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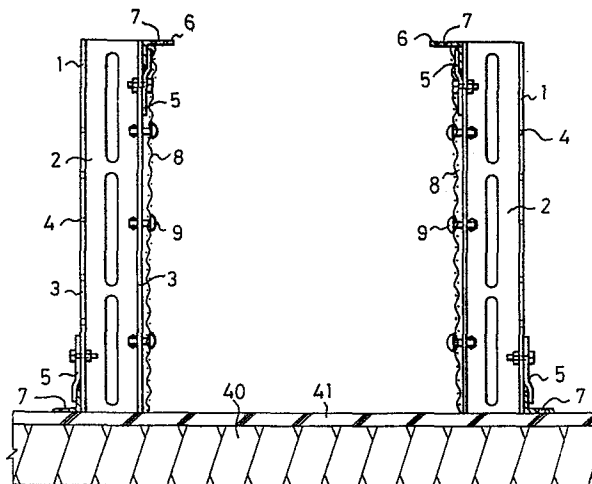
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Method of constructing concrete structure.

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A concrete structure is constructed by attaching metal nets 8 to opposite sides of support members 2 to form a framework. Concrete is poured into the framework and the support member is removed after the concrete has set. The nets 8 are attached by pins 9 extending into holes in the support members 2, or by lugs 19 pressed out of the support members 2, for example.



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METHOD OF CONSTRUCTING CONCRETE STRUCTURE

BACKGROUND OF THE INVENTION

Field of the Invention:

This invention relates to a method of constructing a concrete structure, in which metal nets, for instance expanded metal, are used for a framework and are left in or on the surface of the concrete structure.

Description of the Prior Art:

Heretofore, to construct concrete structures such as a continuous footing, a water tank and a retaining wall, various cumbersome operations of manufacturing, assembling and disassembling frameworks have been involved. These operations also require high precision for they have great influence on the finish of the concrete structure, and hence requires sufficiently skilled workers.

SUMMARY OF THE INVENTION

In the method of constructing a concrete structure according to the present invention, support members and metal nets having comparatively high rigidity such as expanded metal, ribbed expanded metal lath are used in lieu of the conventional framework which consists of frame plates and support members such as batters and pillars

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supporting the frame plates. To construct a concrete structure such as a continuous footing, a water tank or a retaining wall, a concrete framework is first formed by attaching the metal nets to the support members, 5 then concrete is placed into the frame defined by the metal nets, and the support members alone are removed with the metal nets left in or the concrete after the solidification thereof. If necessary, reinforcing bars may be provided in the space defined by the metal nets before 10 placing concrete.

According to the present invention, the time necessary for the manufacturing and assembling of frameworks can be reduced, and particularly the operation of disassembling the framework can be amplified or extremely 15 reduced, so that it is possible to simplify the construction, save labor thereof and greatly reduce the term thereof. Further, the operations of assembling the framework and attaching the metal nets are very simple and do not require any skilled worker. The invention is set out in claim 1.

20 OBJECT OF THE INVENTION

The present invention has an object of obviating the drawbacks discussed above by the provision of a method of constructing a concrete structure, which uses metal nets in lieu of frame plates to thereby permit simplification 25 of the construction, saving of labor therefor and

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great reduction of the term thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Figs. 1 to 6 illustrate a first embodiment of the present invention, in which Fig. 1 is a front view showing part of a framework, Fig. 2 is a plan view showing part of the inner side of the framework, Fig. 3 is a sectional view taken along line B-B in Fig. 1, Fig. 4 is a plan view showing part of the framework, Fig. 5 is a perspective view showing pillars coupled for elongation and contraction, and Fig. 6 is a plan view of a snap;

Figs. 7 to 11 show a second embodiment of the present invention, in which Fig. 7 is a perspective view showing part of the framework, Fig. 8 is a plan view showing part of the same, Fig. 9 is a perspective view showing part of a framework for explaining the method of coupling of a pillar and a lower liner, and Figs. 10 and 11 are perspective views showing a coupling member;

Figs. 12 to 16 are sectional view showing a retaining wall, a continuous footing, a store house and a water tank, respectively;

Figs. 17 to 19 are fragmentary perspective views showing pillars;

Figs. 20 and 21 are perspective views and a fragmentary side view showing a pillar having a ladder-like shape;

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Figs. 22 and 23 are a fragmentary front view and a fragmentary sectional view showing a metal net; and

Fig. 24 is a front view illustrative of the way of installation of a spacer holder.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiment of the present invention will now be described. Referring now to Figs. 1 to 3, showing one embodiment of the present invention, reference numeral 1 designates channel-like pillars. Each channel-like pillar 1 has a web 2 having a plurality of longitudinally elongate slots spaced apart in the longitudinal directions. Its opposite side flanges 3 each have a plurality of holes 4 spaced apart a suitable distance in the longitudinal directions.

15 Clamp members 5 are secured to the pillar 1 at the upper and lower ends thereof. More specifically, a clamp member 5 is secured by a bolt and a nut to the outer surface of one side flange 3 at one end, and another clamp member 5 is secured in the same way to the outer
20 surface of the other side flange 3 at the other end.

The clamp member 5 is formed from a flat plate and has a stepped portion formed at its longitudinal center. It is secured by clamping the nut on the bolt which is inserted through a hole formed in it and a hole 4 formed
25 in the side flange 3. At each end of the pillar, the clamp

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member 5 defines a small gap with the corresponding outer surface of the side flange 3.

Pillars 1 as described above are erected in upright pairs in two rows such that their side flanges 3 oppose each other. The opposing side flanges 3 are those, to which the clamp members 5 are secured at the upper end. The pillars 1 of a pair are spaced apart by a spacer member e.g., a steel rod.

The pillars 1 in a row are connected by a batten 6 extending at right angles to the line forming the pair of pillars. The batten 6 has an L-shaped section. One of its arms has a plurality of longitudinally elongate slots 7 spaced apart in the longitudinal direction. Its slotted portion is clamped between the clamp member 5 and associated side flange 3 of each pillar 1. The other arm projects toward the other row of the pillars 1. The pillars 1 in each row are also connected at their lower end by similar L-shaped batten with the arm without slots 7 clamped between the clamp member 5 and corresponding side flange 3 of each pillar 1 and the slotted arm projecting in the direction away from the other row of pillars 1. Parallel metal nets 8 are stretched over the facing sides of the pair rows of pillars 1.

Fig. 6 shows a metal net mounting snap 9.

It is made of vinyl chloride but it may also be made

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of other synthetic resins or rubber. It has a disc-like head 10 and a plurality of locking portions 11 perpendicularly projecting from one side of the head 10. The locking portions 11 are four in number and
5 define a cross-shaped space in section. Each has an outward projection at its mid-portion. The projection 12 is smoothly raised from the rest of the locking portion 11 and smoothly terminates therein at the other end.

10 The metal net is attached to the pillars 1 by the snaps 9 in the following way. Meshes of the metal net 8 are fitted in the locking portions 11 of the metal net mounting snaps 9, and then the snaps 9 are inserted into the holes 4 of the pillars 1. The locking
15 portions 11 have the projections 12, and as they are inserted the outer diameter of the assembly of the projections 12 is reduced by an amount corresponding to the cross-shaped space so that the projections 12 can be pressure inserted through the hole 4. When
20 the projections 12 clear the hole, they are restored to the initial state by the elasticity of the locking portions 11. Now, the metal net mounting snap 9 can not be readily removed. In this way, the metal net 8 can be held attached to the pillars 1 by the head 10
25 of each snap 9.

The battens 6 are connected together to connect

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adjacent C-channel-shaped pillars by lapping a connecting member over opposed end portions of the battens and securing the connecting member by inserting bolts through the slots 7.

5 The battens 6 connecting the lower ends of the pillars 1 are secured to a concrete subslab by passing concrete nails or the like through the slots 7 and driving them into the concrete.

 Figs. 7 to 11 show a different embodiment of the present invention. A pair of frameworks 13 is erected on a concrete foundation 1 formed by placing concrete on site. The pair frameworks 13 are spaced apart a necessary distance. The framework 13 consists of a lower liner 14, pillars 15 and an upper liner 16. The lower
15 liner 14 is laid on the concrete foundation 37, and is secured to the same by a plurality of securing members 17. The pillars 15 are erected on the lower liner 14 at predetermined intervals in the longitudinal direction of the lower liner 14. They are coupled to the lower liner
20 14 by coupling members 18 as shown in detail in Figs. 10 and 11. The upper liner 16 is secured to the upper end of the pillars 15 by coupling members 18.

 The lower liner 14, pillars 15 and upper liner 16 have a channel section. They have a
25 plurality of cut-and-raised pawls 19 formed on one or both side portions. They are assembled into

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the framework 13 such that the pawls 19 are directed to the opposite framework 13 of the pair.

The securing member 17 has an angle, and it is secured by means of nails, screws, etc. to the concrete foundation and lower liner 14.

The coupling member 18 has an L-shaped form consisting of a horizontal section 20 and a vertical section 21. The horizontal section 20 has a pin 29 inserted through its substantial central portion from the above. A clamp member 22 is rotatably mounted on the pin 29. The coupling member 18 is secured to the upper or lower liner 14 or 16 such that the opposite side portions 23 of the liner are clamped between its horizontal section 20 and clamp member 22. The vertical section 21 has a plurality of vertically spaced-apart bifurcated clamp pieces 24 horizontally projecting from each of the opposite edges. The coupling member 18 is secured to the pillar 15 with the opposite side portions 23 of the pillar 15 clamped in the bifurcated clamp pieces 24.

When the assembly of the frameworks 13 is completed, metal nets 25 of metal lath, wire lath and ribbed lath or the like which are stretched over the inner side of the frameworks 13 by hooking them on the pawls 19, as shown in Figs. 22 and 23. If necessary, a spacer or spacers are mounted between the pair frameworks 13.

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When the attachment of the metal nets 25 is completed, reinforcing bars 26 are provided on the inner side of the metal nets 25, and then concrete is placed.

When the placed concrete has acquired a certain mechanical strength, the frameworks 13 are removed. If necessary, a finishing material such as mortar is coated on the surface of the metal nets 25.

Fig. 12 shows a retaining wall fabricated by the method of constructing concrete structure according to the present invention. To produce this structure, first rubble 40 is laid at the bottom of a trench, and a concrete subslab 41 is formed on the rubble 40. A pair of frameworks 13 is then erected on the concrete subslab 41 at a predetermined spacing. One of the frameworks 13 is inclined toward the inner side a certain angle. Afterwards, the frameworks 13 are supported from the outer side using supporting material such as battens 26, oblique supports 27, and angle pieces, for example.

The framework 13 consists of an upper liner 16, pillars 15 and a lower liner 14. These components are metal members having a channel section and have a plurality of cut-and-raised pawls 19 formed on one or both side portions. To assemble the frameworks 13, the lower liners 14 are laid parallel to and at a predetermined spacing from each other on the concrete subslab 41 and secured on the concrete subslab 41

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using securing members 17. The pillars 15 are erected on each of the lower liners 14 at predetermined intervals^s in the longitudinal direction thereof. They are secured to the lower liners 14 using coupling members 18 as shown 5 in Figs. 10 and 11. The upper liners 16 are secured to the pillars 15 in respective rows using coupling members 18.

When the assembly of the frameworks 13 is completed, metal nets 25 of metal or wire lath for example are stretched over the inner side of 10 the frameworks 13 by hooking them to the cut-and-raised pawls 19. If necessary, the frameworks 13 are tied together using coupling bolts 28.

When the attachment of the metal nets 25 is completed, reinforcing bars 26 are provided on the inner 15 side of the metal nets 25, and then concrete 39 is poured.

When the poured concrete 39 has acquired a sufficient mechanical strength, the frameworks 13 and support members supporting the same such as battens 26, oblique supports 27, and angles etc. are removed. If 20 necessary, a finishing material such as mortar is subsequently coated on the surface of the metal nets 25. Alternatively, paper materials such as those used for roofing or the like may be preliminarily applied to the surface of the metal nets 25, and they may be separated 25 after the poured concrete 39 has solidified. In this case, solidified concrete 39 will have a smooth and flat

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surface so that the coating of the finishing material may be dispensed with.

Figs. 13 to 16 show respective different structures, i.e., a continuous footing, a garage, a store-house, a pool and water tank. To construct the continuous footing, trench A is first formed, and rubble 40 is laid at the bottom of the trench A. A concrete subslab 41 is formed on the rubble 40. A plurality of pillars 15 are erected on the concrete subslab 41 at predetermined interval in the longitudinal direction of the trench A.

The pillar 15 has a ladder-like intergral structure consisting of opposite side pillars 15a and coupling portions 15b connecting the pillars 15a. The pillars 15a have a plurality of outwardly projecting pawls 19 spaced apart at predetermined interval in the vertical direction of pillars 15a. The pillars 15 are erected on the concrete subslab 41 by nailing them or inserting them into the concrete subslab 41. The upper ends of the pillars 15 are connected together by L-shaped liners 28.

20 Subsequently, metal nets 25 are stretched over both sides of the row of pillars 15 and are attached thereto by hooking them on the pawls 19 projecting from the pillars 15a and by bending the pawls 19.

Finally, concrete 39 is poured into the space 25 defined between the opposite side metal nets 25, and then

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a finishing material 38, such as mortar is coated on the surfaces of the metal nets 25.

If necessary, reinforcing bars may be provided in the space between the metal nets 25 before pouring
5 the concrete 39.

Alternative pillars 15 are shown in Figs. 17 to 19.

Where these pillars 15 are used, the upper ends of the pillar pairs 15 are liable to deviate away
10 outwardly during the pouring of concrete if they are not tied together by any connecting means. To prevent this deficiency, a spacer holder 34 as shown in Fig. 24 may be used.

The spacer holder 34 is secured to the opposite
15 side liners 28 by inserting projections 30 and 31 through holes 32 formed in the liners 28.

The distance between the projection pairs 30 and 31 may be adjusted by loosening set screws 33, moving a slide member 35 in the longitudinal direction of the
20 spacer holder which may be a steel pipe and clamping the set screws 33 again with the slide member 35 at a predetermined position.

EFFECTS OF THE INVENTION

With the construction described above according
25 to the present invention, the time necessary for manufacturing and assembling as in the prior art framework can be reduced, and particularly the disassembling

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operation can be carried out quickly. It is thus possible to simplify the construction and greatly reduce the time taken.

5 Further, the operation of assembling the framework and operation of attaching the metal net are very simple and can be done without skilled workers.

CLAIMS:

1. A method of constructing a concrete structure comprising the steps of:

5 attaching metal nets to opposite sides of a
support member to form a framework;
pouring concrete into said framework; and
removing said support member after said concrete
has solidified.

10 2. The method of constructing a concrete structure
according to claim 1, wherein said support member
comprises a pillar having a channel section whose
opposite side flanges have a plurality of longitudinally
elongate slots spaced apart along the length of the
pillar.

15 3. The method of constructing a concrete structure
according to claim 1, wherein said support member
comprises a pillar having a channel section of whose
opposite side flanges, at least one has a plurality
of cut-and-raised nails provided in a suitable
20 spacing in the longitudinal direction.

25 4. The method of constructing a concrete structure
according to claim 1, wherein said support member
comprises a liner having a channel section of whose
opposite side portions, at least one has a plurality
of cut-and-raised nails provided in a suitable
spacing in the longitudinal direction.

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5. The method of constructing a concrete structure according to claim 1, comprising joining together said pillars by a pair of battens having an L-shaped section, at least one of the battens having a plurality of
5 longitudinally elongate slots spaced apart along the length of the batten.

6. The method of constructing a concrete structure according to claim 1, wherein said support member comprises a ladder-like pillar including opposite side
10 pillar members connected together by a plurality of connecting members, each said side pillar member having a plurality of cut-and-raised nails projecting from the outer side and suitably spaced apart in the longitudinal direction.

15 7. The method of constructing a concrete structure according to claim 1, wherein the support member is arranged in two portions and said metal nets are attached to the facing sides of said portions.

8. The method of constructing a concrete structure
20 according to claim 1, wherein said metal nets are attached to an outer side of said support member.

9. The method of constructing a concrete structure according to claim 1, wherein said metal nets are stretchedly attached to one side of said support member
25 by metal net mounting snaps capable of being pressure

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fitted into holes formed in said support member.

10. The method of constructing a concrete structure according to claim 9, wherein said metal net mounting snaps each has a circular head and a plurality of
5 elongate locking portions projecting from said circular head, each said locking portion having an outward projection formed in an intermediate portion thereof.

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FIG.1

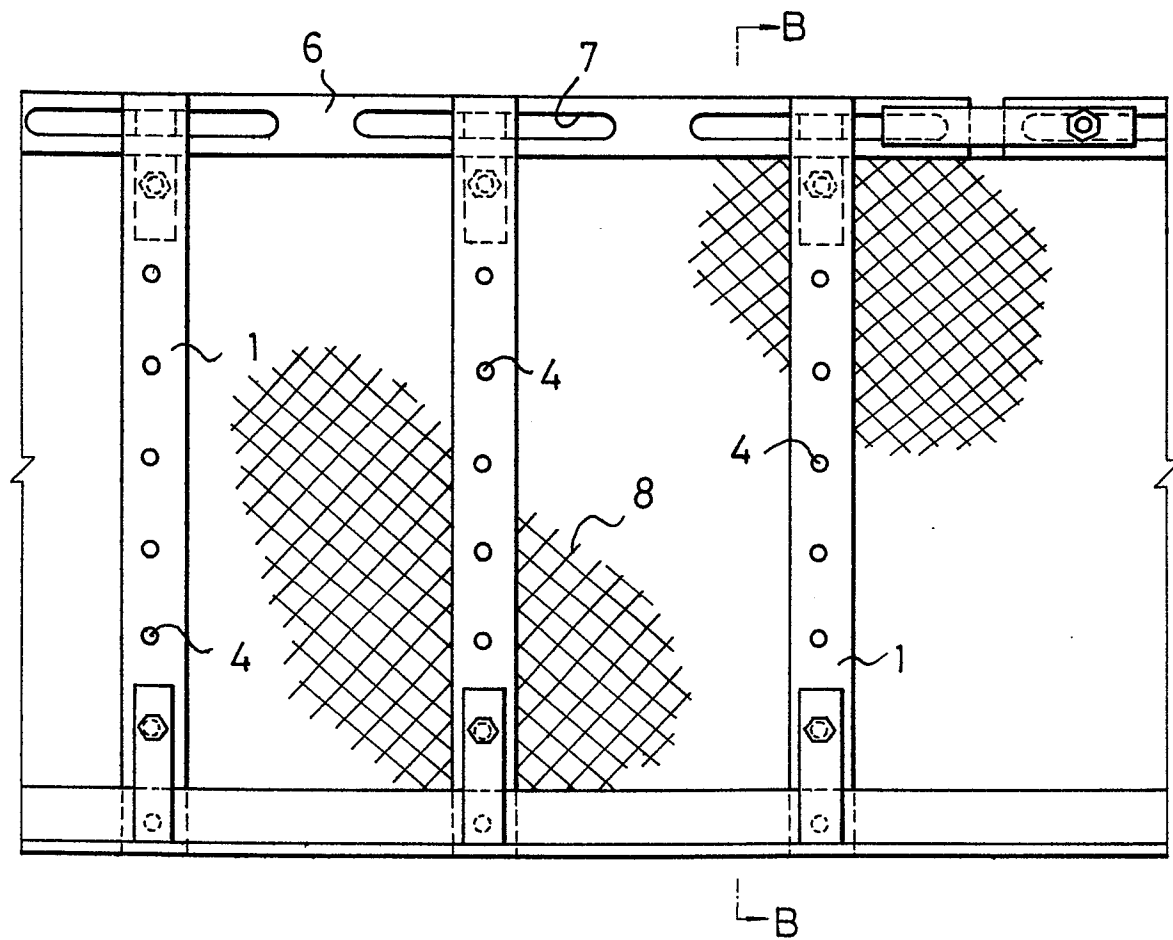


FIG. 2

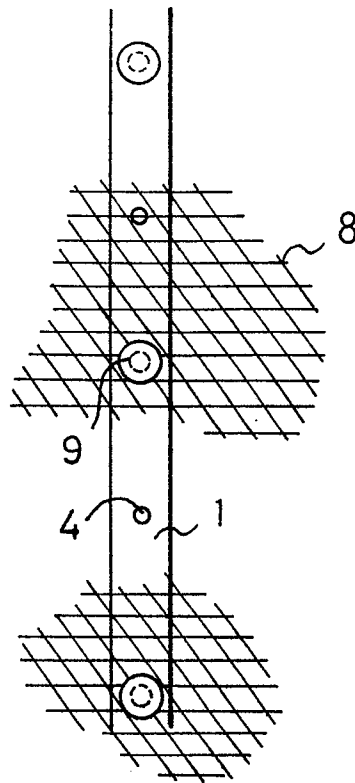
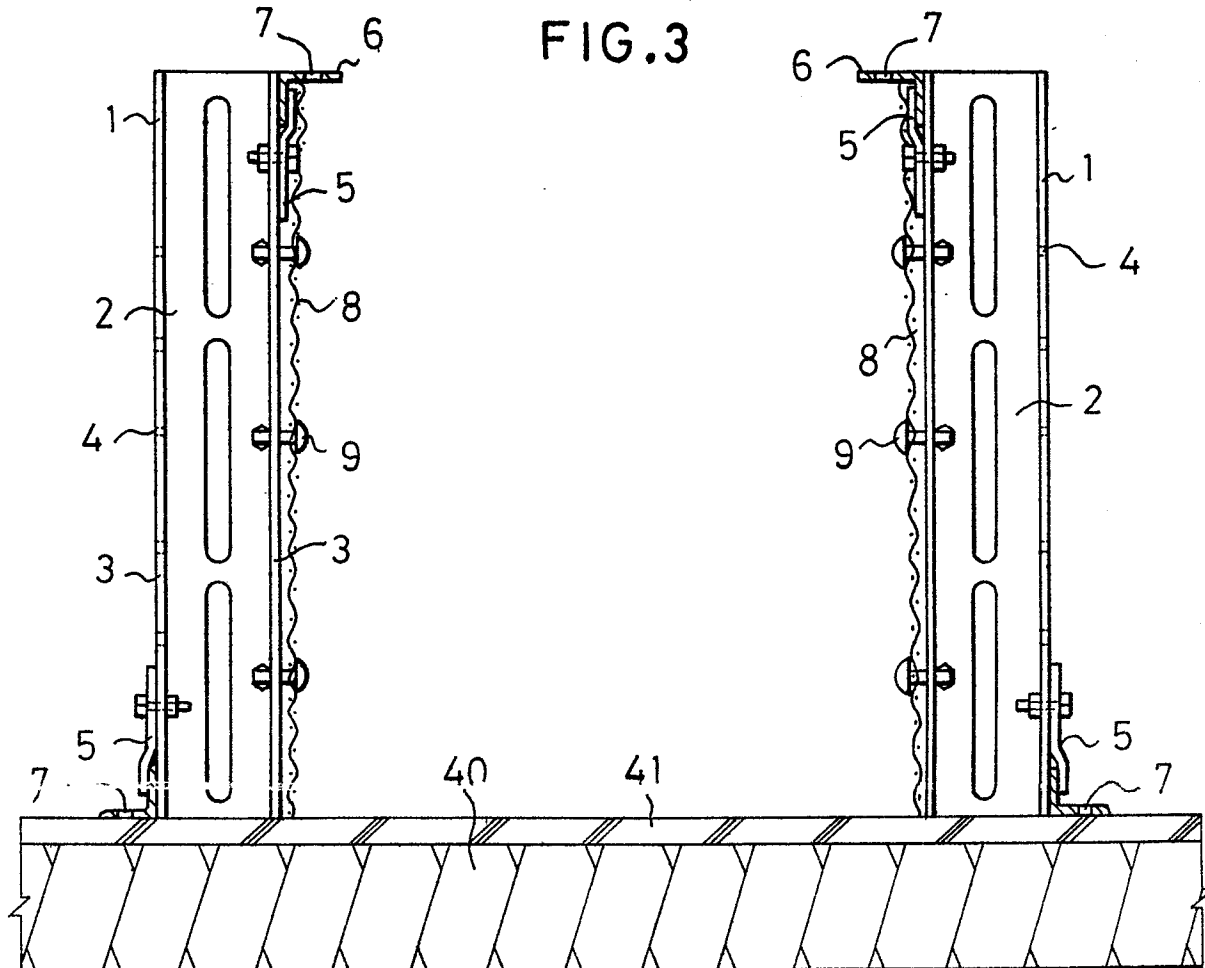


FIG. 3



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FIG.4

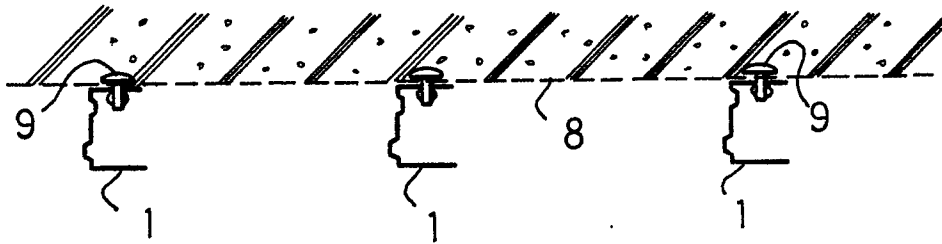


FIG.5

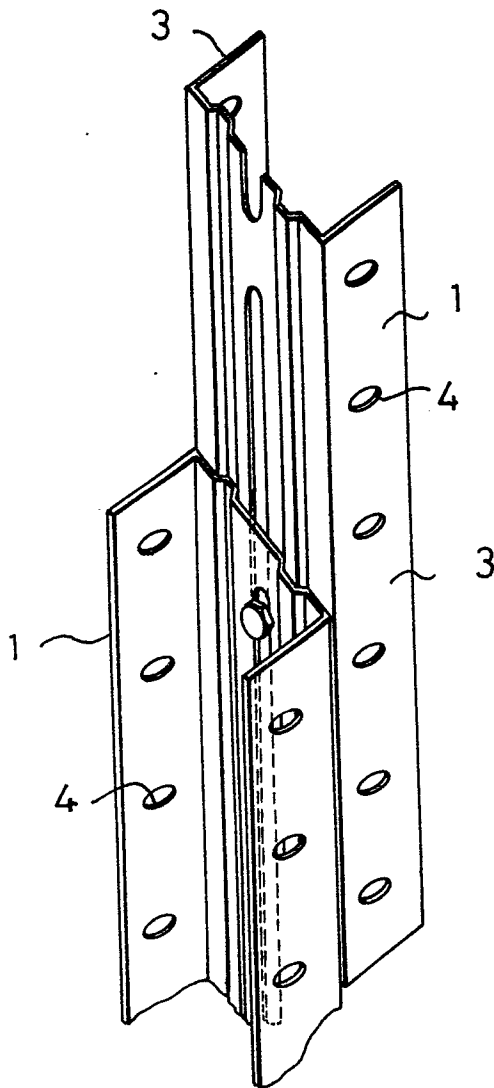
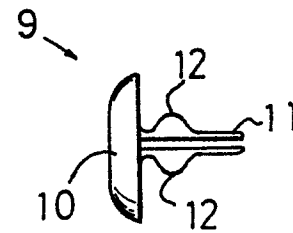


FIG.6



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FIG. 7

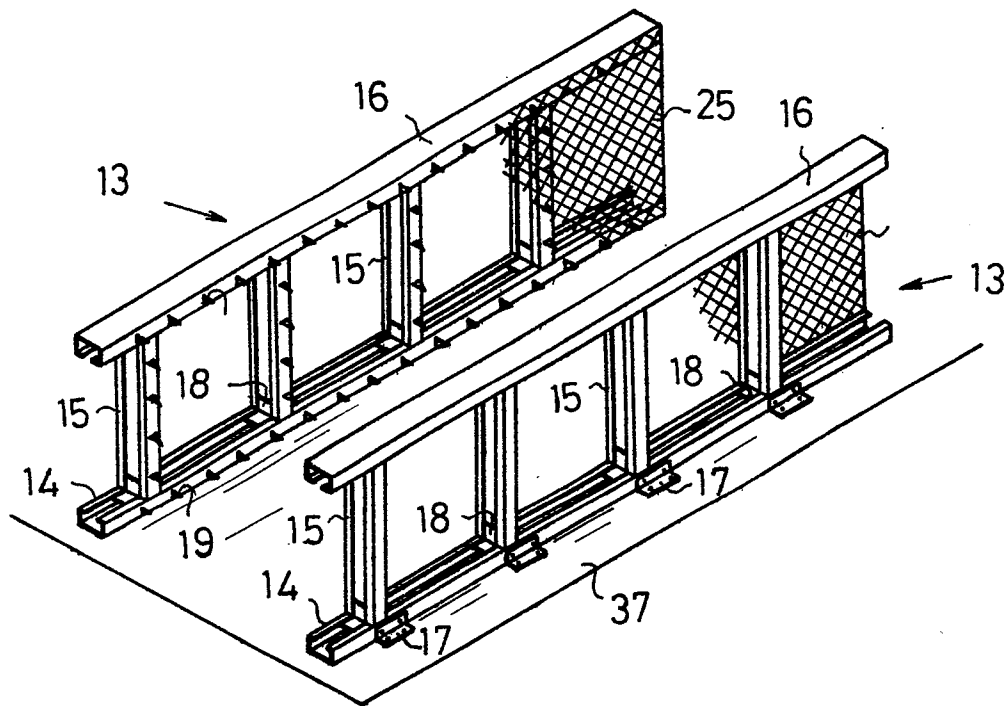
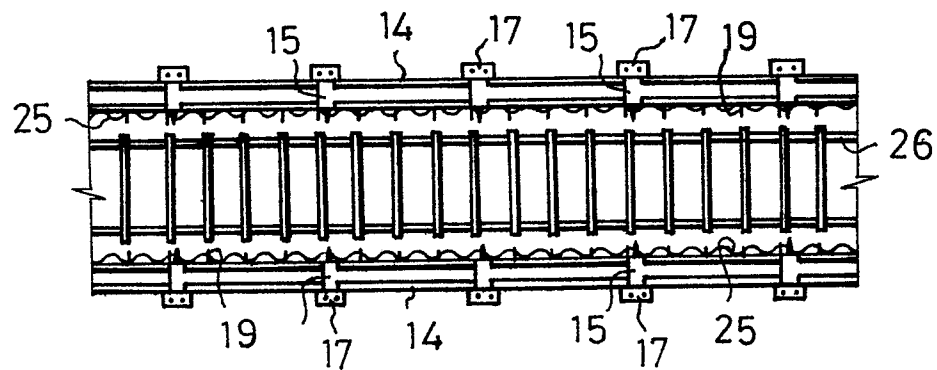


FIG. 8



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FIG.9

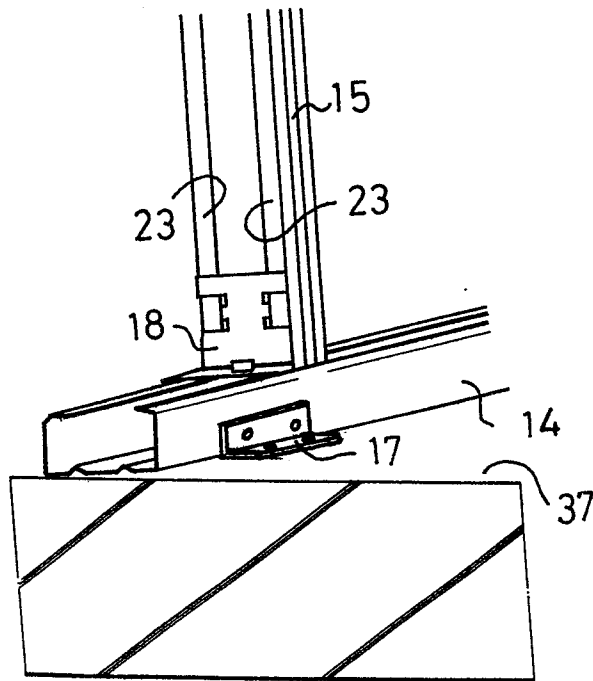


FIG.10

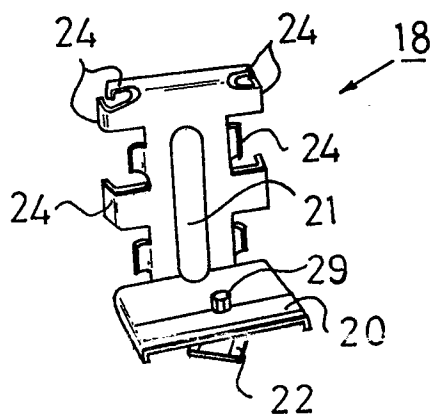
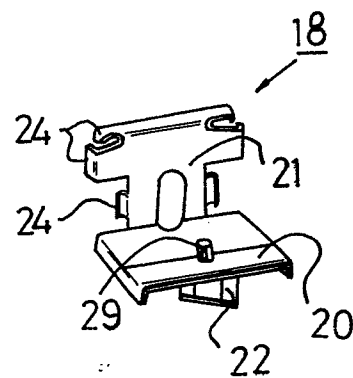
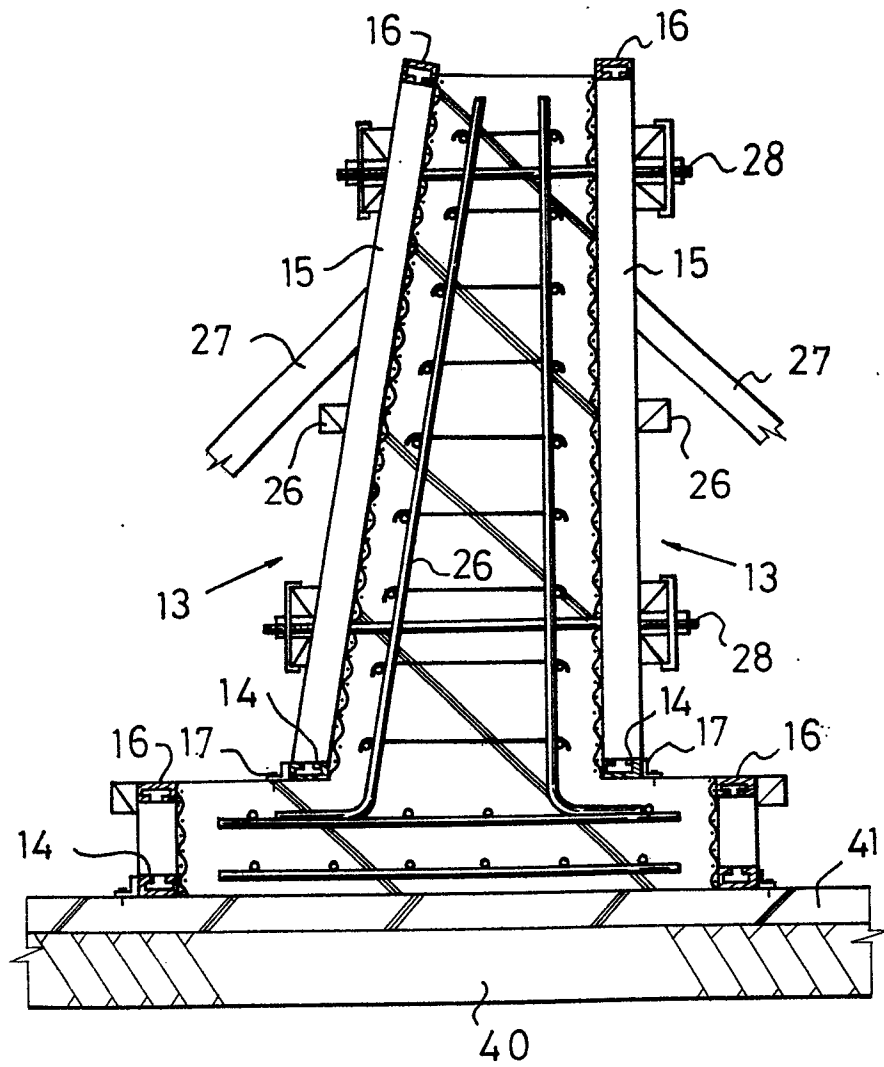


FIG.11



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FIG. 12



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FIG. 13

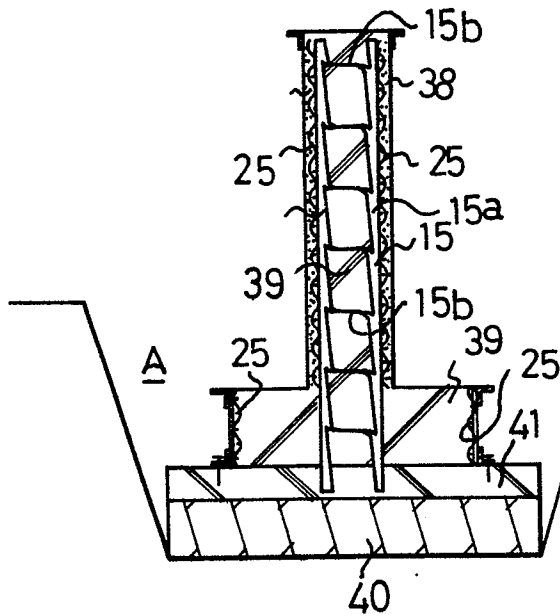


FIG. 14

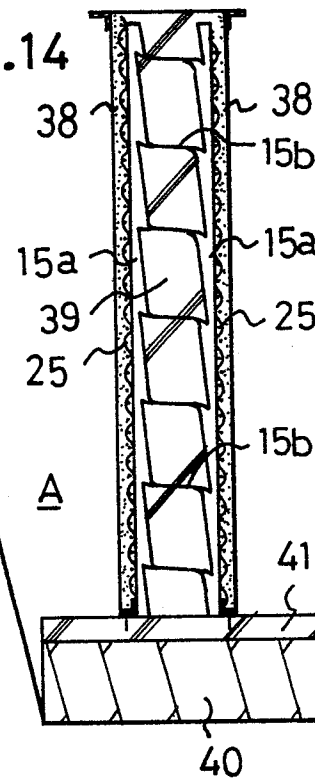
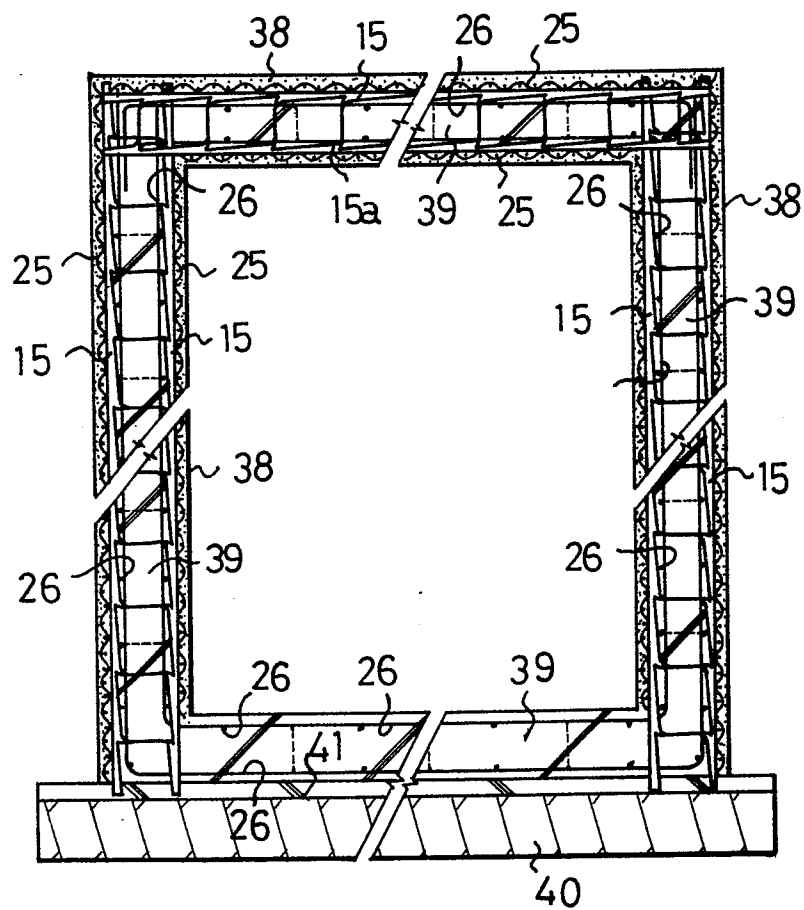
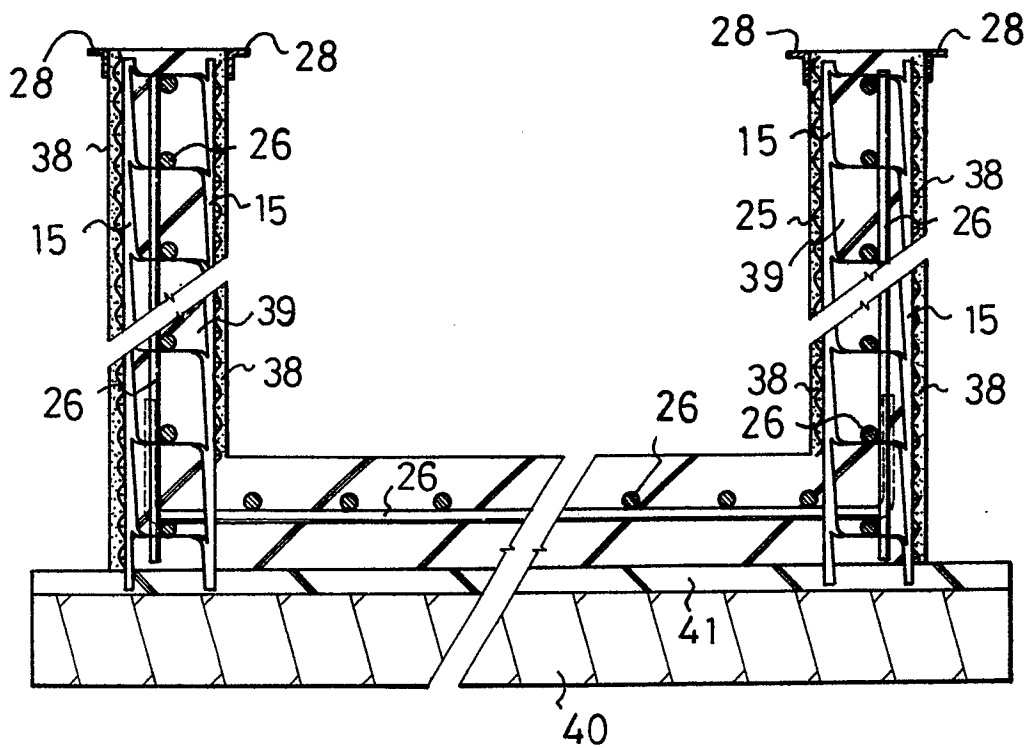


FIG. 15



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FIG.16



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FIG.17

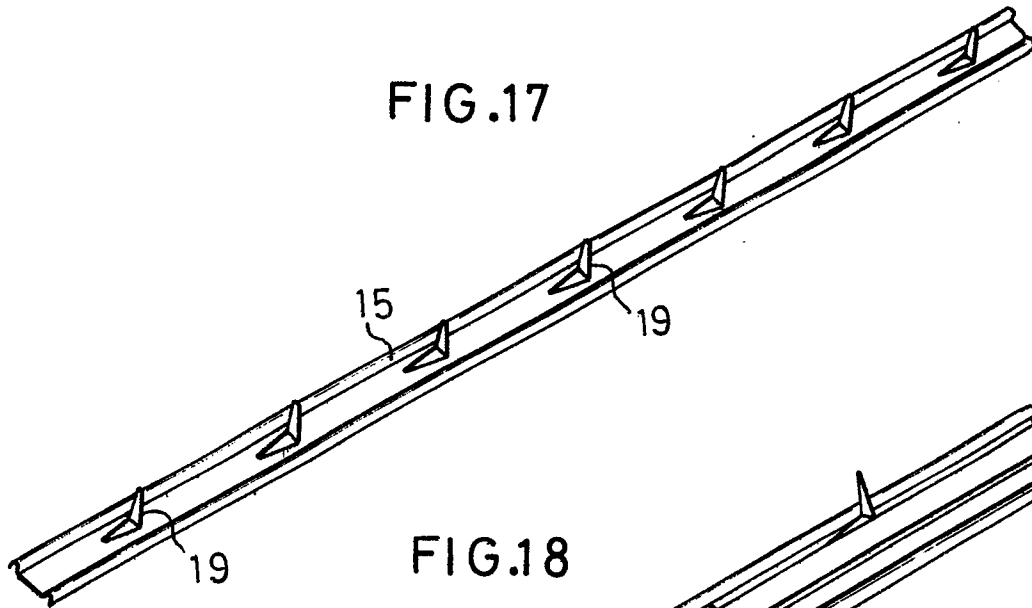


FIG.18

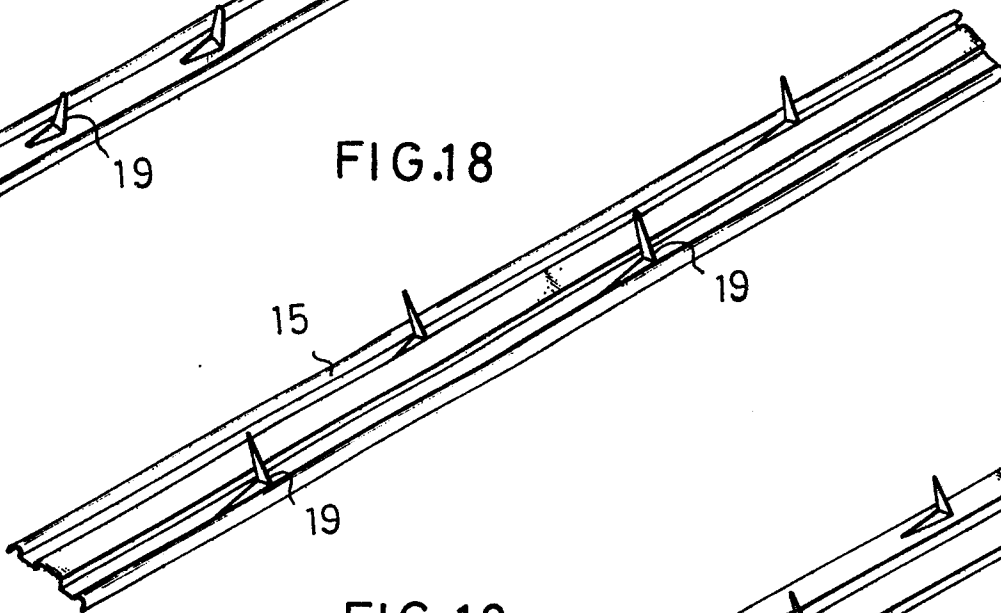
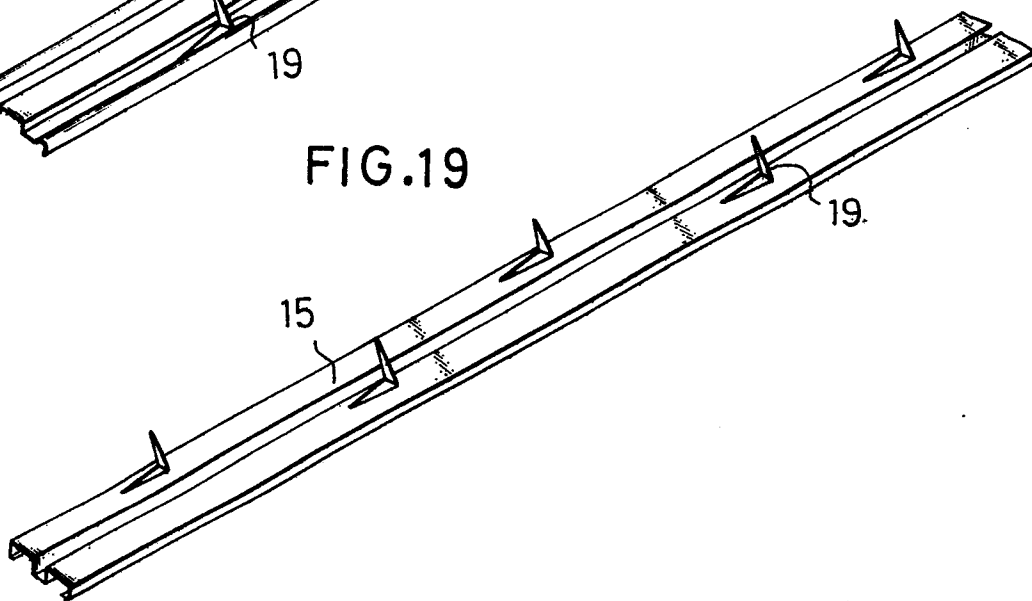


FIG.19



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FIG. 20

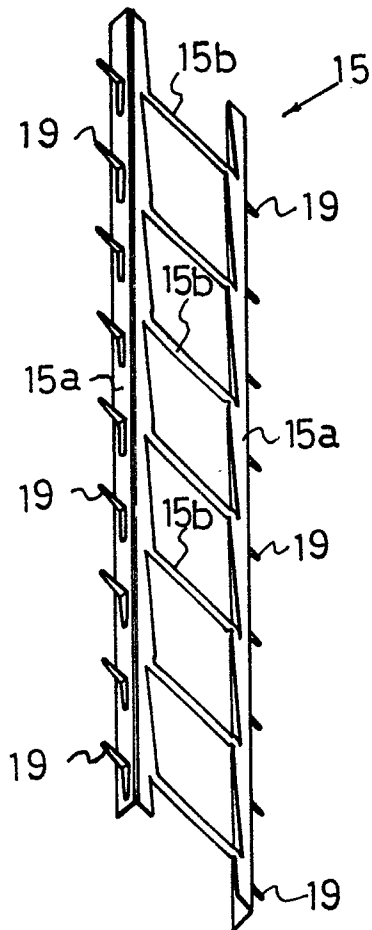
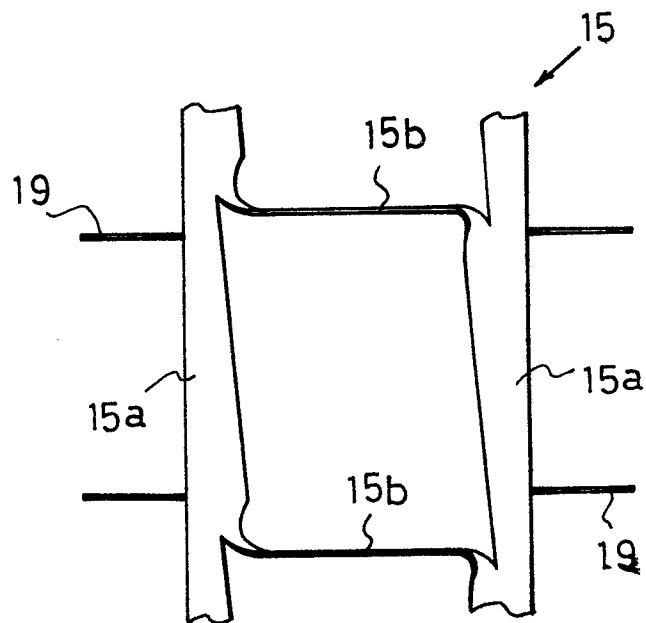


FIG. 21



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FIG. 22

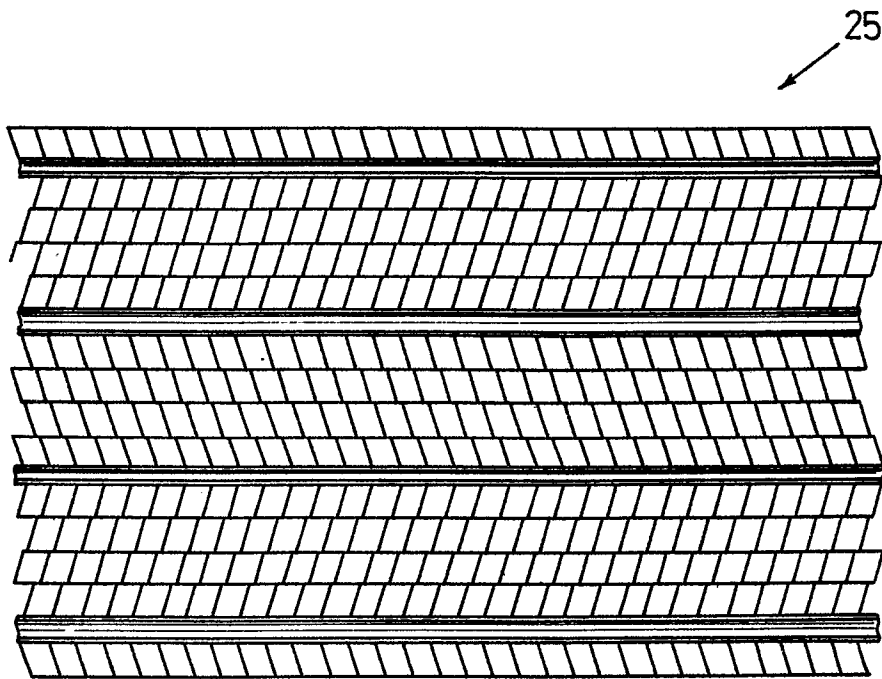
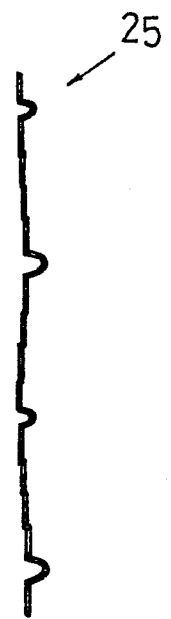


FIG. 23



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FIG. 24

