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(54) **Fully recoverable shuttering system for cast floors**

(57) The system comprises recoverable members (8,9) of lesser length than the floor shuttering panels (1,1',1'') and arranged between two adjacent floor shuttering panels (1,1',1''), supported by their outer ends on the same panel supporting beams (2,3) on which the floor shuttering bears and facing one another at their other ends; and intermediate panel supporting beams (4) located at a lesser height than the panel supporting beams (2,3) receiving the shuttering panels (1,1',1'') and intended to receive the inner ends of the recoverable members (8,9), permitting, after partial setting, the initial dismantling of the recoverable members (8,9) in the operation of shuttering recovery, permitting the placing, in the space freed by same, of props for bearing directly on the floor cast.

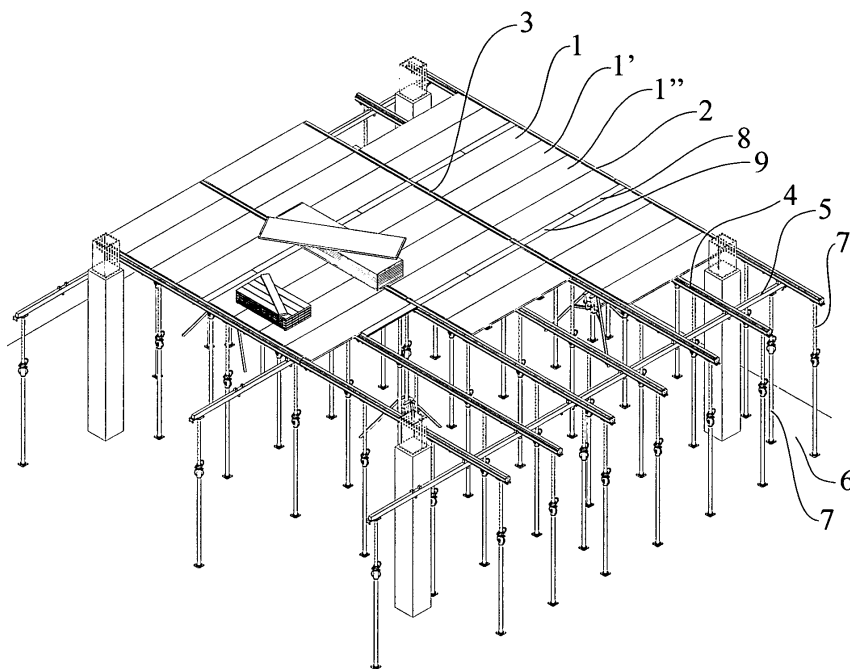


FIG. 1

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Description

[0001] The present invention relates to a shuttering system for cast floors which is characterized in that it is fully recoverable.

[0002] As is known, in the shuttering of concrete constructions a large amount of shuttering panels are used which, supported by panel supporting beams and lower supporting beams for the support of panel supporting beams as well as the corresponding props, are used for the shuttering of cast floors.

[0003] It is a customary technique in this field to partially recover the shuttering members when the cast floor has reached a specific partial strength. In this case, a part of the resistant support members, such as props and lower supporting beams, and also shuttering panels, is dismantled, leaving in place an assembly of panel supporting beams with their props.

[0004] Among the many systems for partial recovery of shuttering for cast floors which are currently known, it is possible to cite in a simplified manner the following:

- systems which leave alignments of beams with a separation which corresponds to the length of the shuttering panels, for example two metres, without moving the props, which will remain supporting the cast, for example:

with support members that can be dismantled for the recovery of the shuttering panels, or
with the use of panels having a length approximately half the distance between the alignments of beams which will remain supporting the cast

- systems which require the re-propping of the cast by means of the use of beam members, for the distribution of loads, located initially between the shuttering panels and which have pivots on their lower face for receiving the props.

[0005] However, all the systems currently known are based on the fact that after partially dismantling the shuttering for a cast floor, this latter remains supported by means of continuous or discontinuous alignments of beams with their corresponding props.

[0006] Therefore, with the systems currently known, it is not possible to dismantle the entirety of the actual floor shuttering members, that is to say, the panels and the entirety of the beams of different types.

[0007] However, one of the objectives for the reduction of costs in construction consists in the reduction of the investment in shuttering devices and members, since these represent an important part of the costs of the construction.

[0008] For this reason, the invention set himself the aim of obtaining a shuttering system which is fully recoverable with regard to the actual floor cast shuttering members.

[0009] To this end, the present invention discloses a shuttering system for cast floors which can be designated as being fully recoverable, that is to say, at the moment when a specific strength of the cast floor is reached, all the members used for the actual shuttering of the cast floor, with the exception of some props, can be dismantled. The entirety of specific shuttering members, including the entirety of the beams, both panel supporting beams and lower supporting beams, can be recovered for use in other areas of the construction.

[0010] In order to achieve these aims, the system of the present invention is fundamentally based on arranging recoverable members, having special characteristics, adjacent to some of the floor shuttering panels, for example, one every three or four shuttering panels, said recoverable members, which in a preferred solution may assume a tie-beam structure, being supported, in a manner that can be easily dismantled, at one of their ends by the support beams for the shuttering panels and at the other end, remaining facing one another and supported by an intermediate beam. Said recoverable members have a variable width, preferably reduced, sufficient as a minimum for permitting the introduction and placing of the head or upper end of a building prop, and combine with the structure of the beams in such a way that they permit easy dismantling thereof at the moment of their recovery, for example, the support beams or panel supporting beams having a stepped lateral region slightly inclined at an angle, so that the recoverable members or tie-beams might be equipped with rebates or cavities on their inner lower edge in order to permit their downward rotation on a flat step. For their part, the recoverable members are equipped, near each of their ends and on the lower face, with respective stops for their centring on the long sides of the panel supporting beams.

[0011] The system of the present invention therefore makes it possible, once sufficient hardening of the concrete floor has taken place, to proceed with the dismantling of an intermediate panel supporting beam, which will in turn permit the dismantling of two recoverable members of the system, which will therefore provide a free surface of the lower face of the cast floor which will allow the arrangement of support props directly in contact with said lower face, permitting direct bearing of the cast floor on the props. Once these auxiliary props are arranged, the floor shuttering panels and the support beams for same can be dismantled, so that the cast floor will remain supported only by several props, the entirety of the lower supporting beams, beams and shuttering panels, which are the actual floor shuttering members, having been recovered, as well as a large part of the props or stanchions.

[0012] For greater understanding thereof, some drawings of a preferred embodiment of the present invention are appended by way of non-limiting example.

[0013] Figure 1 shows in perspective an assembly of members for the shuttering of a cast floor, seen in perspective from above.

[0014] Figure 2 shows a perspective view of a part of

the actual assembly of floor shuttering members from below, after the recoverable members of the invention have been dismantled.

[0015] Figures 3 to 8 are sectional views which show in a simplified manner the functioning of the system of the present invention in the shuttering of a cast floor from the placing of the recoverable members to their final dismantling and the support of the recently set floor by means of props.

[0016] Figures 9 and 10 show, respectively in side elevation and in plan, views of a recoverable tie-beam of the type used in the present invention.

[0017] Figure 11 shows a perspective view, from below, of a recoverable tie-beam used in the system of the invention.

[0018] Figures 12 and 13 show simplified sections of intermediate beams for the support of the recoverable members which in the first case combine with beams having inclined flanks and in the second case with beams equipped with flat steps.

[0019] Figures 14 to 19 show an alternative to the process of assembly or de-shuttering of the recoverable members in a similar manner to that shown in Figures 3 to 8, valid for the case where a version of said members such as those shown in Figure 13 is employed.

[0020] As will be seen from the drawings, the system applies to the shuttering of cast floors which is shown diagrammatically in the perspective views of Figures 1 and 2, which show the arrangement of a multiplicity of shuttering panels 1, 1', 1'', supported on end beams, such as those indicated by the numbers 2 and 3. Underneath are arranged other intermediate beams, parallel to 2 and 3, indicated in the drawing by the number 4, and lower supporting beams, such as those indicated by the number 5, which are intended to support by their lower face the beams 2, 3 and 4. The support on the floor 6 of the lower storey is effected by means of a multiplicity of props 7, 7', which bear on the floor 6 and which receive the load of the beams.

[0021] According to the system of the present invention, some recoverable members, such as those indicated by the numbers 8 and 9, are arranged parallel to the shuttering panels 1, 1', 1'', adjacent to one of said panels, grouped with a specific series of floor shuttering panels, which has been shown in the drawings by the numbers 1, 1', 1''. Said recoverable members 8 and 9 bear by one of their ends on the beams 2 and 3, and by the other ends which are facing one another, as can be seen in Figure 1, on one of the intermediate beams 4. Figure 2 shows, from below, the arrangement of Figure 1, in which can be seen the shuttering panels 1' and 1'' and also the intermediate beam 4, and various props on which said lower supporting beam and which are indicated by the numbers 10, 11 and 12. In the same drawing can be seen the beam 3 supported by the props 14, 15 and 16 and which is the one which will bear the ends of the shuttering panels and the outer ends of the recoverable members 8 and 9.

[0022] The recoverable members, such as 8 and 9, will be variable in shape, especially as regards width, their length being part of the length of the shuttering panels, for example 1', 1'' between which they are situated. Their function is to permit prior dismantling which will free local areas of the lower face of the cast floor in order to allow the placing of props for direct support of said floor cast, permitting the dismantling of the entirety of the shuttering panels and also of the support beams, intermediate beams and their respective props. The structure of said recoverable members will therefore be preferably extended with a width which will correspond, at minimum, to the width of the head of a prop so that the freed space will permit the placing of the prop, but without express limitation as regards the maximum value of the width, since the function of said intermediate devices could be performed by shuttering panels of lesser length than the main panels.

[0023] In a preferred embodiment, said recoverable members may assume a structure of tie-beams of sheet metal cut and bent as will be explained hereinafter.

[0024] By means of the arrangement provided for in the invention it becomes possible, after a period of partial hardening of the concrete floor, to dismantle the intermediate beams 4 for supporting the inner ends of the recoverable members, followed by dismantling said recoverable members and proceeding to support the concrete floor by means of other props. All this has been shown in greater detail in Figures 3 to 8, in which can be seen the recoverable members 8 and 9 supported by the end beams 13 and 18, and by the intermediate beam 4, the numbering of the members corresponding only partially to that used in Figure 2. The recoverable members 8 and 9 in this case assume a stepped form with inclined faces, as can be observed in detail in section in Figure 12. As will be observed, the intermediate beam 4 is arranged at a height below that of the end beams 13 and 18, since it must receive the recoverable members 8 and 9 by their lower face, since these latter limit with their upper face, directly, the floor cast 19 shown in Figure 4.

[0025] Figure 5 shows the dismantling of the intermediate beam 4, the recoverable members 8 and 9 being able to be loosened afterwards on tilting on the inclined support steps of the beams 13 and 18. In this view there can already be seen the shuttering panel 20, obviously double the length of said members.

[0026] Then, taking advantage of the space which has been freed on dismantling the recoverable members 8 and 9, new props varying in number, for example two in each section, will be mounted, indicated by the numbers 21 and 22, and which bear above directly on the lower face of the cast floor 19, that is to say, they effect the direct bearing of the cast floor on the props. In this situation, and as shown in Figure 7, the beams 13 and 18, with their alignments of props 15 and 17, can be dismantled, so that the shuttering panels 20 can be dismantled, the cast floor 19 therefore finally remaining supported simply on the props 21 and 22, the entirety of the remain-

ing shuttering members having therefore been recovered.

[0027] As indicated, the recoverable members are characterized in that they have a length which will preferably be half that of a floor shuttering panel and a width which is variable although preferably reduced, which should fulfil the condition of permitting the direct bearing of the head of a prop, that is to say, its width should be greater than that of the top end of the support props that are being used. A preferred construction is shown in Figures 9, 10 and 11, it being observed that a recoverable member 8 is constituted by a sheet metal member, for example of cold-rolled steel sheet conveniently cut and bent on its lateral edges and ends, forming a very flattened box structure, with lateral walls of the longer sides 23 and 24 and shorter sides 25 and 26. The longer sides form bent over lower overlaps 27 and 28 and the ends are bent in the shape that can be seen in Figure 11, forming a straight step 29 which for greater support continues in an inclined rear wing 30, which bears on the flanges 27 and 28. However, it will be understood that the recoverable members 8 may be constituted by any method and materials compatible with the technical functions explained, that is to say, corresponding dimensionally to a narrow zone between shuttering panels and permitting their initial dismantling in order to be able to place props in direct contact with the at least partially hardened floor cast.

[0028] In the detail of Figure 12 can be seen the way in which the bearing between the recoverable member 8 and the intermediate beam 2, which has the downwardly inclined step 31, is produced and which will permit the tilting and displacement of the recoverable member 8 at the moment of its dismantling.

[0029] In the variant shown in Figure 13, the beam 2' has a stepped shape similar to that of Figure 12, although its steps have faces 32 that are not inclined but substantially horizontal. The bearing point of the beam 8' which is shown by the number 33 and which corresponds to the bearing point 34 of the case shown in Figure 12, is formed by the rib formed by the vertical face 35 of the recoverable member 8' and the corresponding lower face 36. In this way, a free zone 37 is formed between the lower face of the recoverable member 8' and the corresponding upper face 38 of the beam 2', in order to permit downward rotation of the recoverable member 8', the detailed functioning of which is shown in Figures 14 to 19.

[0030] As will be understood, both in the example of Figure 12 and in that of Figure 13, what is of interest for the functionality of the invention is that the recoverable members or tie-beams, for example 8 and 8' can rotate downwards on the bearing rib in order to permit their dismantling without interference with the recently partially set floor cast.

[0031] In any case, as will be understood, the precise form of the cavity 37 may be widely variable in the shape of curvature or step in the opposite direction or any other arrangement which permits the partial free rotation of the

recoverable member 8, 8' to permit its dismantling.

[0032] With the corresponding beams in Figure 13, that is to say, with flat steps, the process of mounting and dismantling has been shown in Figures 14 to 19, in which can be seen the arrangement of the recoverable members 39 and 40 between the end beams 41 and 42 on which the main shuttering panels bear, such as that indicated by the number 43 in Figures 16 to 18, and supporting themselves at the end at which the recoverable members 39 and 40 meet in opposition to each other on the intermediate beam 44, of lesser height. All the beams mentioned are supported on the corresponding props 45, 46 and 47.

[0033] Once the floor cast 48 is produced, and after the partial setting thereof, the dismantling, Figure 16, of the end beams 41 and 42 with their corresponding props 45 and 47 will be carried out, rotating the recoverable members 39 and 40, for their dismantling, as shown in the drawing. Support props bearing directly on the lower face of the floor cast 48 will then be put in place, taking advantage of the space which will have remained free on dismantling the recoverable members 39 and 40, as shown in Figure 17. The main shuttering panels, such as that indicated by the number 43, and also the support prop for the intermediate beam 44, can then be dismantled. Finally, as shown in Figure 19, the floor cast 48 will remain supported simply by the props which, in a smaller number such as those indicated by 41 and 50, will have taken the place of the remaining shuttering members.

[0034] Although the invention has been described in detail on the basis of the specific embodiment shown in the drawings, it will not be limited to said embodiment but, on the contrary, will include multiple variants which may be introduced by the experts in the field once aware of the content of the present description, claims and drawings, provided that they come within the scope of the appended claims.

Claims

1. A fully recoverable shuttering system for cast floors, applicable to the shuttering systems which comprise floor shuttering panels supported by beams bearing on props, **characterized in that** it comprises the following elements:

- recoverable members of lesser length than the main floor shuttering panels and arranged between two adjacent floor shuttering panels, supported by their outer ends on the same panel supporting beams on which the floor shuttering panels bear and facing one another with their other ends; and
- intermediate panel supporting beams located at a lesser height than the panel supporting beams receiving the shuttering panels and intended to receive the inner ends of the recover-

able members, permitting, after partial setting, the initial dismantling of the recoverable members in the operation of shuttering recovery and the placing, in the space freed by same, of props bearing directly on the floor cast.

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2. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the sum of lengths of the recoverable members corresponds to the length of a shuttering panel. 10
3. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the recoverable members have a width slightly greater than the top head of a building prop. 15
4. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the recoverable members have on their lower face near their ends, respective steps for their guiding with the long sides of the panel supporting beams. 20
5. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the recoverable member is made of steel sheet cut and bent at its edges, forming a flattened box structure, and the centring step being formed on the shorter sides by subsequent bending of the sheet metal. 25
6. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the panel supporting beams on which the floor shuttering panels bear have stepped sides with downwardly inclined surfaces for supporting the panels. 30
7. A fully recoverable shuttering system for cast floors, according to claim 1, **characterized in that** the panel supporting beams on which the floor shuttering bears have a stepped structure with the support faces horizontal. 35
8. A fully recoverable shuttering system for cast floors, according to claims 1 and 7, **characterized in that** the recoverable members have at the end zone intended to bear on the beam carrying the panels, a rebated zone to permit the tilting of the recoverable member during its dismantling. 40

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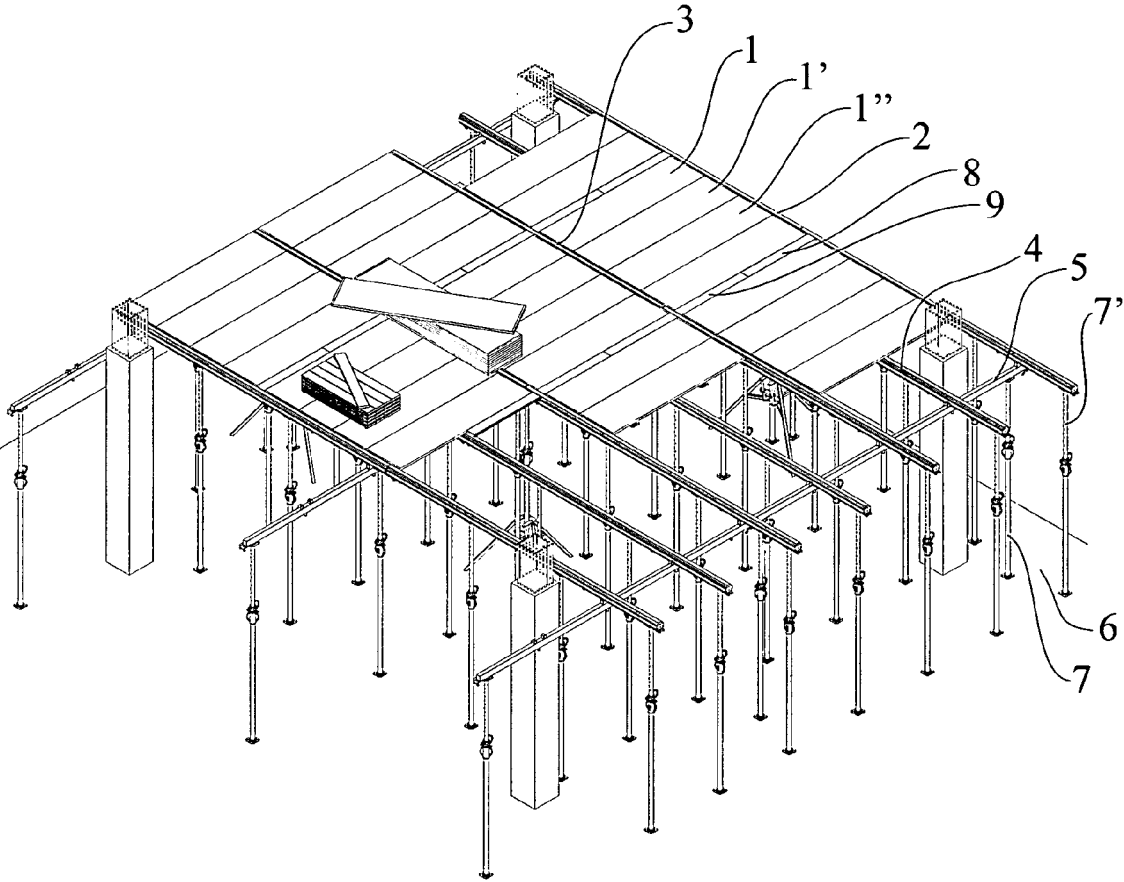


FIG. 1

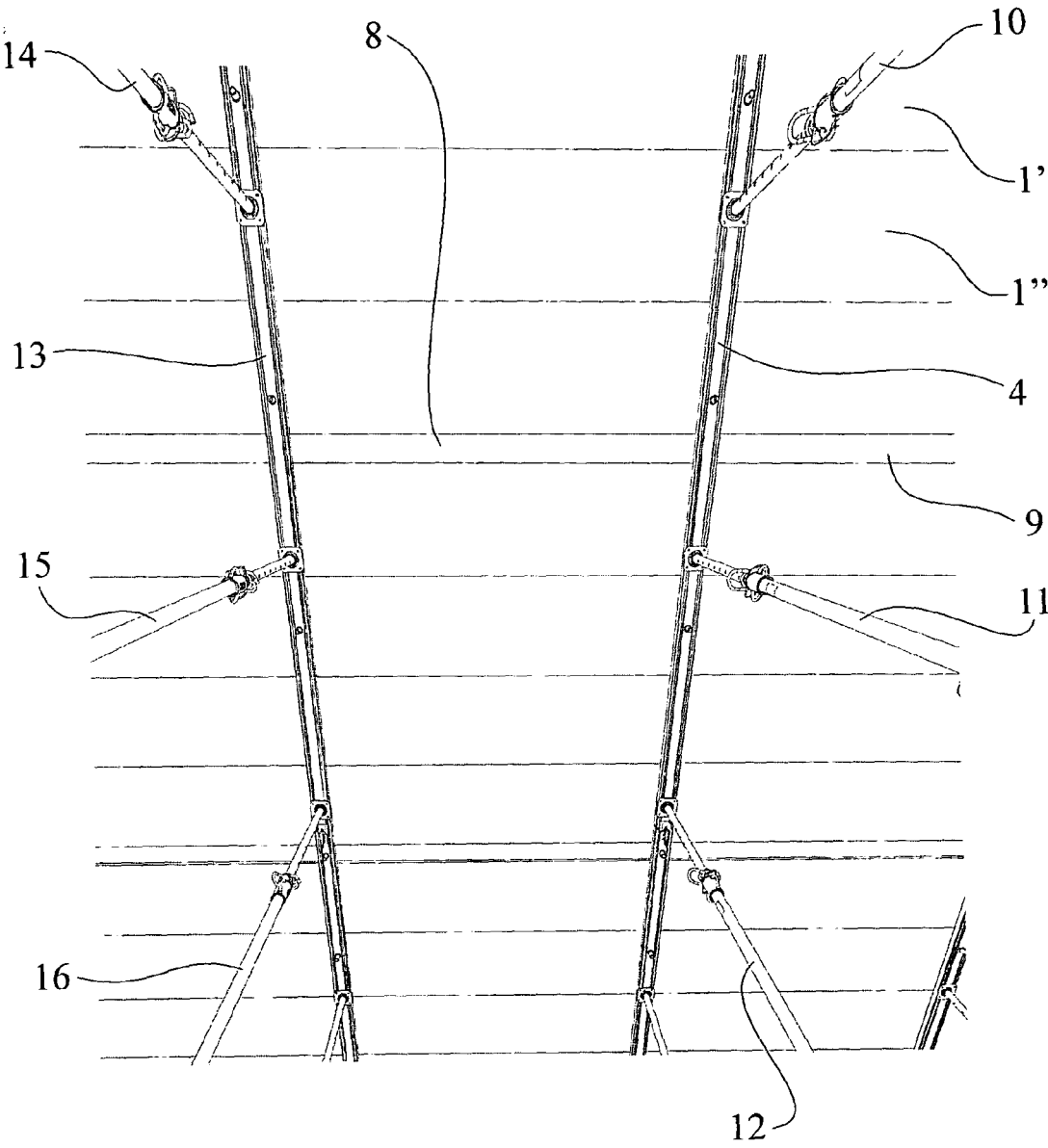


FIG. 2

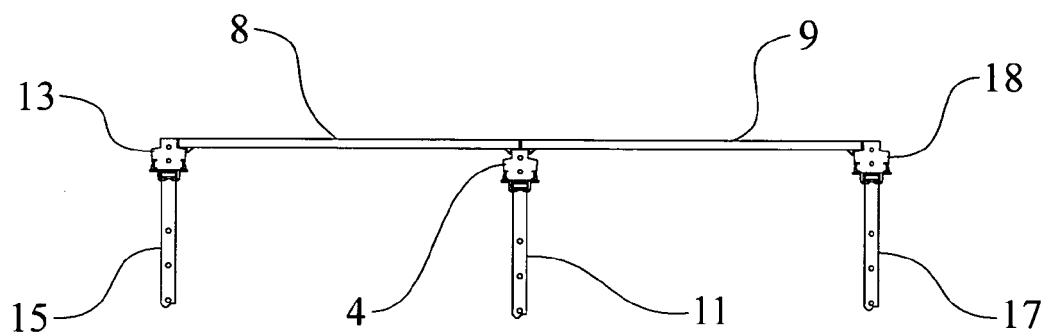


FIG. 3

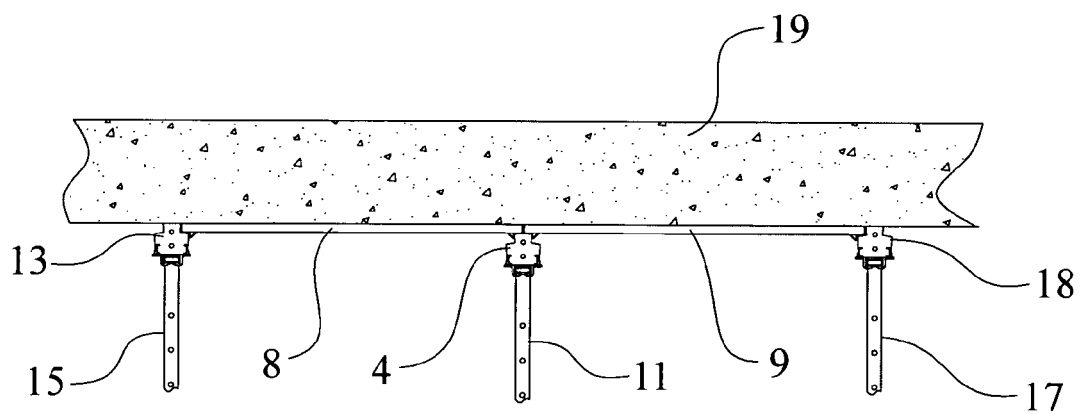


FIG. 4

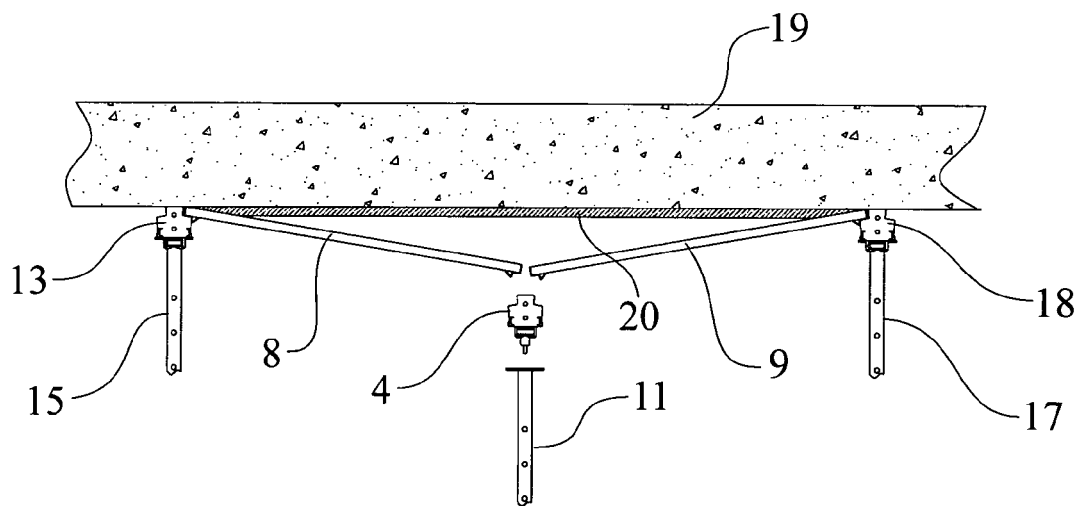


FIG. 5

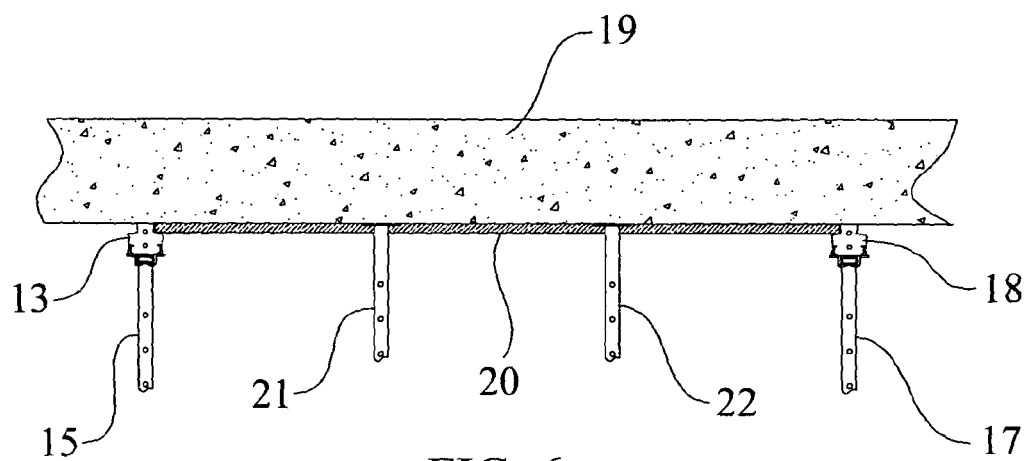


FIG. 6

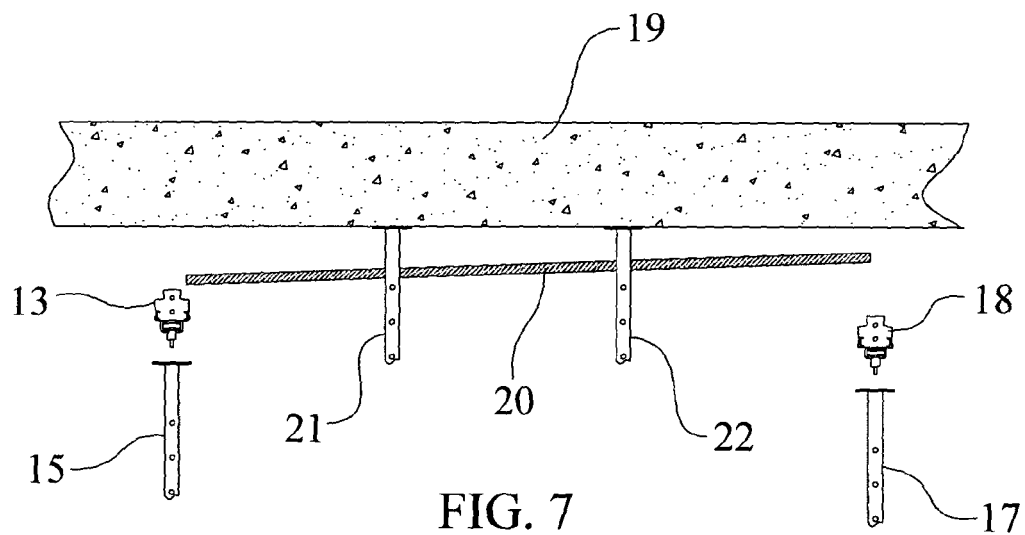


FIG. 7

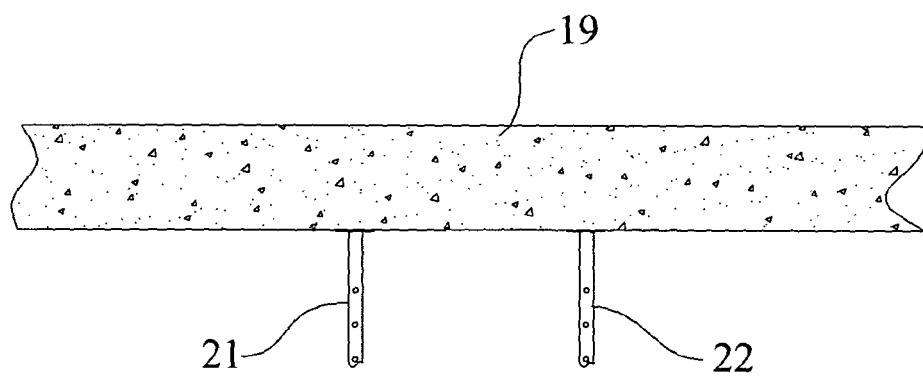


FIG. 8

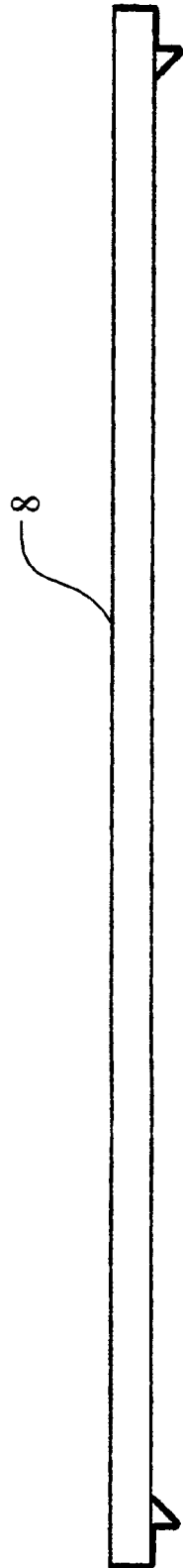


FIG. 9

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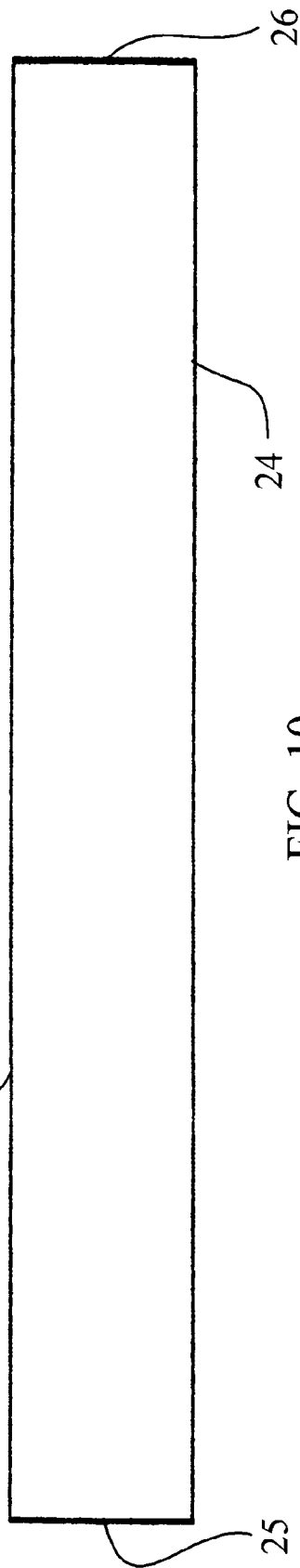


FIG. 10

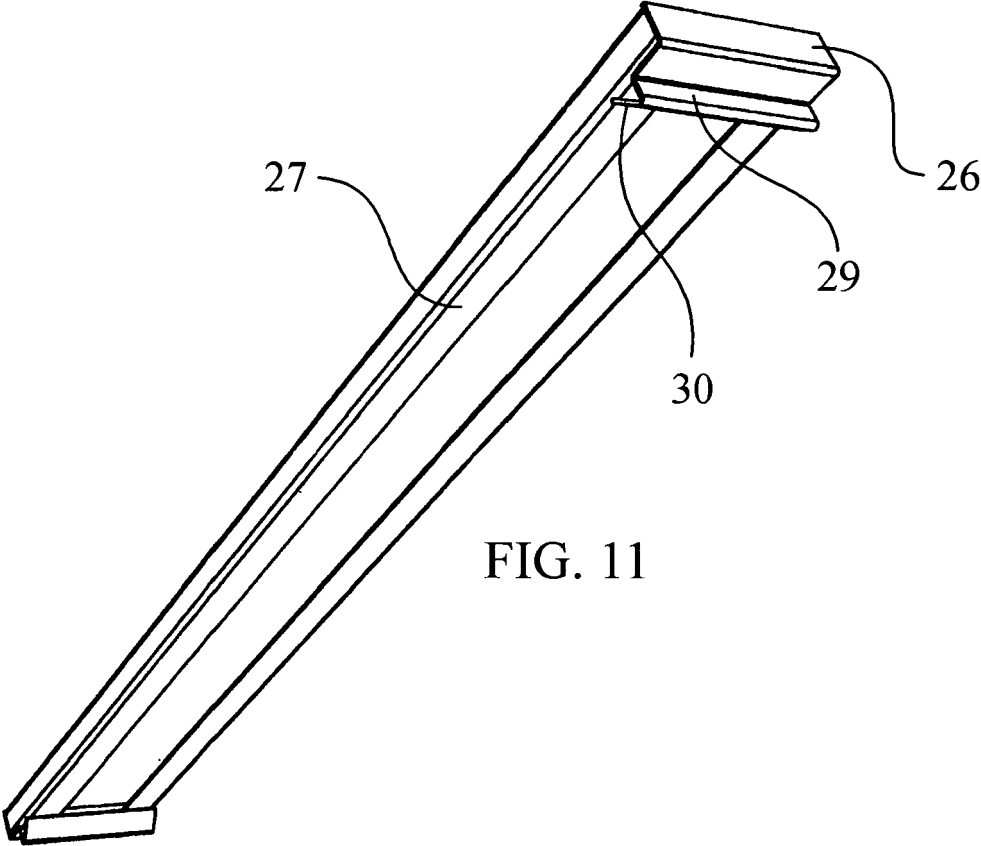


FIG. 11

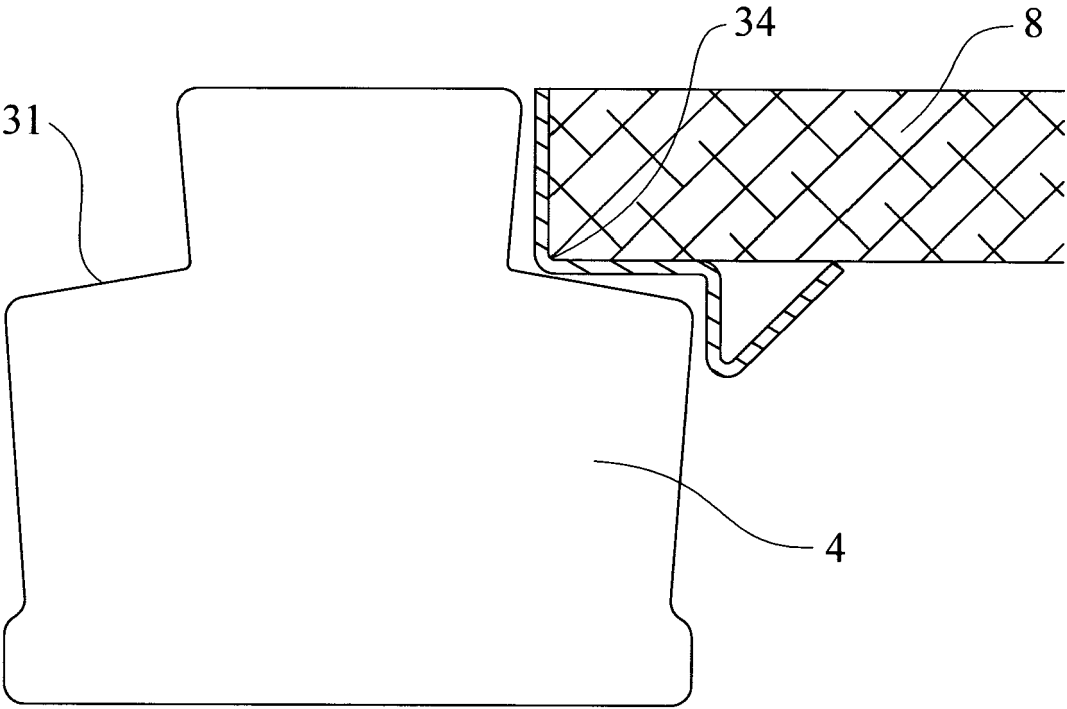


FIG. 12

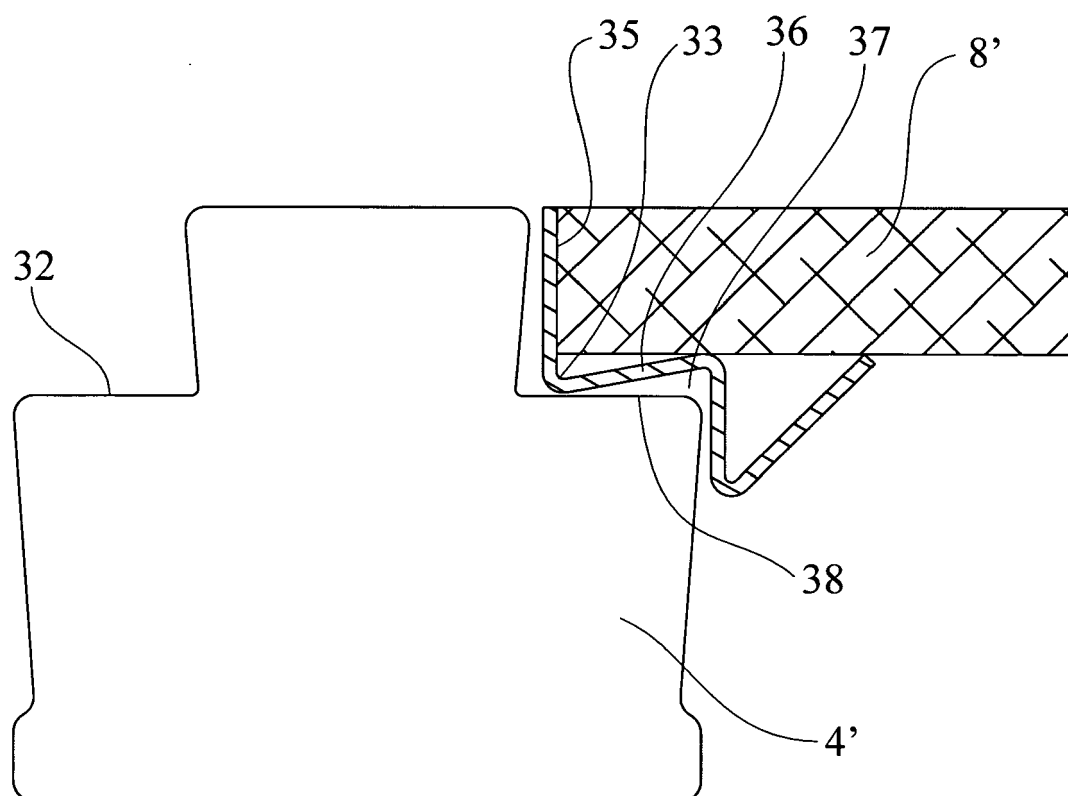


FIG. 13

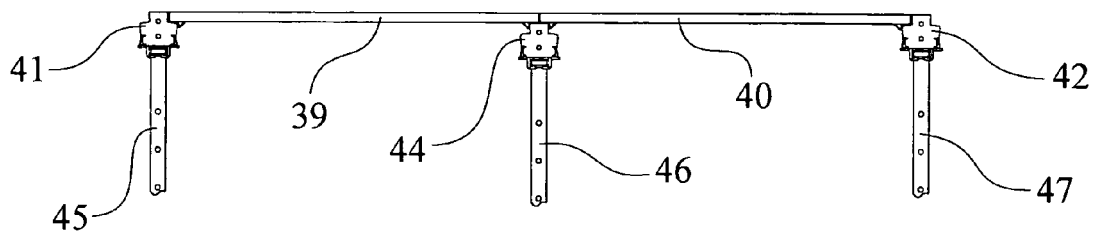


FIG. 14

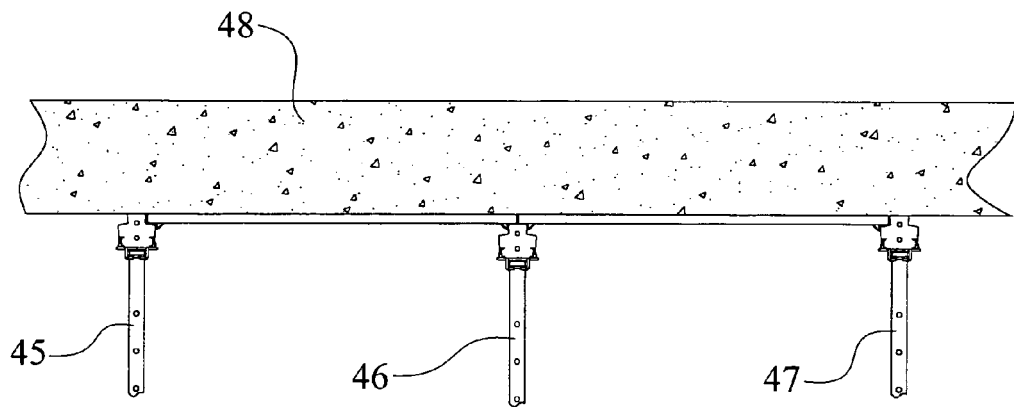


FIG. 15

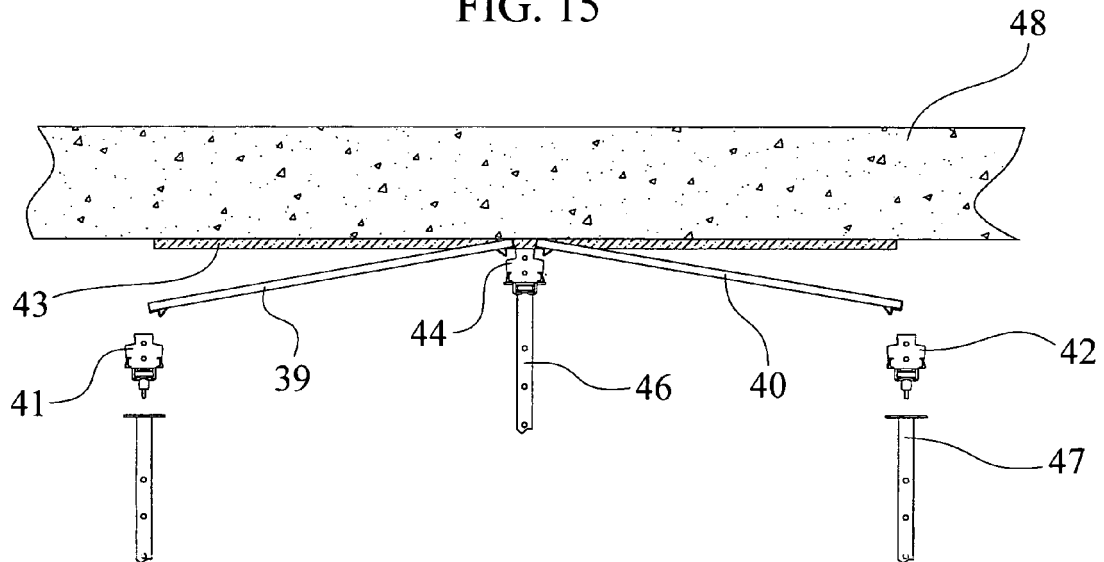


FIG. 16

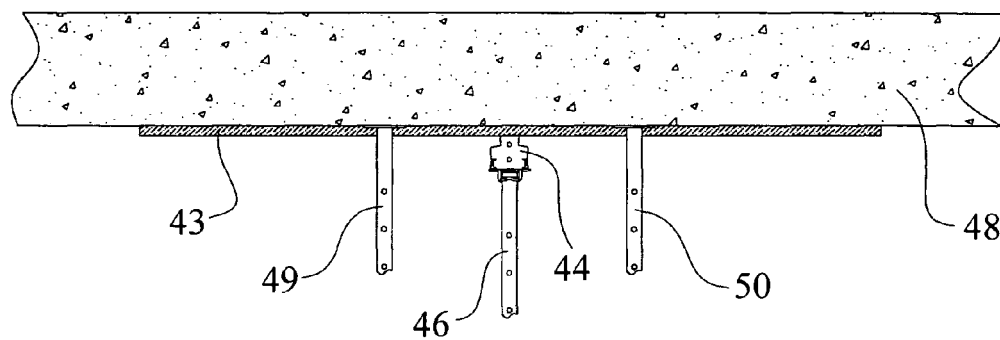


FIG. 17

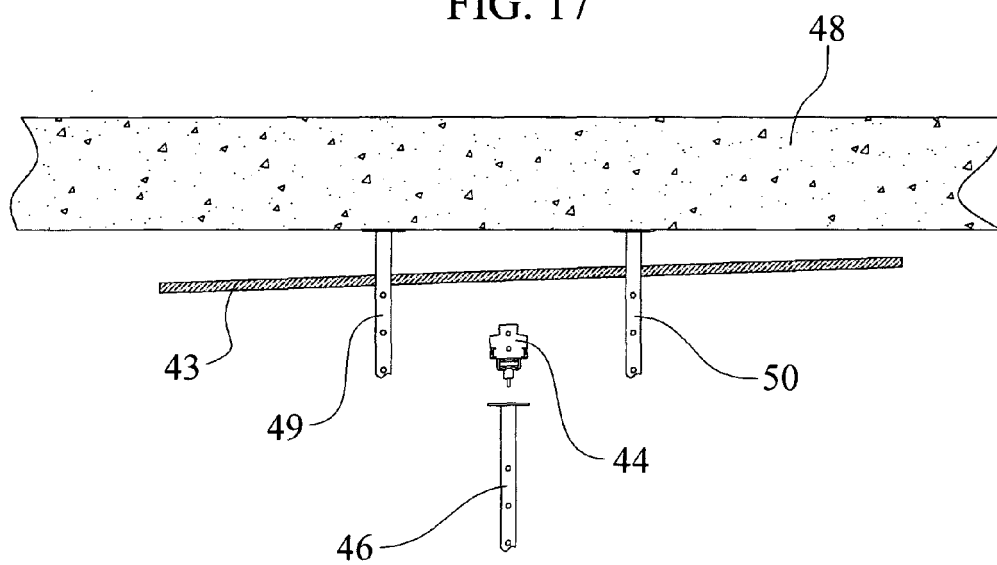


FIG. 18

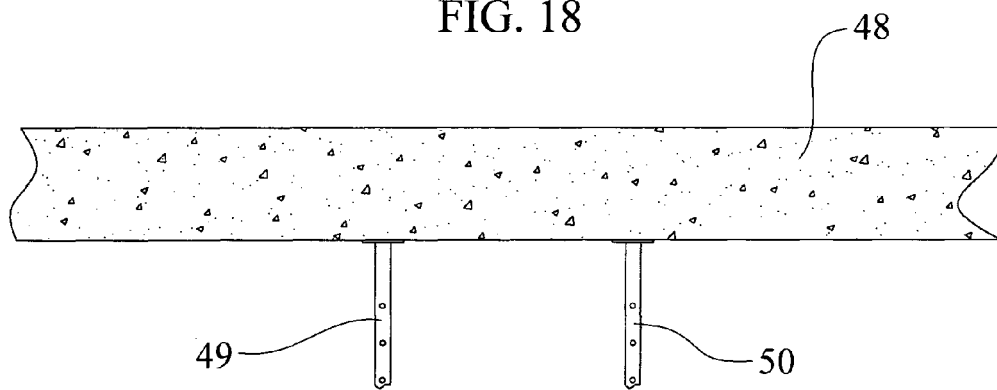


FIG. 19