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(54) **Prefabricated tank for elevator pit**

(57) A prefabricated tank (1) for elevator pit comprises a tank bottom (10) and side walls (2). Elevator loads exercised to the tank bottom (10) are transmitted to side walls (2) and then applied only to supporting structures extending in front of said side walls (2), supporting structures to which the side walls (2) are fastened by anchoring means.

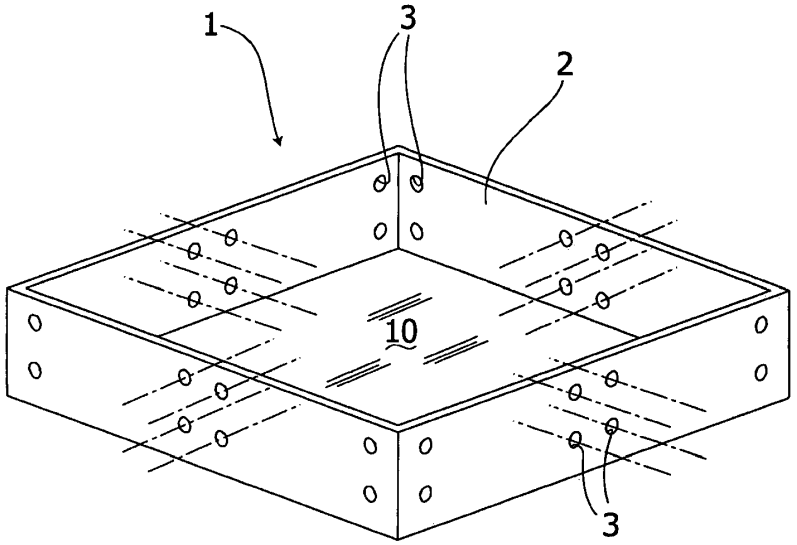

Fig. 1

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Description

[0001] The present invention relates to a prefabricated tank for elevator pit. The pit in an elevator is defined as the *"portion of the hoistway extending under the sill level of the lowest floor of the elevator".* The pit, besides to house some apparatuses necessary to the normal operation of the elevator, such as a damping assembly, a cylinder-piston unit (for hydraulic/oleodynamic elevators) and other control and safety apparatuses for users and maintenance engineers, must have features of load resistance in the pit bottom, i.e. in a wall contacting the foundation or other structure. Further, the pit needs to be protected against water seepage.

[0002] Nowadays when an elevator is installed in an existing building, the structure constituting the elevator pit is built directly by the building owner according to the specifications of the elevator provider. The structure being made of materials like masonry or reinforced concrete has side walls and pit bottom of varying thickness depending on both the loads and the material employed.

Also in new buildings, the structure constituting the elevator pit is built by the builder in the form of an handwork manufactured in situ.

In other words, the structure constituting the elevator pit is not classified, at both a building and normative level, as a component being part of the elevator, but as a part of the environment in which the elevator is located.

The feature of elevator load resistance is assured, besides to the material of the structure constituting the elevator pit, also by the resistance of materials and structures by which the elevator pit is supported (soil texture, foundation type or other underlying structure).

[0003] In this technical field the South Korean patent application No. 1020080096125 A, filed on 27.4.2007 by Eum Gi Hyung and published on 30.10.2008, discloses a partially prefabricated, easily assembled structure made of steel and concrete which replaces a pit structure of reinforced concrete manufactured directly in situ. Such a prefabricated structure is suitably supported or bound to underlying or adjacent structures.

Further, it should be considered that the current technology has permitted the pit depth to be reduced from the common measure of 110-120 cm to less than 50 cm, also to about 20-25 cm, while in the past people often renounced to install elevators in absence of space with the consequence of preventing a disabled access to the buildings.

The problems of space absence may be overcome in newly constructed buildings, since they can obviously be designed for housing pit of the requested sizes. On the contrary, the same problems are particularly important in existing buildings designed to house a new elevator. It occurs frequently that floors and vaults are not so very thick that can house pits. In other cases a pit could be positioned over third party real estate or not accessible places.

The above cited South Korean patent application fulfils only part of this need because it provides a partially prefabricated starting structure. However even if the thickness of the bottom and walls is never indicated in said patent application, it can be assumed, from the structure as manufactured, that the thickness is equal or a little lower than that of an analogous structure made of reinforced concrete, whose thickness is not less than some tens of centimetres. Further according to Eum Gi Hyung the prefabricated structure constituting the pit rests on a foundation or the like.

An object of the present invention is to provide a prefabricated tank that houses a reduced elevator pit.

A further object of the invention is to provide a self-supporting tank, i.e. being manufactured by a very strong material adapted to support in the pit bottom autonomously the normal loads of an elevator, and then requiring less space for its installation with respect to the prior art.

Yet another object of the invention is to provide a tank that may be hung, i.e. that does not required to rest on a foundation or other supporting structure.

The technical task defined and the objects specified are essentially achieved by a prefabricated tank for elevator pit comprising the technical features set forth in one or more of the enclosed claims.

[0004] Further features and advantages of the present invention will be most clear from the indicative and therefore not limiting description of a preferred embodiment of a prefabricated tank for elevator pit as shown in the enclosed drawings in which:

- figure 1 is a diagrammatic perspective view of a prefabricated tank for elevator pit according to the invention;
- figures 2 to 5 are diagrammatic central transversal cross-section views of the tank in figure 1 in four forms of application; and
- figures 6 and 7 are diagrammatic perspective views of the tank in figure 1 in other two forms of application according to the invention.

[0005] With reference to figure 1, a prefabricated tank 1 for elevator pit is diagrammatically shown therein in a perspective view. The prefabricated tank 1 has a tank bottom 10 and side walls indicated as a whole at 2. Slots that serve for engaging anchoring means (not shown) adapted to anchor the tank constituting the pit to the structure receiving the same are generally indicated at 3. The tank 1 is manufactured from a high strength material like a common or special steel or other equivalent material in terms of mechanical resistance. The tank 1 is able to support autonomously the normal loads of an elevator on the tank bottom 10. Then, the tank 1 is self-supporting as it does not require to rest on a structure supporting it. The slots 3 of the tank 1, co-operating with the anchoring means such as pins, bolts, brackets or other equivalent mechanical resistant elements, allow the tank 1 to be inserted in existing self-supporting structure, some ap-

plications of which are shown diagrammatically in figures 2 to 7.

As shown in the diagrammatic central transversal cross-section views in figures 2 and 3, the tank may be inserted completely or almost completely in the thickness of the floor 4 of a building, then promoting the elevator installation in places that are deemed unsuitable today. The thickness of the tank bottom 10 and of the side walls 2 is between 2 and 3 cm, depending on the material used and the loads applied by the elevator. Computer simulations made by using mathematical models of Finite Element Analysis proved that said thickness and anchoring means are sufficient to give the requested resistance for the tank in its various applications.

With reference to figure 4, the tank 1 is shown in a hoistway 5. The anchoring means is not even shown in this figure.

With reference to figure 5, the tank 1 is shown as installed in a floor 4 over a cavity 6, for example a cave, a garage, a downstairs room under a floor of very small thickness or a third party real estate or not accessible places.

With reference to figure 6, the tank 1 is shown as cantilever supported from a horizontally and vertically extending self-supporting structure indicated generally as 7. Even if not shown, sloping sustaining elements can be provided. Such a self-supporting structure is diagrammatically represented by beams able to bear loads applied to the slot 3 of the walls 2 of the tank 1.

With reference to figure 7, the tank 1 is shown as attached to side beams 8 in its further application.

The advantages of the prefabricated tank for elevator pit according to the invention are important.

The tank constitutes a component connected to the design of the elevator and made by the same elevator manufacturer instead of a handwork manufactured in situ by the building constructor; therefore the tank may be designed, equipped, finished and certified already in a plant as well as provided with safety devices for user and maintenance engineers according to rules on elevators (buffers, stops, switches, lamps, etc.).

The time spent for installing and assembling the elevator, as well as the time necessary for the maintenance and the repair of devices in the pit are considerably reduced.

Claims

1. A prefabricated tank for elevator pit comprising a tank bottom (10) and side walls (2), **characterised in that** the elevator loads exercised to the tank bottom (10) are transmitted to side walls (2) and then applied only to supporting structures extending in front of said side walls (2), supporting structures to which the side walls (2) are fastened by anchoring means.

2. The tank according to claim 1, **characterised in that** the anchoring means is bound to slots (3) made in the side walls (2) of the tank (1).

3. The tank according to claim 1, **characterised in that** the tank is made completely of metal.

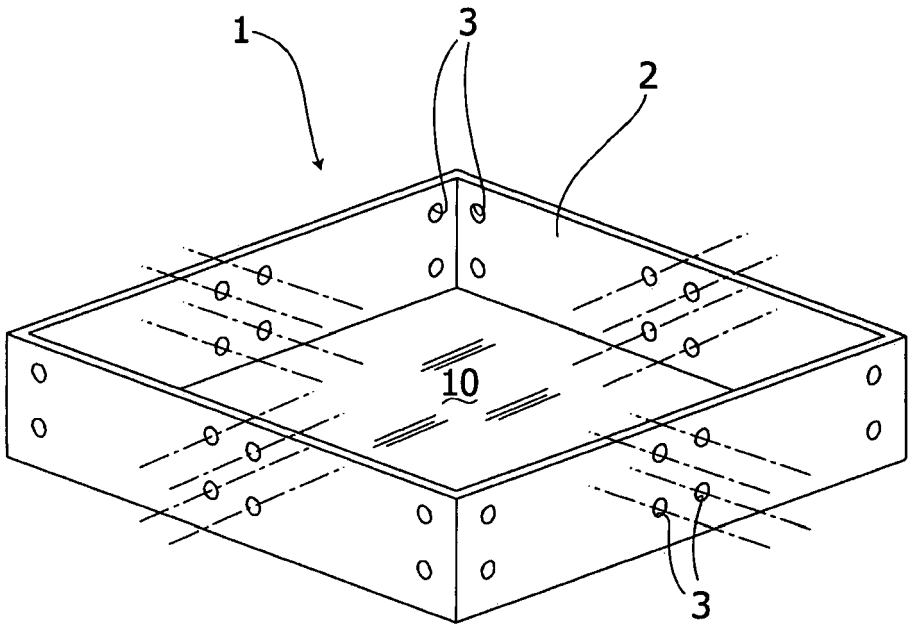

Fig. 1

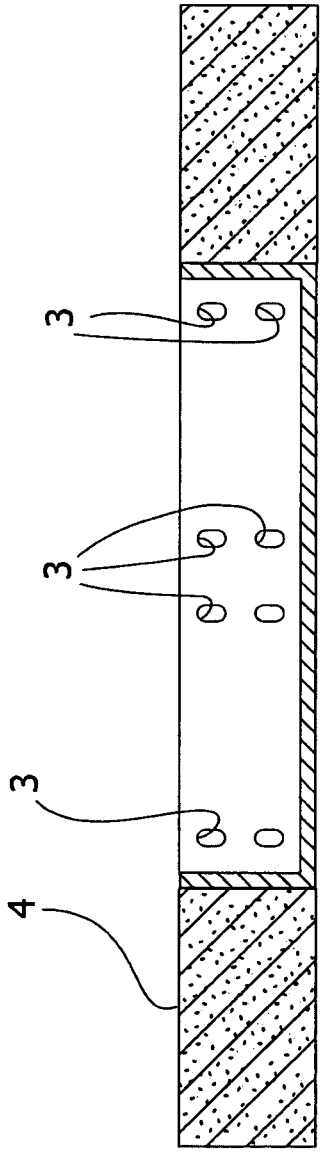

Fig. 2

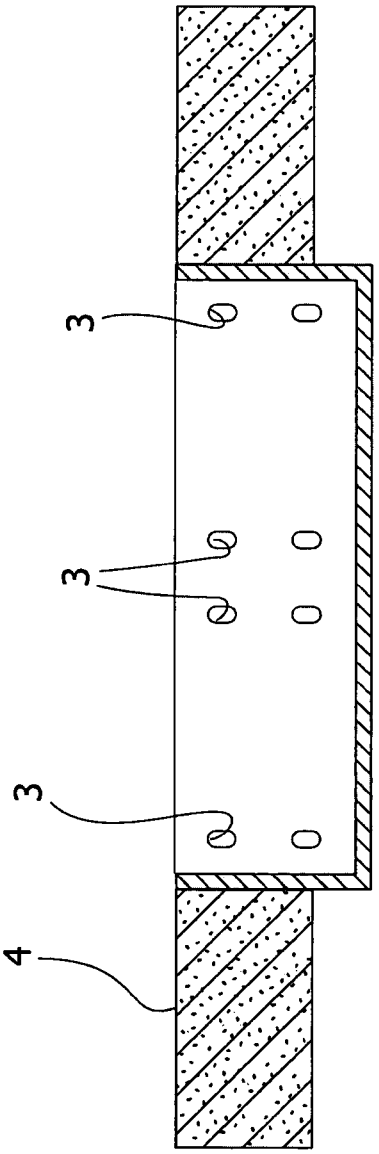

Fig. 3

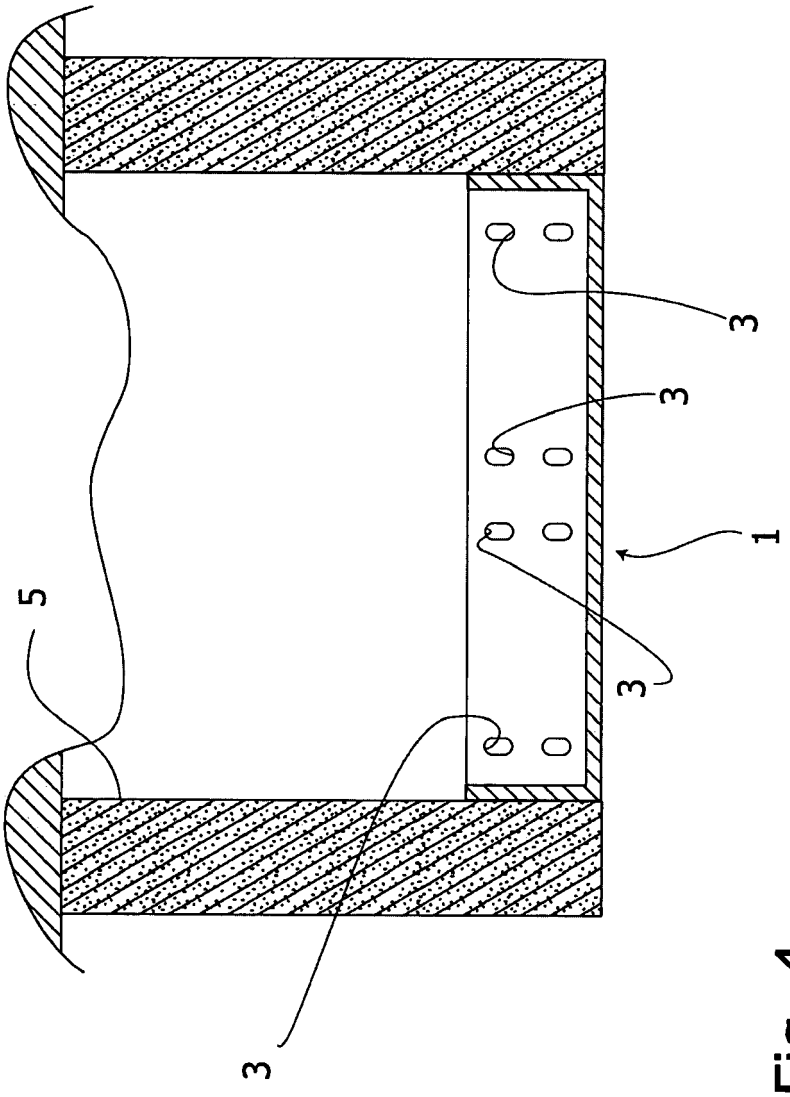

Fig. 4

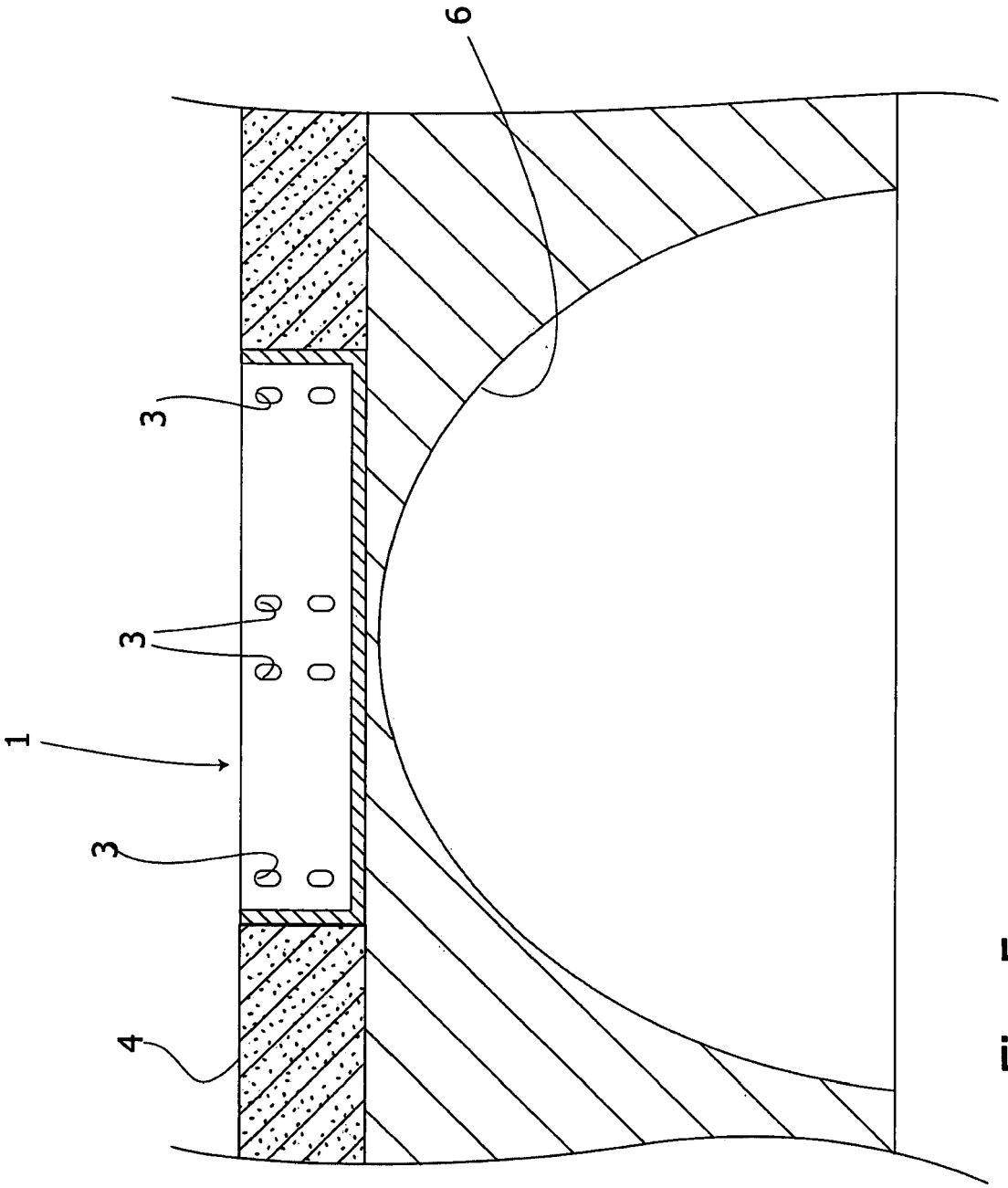

Fig. 5

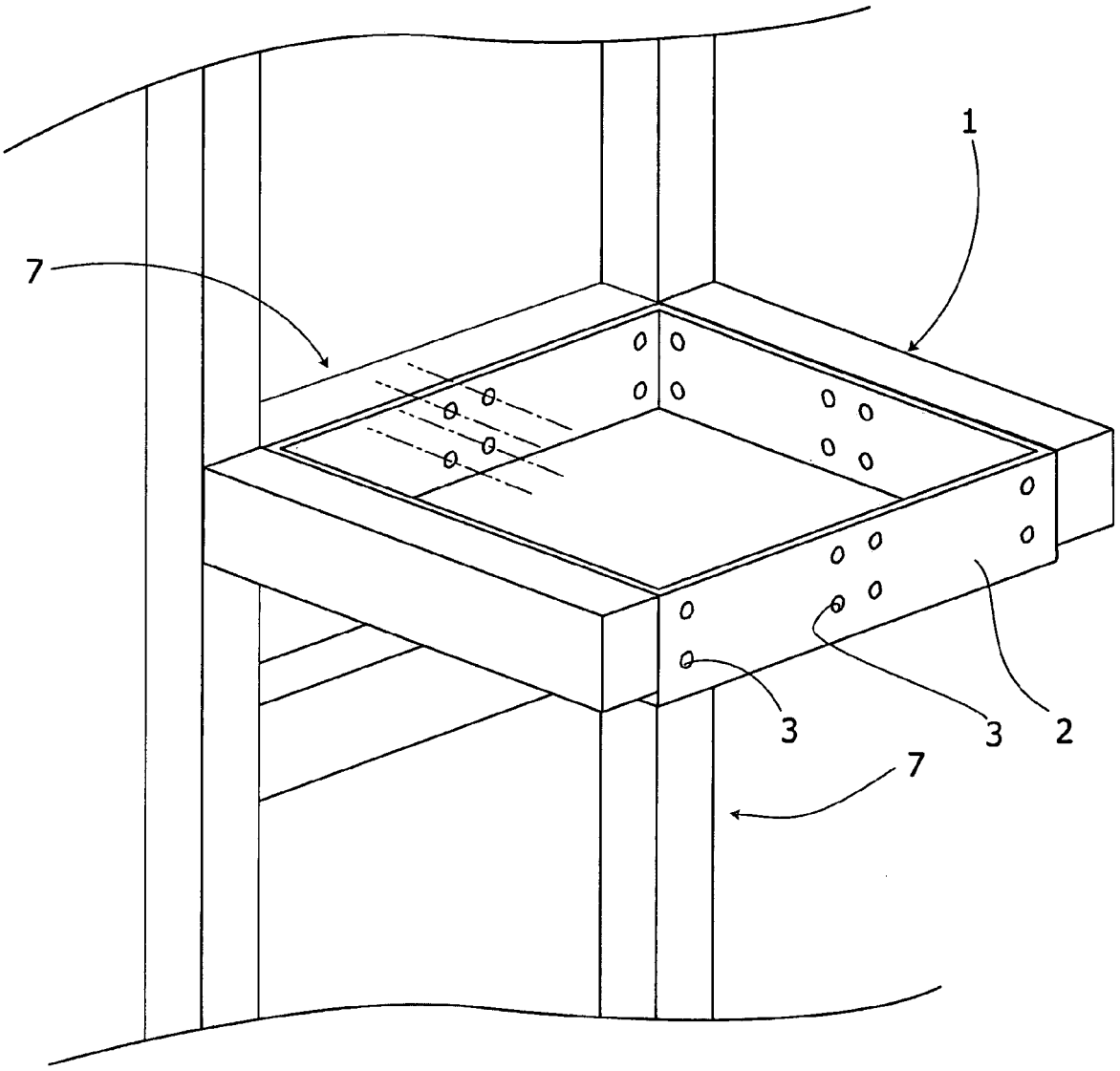

Fig. 6

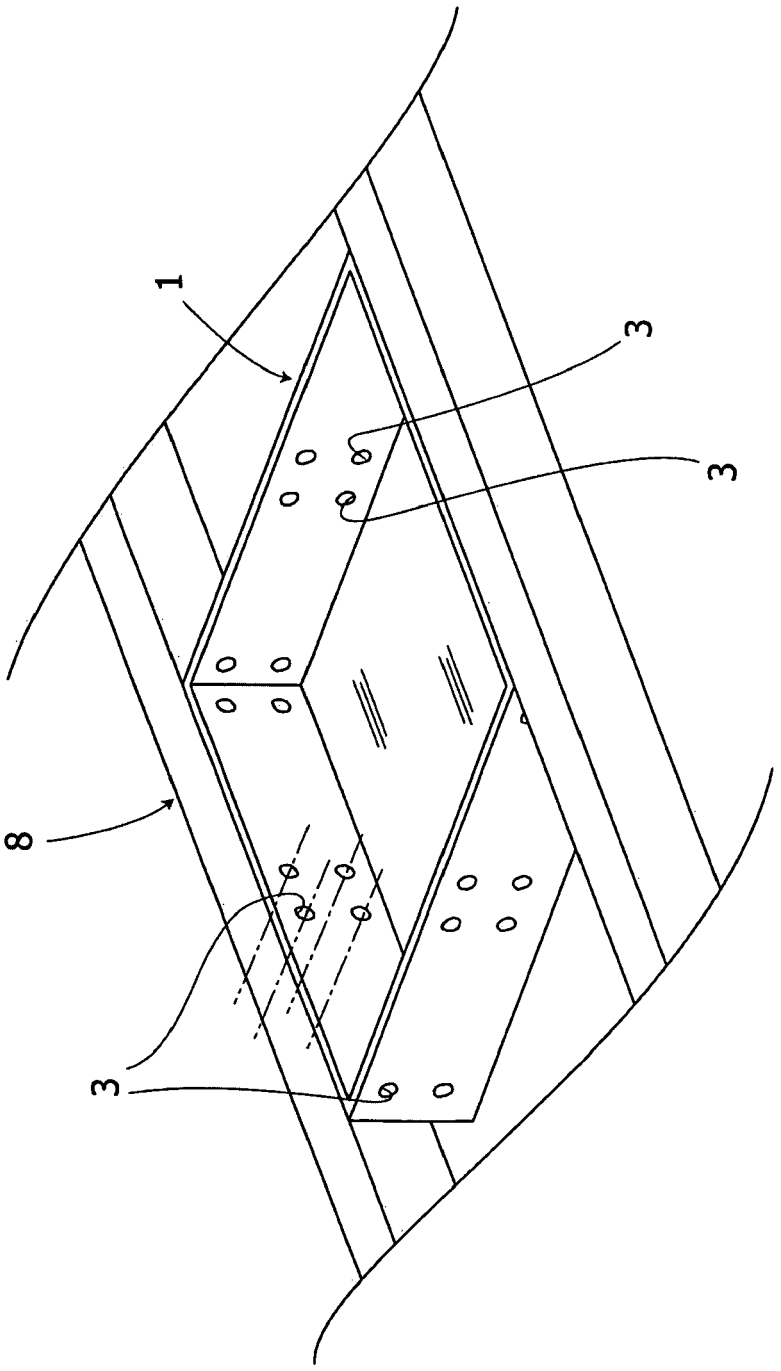

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 10 42 5378

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	KR 2009 0049731 A (EUM GI HYUNG [KR]) 19 May 2009 (2009-05-19) * paragraph [0105]; figures 2-4 *	1-3	INV. B66B11/00
X	EP 1 321 421 A1 (INVENTIO AG [CH]) 25 June 2003 (2003-06-25) * abstract * * paragraph [0016] *	1-3	
X	EP 0 579 024 A1 (FRANZ OLIVER [DE]) 19 January 1994 (1994-01-19) * column 3, line 22 - line 27; figure 2 *	1-3	
A	WO 2006/131947 A2 (CIAM SERVIZI SPA [IT]; DOTTORI ANDREA [IT]) 14 December 2006 (2006-12-14) * page 2, line 1 - line 6; figure 2 *	1-3	
A	DE 195 22 046 A1 (DOLD EBERHARD DIPL ING FH [DE]; HILD DIETER PROF DIPL ING [DE]; FRANK) 19 December 1996 (1996-12-19) * abstract; figures 5,8 *	1-3	TECHNICAL FIELDS SEARCHED (IPC) B66B
A	GB 2 446 862 A (CHAPMAN JOHN HENRY [GB]) 27 August 2008 (2008-08-27) * abstract *	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	12 April 2011	Nelis, Yves

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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EPO FORM 1503 03.82 (P04C01)

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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12-04-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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