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(71) Applicant(s)

Yuanhe Li

(72) Inventor(s)

Li, Yuanhe

(74) Agent/Attorney

Collison & Co, GPO Box 2556, ADELAIDE, SA, 5001

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(71)(72) 发明人/申请人: 李渊河(LI, Yuanhe) [CN/CN]; 中国台湾省台南市健康路一段390巷8号七楼之三, Taiwan (CN)。

(74) 代理人:
广州华进联合专利商标代理有限公司(ADVANCE CHINA I.P. LAW OFFICE); 中国广东省广州市东山区先烈中路69号东山广场918-920室, Guangdong 510059 (CN)。

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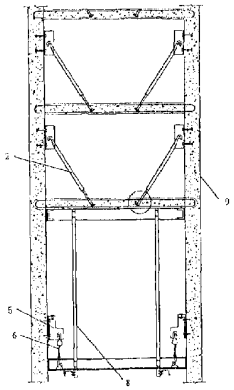
(54) Title: AN ERECTION UNIT FOR A BUILDING FLOOR SLAB AND THE ERECTION METHOD THEREOF

(54) 发明名称: 建筑物楼板的安装设备及安装方法



(57) Abstract: An erection unit for a building floor slab is disclosed, which includes a load-bearing member for lifting the floor slab. Said load-bearing member is higher than a plane where the floor slab lies and fixed in a wall and connected with the floor slab by the aid of a traction member. A method for erecting the floor slab with said erection unit is disclosed, which includes the following processes: installing the floor slab mould; connecting the upper end of the traction member to the load-bearing member above the floor slab; placing the lower end of the traction member on the height where the floor slab is located; then pouring concrete; dismantling the mould and installing the next lower layer after the floor slab has hardened; taking off the traction member after the floor slab has solidified to a strength enough to support its deadweight.

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(57) 摘要

本发明公开了一种建筑物楼板的安装设备及安装方法。该楼板的安装设备，包括用于提起楼板的承力构件，该承力构件高于楼板所在平面，承力构件与楼板之间连接有牵引件。该楼板的安装方法是：先将楼板模板安装好；把牵引件的上端连接在位于楼板上方的承力构件上，把牵引件的下端置于楼板所在高度上，然后进行混凝土的灌注；待楼板有一定凝固度后，即拆卸模板进行下层楼板的安装；待楼板凝固至足以支撑自身重量后，再把牵引件取出。采用本发明的安装方法及设备安装楼板，避免了下层楼板承受上层楼板的重量而产生变形的现象,提前了拆卸模板的时间，提高了楼板的安装速率，同时减轻了模板的安装与运送工作。

Revised

AN ERECTION UNIT FOR A BUILDING FLOOR SLAB AND THE ERECTION METHOD THEREOF

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an erection unit for a building floor slab and the erection method thereof, and more particularly to an erection unit for multiple floor slabs and the erection method thereof.

Description of the Prior Arts

The floor slab is used to vertically divide the space of a building into plural floors according to customer's requirements. At present, the floor slab of most buildings is made of concrete, as shown in Fig. 1, and the erection method is to install the next upper floor slab after the load-bearing structure (such as concrete structure) for each floor or the load-bearing structure for the whole building has been completed. After the concrete of the lower floor is poured, it needs to wait for a certain period of time until the concrete has hardened enough to bear a certain weight. And then support frame can be installed on this floor slab so as to carry out another installation for the next upper floor slab. However, this erection method still has two disadvantages which are described as follows: 1) it has to wait for a certain period of time before the floor slab hardens, then the next upper floor slab can be installed. Furthermore, it is time-consuming since the support frame and the floor slab mould should be assembled and dismantled repeatedly after each floor is completed. 2)

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It will have a bad effect on the structural strength of the floor slab since the lower floor slab has to bear the weight of the plural upper floor slabs, the support frame and the floor slab mould when multiple floor slabs are installed synchronously, which will likely lead deformation of the floor slab, as shown in Fig. 1. Accordingly, the requirement for structural strength of the support frame will be relatively higher. In view of the above-mentioned conditions, an improved erection method for a building floor slab is disclosed in SIPO Patent No. 01,129,796 (Oct 22, 2001) titled "an erection unit for a building floor slab and the erection method thereof". This method is used to install the floor slab downwardly starting from the upper floor to lower floor of a building, which generally includes the following steps: fixing a first plurality of positioning members on the load-bearing structure of the building, placing the floor slab mould on the first plurality of positioning members, the floor slab mould is supported with a support structure which is hung on the first plurality of positioning members through a traction member, then pouring concrete; installing a second plurality of positioning members at the position where the lower floor slab lies after the concrete has cured to a certain extent, hanging the support structure on the positioning member of the lower floor through the traction member, then taking off the first plurality of positioning members of the upper floor slab, under the effect of gravity and by the aid of the traction of the traction member, the floor slab mould is lowered to the position where the lower floor slab lies and

placed on an upper end of the positioning member, then pouring the concrete. With this erecting method, multiple floor slabs can be installed concurrently. Furthermore, the assembly and disassembly of the floor slab mould is omitted, so as to speed up the installation and to prevent the upper floor slab being loaded on the lower floor slab. However, this erection method still has to wait a certain period of time until the floor slab becomes hard enough to support its deadweight, then the floor slab mould can be taken away.

The present invention has arisen to mitigate and/or obviate the afore-described disadvantages.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide an erection unit for a building floor slab and the erection method thereof, which is capable of taking off the floor slab mould and installing the next lower layer after the floor slab is solidified to a certain level. Thus, not only the installation speed is increased, but also the quality of the floor slab is improved.

The erection unit for a building floor slab in accordance with the present invention includes a load-bearing member for lifting the floor slab, said load-bearing member located higher than a plane where the floor slab lies and connected to the floor slab through a traction member.

the mounting member can be a mounting block fixed on the wall through screw bolt or can be a truss of the positioning member supporting

the upper floor slab or can be a traction member pulling the upper floor slab.

The traction member can be tension rod, threaded rod, steel cord or iron chain.

The method for erecting floor slab in accordance with the present invention includes the following processes: installing the floor slab mould and reinforced bars, connecting the upper end of a traction member to a load-bearing member above the floor slab; placing a lower end of the traction member on a height where the floor slab is located; then pouring concrete; dismantling the floor slab mould and installing the next lower layer after the floor slab is solidified to a certain level; taking off the traction member after the floor has solidified to a strength enough to support its deadweight.

By using the erection unit for a building floor slab and the erection method in accordance with the present invention, the floor slab will not pressed by the upper floor slab during the solidification process, so that the lower floor slab is prevented from deformation caused by the weight of the upper floor slab. Furthermore, by the aid of the traction member, the floor slab mould can be taken off and the next lower floor slab can be installed before the floor slab is completely solidified, thus the installation speed is substantially increased. Since the installation of the floor slab is carried out starting from the top layer to the lower layer, after taking off the floor slab mould, the floor slab can be easily lowered

to and installed on the next layer under the effect of gravity by using the traction member, so that the installation and transportation of the floor slab mould is simplified.

The present invention will become more obvious from the following description when taken in connection with the accompanying drawings, which show, for purpose of illustrations only, the preferred embodiments in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic plan view for showing the conventional erection method for erecting the floor slab;

Fig. 2 is a first schematic plan view for showing the installation process for the floor slab in accordance with a first embodiment of the present invention;

Fig. 3 is a second schematic plan view for showing the installation process for the floor slab in accordance with the first embodiment of the present invention;

Fig. 4 is a third schematic plan view for showing the installation process for the floor slab in accordance with the first embodiment of the present invention;

Fig. 5 is a fourth schematic plan view for showing the installation process for the floor slab in accordance with the first embodiment of the present invention;

Fig. 6 is a top view of the first embodiment of the present

invention;

Fig. 7 is an enlarged view of the portion "A" in Fig. 1;

Fig. 8 is a structural view of a second embodiment of the present invention;

Fig. 9 is an enlarged view of the part "B" in Fig. 8;

Fig. 10 is an enlarged view of the part "C" in Fig. 8;

Fig. 11 is a structural view of a third embodiment of the present invention;

Fig. 12 is an enlarged view of the part "D" in Fig. 11;

Fig. 13 is an enlarged view of the part "E" in Fig. 11;

Fig. 14 is a structural view of a fourth embodiment of the present invention;

Fig. 15 is an enlarged view of the part "F" in Fig. 14;

Fig. 16 is an enlarged view of the part "G" in Fig. 14;

Fig. 17 is a structural view of a fifth embodiment of the present invention;

Fig. 18 is an enlarged view of the part "H" in Fig. 17;

Fig. 19 is a structural view of a sixth embodiment of the present invention;

Fig. 20 is an enlarged view of the part "I" in Fig. 19;

Fig. 21 is a structural view of a seventh embodiment of the present invention;

Fig. 22 is an enlarged view of the part "J" in Fig. 21.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An erection unit for quick erection of a building floor slab and the erection method thereof in accordance with the present invention can be used in various ways, such as that disclosed in SIPO patent No. 01,129,796, which is illustrated as follows:

Referring to Fig. 2, a first plurality of positioning members 5 are fixed at a height where a floor slab 3 is to be installed, and a floor slab mould 4 is then installed on the first plurality of positioning members 5. Through a plurality of traction members 6, a supporting structure 8 is hung on a lower end of the positioning member 5 and employed to support the floor slab mould 4. The floor slab 3 is then to be cast by pouring concrete into the floor slab mould 4. Before pouring concrete, a plurality of tension rods 2 having a threaded head 10 at their lower end are obliquely inserted, from the above, into the floor slab mould 4 in a manner that upper hook ends of the tension rods 2 are hung on a plurality of load-bearing members that are mounting members 1 on the wall 9 (as shown in Figs. 2 and 7). After the concrete is poured and cured to a certain extent, a second plurality of positioning members 5 are re-installed at a position of the lower floor, and the supporting member 8 and the floor-slab mould 4 are connected to the second plurality of positioning members 5 through the traction members 6. The floor slab 3, after being cast, is pulled by plural tension rods 2. Then the mounting

members 1 is dismantled, after the floor slab 3 is cured, and the tension rods 2 are taken away while leaving the threaded head 10 in the floor slab mould 4. The holes left during the installation of the floor slab are filled up with cement.

Referring to Fig. 3, the first plurality of positioning members 5 are dismantled before casting the next lower floor slab, so that the supporting frame 8 and the floor slab mould 4 are loaded on the second plurality positioning members 5. With reference to Figs. 4 and 5, under the effect of gravity and by the aid of the traction of the traction member 6, the floor slab mould 4 is lowered on the second mounting member 5. After that, the installation for the next lower floor is to be carried out.

Referring to Figs. 8, 9 and 10, which show an erection unit in accordance with a second embodiment of the present invention, the traction members 2 in this embodiment are hook-like tension rods. After installation of the floor slab mould 4 and the steel bar, an end of each of the hook-shaped tension rods 2 is inserted in the floor slab 3 and folded to into an angle, and another end of each of the tension rods 2 is folded into a hook and connected to the steel bar 9' on the wall 9. The tension rod 2 is obliquely arranged.

Referring to Figs. 11, 12 and 13, which show an erection unit in accordance with a third embodiment of the present invention, wherein a plate 7 is soldered with a connecting rod 14 to create a "T"-shaped mounting member that is to be inserted in the wall 9. A lower end of the

connecting rod 14 is formed with threads and protrudes out of the wall 9, and alike, the connection between the traction member 6 and the floor slab 3 is also achieved through the "T"-shaped mounting member formed by the plate 7 and the connecting rod 14. The traction member 6 can be in the form of a sleeve 11 formed with threads.

The traction member shown in Figs. 11-13 is a tension rod 2, both ends of the tension rod 2 are connected to the floor slab 3 and the wall 9, respectively, via the plate 7. The plate 7 is threadedly connected to the tension rod 2.

Referring to Figs. 14-16, which show an erection unit in accordance with a fourth embodiment of the present invention, both ends of the tension rod 2 in this embodiment are folded into a hook and connected to the steel bars 3' of the floor slab 3 and to the steel bars 9' on the wall 9, respectively. The tension rod 2 is threadedly connected to the sleeve 11, so that the tension rod 2 can be tensioned or released by rotating the sleeve 11 in different directions.

Referring to Figs. 17 and 18, which show an erection unit in accordance with a fifth embodiment of the present invention, a first end of a reinforced bar 2' is inserted through the uncured floor slab 3, and a second end of which is connected to the load-bearing member above the uncured floor slab 3. In installation, the reinforced bar 2' passes through the floor slab 3 before pouring concrete, and the concrete will inflate after being solidified and will produce pressure effect on the reinforced

bar 2'. Since the reinforced bar 2' is formed with lines and grooves, when the uncured floor slab 3 is a little deformed under the effect of gravity, the friction force generated between the reinforced bar 2' and the concrete will be greater enough to limit the deformation of the floor slab 3 within an acceptable range. When the load-bearing member above the uncured floor slab 3 is connected to the truss of the mounting member, an upper end of the reinforced bar 2' is connected to the truss while a lower end of the reinforced bar 2' passes through the uncured floor slab 3. If the traction member above the uncured floor slab 3 is the traction member serving to pull the next upper floor slab, namely a reinforced bar 2', then the reinforced bars 2' are connected to each other by soldering methods, and the soldering point is located above the respective floor slabs.

Referring to Figs. 19 and 20, which show an erection unit in accordance with a sixth embodiment of the present invention, wherein the traction member in this embodiment is a steel cord 2'', a first end of which is connected to the uncured floor slab 3 through an upper drop hanger 12, and a second end of which is connected to the load-bearing member above the uncured floor slab 3. A lower end of the upper drop hanger 12 is connected with a wedge block 13 having a small upper end and a big lower end, the wedge block 13 passes through the floor slab 3. A lower end of the wedge block 13 is connected with a lower drop hanger 12 which is used to tighten the steel cord 2'' by hanging weight, so that, after pouring concrete, a pulling force can be produced to

counteract the weight of the uncured floor slab 3. When the load-bearing member above the floor slab 3 is connected with the truss of the positioning member, the upper end of the steel cord 2'' is connected to the truss, and the lower end of the steel cord 2'' passes through the uncured floor slab 3 through the wedge block 13. If the load-bearing member above the uncured floor slab 3 is the traction member of upper floor slab, the steel cord 2'' is able to pass through plural floor slabs in a manner that the respective parts of the steel cord 22'' are connected with one another by the drop hanger 12 and the wedge block 13.

Referring to Figs. 21 and 22, which show an erection unit in accordance with a sixth embodiment of the present invention, the traction member in this embodiment is an iron chain 2, and other components are the same as the above-mentioned six embodiments, thereby, further descriptions are omitted.

While we have shown and described various embodiments in accordance with the present invention, it should be clear to those skilled in the art that further embodiments may be made without departing from the scope of the present invention.

WHAT IS CLAIMED IS:

1. An erection unit for a building floor slab including a load-bearing member for lifting the floor slab, said load-bearing member located higher than a plane where the floor slab lies and connected to the floor slab through a traction member, the load-bearing member fixed to a mounting member on wall of a building, wherein an upper end of the traction member is connected to the mounting member through hooks.

2. The erection unit for a building floor slab as claimed in claim 1, wherein the mounting member is a mounting block fixed on the wall through screw bolt, and the mounting member can be a steel bar on the wall.

3. The erection unit for a building floor slab as claimed in claim 1, wherein the mounting member comprises a plate and a connecting rod which are connected with each other to form in the shape of a "T", upper end of the plate and the connecting rod are located inside the wall, a lower end of the connecting rod protrudes out of the wall.

4. The erection unit for a building floor slab as claimed in claim 3, wherein the connecting rod is threadedly connected to the traction member.

5. The erection unit for a building floor slab as claimed in claims 1 or 3, wherein the traction member is a tension rod.

6. The erection unit for a building floor slab as claimed in claim 1, wherein the load-bearing member is a truss connected to a positioning

member that is employed to support an upper floor slab mould.

7. The erection unit for a building floor slab as claimed in claim 1 or 6, wherein the traction member is a reinforced bar whose lower end is folded after inserting through the floor slab, and the traction member also can be connected to a plate after passing through the floor slab.

8. The erection unit for a building floor slab as claimed in claim 6, wherein the traction member is a steel cord, and it also can be an iron chain.

9. The erection unit for a building floor slab as claimed in claim 7, wherein the plate is threadedly connected to the traction member.

10. The erection unit for a building floor slab as claimed in claim 1, wherein the load-bearing member is the traction member for pulling the upper floor slab.

11. The erection unit for a building floor slab as claimed in claim 10, wherein the traction member is the reinforced bar, an upper end of the reinforced bar is connected to a lower end of another reinforced bar for pulling the upper floor slab, and a lower end of the reinforced bar passes through the floor slab.

12. The erection unit for a building floor slab as claimed in claim 11, wherein the reinforced bars are connected to each other by soldering.

13. The erection unit for a building floor slab as claimed in claim 10, wherein the traction member is the steel cord and also can be

the iron chain passing through the floor slab, the traction members are connected to each other by hook structure.

14. The erection unit for a building floor slab as claimed in claims 8 or 13, wherein a lower end of the steel cord or the iron chain is connected with a wedge block which is inserted in the floor slab, a lower end of the wedge block is provided with a drop hanger for hanging weight.

15. A method for erecting floor slab including the following processes: installing the floor slab mould and reinforced bars, connecting the upper end of a traction member to a load-bearing member above the floor slab; placing a lower end of the traction member on a height where the floor slab is located; then pouring concrete; dismantling the floor slab mould and installing the next lower layer after the floor slab is solidified to a certain level; taking off the traction member after the floor has solidified to a strength enough to support its deadweight.

16. The method for erecting floor slab as claimed in claim 15, wherein a positioning member is fixed on the wall initially, and then the floor slab mould is pressed on the positioning member.

17. The method for erecting floor slab as claimed in claim 15, wherein the upper end of the traction member is fixed on the wall above the floor slab, the lower end of the traction member is connected to the reinforced steel in the floor slab mould, the traction member is slantingly arranged.

18. The method for erecting floor slab as claimed in claim 15, wherein the upper end of the traction member is connected to the truss of the positioning member that serves to support the upper floor slab.

19. The method for erecting floor slab as claimed in claim 15, wherein the upper end of the traction member is connected to the traction member that serves to pull the upper floor slab, the lower end of the traction member passes through the floor slab, and the traction member is obliquely arranged.

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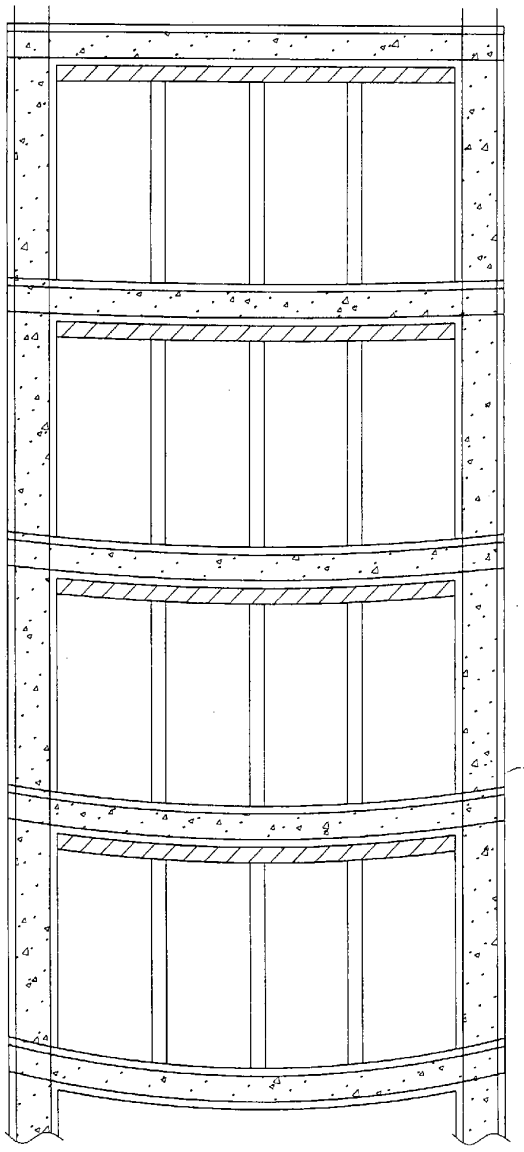

FIG. 1
PRIOR ART

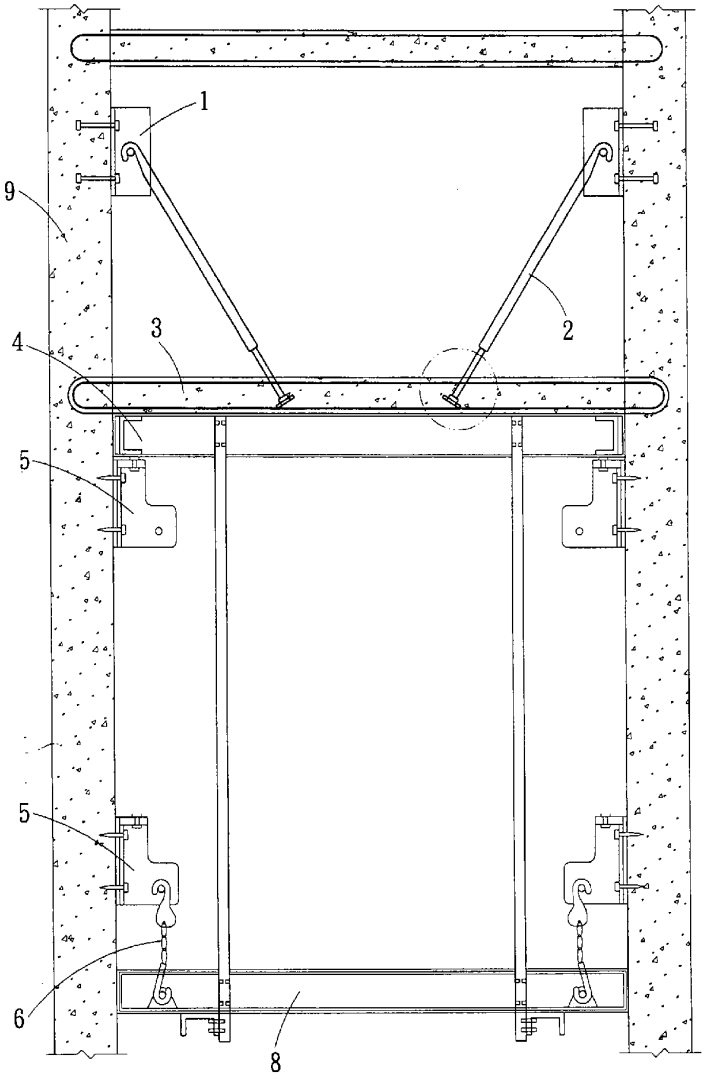

FIG. 2

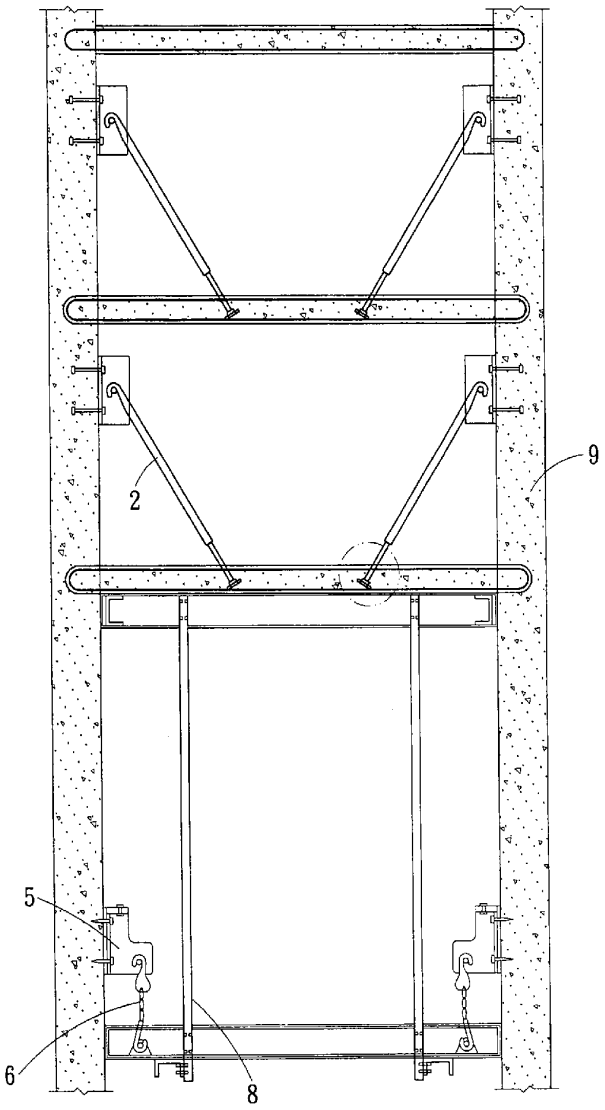

FIG. 3

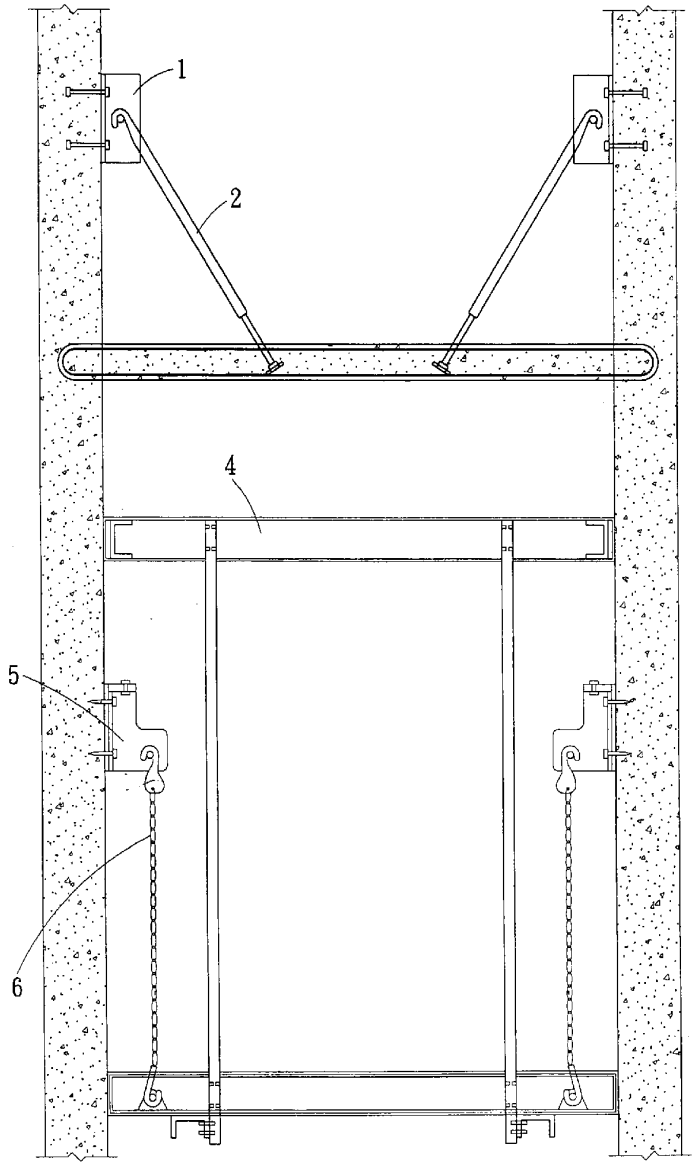

FIG. 4

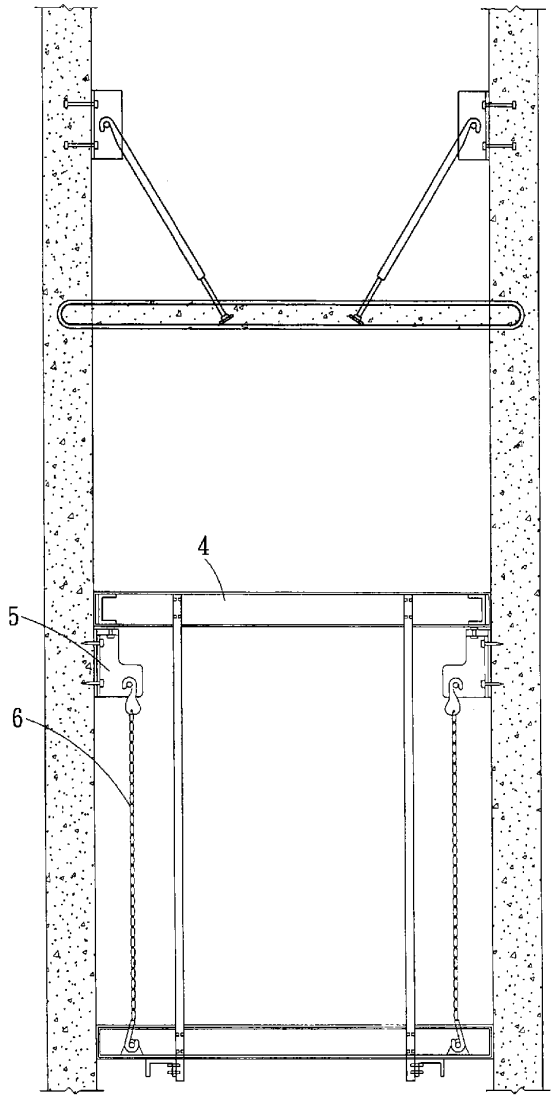

FIG. 5

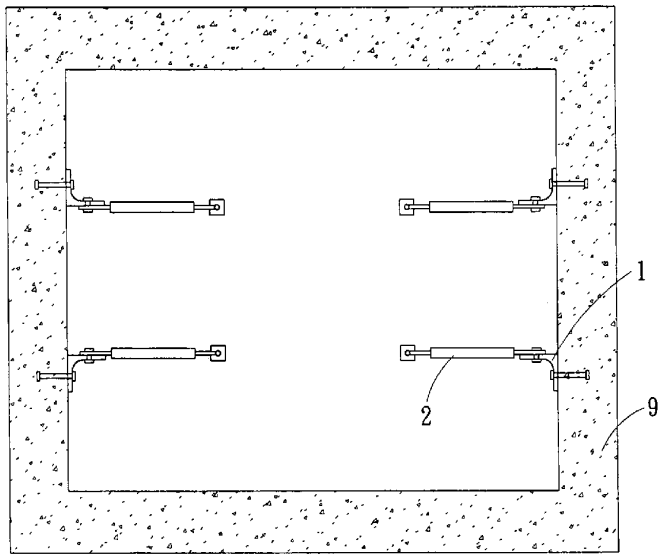

FIG. 6

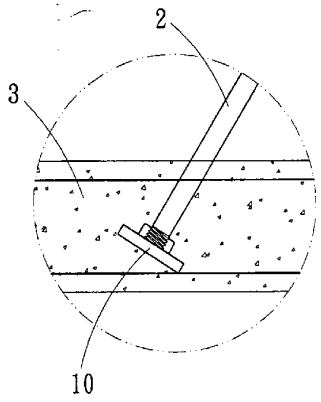

FIG. 7

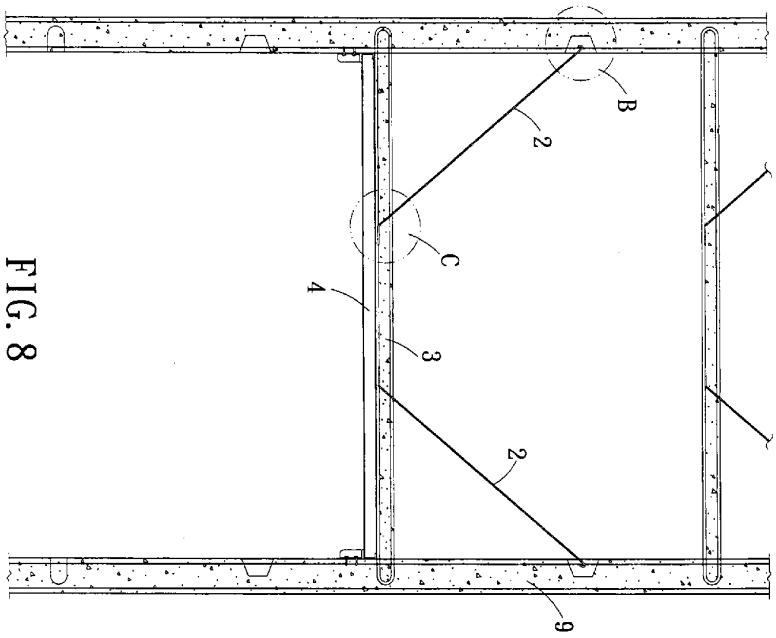

FIG. 8

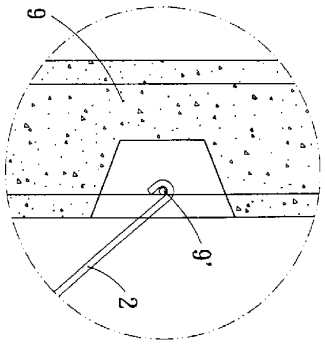

FIG. 9

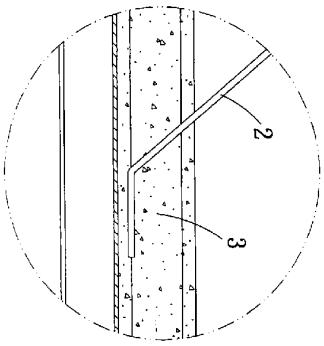

FIG. 10

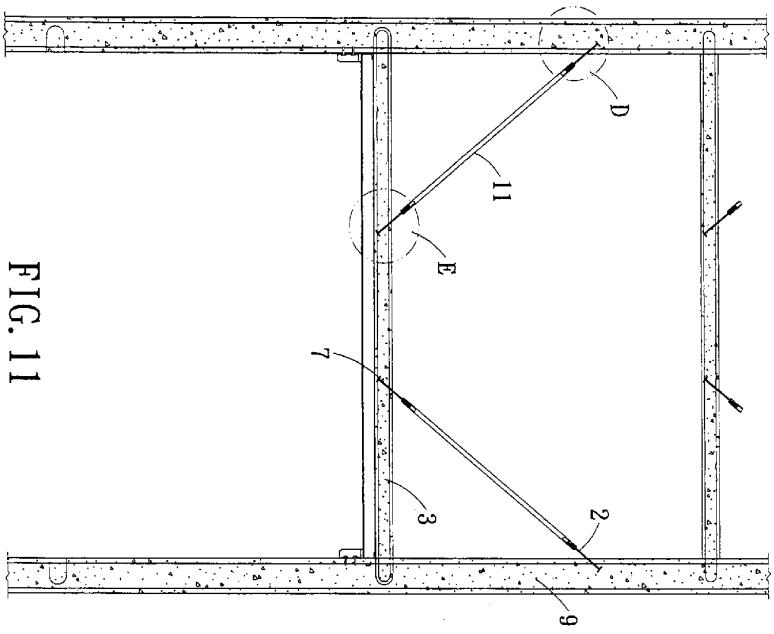

FIG. 11

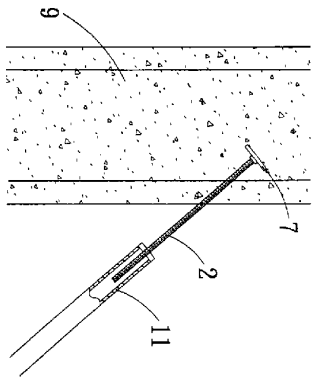

FIG. 12

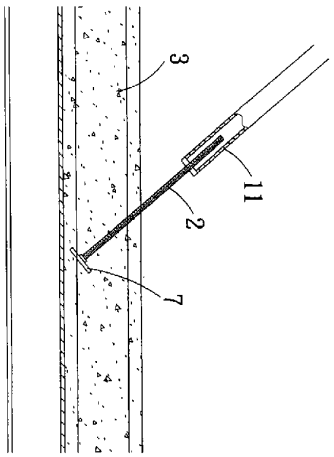

FIG. 13

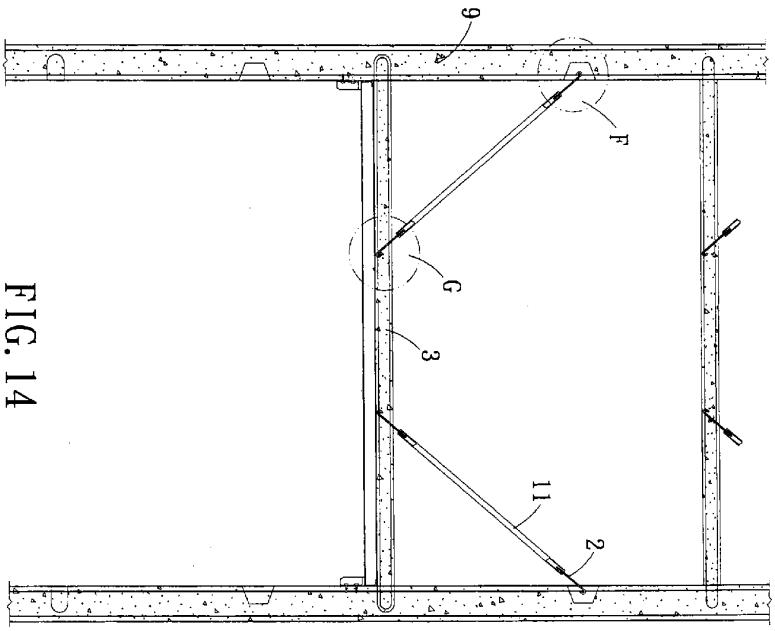

FIG. 14

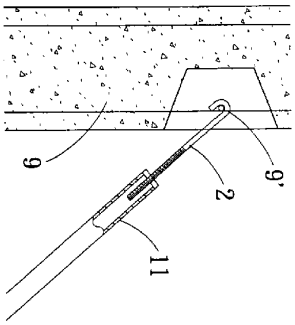

FIG. 15

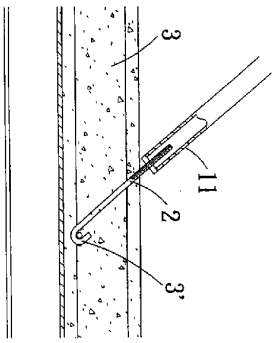

FIG. 16

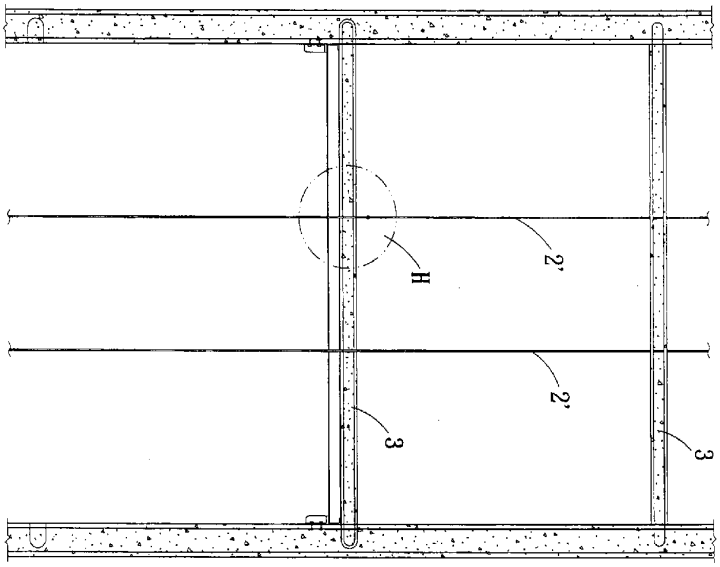

FIG. 17

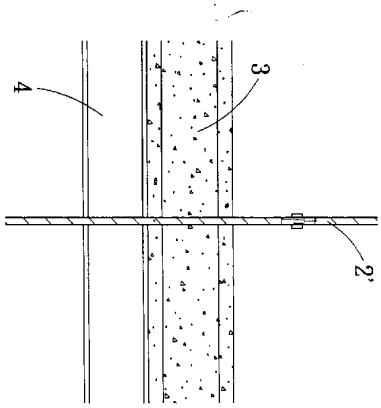

FIG. 18

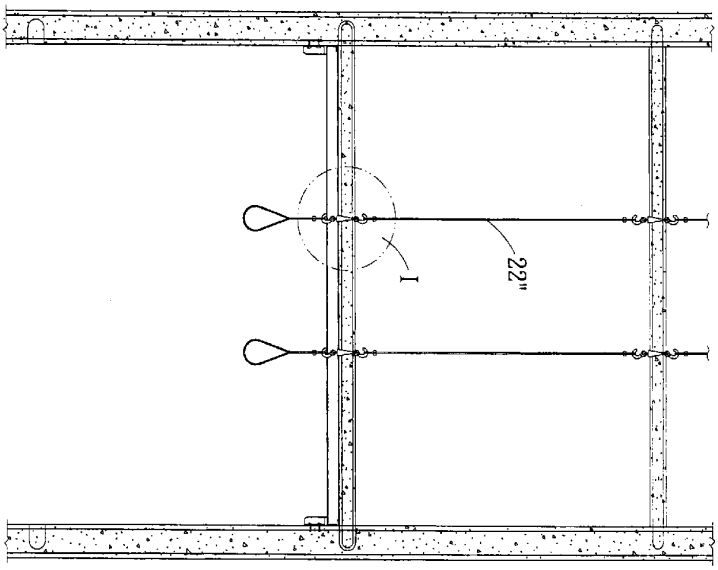

FIG. 19

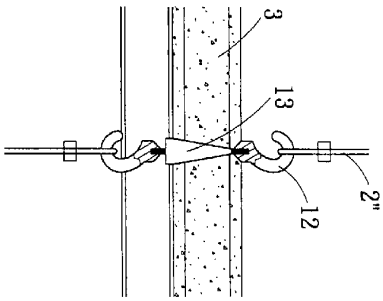

FIG. 20

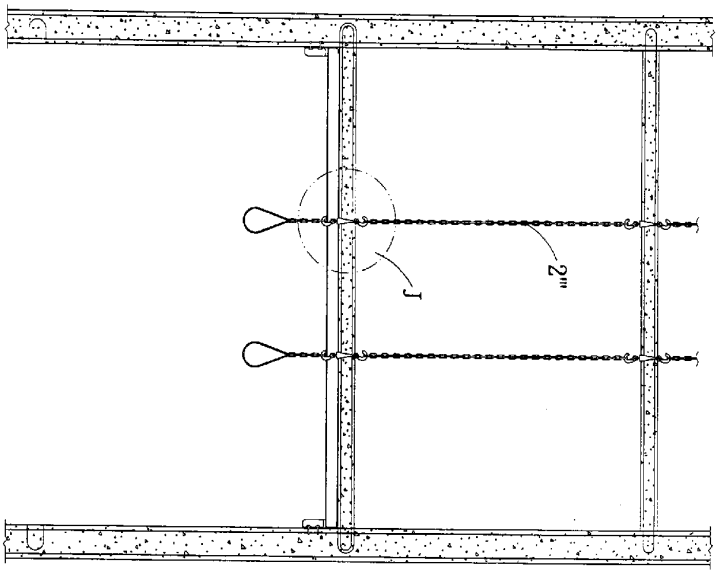

FIG. 21

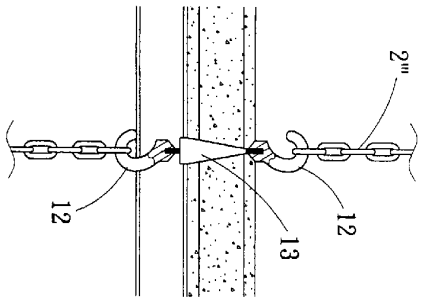

FIG. 22