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(71) Applicant: **Edilpiu' S.n.c.**
30030 Salzano, VE (IT)

(72) Inventors:
- **Pizzolitto, Lauro**
  30030 Salzano (VE) (IT)
- **Masiero, Claudio**
  30030 Salzano (VE) (IT)

(74) Representative: **Vinci, Marcello**
Ufficio Veneto Brevetti
Via Sorio 116
35141 Padova (IT)

(54) **Non-retrievable formwork**

(57) The invention is a non-retrievable formwork comprising vertical walls (C3,B1) that define, at least partially, a substantially parallelepiped or cylindrical space, said walls being suitable for acting as a guide or support for the positioning of concrete casting formwork assemblies for the construction of pillars, columns or vertical walls in general, and at least one surface or horizontal wings (C5,B2) at the base for resting thereof on the bed and application of means for fixing to the bed, such as nails or other.

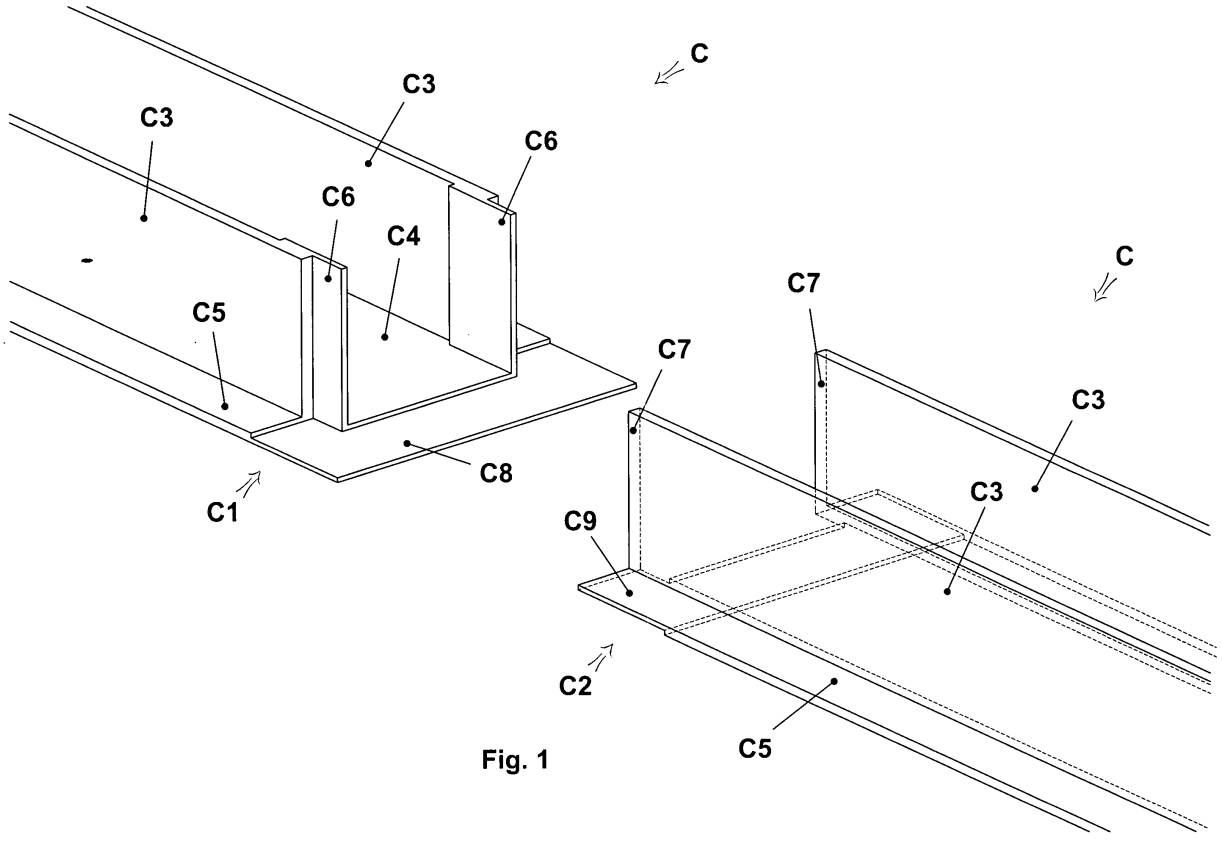

Fig. 1

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Description

[0001] The present patent relates to equipment for constructing buildings and in particular concerns a new non-retrievable formwork for positioning concrete casting formwork assemblies for the construction of concrete vertical walls and pillars and for the construction of reinforced concrete girths or base course.

[0002] In the construction phases of vertical walls and columns or pillars in buildings of any kind, after casting and partial consolidation of the reinforced concrete bed, it is possible to mark the plan of the building, for example by means of laser or string, in order to indicate the exact position of the walls, pillars and other elements.

[0003] For the construction of concrete pillars, columns or walls, reinforcing rods are also provided protruding vertically from the concrete bed and connected to the horizontal reinforcing rods embedded in the concrete.

[0004] Said reinforcing rods used as reference points for the erection of walls and pillars can, however, move and tilt during casting of the concrete bed.

[0005] The concrete casting formwork assemblies for the construction of walls and/or pillars are appropriately arranged on said reinforced concrete bed.

[0006] In said regard, reusable formwork assemblies are known, consisting of flat elements which are removed after setting of the concrete and are reused for the construction of other walls or pillars.

[0007] Said formworks are substantially panels which are provided with a smooth formwork back surface and are made of sheet metal or wood. Reusable modular formworks are also known consisting of elements made of thermoformed plastic, with more limited dimensions and weight.

[0008] Formworks are also known in which said smooth formwork back surface is not flat but cylindrical or consists of two flat L-shaped surfaces. Said formworks are conveniently used for the construction of concrete columns and pillars.

[0009] For the construction of masonry walls, on the other hand, after waiting the time required for consolidation of the concrete, a reinforced concrete girth or base course is constructed, approximately 20 cm height, on which the brick walls are then erected.

[0010] Said girth will enclose the slab, constructed subsequently, where the water and gas pipes and electrical cables will be embedded in the concrete.

[0011] Before construction of the slab, however, it is necessary to lay, on said bed and said girth, the waterproofing layer which has the function of preventing damp from rising up, which would then damage the plaster and masonry work of the building.

[0012] The subject of the present invention is a new non-retrievable formwork for positioning the concrete casting formwork assembly for the construction of concrete vertical walls and pillars and for the construction of reinforced concrete girths.

[0013] The main aim of the present invention is to act as a fixed guide support that can be connected to the bed for positioning the formworks for casting the concrete for the construction of pillars and walls in general.

[0014] A further important object of the present invention is to provide a barrier to prevent the rising up of damp at the base of walls and pillars, thus replacing the waterproof sheath.

[0015] A further important object of the present invention is to act as a non-retrievable formwork for the construction of reinforced concrete girths for brick walls.

[0016] An important advantage of the present invention lies in that it permits positioning and non-removable fixing of the elements on the concrete bed immediately after casting of the bed, so that the references for the construction of walls and pillars are accurately identified, without being moved.

[0017] These and other direct and complementary objects have been achieved through the development of the new non-retrievable formwork for positioning concrete casting formwork assemblies for the construction of concrete vertical walls and pillars, and for the construction of reinforced concrete girths.

[0018] The new non-retrievable formwork can comprise a channel element, with generically U-shaped vertical cross section and, if necessary, horizontal lateral wings at the base and/or a cup or collar element, with vertical walls forming a substantially parallelepiped or cylindrical space, with open bottom and horizontal lateral wings at the base.

[0019] Said channel element can be usefully employed for marking the position of the walls of a building, where each element, properly positioned adjacent to one or more further elements, can rest directly on the concrete bed that was previously cast and be fixed to it in a non-removable manner.

[0020] Analogously, said cup or collar element is usefully employed for exact positioning of the pillars which will be cast subsequently, after arrangement of the formwork assembly, and can rest directly on the concrete bed and be fixed to it in a non-removable manner.

[0021] In particular, each of said elements will be fixed by application, for example, of nails driven into the widened edges or horizontal wings at the base of said elements.

[0022] The widened bottom of said channel element has the main function of preventing the rising up of damp from the bed below. For said purpose, said channel element has horizontal wings at the base which extend on both sides outside the vertical walls with approximate width of at least 10 cm.

[0023] According to the invention, the vertical walls constituting the walls of the channel are at least 20 cm high, so as to permit casting of the concrete, for example for the construction of a girth of adequate height.

[0024] Furthermore, the reinforcing rods can be properly housed inside said channel.

[0025] Above said reinforced concrete girth the bricks can be laid for construction of the brick wall.

[0026] Said vertical walls of the channel also act as a guide for perfect alignment of formworks of known type, between which the concrete will then be cast for the construction of high and low walls, lift shafts, partitions etc.

[0027] The use of said channel elements eliminates the need for waterproof sheaths to prevent rising damp, a function which, as said, is performed by the bottom and widened edges of the channel element. In order to prevent infiltrations of humidity at the joints between two adjacent channel elements, one or both ends of each channel are shaped to allow the bottom, the horizontal wings at the base and the walls to partially overlap the bottom, the horizontal wings at the base and the walls of the adjacent channel.

[0028] Analogously, said cup or collar element comprises horizontal wings at the base, suited to rest on and be fixed to the concrete bed, as previously described, at the points where the pillar will then be constructed.

[0029] In order to guarantee correct positioning of the cup element on the concrete bed, said element which, as said, has an open bottom for passage of the reinforcing rods protruding from the concrete bed, comprises said lateral horizontal wings at the base into which the nails for fixing to the bed are driven.

[0030] Furthermore, according to the invention, the upper edge of the lateral vertical walls of the element can be indented so as to form one or more seats or corresponding lugs for precise matching with the strings or laser beams constituting the grid commonly used for location of the pillars.

[0031] In this way, after positioning the reference grid, the operator can arrange each of said cup or collar elements at the nodes of the grid.

[0032] Said elements are then fixed to the bed by means of nails or other fastening means and left permanently in situ, where they will be used as a support and guide for positioning the concrete casting formworks for subsequent construction of the pillars.

[0033] After consolidation of the concrete and dismantling of the formwork assembly, said elements will be covered with plaster or other external finishing elements, thus being totally hidden from view.

[0034] The new channel and cup elements, made preferably of plastic, have a reduced thickness, in the order of a few millimetres, hence they are extremely lightweight and can furthermore be easily covered with plaster.

[0035] According to the invention, said elements will have adequate dimensions for constructing walls of any thickness required, for example 20 cm, 25 cm, 30 cm etc. and pillars with dimensions, for example, of 35 x 35 cm, 35 x 40, 40 x 40, etc.

[0036] The characteristics of the new systems of non-retrievable elements will be better illustrated in the following description with reference to the drawings, attached by way of non-limiting example.

[0037] Figures 1 and 2 show three-dimensional views of the two opposite ends (C1) and (C2) of a channel element (C).

[0038] Figure 3 shows a three-dimensional view of a cup element (B), while figure 4 shows a vertical section of the cup element (B).

[0039] Figure 5 shows a plan view of a cup element (B) acting as a guide for the positioning of modular concrete casting formworks (K), for example of the type made of thermoformed plastic, for construction of a square section pillar.

[0040] Figure 6 shows a plan view of two adjacent channel elements (C1) and (C2) acting as a guide and support for the positioning of formworks (J), for example of the type made of wood or metal sheet, between which concrete is cast for the construction of vertical walls.

[0041] Figure 7 shows a three-dimensional view of an embodiment of a corner channel element (D), while figure 8 shows a three-dimensional view of an embodiment of a T-shaped channel element (T).

[0042] The new non-retrievable formwork can be:

- of the channel type (C), having generically U-shaped vertical cross section, with two parallel vertical walls (C3) and bottom (C4), with lateral horizontal wings (C5) at the base;
- of the cup (B) or collar type, with vertical walls (B1), with completely open bottom and lateral horizontal wings (B2) at the base.

[0043] Said horizontal wings (C5, B2) at the base of the channel element (C) and of said cup element (B) are suitable for allowing each of said elements to rest on and be fixed to the concrete bed (P), for example through the application of nails (F).

[0044] In particular, said horizontal wings (C5) at the base of said channel element (C) extend on both sides externally to the vertical walls (C3) and can, for example, be at least 10 cm wide.

[0045] Said vertical walls (C3), constituting the walls of the channel, are preferably at least 20 cm high, so as to permit casting of the concrete (L), for example for the construction of a girth of adequate height.

[0046] Said vertical walls (C3) will be parallel and spaced from each other, for example by 15 cm, 20 cm, 25 cm etc., for performing concrete casting of corresponding width.

[0047] Above said reinforced concrete girth the bricks can then be laid for construction of a wall.

[0048] As shown in figure 6, said vertical walls (C3) of the channel also act as a guide for aligning reusable formworks (J), for example made of wood, metal or plastic, or non-retrievable formworks, for example made of polystyrene, between which the concrete will then be cast for the construction of high and low walls etc.

[0049] In order to prevent infiltrations of humidity from below at the joints between two adjacent channel elements (C), as illustrated, for example, in figures 1 and 2, the bottom (C9), at the level of at least one end (C2) of the channel element (C), can overlap the bottom (C8) at the end (C1) of the opposite channel element (C).

[0050] In particular, each of said overlapping parts of the bottom (C8) and (C9) can, for example, be half as thick as the remaining bottom (C4), so that, when said parts (C8) and (C9) are overlapped, the overall thickness is equal to the thickness of the bottom.

[0051] In order to prevent lateral infiltrations of humidity at the joints between two adjacent channel elements (C), according to the invention the vertical walls (C3) of at least one channel element (C) will comprise an end section (C6) lying on a plane substantially parallel to the plane on which the walls (C3) lie and parallel to and overlapping the ends (C7) of the vertical walls (C3) of the opposite channel element (C).

[0052] In particular, said end section (C6) must be recessed with respect to said vertical walls (C3), so that when the channel elements (C) are positioned adjacent to each other, as shown in figure 2, the vertical walls (C3) of the two adjacent elements are externally aligned, without discontinuity.

[0053] Always according to the invention, the new non-retrievable formwork can be a corner channel element (D), constituted by at least one pair of parallel vertical walls (C10), each joined and square to the corresponding wall of at least one further pair of vertical parallel walls (C11). One or both the ends (C1, C2) of said corner element (D) are shaped and configured in such a way as to permit overlapping with the corresponding ends (C2, C1) of the linear channel elements (C) described above.

[0054] It is also possible for the new non-retrievable formwork to be T-shaped (T), made up of at least one substantially rectilinear vertical wall (C12) and at least one pair of corner walls (C13), positioned so as to define a first U-shaped channel (C14) with axis substantially parallel to said rectilinear vertical wall (C12) and a further U-shaped channel (C15) with axis substantially square to said rectilinear vertical wall (C12).

[0055] As shown in figures 3 and 4, the cup element (B) comprises one, two or more lateral horizontal wings (B2) at the base, suited to rest on and be fixed to the concrete bed (P), while the bottom (B4) is completely open to permit passage of the reinforcing rods (A) protruding vertically from the bed.

[0056] The upper edge of the lateral vertical walls (B1) of the element (B) comprises, for example at the centre, one or more indentations or lugs so as to define one or more seats (B3) for correct positioning of the element (B) along the planned axes, identified by means of strings or light beams commonly used for positioning pillars and walls.

[0057] As shown in figure 5, the lateral walls (B1) also act as a guide and support for the positioning of formworks (K), both of the reusable type, for example made of wood, plastic or metal, and of the non-retrievable type, such as those made of polystyrene, between which the concrete is cast for the construction of pillars, in this example with square section.

[0058] Therefore, with reference to the preceding description and the attached drawings, the following claims are made.

Claims

1. Non-retrievable formwork, **characterised in that** it comprises:

   - vertical walls (C3, B1), defining at least partially a substantially parallelepiped or cylindrical space, suitable for acting as a guide or support for the positioning of concrete casting formwork assemblies for the construction of pillars, columns or vertical walls in general;
   - surface or horizontal wings (C5, B2) at the base for resting on the bed and application of means for fixing to the bed, such as nails or other.

2. Non-retrievable formwork according to claim 1, **characterised in that** said surface or horizontal wings at the base (C5, B2) are positioned externally to said vertical walls (C3, B1).

3. Non-retrievable formwork according to claims 1, 2, **characterised in that** it comprises:

   - two parallel vertical walls (C3) and substantially flat bottom (C4), forming a channel, with generically U-shaped cross section, for concrete casting;
   - one or more horizontal wings at the base (C5) for resting said non-retrievable formwork on the bed and application of means for fixing thereof to the bed;

   and wherein said vertical walls (C3), said bottom (C4) and said horizontal wings at the base (C5) are made of a material suitable for preventing the rising up of damp from below.

4. Non-retrievable formwork according to the preceding claim, **characterised in that** said horizontal wings at the base (C5) are positioned laterally and externally to said vertical walls (C3).

5. Non-retrievable formwork according to claims 3, 4, **characterised in that** at the level of at least one end (C1), said bottom (C8) and said horizontal wings at the base (C5) are partially raised and/or have a partially reduced thickness, so that they can be coupled by overlapping with part of the bottom (C9) and of the horizontal wings at the base (C5) at the corresponding end (C2) of an opposite aligned element (C), to prevent the rising up of damp from below.

6. Non-retrievable formwork according to the preceding claim, **characterised in that** each of said vertical walls (C3), at the level of at least one end (C1), com-

prises an end section (C6) with partially reduced thickness and/or offset with respect to the wall (C3) itself, and wherein said end section (C6) is suited to be positioned next to the corresponding end section (C7) of the vertical walls (C3) of an opposite aligned element (C), to prevent lateral infiltration of humidity.

7. Non-retrievable formwork according to the preceding claims, **characterised in that** it is a corner element (D), comprising at least one pair of parallel vertical walls (C10), each of which joined to a corresponding wall square thereto, or with other suitable angle, of a further pair of parallel vertical walls (C11).

8. Non-retrievable formwork according to the preceding claims, **characterised in that** it is a T-shaped element (T), comprising at least one substantially rectilinear vertical wall (C12) and at least one pair of corner walls (C13), arranged so as to define at least one first U-shaped channel (C14) with axis substantially parallel to said rectilinear vertical wall (C12) and at least one further U-shaped channel (C15) with axis substantially square to said rectilinear vertical wall (C12).

9. Non-retrievable formwork according to claim 1, **characterised in that** it comprises:

- four vertical walls (B1), each square to the adjacent wall, defining a substantially square or rectangular parallelepiped space;
- bottom wholly or partly open for passage of the reinforcing rods (A) vertically protruding from the bed;
- two or more horizontal wings at the base (B2) for resting on the bed and application of means for fixing to the bed.

10. Non-retrievable formwork according to the preceding claim, **characterised in that** one or more of said vertical walls (B2) comprises, on the upper edge, one or more seats (B3) or corresponding lugs for positioning and aligning the formwork with respect to external references.

11. Non-retrievable formwork according to claim 1, **characterised in that** it comprises:

- at least one substantially cylindrical vertical wall;
- bottom wholly or partly open for passage of the reinforcing rods (A) vertically protruding from the bed;
- two or more horizontal wings at the base (B2) for resting on the bed and application of means for fixing to the bed.

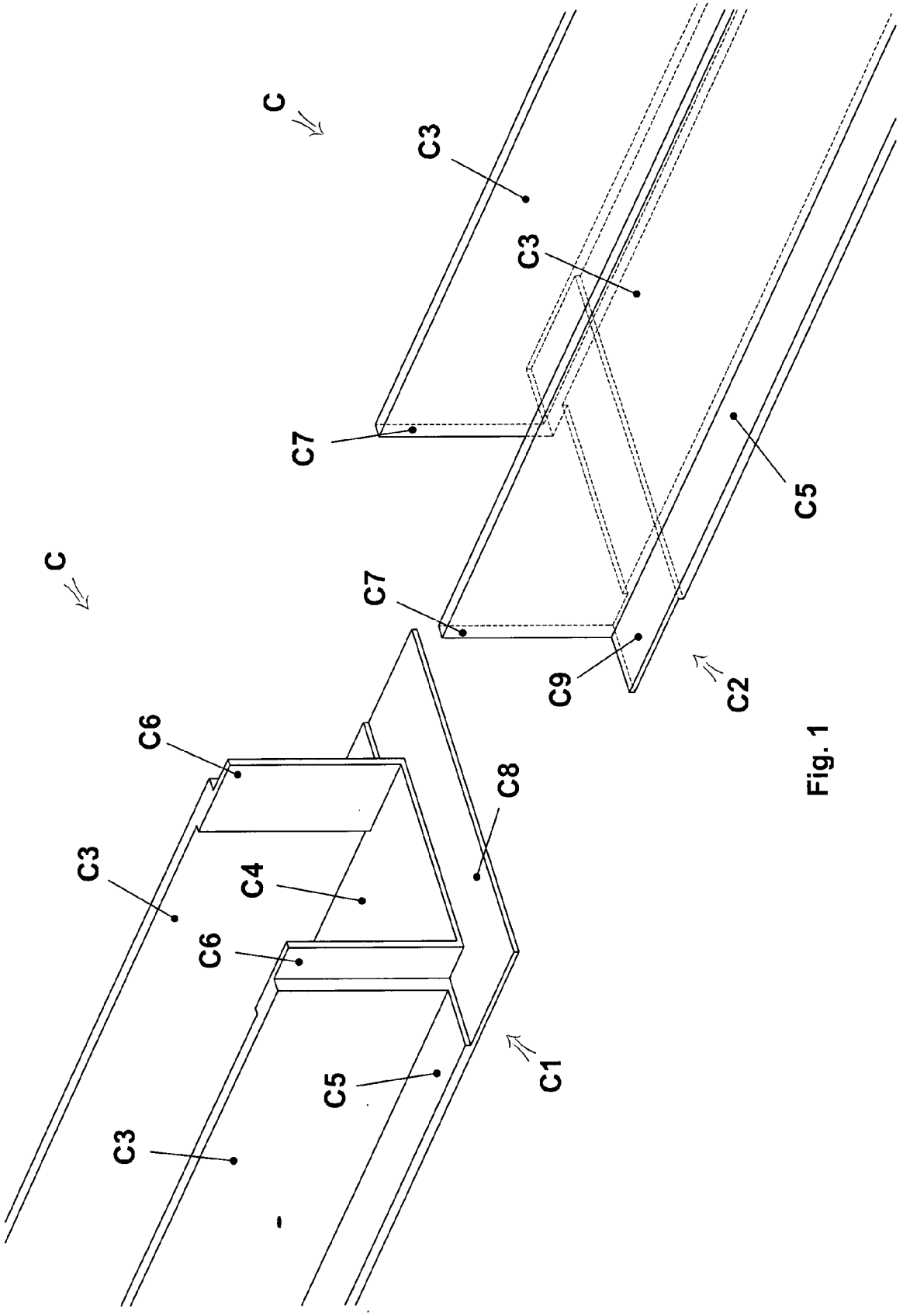

Fig. 1

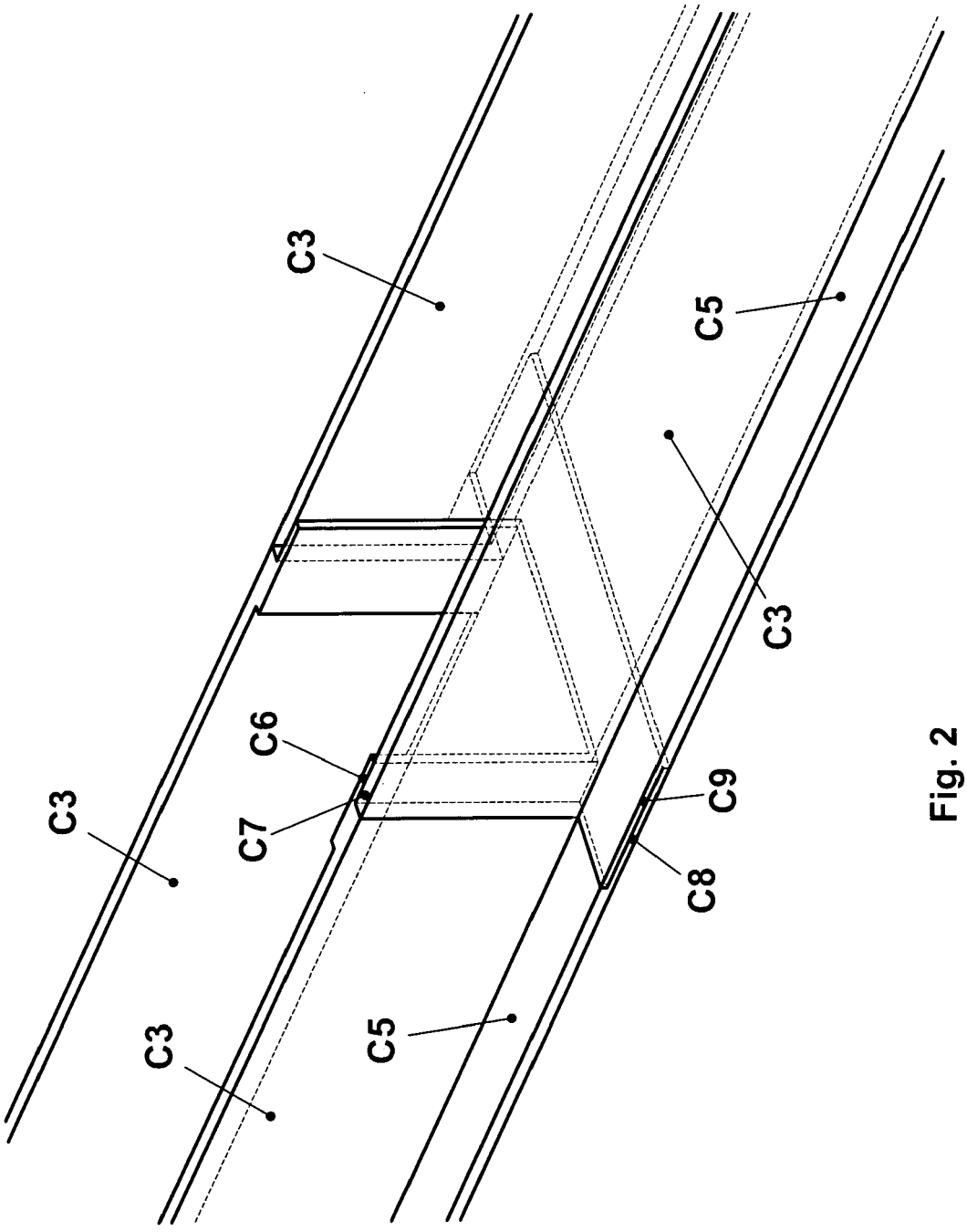

Fig. 2

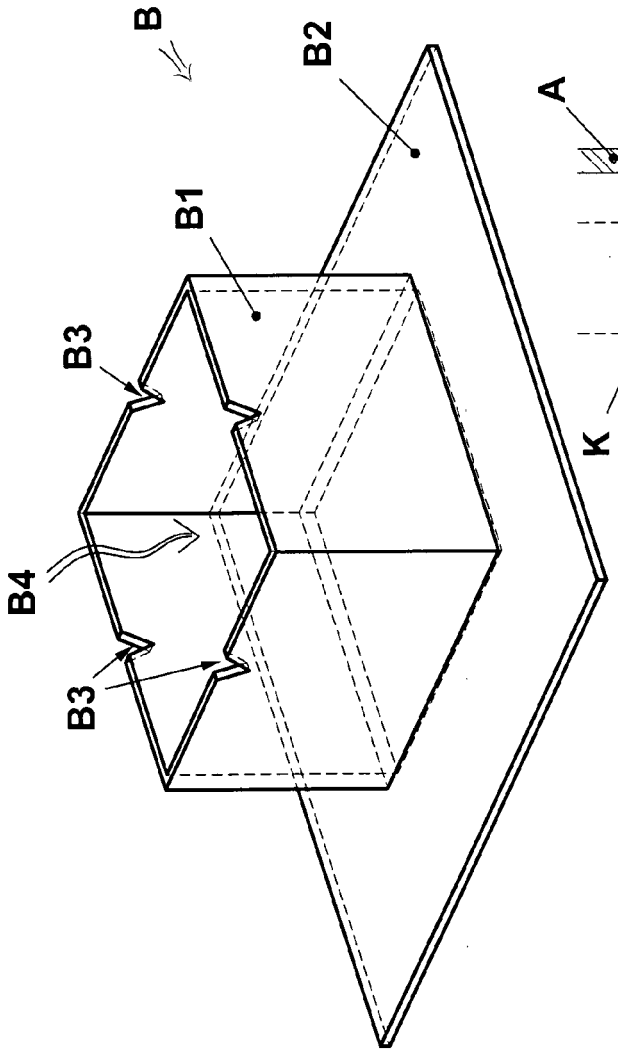

Fig. 3

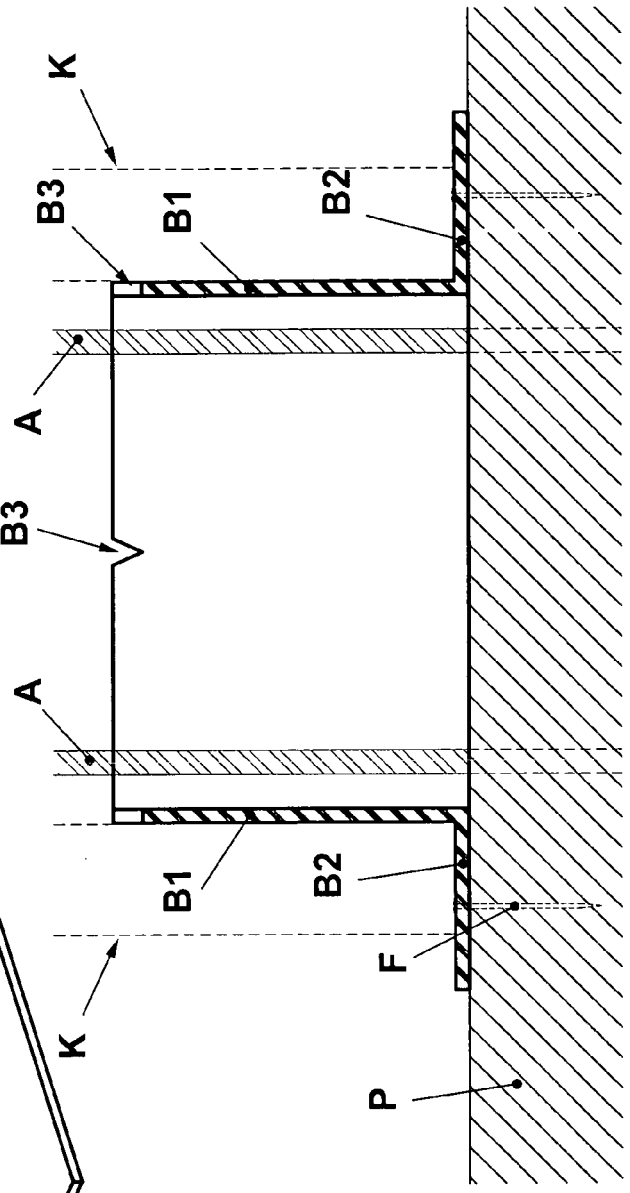

Fig. 4

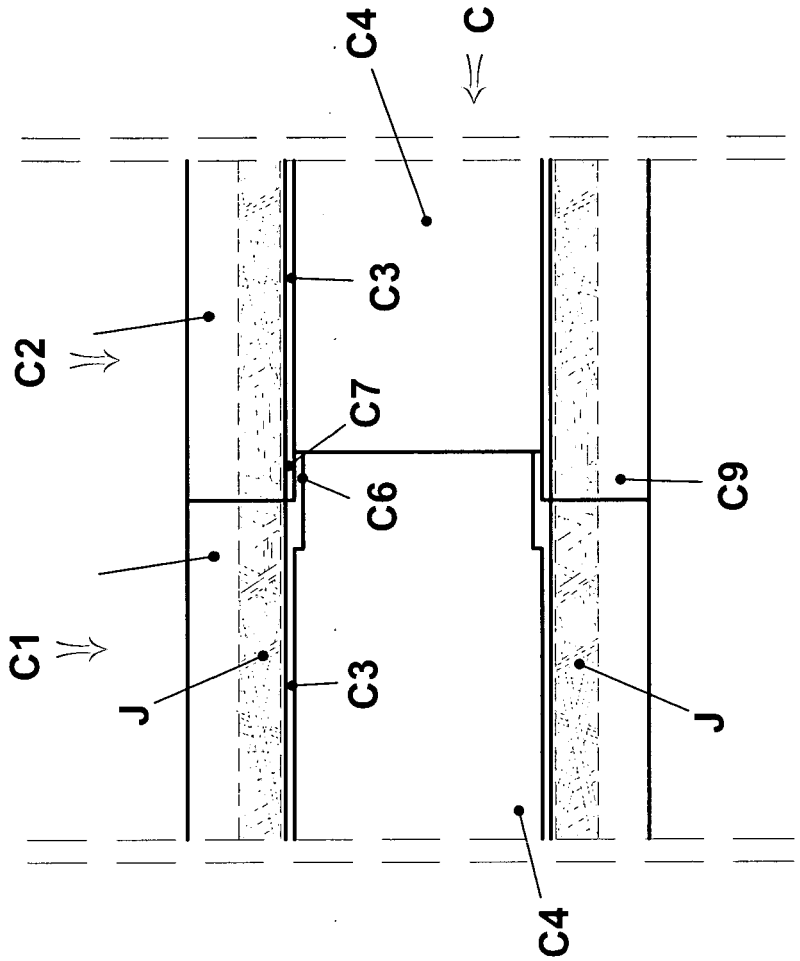

Fig. 6

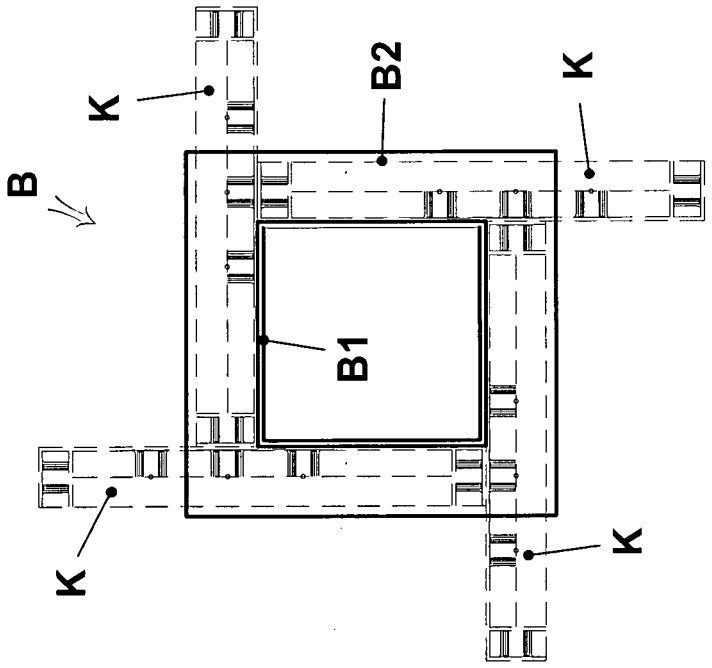

Fig. 5

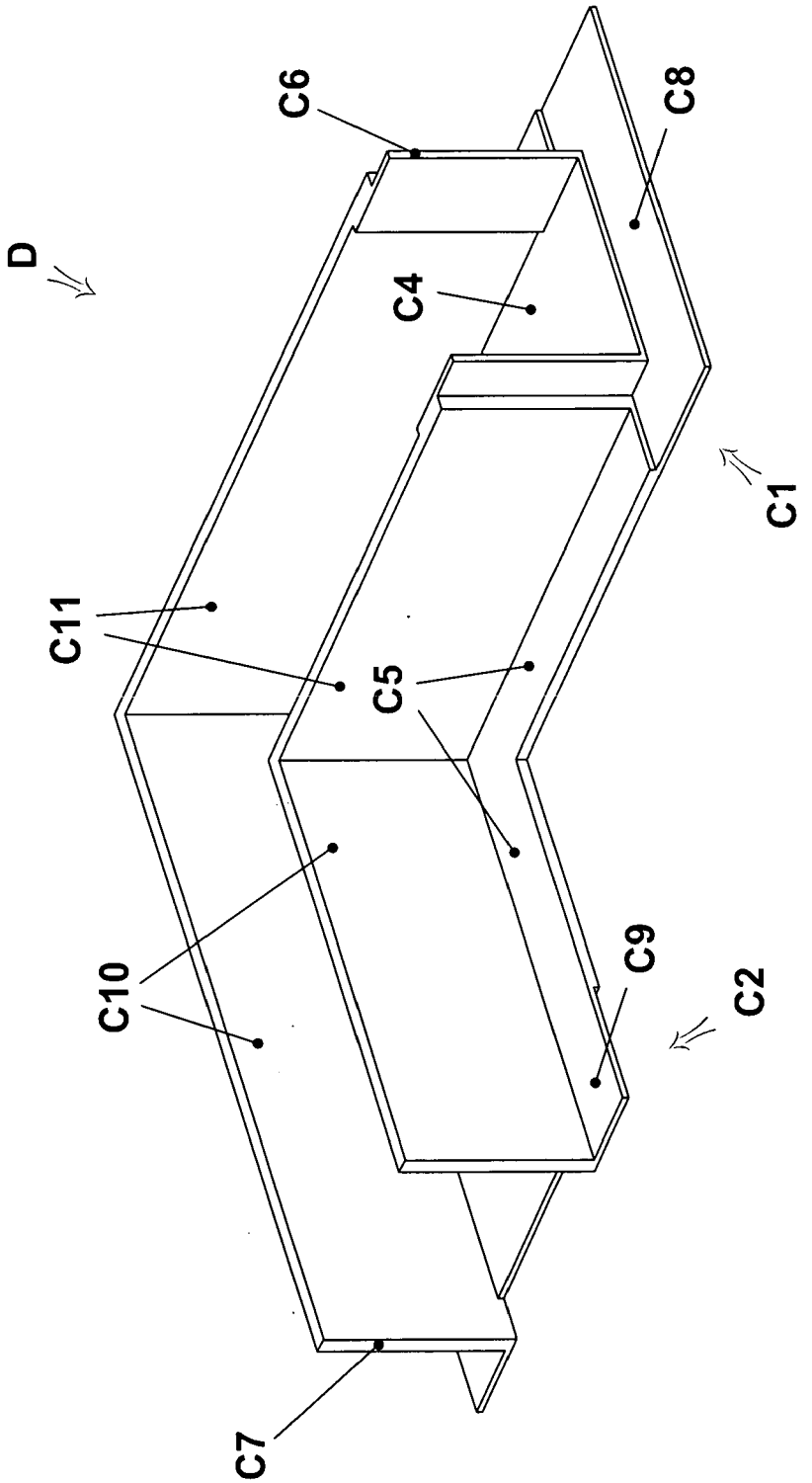

Fig. 7

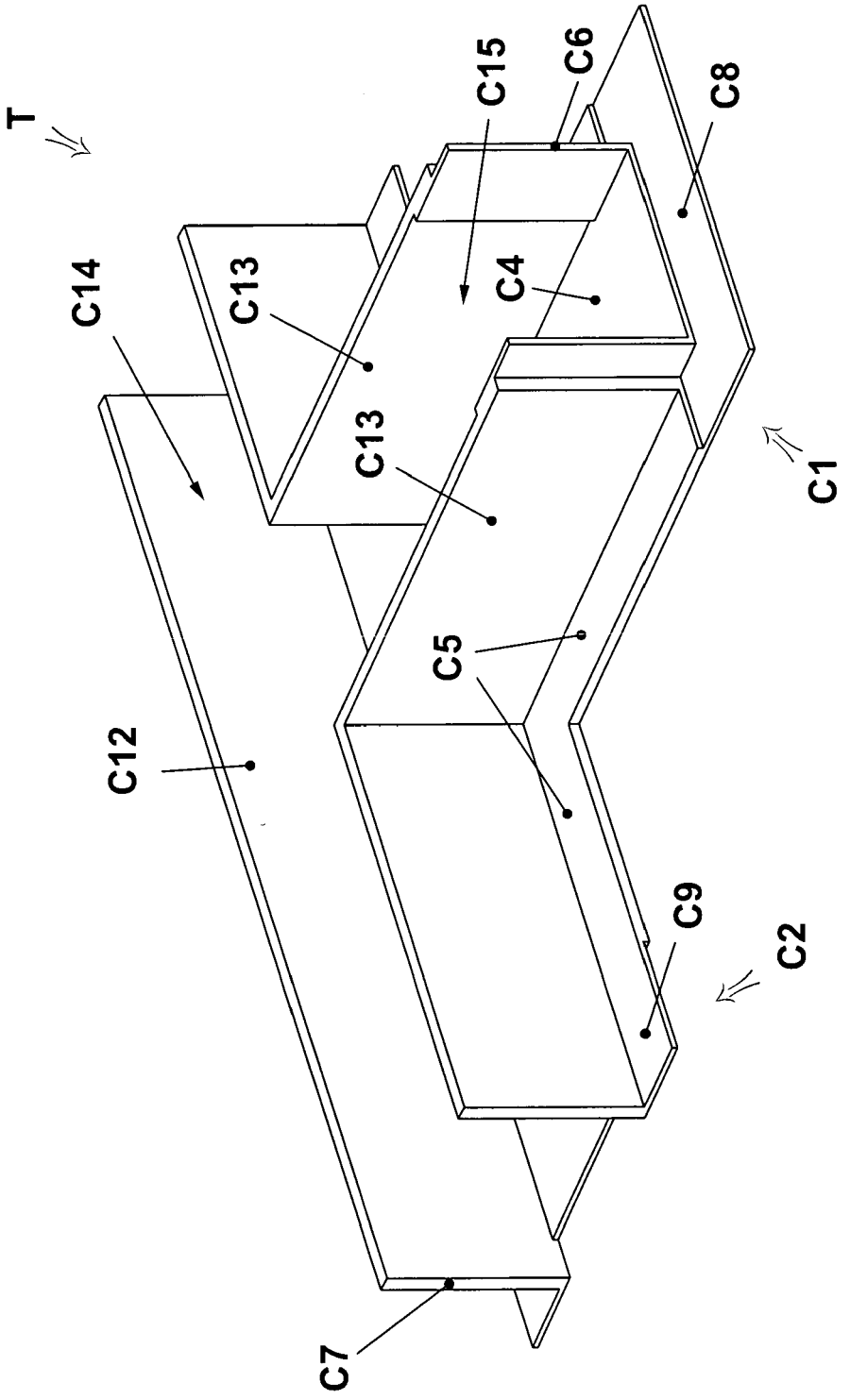

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5849

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 650 872 A (WILLIAM GEORGE SHIPWRIGHT) 7 March 1951 (1951-03-07) * figure 3 *	1-4	INV. E02D27/02 E04G13/00 E04G13/02 E04G13/04
X	JP 08 311884 A (MITSUBISHI MATERIALS CORP) 26 November 1996 (1996-11-26) * figures *	1,2,9,11	
Y		10	
X	WO 90/15909 A (TRENCHFORM LTD [GB]) 27 December 1990 (1990-12-27) * page 9 * * figure 5 *	1-4,6	
X	DE 336 549 C (WILLEM JOSEPH STEUP) 6 May 1921 (1921-05-06) * figures *	1-3	
X	US 2 387 445 A (HERRING WILLIAM W) 23 October 1945 (1945-10-23) * figures 2,4,10,11 *	1,2,7,8	TECHNICAL FIELDS SEARCHED (IPC) E02D E04G
A		5,6	
Y	US 4 017 051 A (SCOTT SAMUEL C ET AL) 12 April 1977 (1977-04-12) * figure 10 *	10	
X	JP 03 002422 A (SUN ARROW PLAN KK) 8 January 1991 (1991-01-08) * figures 11-16 *	1,2,7,8	
X	DE 102 00 251 A1 (ELISABETH BAYERLEIN [DE]) 24 July 2003 (2003-07-24) * figures *	1	
X	FR 1 467 945 A (LUCIEN MILON; JACQUES-PAUL LONGUET) 3 February 1967 (1967-02-03) * figure 3 *	1-3	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 May 2007	Andlauer, Dominique

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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16-05-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 650872 A	07-03-1951	NONE	
JP 8311884 A	26-11-1996	NONE	
WO 9015909 A	27-12-1990	AU 5828090 A	08-01-1991
		CA 2060894 A1	21-12-1990
		CN 1049042 A	06-02-1991
		EP 0478604 A1	08-04-1992
		IE 902098 A1	02-01-1991
		JP 5500249 T	21-01-1993
		PT 94407 A	28-02-1994
DE 336549 C	06-05-1921	NONE	
US 2387445 A	23-10-1945	NONE	
US 4017051 A	12-04-1977	CA 1062033 A1	11-09-1979
JP 3002422 A	08-01-1991	NONE	
DE 10200251 A1	24-07-2003	NONE	
FR 1467945 A	03-02-1967	NONE	

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