

12

EUROPEAN PATENT APPLICATION

21 Application number: 82200720.9

51 Int. Cl.³: E 04 C 2/38
 E 04 H 9/02, E 04 B 5/52
 E 04 B 7/04

22 Date of filing: 11.06.82

43 Date of publication of application:
 21.12.83 Bulletin 83/51

64 Designated Contracting States:
 BE DE FR GB IT LU NL

71 Applicant: Debremaeker, Egide Jozef
 No. 40 Dr. Spitaelslaan
 B-1520 Lembeek-Halle(BE)

71 Applicant: Gewestelijke Investeringsmaatschappij voor
 Vlaanderen N.V.
 Bus 1
 B-2000 Antwerpen(BE)

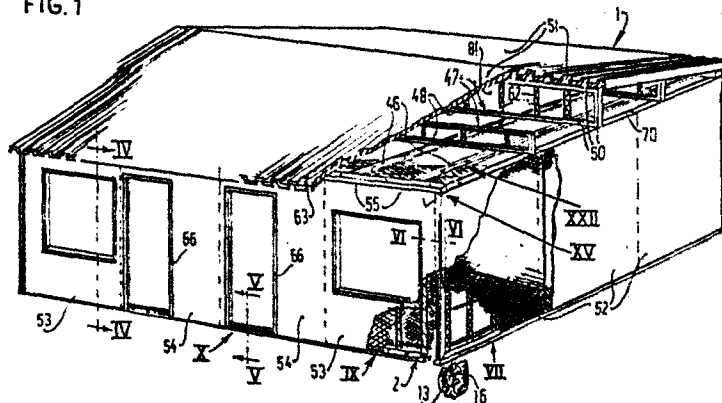
72 Inventor: Debremaeker, Egide Jozef
 No. 40 Dr. Spitaelslaan
 B-1520 Lembeek-Halle(BE)

74 Representative: Konings, Lucien Marie Cornelis
 Joseph et al,
 OCTROOIBUREAU ARNOLD & SIEDSMA Sweelinckplein
 1
 NL-2517 GK Den Haag(NL)

54 Building and prefabricated parts, such as building element and plate profile destined for said building.

57 The building has low weight and can be erected by
 unskilled personal, since it consists for an important part of
 panels (52, 53, 54) each formed by a metal frame and
 relatively crossing stay wires arranged in said frame. These
 panels (52, 53, 54) can be readily put at their places and be
 plastered.

FIG. 1



-1-

Building and prefabricated parts such as structural elements and sheet profiles for use therein.

The invention relates to a building and has for its object to provide a building which can be erected by unskilled labour.

For this purpose the building is characterized by
5 panels comprising each a metal frame and a plurality of relatively crossing stay wires arranged in said frame. The panels can each be formed by a prefabricated structural element comprising a metal frame and a plurality of relatively crossing stay wires fastened in said frame. In this case the builders
10 only need dispose the panels and, as the case may be, plaster them.

Transport to the building site and the erection are facilitated by constructing light-weight elements. In the panel embodying the invention the elements thereof co-operate
15 in accordance with a composition material effect to form a solid unit. The buckling lengths of the profiles of the frame and the buckling lengths of the stay wires are small. The elements hold one another in the predetermined, relative positions. This composition material effect is further enhanced

when the panels have a stiffening layer, for example, a plaster attaching mat on at least one side, but preferably on both sides.

The transport may be simplified by conveying the
5 panel in separate, fitting components such as sheet profiles, rafters and mats, which are subsequently assembled on the building site.

When the rims of the panel frames are each formed by a U-section profile, the web of which has an inverted
10 U-shaped groove, two neighbouring panels can be connected with one another by means of a spring, the panels can be firmly secured by their grooves on annular protuberances of floor profiles and the panels can be readily interconnected at the top by I-, T-section, corner or cross pieces.

15 The building, though having a light weight owing to the small quantity of material required, can be firmly anchored to the ground by means of ground anchors having at least one helical anchor to be screwed into the ground.

The aforesaid and further features of the invention
20 will become apparent from the following description with reference to the drawing. The drawing schematically shows in:

Fig. 1 a fragmentary, perspective view of a preferred embodiment of a building in accordance with the invention,

25 Fig. 2 a perspective view of a floor frame for a building as shown in Fig. 1,

Fig. 3 on an enlarged scale detail III of Fig. 2,

Figs. 4, 5 and 6 enlarged sectional views taken on the lines IV-IV, V-V and VI-VI respectively in Fig. 1,

30 Figs. 7, 9 and 10 an enlarged, perspective view of details VII, IX and X respectively of Fig. 1,

Fig. 8 an exploded, perspective, partial view of detail VII of Fig. 1,

Figs. 11 to 14 cross-sectional views of a sheet
35 profile used in the building of Fig. 1,

Figs. 15 to 18 perspective plan views of connection details,

Fig. 19 a variant of detail XIX of Fig. 4,

Fig. 20 on an enlarged scale a detail at the location of detail XX of Fig. 2 in a later building stage,

Fig. 21 on an enlarged scale a profile piece of detail XX of Fig. 2,

5 Fig. 22 on an enlarged scale a profile piece of detail XXII in Fig. 1 and

Fig. 23 on an enlarged scale a variant of detail XXIII in Fig. 2.

The building 1 of Fig. 1 comprises a floor frame 2
10 shown in Fig. 2 which is assembled from sheet profiles 3
shown in Fig. 11, which are located at the areas where outer
walls have to be erected. The profile 3 has a substantially
U-shaped profile formed by a folded sheet of preferably 1,5
mms wall thickness, having an upwardly bulging web 4 and a
15 rectangular, trapezoidal section with a basis width $\underline{a}$. At the
corners of the floor frame 2 a recess 5 is cut out of the web
4 of the adjoining profiles 3 so that after being slightly
bent out the profiles 3 can be slipped one into the other and
subsequently firmly fastened to one another by means of pop
20 rivets 7 inserted into previously bored holes (see Fig. 3).
As an alternative of the connection shown in Fig. 3 the ends
of the profiles 3 can be interconnected by means of a
U-shaped profile 64 bent over at right angles, the profiles 3
being spot-welded to the U-shaped profile 64 (see Fig. 23).

25 To the profiles 3 are welded at intervals wire anchors 11 formed by transverse plates. Reinforcing rods 12
can, therefore, be passed through. On the site where the
building 1 has to be erected it is only necessary to fasten
the profiles 3 of the floor frame 2 to one another by means
30 of the pop rivets 7. The floor frame 2 is anchored to the
ground 13 by means of a plurality of ground anchors 14, each
having a shank 15 with an anchor member 16 to be screwed into
the ground 13, said member being formed by a screw blade welded to the shank 15. At the top end each ground anchor 14 has
35 a shoulder 17 and above the latter a screwthreaded piece 18
with a nut 19 by which clamping plates 20 engaging the sheet
profile 3 are retained. By means of the ground resistance the
required resistance against tornados or flushing away due to
tropical rains can be obtained.

After the required reinforcing rods 12 and 21 are arranged in place the floor frame 2 is filled with concrete and/or filling material.

In order to form the walls of the building preferably prefabricated structural elements 22, 23 and 24 as shown in Figs. 7, 9 and 10 respectively are disposed to form panels 52, 53, 54. Each structural element 22, 23, 24 has a metal frame 25 assembled from four sheet profiles 26 each mainly formed by a U-section profile, the web of which has a U-shaped groove 27. (Fig. 12). The lower girder 28 of the frame 25 engages by its groove 27 the bulging web 4 of the sheet profile 3 and is riveted thereto.

At the area of door thresholds 8 a U-shaped profile 68 is placed on the profile 26 and fastened thereto by means of screws 70.

The neighbouring structural elements 22, 23 and 24 are interconnected by means of springs 6 (Fig. 16) extending in the grooves 27. The orthogonally disposed structural elements 22, 23 and 24 are interconnected by means of angle-, I-, cross-, or T-section coupling pieces 29, 30, 31 and 32 respectively shown in Figs. 15, 16, 17 and 18 respectively, engaging grooves 27 of the upper girders 33. In this manner the required resistance to wind is ensured. The intermediate walls 71 are fastened as is shown in Fig. 20 to the floor slabs 73 by means of inverted U-shaped profiles 74, which are anchored to the floor 73 by means of key bolts 75. The lower girders of the panels 83 of the intermediate walls 71 are positioned in the U-shaped profiles 74 and fastened thereto by screws 82. Afterwards the floor is completed by a coating 76.

In the variant of Fig. 19 the panels 52, 53, 54 are fastened to a concrete floor slab without floor frame 2 by means of dogs 77 and key bolts 75.

As is shown in Fig. 8 each structural element 22, 24 is formed by a monolithic profiled piece 34 of folded sheet material having the profile of the sheet profiles 26 of

Fig. 12. Four frame rims 35 adapted to be relatively bent over at right angles are marked by three V-shaped notches 36 in each flange so that, as the case may be, the profiled piece 34 can be transported in a straight state to the building site, where it can be bent into the rectangular shape. At the corners the flangers can be welded to one another. Preferably the flanges are connected with one another by corner plates 37 and/or angle-section pieces 38 and pop rivets.

Each structural element 22, 23 and 24 derives its firmness also from stay wires 39 and 40 in coplanar distribution. Each stay 39, 40 has a zigzag wire 41 and straight wires 42 welded to the tops of the former. The standing stay wires 39 are stronger than the lying stay wires 40. Each stay 39 has a zigzag wire 41 arranged between every pair of wires 42, whereas each stay 40 has its zigzag wire 41 located in the same plane as the two straight wires 42. The stay 40 is slightly narrower than the stay 39 and extends through each of the latter. The ends of the stays 39 and 40 may be welded to the inner side of the sheet profiles 26. They are, moreover, welded together at their crossings. This can be simply carried out by spot-welding.

On both sides of the rigid frame 25 thus formed a fixing mat 43 for a plaster layer 44 is fastened to both sides of the sheet profiles 26, for example, again by spot-welding. The fixing mat 43 is preferably formed by a plate of expanded metal.

The sheet profiles 26 and 60 preferably have flanges with series of holes 78, 79, through which can be passed twisting wires 69 to fasten the stay wires 39, 40 and/or the fixing mat 43 to the profiles 26, 60 to replace the welding operations.

The fixing mat 43 may extend, as the case may be, along two or more structural elements 22, 23, 24 and thus interconnect said structural elements. If desired, as is shown in Fig. 16, narrow mat strips 45 may be applied to the fixing mats 43 already arranged in place in overlap at the joints 49 between two neighbouring structural elements 22, 23, 24.

It is important, in particular, to arrange fixing

mat strips 45 at the orthogonal corners (see Fig. 15, 17, 18).

The building 1 of Fig. 1 comprises transverse girders 46 supported by two opposite outer walls and formed by 5 Z-section profiles (see Fig. 22). These transverse girders 46 support roof plates 51 via rafters 47 lying on the transverse girders 46. Each rafter 47 comprises a frame 48 of profiles 50 stiffened by stay wires 62. The lower rims 63 of the roof plates 51 bear on the structural elements 23, 24 through wooden blocks 55, which are previously fixed to profiles 56 of Fig. 14, which fit in the grooves 27 of the sheet profiles 26 (see Fig. 4).

A fixing mat 57 is fastened, for example, by spot-welding or preferably by means of twisting wires 69 to flange holes 80 of the transverse girders 46 and to the profiles 26 in order to ensure that the plaster layer 58 of the walls is satisfactorily united at the corner rims to the plaster layer 59 of the ceiling.

Fresh air can freely penetrate into the space 81 between the roof plates 51 and the ceiling 72 formed by the transverse girders 46 with the plaster layer 59.

Figs. 1, 4 and 9 show that the structure element 23 has a window frame 60 formed by a fillet of sheet profiles 61 as shown in Fig. 13. Each sheet profile 61 mainly comprises a 25 U-section profile having stepped flanges 65. The door frames 66 are likewise formed by sheet profiles 61.

Fig. 6 shows that the fixing mats 43 can be prolonged at a corner 67 of the building 1 via a rounded part. They may be spot-welded to sheet profiles and/or fastened by twisting wires 69 or round clamping rivets to stay wires 39, 40. Therefore, the plaster layer 44 can be continuous also at the corners 67.

In the structural elements 22 to 24 may be arranged heat insulating materials (not shown).

35 The structural elements 22, 23, 24 with the stay wires 39, 40 are robust and have, nevertheless, a light weight so that they can be manually transported. This results from the perfect stiffening and supporting co-operation (com-

position material effect) between profiles and stay wires 39, 40 and from the fixing mats 43 rendered resistant to deformation by the plaster. The profiles and also the stay wires 39, 40 per se would be much too light to fulfil a supporting

5 function.

The fixing mat 43 has two functions i.e. stiffening the panels and carrying the plaster coating. By using lightweight, interconnected metal structural elements earthquake-safe building structures can be obtained. Owing to the exclusive use of metal components for the wall panels they are fully inert to vermin infestation. The structural elements 22, 23, 24, which constitute infrastructural components, are made to module length so that a high diversity of wall sizes is available. The depth of the sheet profiles 26 and the stay
15 wires 39, 40 will be a function of the height of the wall and the resultant transverse force to be met. At any place of the building 1 the same sheet profiles 26 are employed for the structural elements 22, 23, 24. The variability of the dimensions and the possibility of using locally different plastering methods provide great planning freedom and enable maximum architectural integration in the local building style.
20 The metal used is preferably galvanized metal, for example, zinc-plated metal.

According to the invention a building 1 can be
25 transported in transportable units of a construction box of prefabricated parts from the metal works to the building site. The extent of premounting depends on the transport costs and on the degree of skill of the local builders.

It should be noted that the building described and
30 illustrated is only an example for clarifying the invention and that within the scope of the invention many kinds and types of buildings can be designed.

For example, buildings with flat roofs can be erected, in which for example, the outer walls directly support the roof slabs. These roof slabs may or may not be provided with a plaster fixing mat. It is the very advantage of the invention that by using a uniform module, that is to say, uniform standard width of the panels 52, 53, 54 different

buildings of different widths and lengths and different layouts may be built.

It is feasible to inject an insulating layer into the panels and to apply a cover plate, for example, an insulating plate to the panels rather than a plaster layer. This more expensive solution may be useful for cold-stores.

-1-

CLAIMS

1. A building (1) characterized by panels 52, 53, 54) each having a metal frame (25) and a plurality of relatively crossing stay wires (39, 40) arranged in said frame (25).

5 2. A building (1) as claimed in claim 1, characterized in that said panels (52, 53, 54) have a stiffening layer on at least one side, but preferably on both sides.

 3. A building (1) as claimed in claim 1, characterized in that the stiffening layer comprises a fixing mat
10 (43) and a plaster layer fixed thereto.

 4. A building (1) as claimed in claim 1 or 2, characterized in that the fixing mat (43) is formed by a piece of expanded metal sheet.

 5. A building (1) comprising a floor frame (2) of
15 profiles (3), each having an upwardly bulging ridge (4) at the area of walls, said floor frame (2) being filled out with a filler, for example, concrete or reinforced concrete.

 6. A building (1) comprising transverse girders
(46) supported by two opposite outer walls, characterized in
20 that roof plates (51) are supported by the transverse girders

(46) via at least one rafter (47) supported by the transverse girders (46) and formed by a frame (48) of profiles (50), stiffened by means of stay wires (49).

7. A building (1) comprising transverse girders
5 (46) supported by two opposite outer walls, characterized in that to the underside of the transverse girders (46) is fastened a fixing mat (57), to which is fixed a plaster layer (59).

8. A building (1) as claimed in anyone of the pre-
10 ceding claims, characterized by ground anchors (14) each having at least one anchor member (16) to be screwed into the ground (13).

9. A building element (22, 23, 24) for a building as claimed in anyone of claims 1 to 4, characterized in that
15 the element comprises a metal frame (25) and a plurality of relatively crossing stay wires (39, 40) arranged in said frame (25).

10. A building element (22, 23, 24) as claimed in claim 9, characterized by a stiffening layer attached to at
20 least one side of the frame (25).

11. A building element (22, 23, 24) as claimed in anyone of claims 8 to 11, characterized in that the ends of each stay wire (39, 40) are welded to flanges of sheet profiles (26) of the metal frame (25).

25 12. A building element (22, 23, 24) as claimed in anyone of claims 9 to 11, characterized in that at least the lower girder (28), but preferably each rim of the frame (25) has a substantially U-shaped profile, the web of which has an inverted U-shaped groove (27) for engaging a bulging ridge
30 (4) of the sheet profile (3).

13. A sheet profile (26) for a building element (22, 23, 24) as claimed in claim 12, characterized in that it is mainly formed by a U-shaped profile, the web of which has an inverted U-shaped groove (27).

35 14. A sheet profile (3) for a floor of the building (1) claimed in claim 5, characterized in that it is mainly formed by a U-shaped profile the upper flange of which has an upwardly bulging ridge (4), which can engage the inverted U-shaped groove (27) of the sheet profile (3) of claim 13.

"1/7"

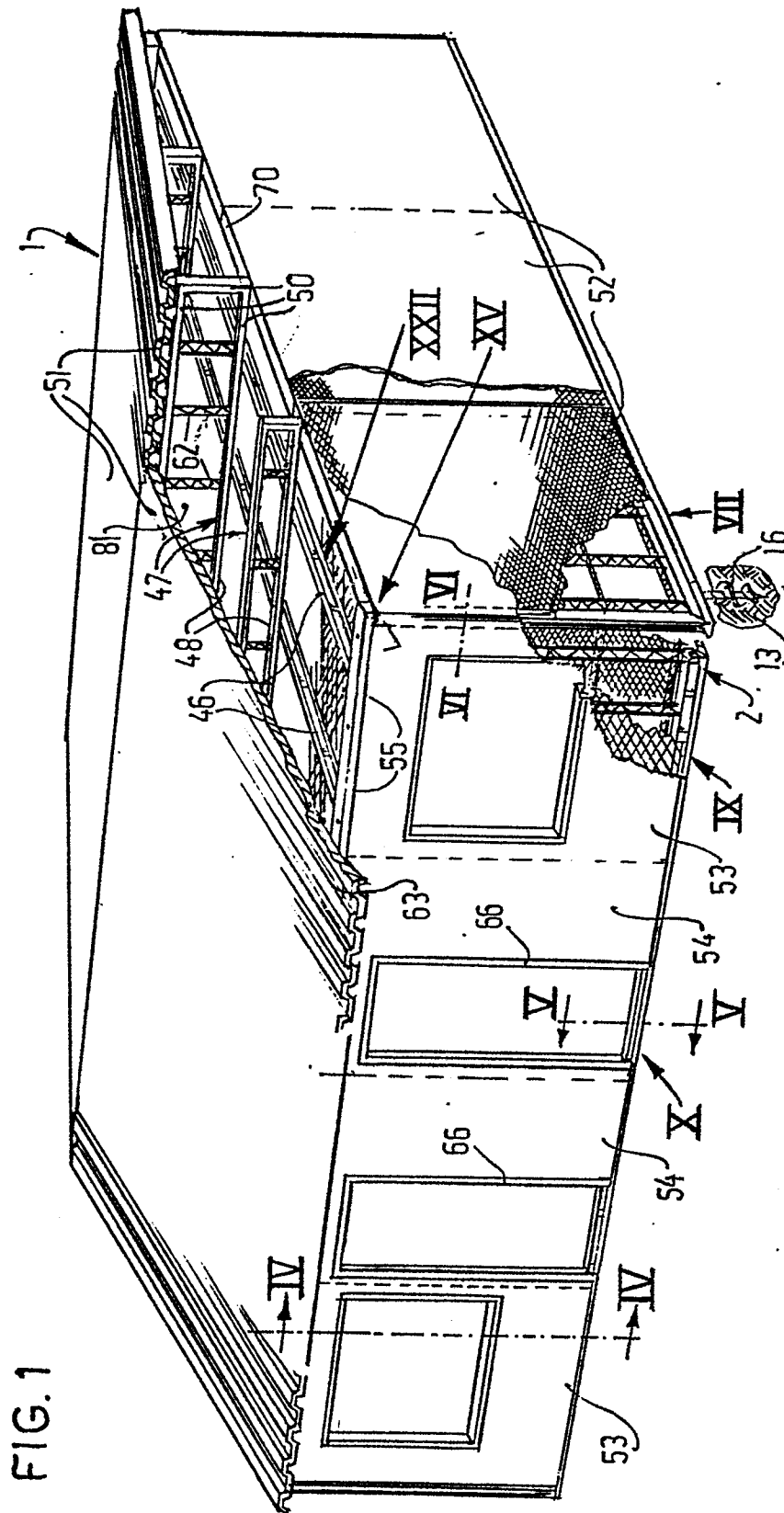


Fig. 1

2/7^x

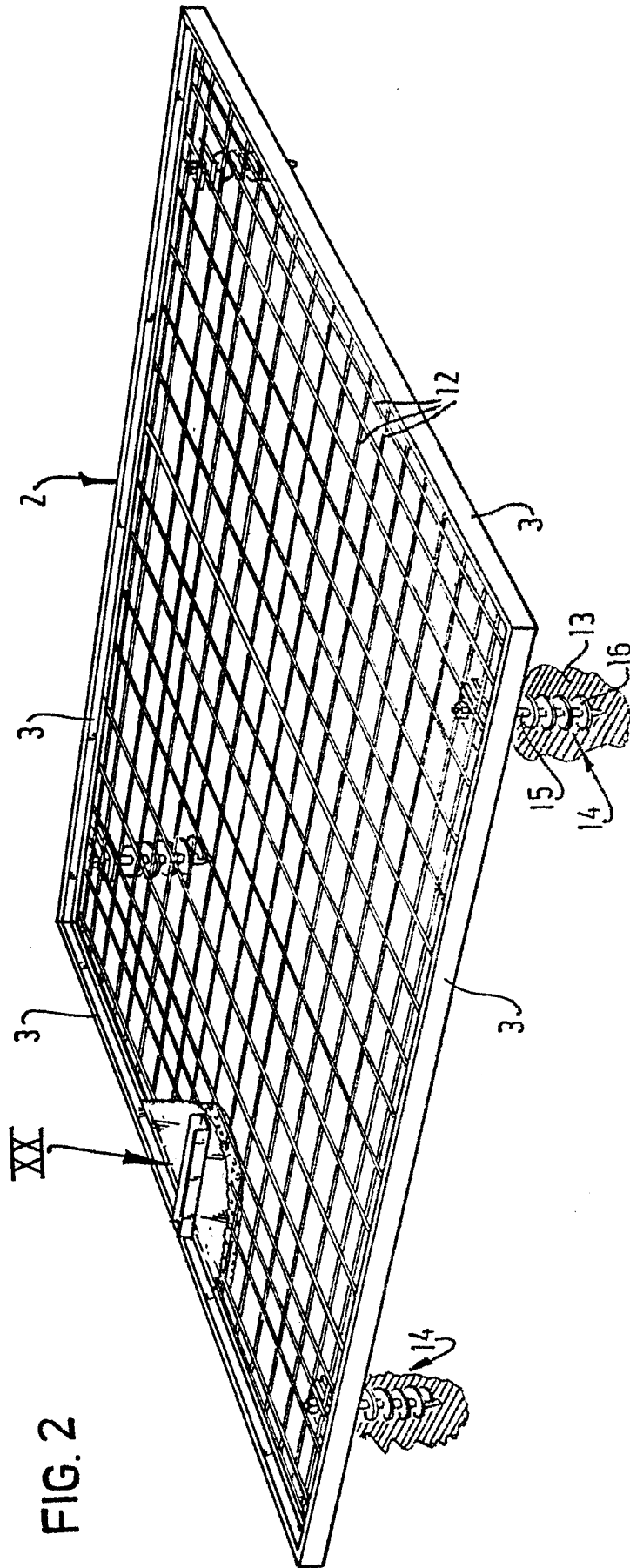


FIG. 2

" 3/7 "

FIG. 3

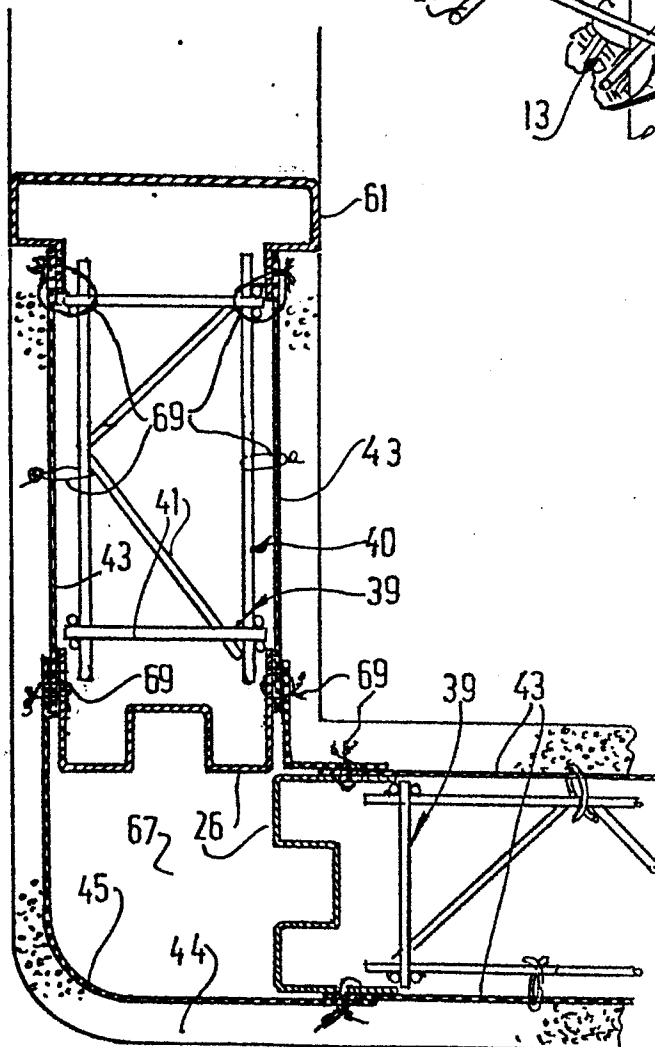
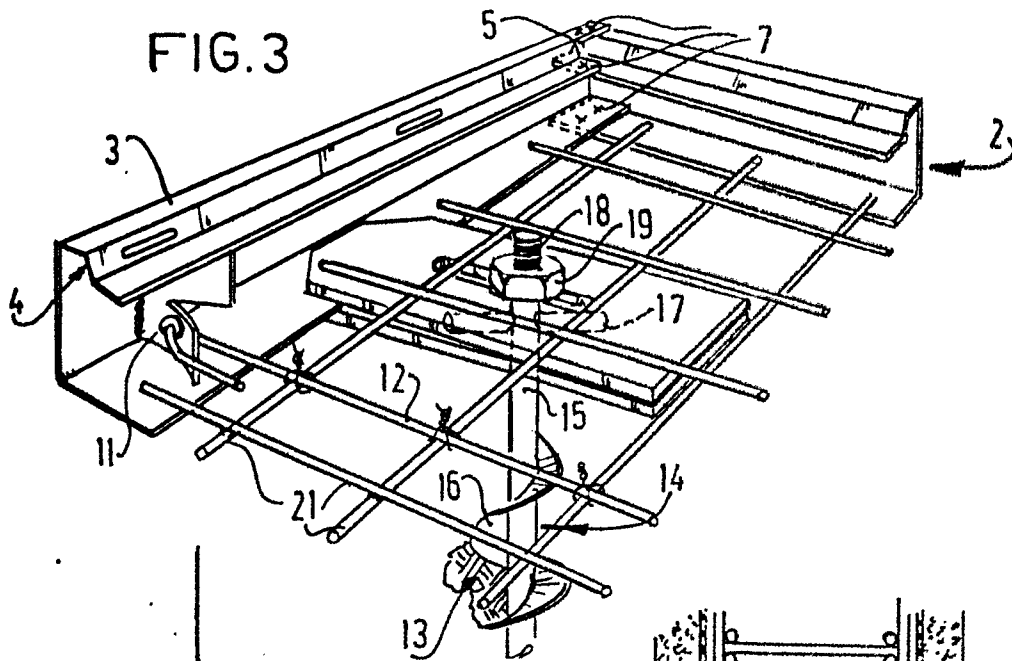


FIG. 6

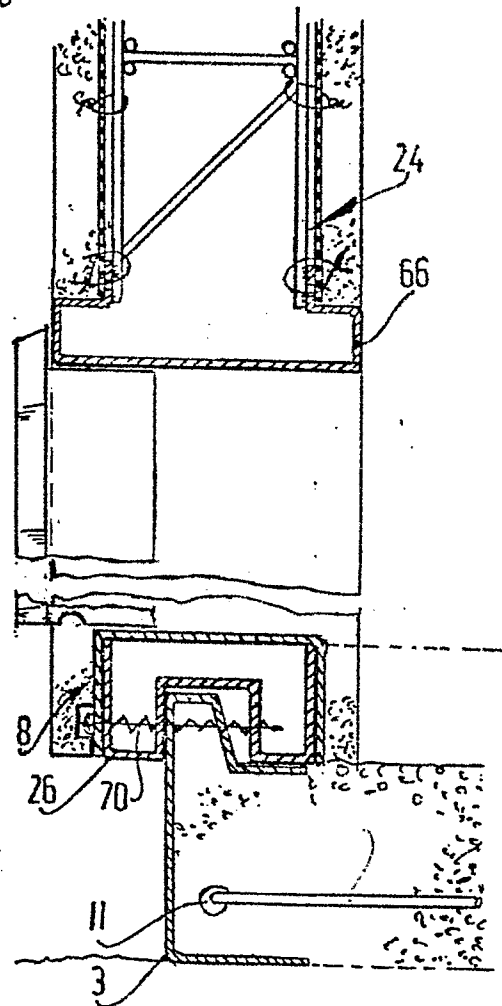
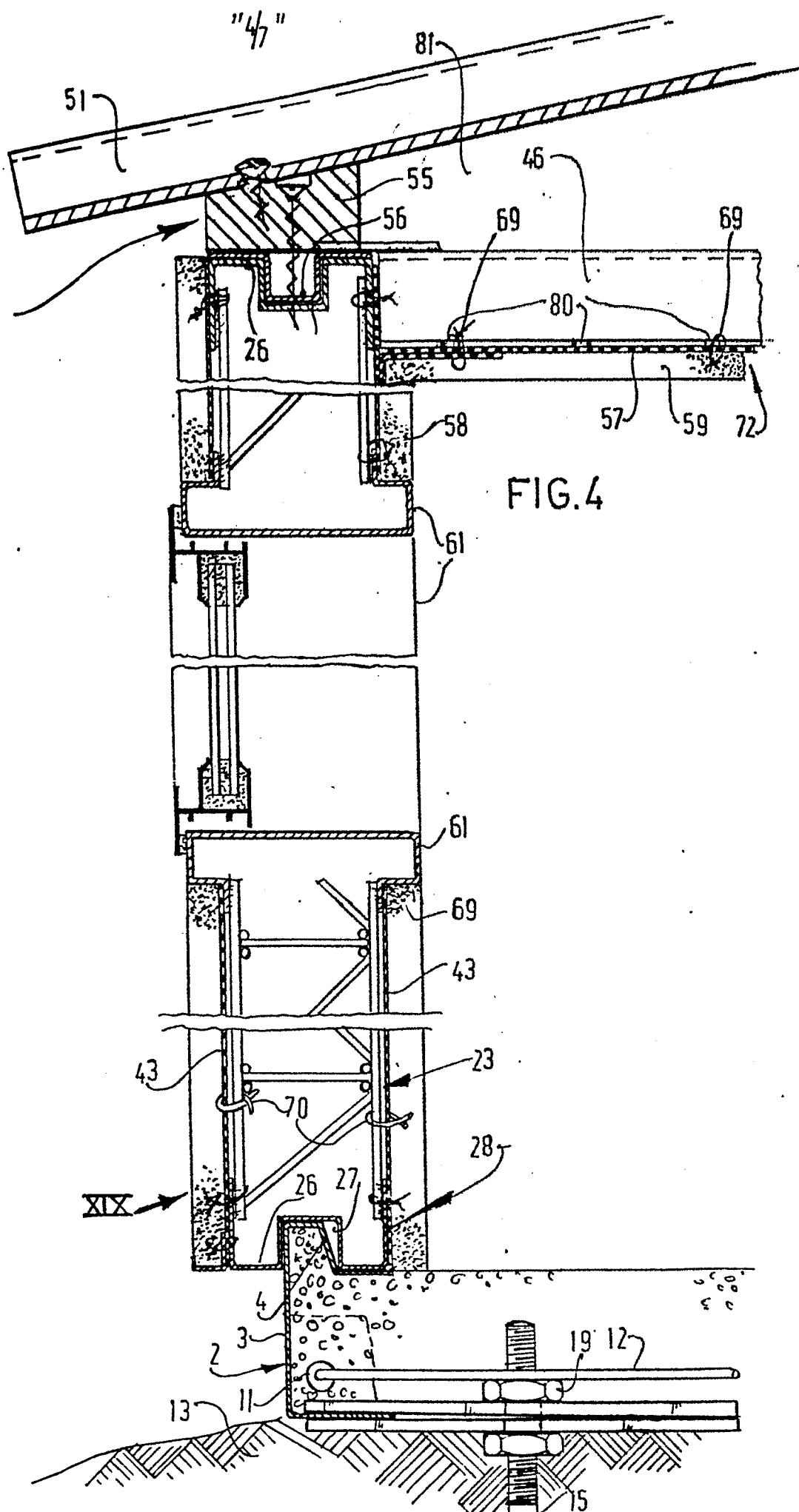
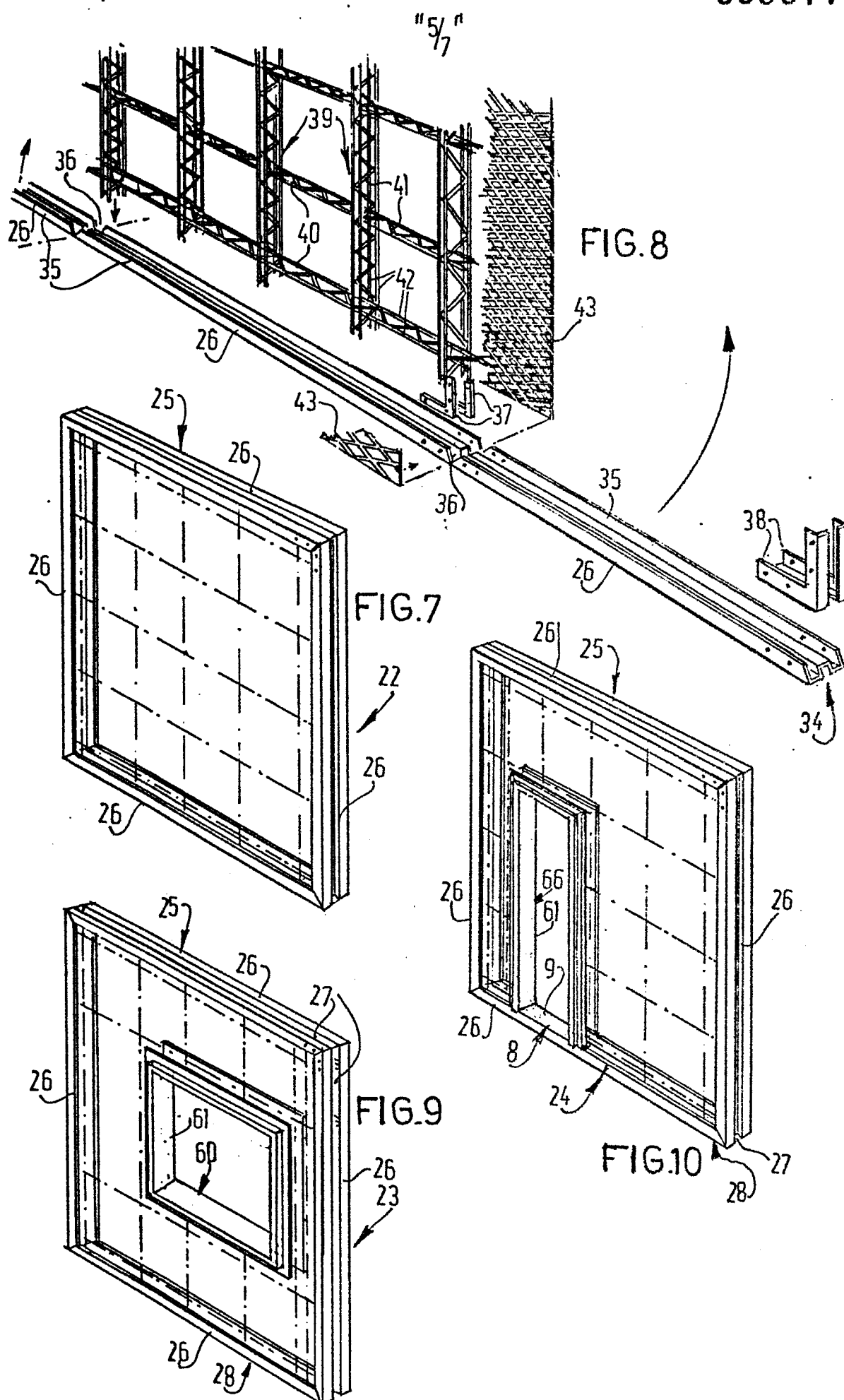
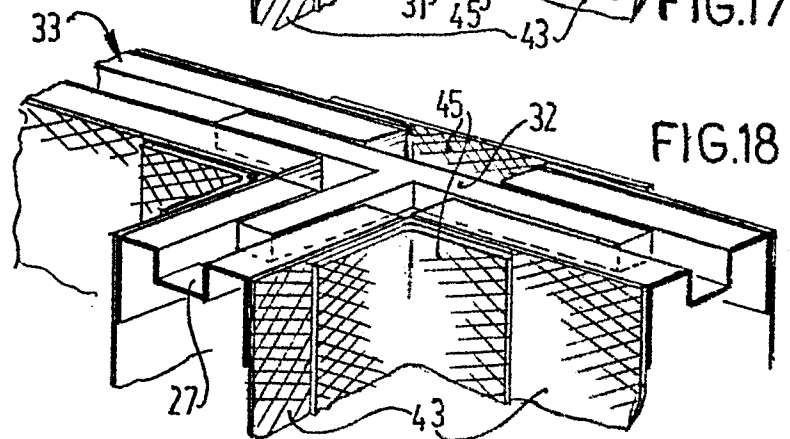
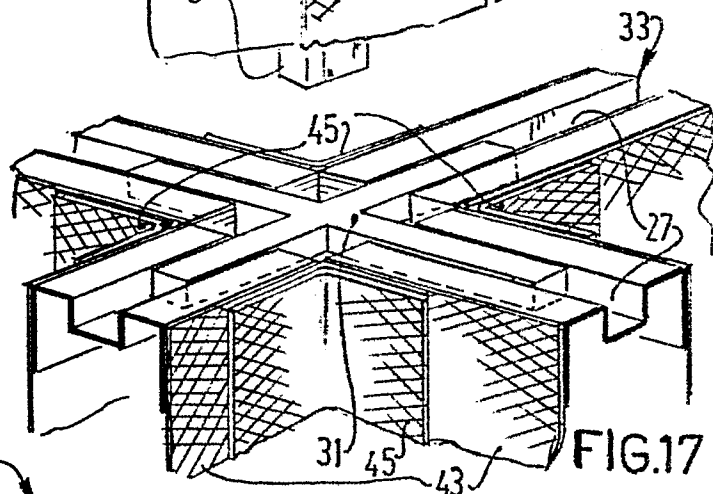
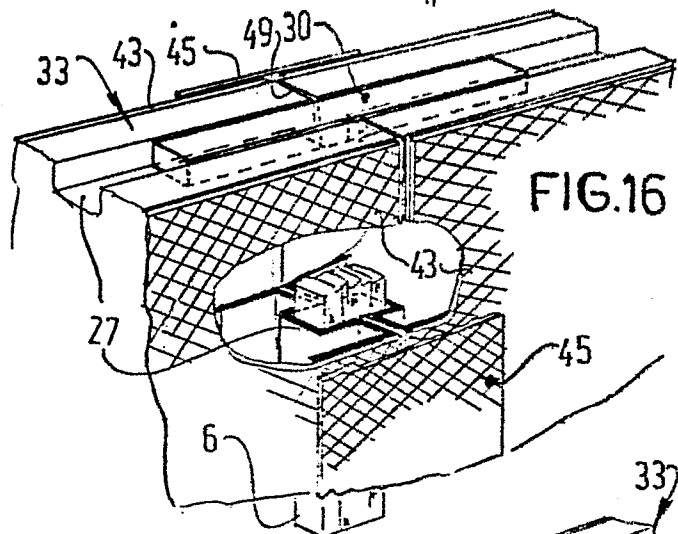
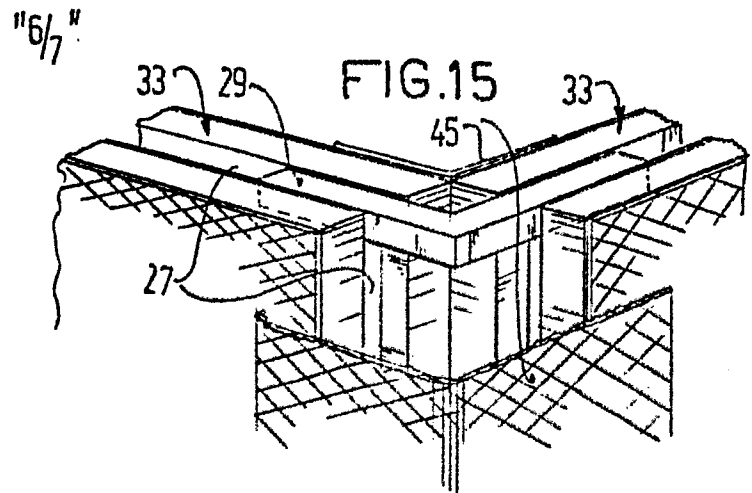
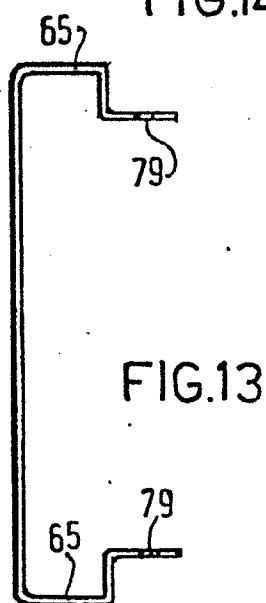
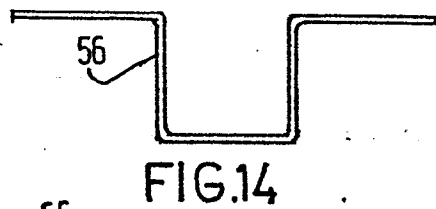
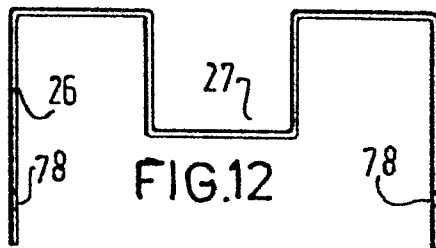
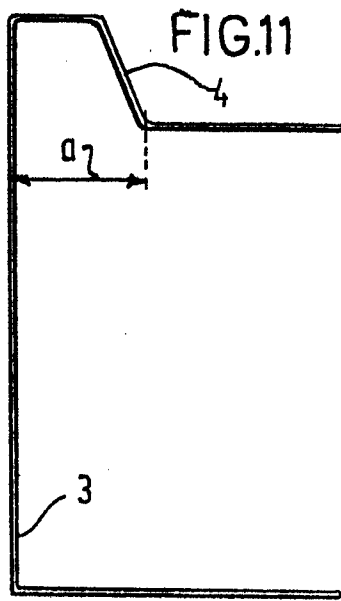


FIG. 5







"7/7"

FIG.19

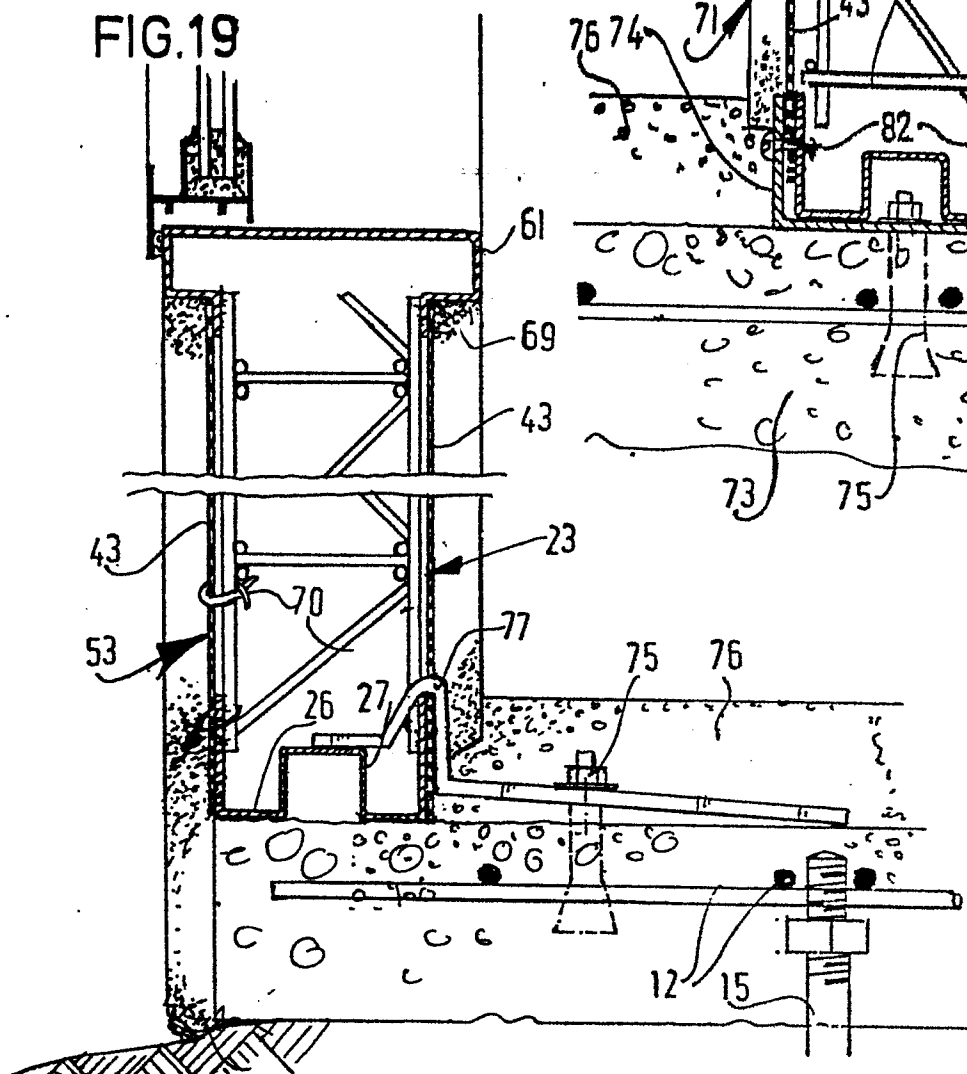


FIG.20

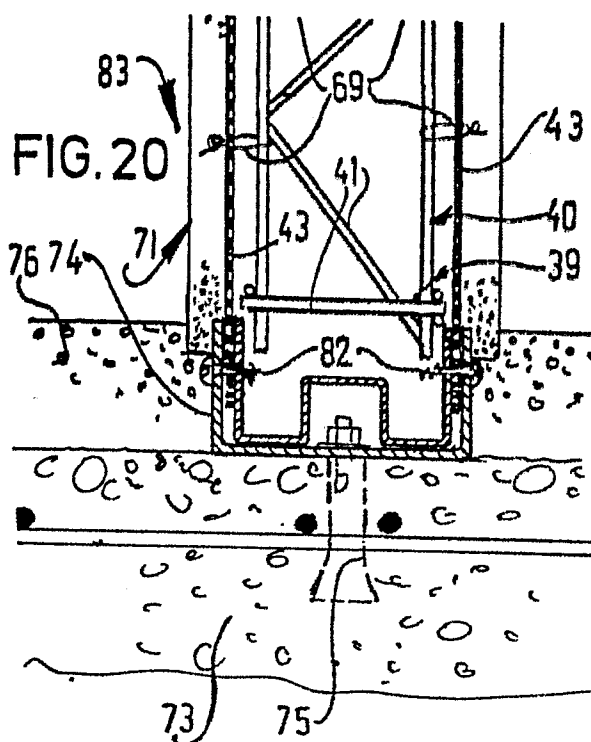


FIG.22

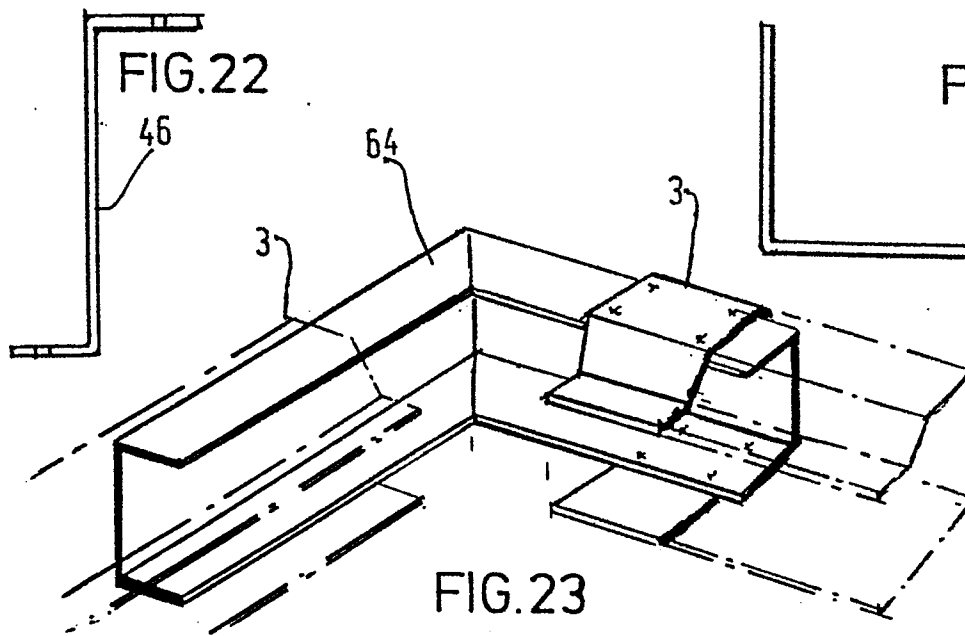


FIG.21

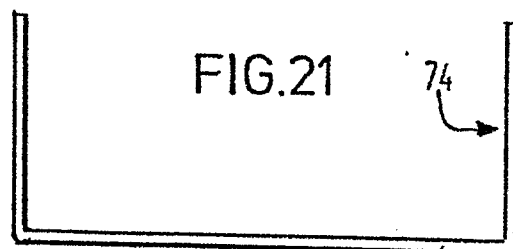


FIG.23



European Patent
Office

EUROPEAN SEARCH REPORT

0096118

Application number

EP 82 20 0720

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	FR-A-2 420 613 (ENTREPRISE CARONI) * Figures 2, 3; page 3, paragraph 3, page 4, paragraph 3 *	1, 2, 9, 10	E 04 C 2/38 E 04 H 9/02 E 04 B 5/52 E 04 B 7/04
A	DE-A-1 940 198 (VEREINIGTE ÖSTERREICHISCHE EISEN- UND STAHLWERKE AG) * Figures 1, 3; claim 1 *	3, 4	
Y	DE-A-2 533 045 (MAHLE GMBH) * Figure 1; claim 1 *	5	
A		8, 11	
Y	DE-U-1 959 700 (MONZA-FENSTERBAU GMBH) * Figure 2 *	5	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A		12-14	E 04 C 2/00 E 04 H 9/00 E 04 B 5/00 E 04 B 7/00
A	AU-B- 480 463 (B.M. SIGAL) * Figures 2, 6 *	6	
X	DE-C- 632 147 (R. GANGLOFF & SOHN) * Complete document *	7	
--- --			
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 19-01-1983	Examiner KRABEL A.W.G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



European Patent
Office

EUROPEAN SEARCH REPORT

0096118

Application number

EP 82 20 0720

DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	CA-A-1 101 179 (CONSTRUCTION MUROX INC.) * Figure 3 * -----	8	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 19-01-1983	Examiner KRABEL A.W.G.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	