



(72) TROVATO, SALVATORE, IT

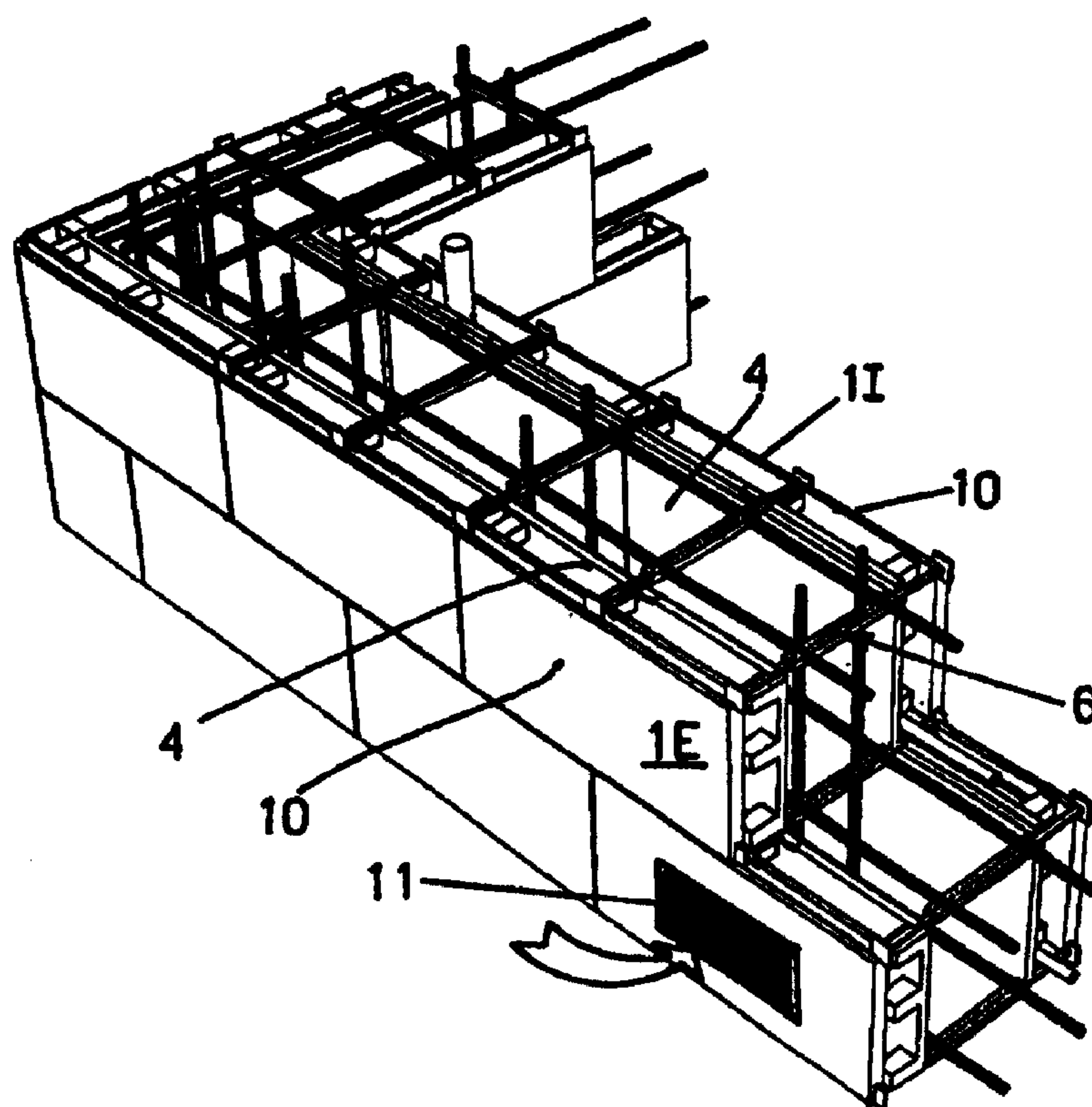
(71) TROVATO, SALVATORE, IT

(51) Int.Cl.⁷ E04B 2/86

(30) 1997/09/02 (CT97A00026) IT

(54) **COFFRAGE AMELIORE POUR MURS DE BATIMENTS**

(54) **AN IMPROVED FORMWORK FOR BUILDING WALLS**



(57) L'invention porte sur un coffrage pour murs porteurs de bâtiments, ce coffrage comprenant une pluralité de paires de panneaux opposés (PE, PI) raccordées entre elles de façon à former un espace interne. Les paires de panneaux opposés sont disposées sous forme de rangées superposées, les panneaux de chaque paire étant raccordés par des entretoises (6) de longueur réglable, et les entretoises (6) et les panneaux (PE, PI) étant placés à gauche dans le mur édifié lorsque le ciment versé dans l'espace intérieur est solidifié. Les murs ainsi édifiés sont pourvus d'éléments de cloisonnement porteurs et de conduits de ventilation, et sont parfaitement isolés et terminés (Fig. 6).

(57) A formwork for building bearing walls comprises a plurality of pairs of facing panels (PE, PI) connected together so as to form an inside space between them, said pairs of facing panels being arranged in superimposed rows, the panels of each pair being connected to each other by braces (6) of adjustable length with both the braces (6) and the panels (PE, PI) being left in the wall formed when a cementitious material poured in said inside space has solidified. The so formed walls are provided with bearing partition members and ventilating duct, and are strongly insulated and already finished.

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁶ :**E04B 2/86****A1****(11) International Publication Number:****WO 99/11883****(43) International Publication Date:****11 March 1999 (11.03.99)****(21) International Application Number:** PCT/EP98/05493**(22) International Filing Date:** 22 August 1998 (22.08.98)**(30) Priority Data:**

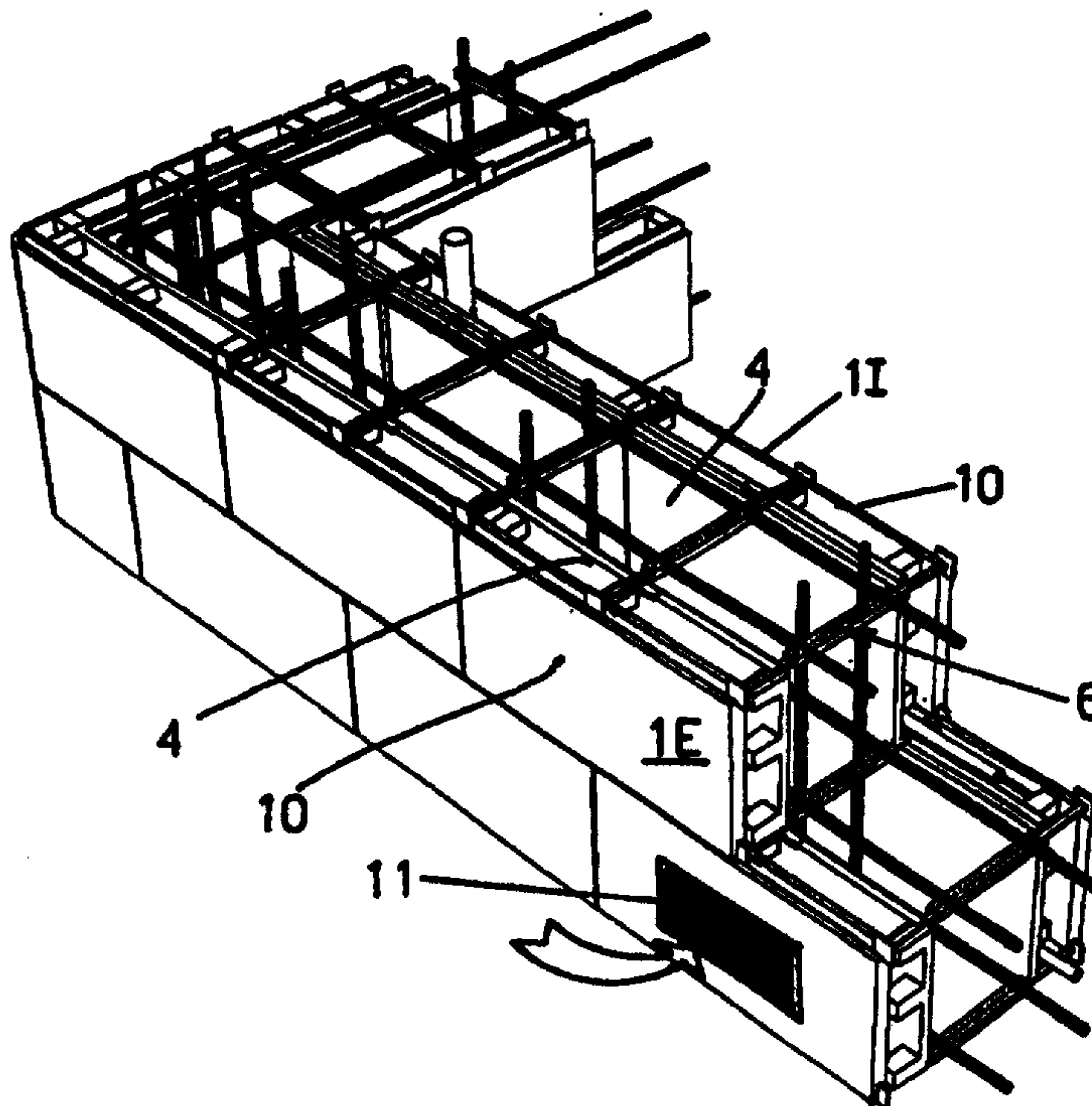
CT97A00026

2 September 1997 (02.09.97)

IT

(71)(72) Applicant and Inventor: TROVATO, Salvatore [IT/IT];
Via Loreto, 16 pal. B, I-95024 Acireale (IT).**(74) Agents:** ROBBA, Pierpaolo et al.; Interpatent, Via Caboto, 35,
I-10129 Torino (IT).**(81) Designated States:** AL, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, ID, IL, IS, JP, KP, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).**Published***With international search report.**Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.***(54) Title:** AN IMPROVED FORMWORK FOR BUILDING WALLS**(57) Abstract**

A formwork for building bearing walls comprises a plurality of pairs of facing panels (PE, PI) connected together so as to form an inside space between them, said pairs of facing panels being arranged in superimposed rows, the panels of each pair being connected to each other by braces (6) of adjustable length with both the braces (6) and the panels (PE, PI) being left in the wall formed when a cementitious material poured in said inside space has solidified. The so formed walls are provided with bearing partition members and ventilating duct, and are strongly insulated and already finished.



AN IMPROVED FORMWORK FOR BUILDING WALLS

Field of the Invention

The present invention relates to building construction and more particularly to the construction of building walls, both inside and outside ones.

The invention is concerned with formworks for building walls, as well as with multi-layer panels for realizing such formworks, and with a method for building walls.

The invention is preferably applicable, but not limited to, (load) bearing walls, by using disposable formworks elements, formed as multi-layer panels that are dry-assembled.

Background Art

The known methods of constructing walls in building and civil engineering works require a large amount of labour, particularly in the finishing stage. On the other hand prefabrications have rigid design and require an assembling apparatus that is not always available in medium and small building yards.

US -A-5 323 578 discloses a prefabricated formwork for building bearing walls, and comprising an exterior and an interior sheathing panels connected together by collapsible connecting members of adjustable length, in order to reduce the space for storing and transporting the formwork as assembled at the factory. Such known formwork do not comprise the exterior and interior facings that are mounted at the building site.

Object of the Invention

It is an object of the present invention to provide improved formwork elements and a method of constructing building walls by using such formwork elements that involves a labour saving by reducing as much as possible the carpentry costs and the wall-finishing costs, while at the same time allowing the design and constructive flexibility deriving by the use of bricks.

These objects are accomplished through a formwork and a method for building a wall as claimed in claims 1, and 8, respectively. Further advantageous features of the invention are recited in the dependent claims.

Disclosure of the Invention

According to a first aspect the invention consists of a formwork for building walls by using basic multi-layer elements to be manufactured at a factory that are finally incorporated in the concrete pouring, such elements forming the inside and outside facings and being firmly secured to the building skeleton with the associated safety advantages in respect of seismic events.

Such formwork is formed by a plurality of pairs of facing panels connected together so as to form an internal space between them, with pairs of facing panels arranged in superimposed rows, and the panels of each pair being connected to each others by braces of adjustable length. Both the braces and the panels are left in the wall formed after a cementitious material poured in said inside space has set.

According to a second aspect a plurality of interposed spacing members or ribs connecting the two layers so as to define channels therebetween.

According to a third aspect, the invention consists of a method for building walls by using such formwork elements.

Brief Description of the Drawings

The invention will now be disclosed with reference to some preferred but non-limiting embodiments thereof, illustrated in the attached drawings in which:

Fig. 1 is a top view of a basic panel illustrating the structure thereof with a pair of braces fitted to the panel;

Fig. 2 show two braces for clamping together a pair of facing panels according to the invention;

Fig. 3 is side view of the panel-braces arrangement of Fig. 1;

Fig. 4 is a top view illustrating a pair of facing basic panels connected by braces to build up modular formwork elements;

Fig. 5 is a side view of the arrangement shown in Fig. 4; and

Fig. 6 is a perspective view showing the construction of two cornering walls.

Detailed Description of Preferred Embodiments

Referring now to the Figures, and in particular to Figures 1 to 3, the formwork according to the invention is formed by basic multi-layer panels 10. A pair of panels 10 disposed in front of each other at a predetermined distance and secured by brace means form a modular formwork elements.

The panels 10 are of two types, i.e. outside panels PE or inside panels PI. More precisely a panel PE is used when building an external wall of the building, with the other panel of the pair being a PI panel. When building an inside wall such as a partition, the panels of each pair are both PI panels, not necessarily with the same structure.

The multi-layer panel (PE or PI) has preferably a rectangular shape and comprises a finishing or facing layer 1E or 1I, adapted to form the inside or outside facing of the finished wall, respectively, a layer of an insulating rigid material 4 and a plurality of interposed spacing members 2 or ribs connecting to each other the layers 1E or 1I and 4. The ribs 2 are parallel to each other and parallel to either one or the other of the rectangle sides so as to define channels 3.

When a plurality of panels PE or PI are assembled in a plane to form a wall, the aligned channels 3 form passages that can be used for ventilating purposes or for receiving electrical cables and/or water pipes and the like.

The facing layer 1E forming the outside facing of the wall can be a stone slab, a tile, a layer formed by mixture of cement and granules of stones, marbles, ceramics, etc., as well as synthetic plastic materials.

The facing layer 1I forming the inside facing of the wall can be made of plaster, putty, plastered board (cartongesso, plastered tiles, etc.

The insulating layer 4 is formed by rigid plates or sheets of either synthetic materials such as polyurethane, polystyrene, or natural materials such as cork, glass wool, glass wool, or a composite material; such as cellular cement and mixtures of cements and granules of polystyrene, or expanded clay, or vermiculite, etc.

The basic panels 10 will be manufactured in factories in accordance with conventional techniques, for example by mixtures of cement, tiles or ceramics, shaped in suitable moulds, presses or vibrating apparatus, etc.

The basic panel is provided along its whole periphery with daps 5 on both the facing layer and the insulating layer. These daps are male daps on the two adjacent sides and females on the remaining two. Preferably the daps are formed by properly positioning the ribs 2.

Holes 7 are formed in the thickness of the panel along the sides that will be horizontally positioned, preferably the longer sides, for receiving the ends of braces or brackets 6 adapted to join together in facing relationships two basic panels in order to form a modular formwork element, as shown in Figures 4 and 5. Braces 6 have preferably a shape resembling a (flat) H, so that they can clamp to each other pairs superimposed of basic panels 10. When no other panel is to be assembled onto a pair, a C-shape brace will be used. According to a non limiting embodiment shown in the Figures, a brace 6 comprises two rods slidably received in a sleeve provided with a plurality of holes, the ends of the rods projecting from said sleeve being provided with means to engage the holes 7 in the thickness of the facing layers 1E, 1I. In accordance with another embodiment (not shown in the drawings), the brace 6 comprises a tubular member provided with an inner thread and two threaded bars the position of which is continuously adjustable with respect to such tubular member.

Braces 6 accomplish two tasks:

5 1. positioning and connecting to each other two facing basic panels that will form a modular formwork element of the framework in which a cementitious material, such as concrete, will be poured;

2. anchoring the two panels to the bearing structure since they will be embedded in the solidified cementitious material.

10 Additional particular members can be added for forming corners, door and window lintels, etc. all of which will include the insulating material layer so as to prevent forming of heat bridges (paths).

15 By forming rows of the pairs of panels facing to each other and connected by a proper number of braces (that is of modular formwork elements) and superimposing the rows to each other, as shown in Fig. 6, a complete formworks is obtained. By preferably pouring concrete or a suitable cementitious material in the space comprised between the insulating slabs 4 of each pair of panels a wall is obtained that is already provided with either the inside or the outside facings or both, as required, and is
20 thermally insulated and provided with ventilating ducts.

As shown in Figures 4 to 6, reinforcing steel rods A can be secured to the braces 6, particularly when using concrete. The braces 6 are embedded into the poured material and replace the transverse rods with the longitudinal and vertical rods
25 A that are tied or otherwise secured to them.

The thickness 8 of the wall is easily selected by adjusting the length of the braces 6.

30 Thanks to the invention, it is possible to build bearing walls of concrete, in case reinforced concrete of a given thickness that are insulated and already provided with the inside and/or outside facings, as well as with ventilating ducts.

35 Industrial Applicability

The invention is applicable in the construction of building walls, both inside and outside ones.

40

45

TWICE AMENDED CLAIMS

1. A formwork for building walls comprising a plurality of pairs of facing panels (PE, PI) connected together so as to form an inside space between them, said pairs of facing panels being arranged in superimposed rows, the panels of each pair being connected to each others by braces (6) of adjustable length with both the braces (6) and the panels (PE, PI) being left in the wall formed when a cementitious material poured in said inside space has solidified,

characterized in that each of said panels (PE, PI) comprises at least two layers of material, one (1E, 1I) of which is adapted to form the facing of the finished wall, and the other (4) being formed by a slab of a rigid insulating material.

2. A framework as claimed in claim 1, characterized in that between said layers (1E, 4; 1I, 4) a plurality of spacing members or ribs (2) is disposed so as to define channels between said layers (1E, 4; 1I, 4).

3. A framework as claimed in claims 1 to 2, wherein each of said braces (6) comprises two rods slidably received in a sleeve provided with a plurality of holes, the ends of the rods projecting from said sleeve being provided with means to engage the facing layers (1E, 1I).

4. A framework as claimed in claim 3, wherein said facing layers are an outside facing (1E) or an inside facing (1I).

5. A framework as claimed in the preceding claims, wherein reinforcing rods (A) are positioned in said inside space and secured to said braces (6).

6. A framework as claimed in the preceding claims, wherein each of said panels (PE, PI) has a rectangular shape.

7. A wall built using and incorporating a formwork as claimed in claims 1 to 6.

8. A method for building a wall provided with ventilating ducts comprising the steps of:

- providing a framework as claimed in claims 2 to 6;
- pouring a cementitious material in the inside space between the insulating slabs (4) of each pairs of facing panels (PE, PI) and embedding said bracing means, whereby said channels (3) defined between said layers (1E, 4; 1I, 4) form ventilating ducts inside the wall formed when said cementitious material solidifies.

9. A wall as claimed in claim 8, wherein said wall is a bearing wall.

AMENDED SHEET

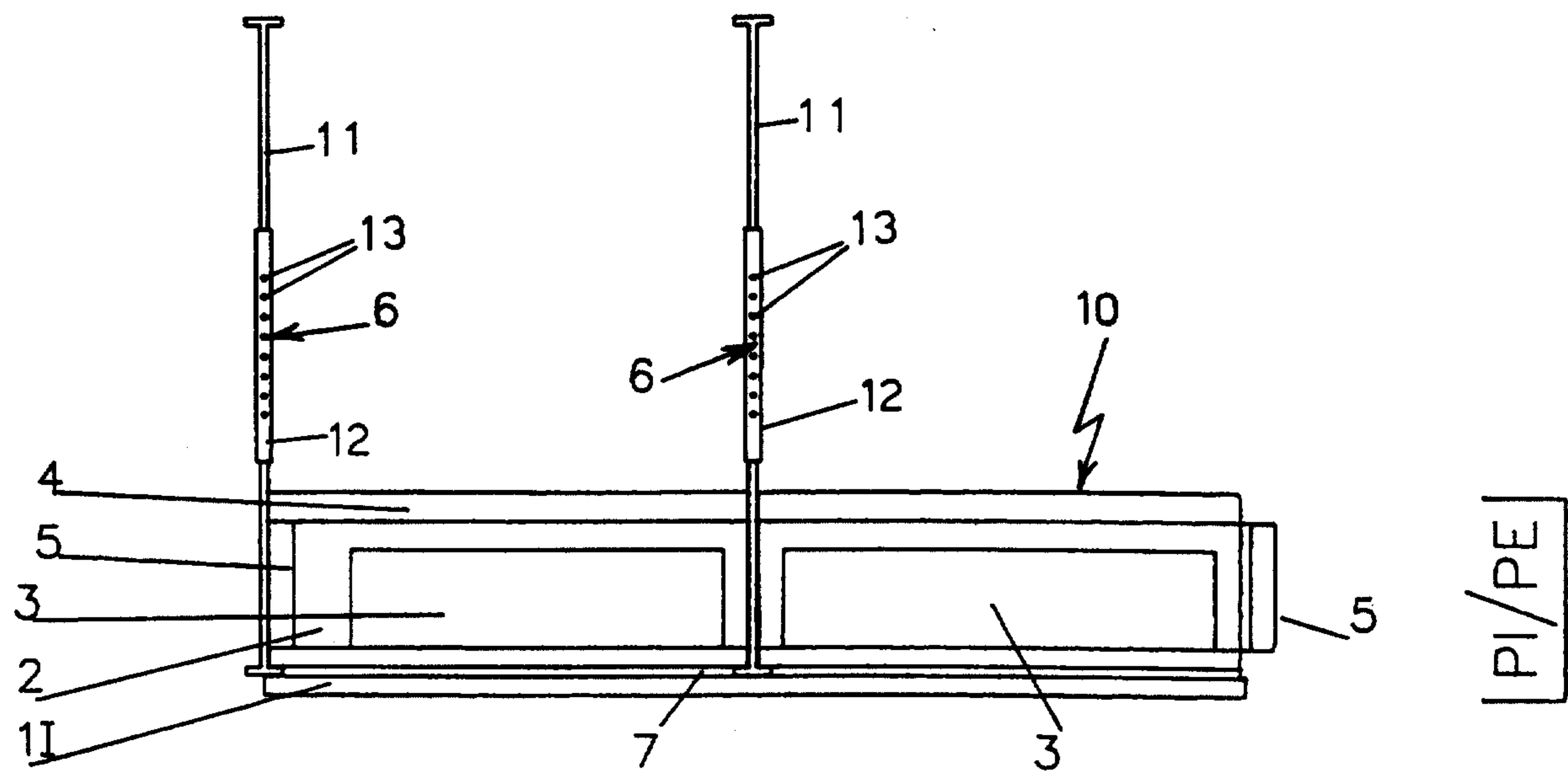


FIG. 1

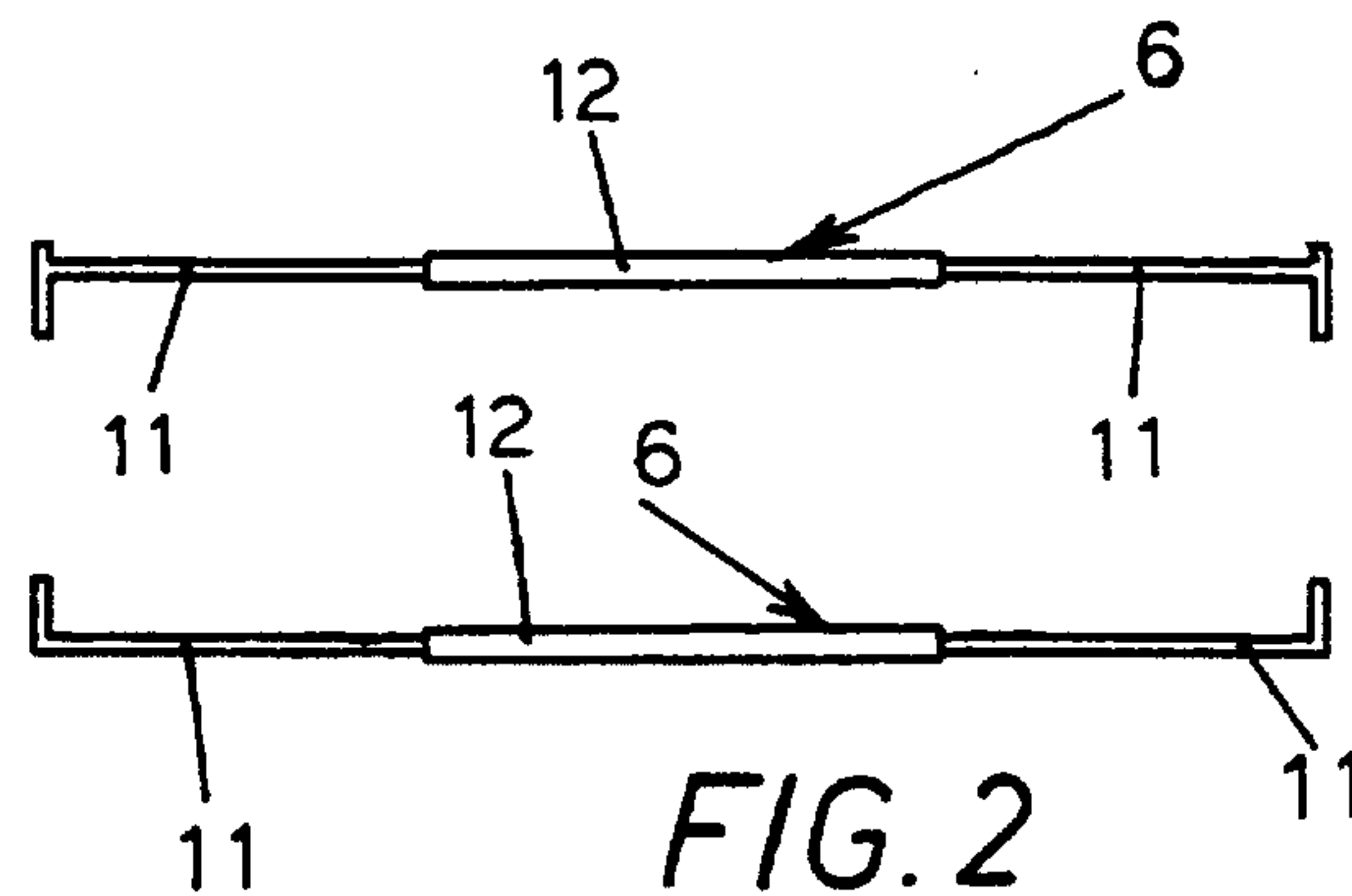


FIG. 2

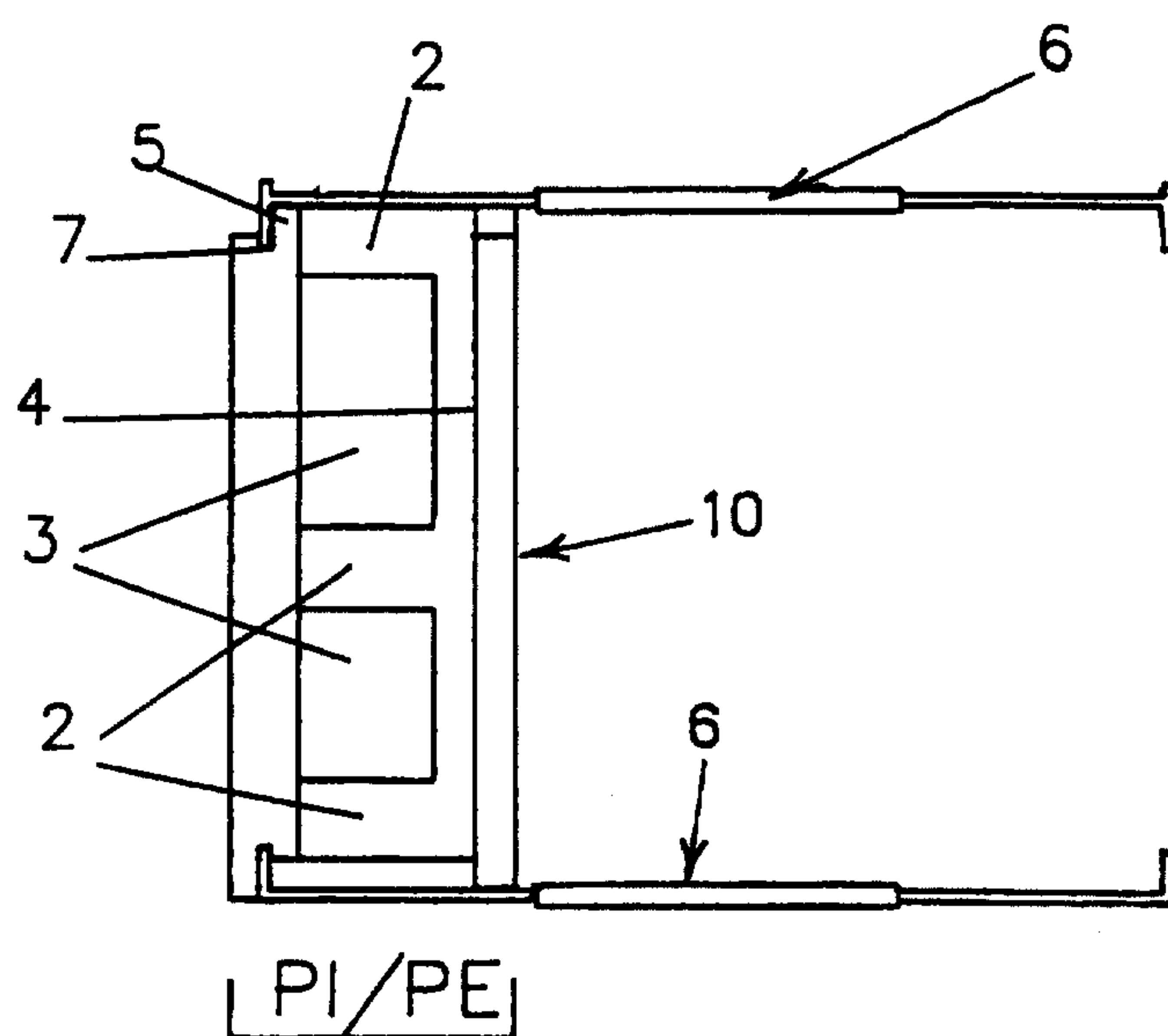


FIG. 3

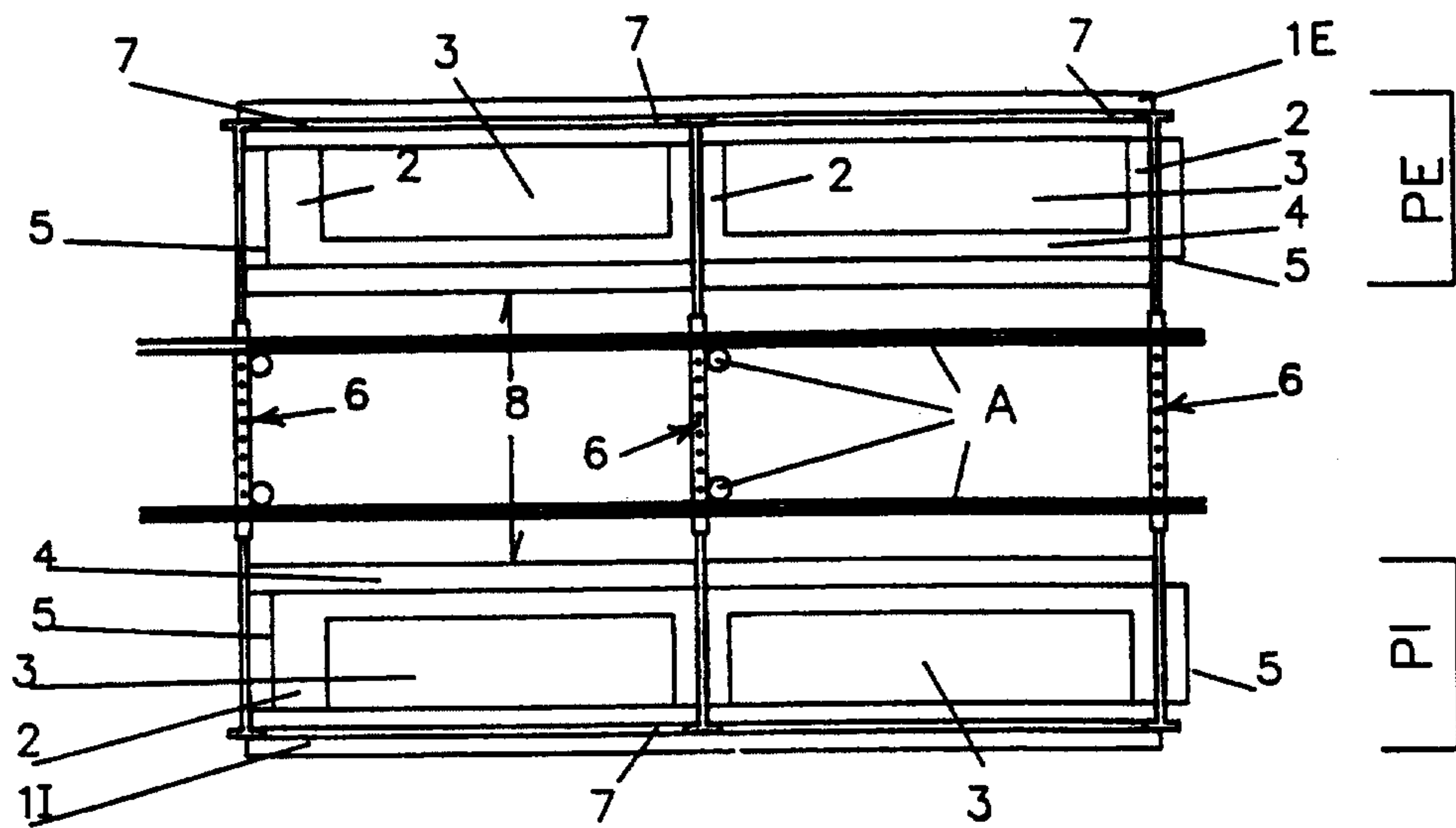


FIG. 4

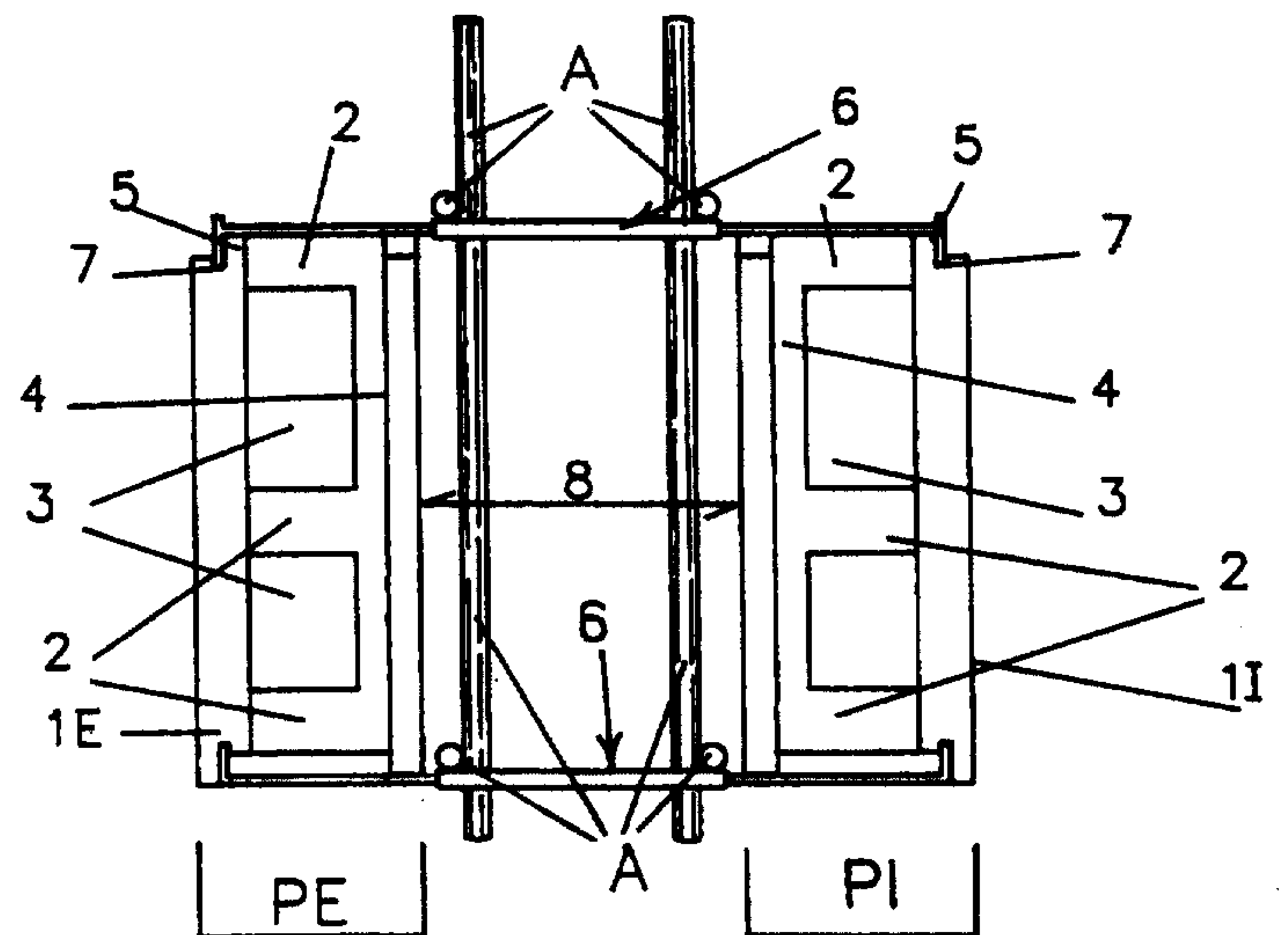


FIG. 5

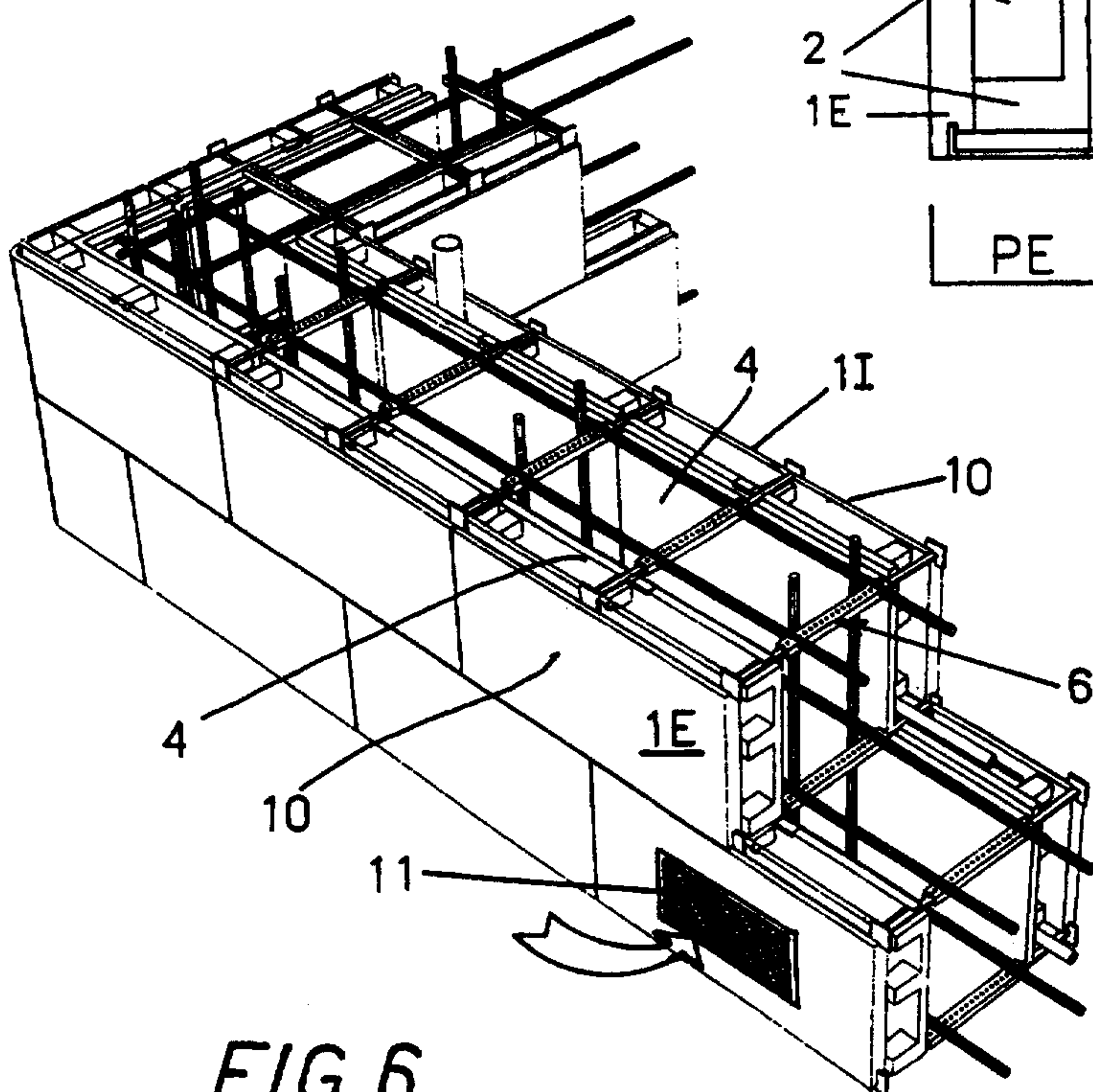


FIG. 6