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EUROPEAN PATENT APPLICATION

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⑦① Applicant: **Ballast-Nedam Groep N.V., Laan van Kronenburg 2, NL-1180 BE Amstelveen (NL)**
Applicant: **Grootel's Bouwmaatschappij B.V., Limburglaan 24, NL-5652 AA Eindhoven (NL)**

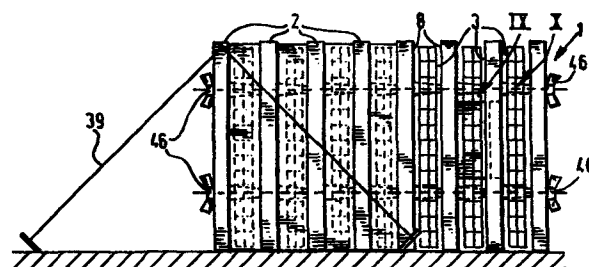
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⑦② Inventor: **Hinkema, Jan Hendrikus, Lucas van Hauthemlaan 14, NL-5671 CJ Nuenen (NL)**
Inventor: **Van Linder, Gerardus Albertus Hubertus, Alpenlaan 14, NL-5691 JX Son (NL)**

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

⑤④ **Shuttering battery.**

⑤⑦ A casing battery comprising a sequence of mould faces requires less construction material and, therefore, has a lower weight and can be readily transported, if the mould faces are intercoupled by coupling means (42) extending through the mould cavities (3).



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Casing battery

The invention relates to a casing battery comprising a sequence of mould faces arranged parallel to and one behind the other and being displaceable in a direction transverse of their plane relatively to one another and
5 having on both sides a skin bounding a mould cavity.

Such a casing battery is known from Dutch patent application 7311946. The mould faces of this known casing battery have to be strong and rigid in order to ensure sufficient accuracy of dimensions with a building element of
10 large size.

The invention has for its object to provide a casing battery which requires a small amount of material and, therefore, has a lower weight and which can be readily transported. This is achieved in that each mould face is composed
15 of a plurality of mould face portions joining one another in the plane of the skin and intercoupled by coupling means and in that every two opposite mould faces bounding the same mould cavity can be interconnected by a plurality of tie

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members distributed along the plane of the mould faces, extending through the mould cavity and holding the mould faces spaced apart. The transport of this casing battery is simplified particularly owing to the fact that the elements
5 to be transported are not very large as a result of the composition of each mould face by a plurality of mould face portions and owing to the fact that, in addition, each mould face and each portion thereof has a low weight as a result of the fact that the accuracy of dimensions of the mould face is
10 also attributable to the tie members distributed along the plane and extending through the mould cavity so that the mould face itself may be constructed with less rigidity and lower weight. The division of the mould face, which basically detracts from the rigidity of the mould face, is enabled
15 owing to the use of said tie members.

A particularly simple and light-weight construction of the mould face is obtained, when the mould face portions are each formed by a panel having a skin plate carrying stiffening profiles on the inner side and when the coupling
20 means interconnect a plurality of panels arranged in a first plane bounding a mould cavity and a plurality of panels arranged in a second plane bounding a consecutive mould cavity.

The coupling means are preferably formed mainly by
25 girders extending between the opposite panels of the same mould face. Said girders have a reinforcing effect and couple panels with one another both in the longitudinal and in the transverse directions.

The application and disengagement of the tie
30 members can be simply carried out when the tie members are mainly formed by tubular spacers provided in all mould cavities and by a plurality of pull rods extending through all mould cavities and being enveloped therein by the spacers.

35 A stable support, in which the mould face is practically not subjected to bending or torsional forces, is obtained when the mould faces bear each on two sets of wheels with a V-shaped chassis supported each by three wheels.

Owing to the division of the mould face into a

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plurality of portions it is readily possible to prefabricate apart from flat, plate-shaped concrete building elements, also building elements having recesses and/or protuberances by using universally suitable parts in conjunction with a few
5 additional recess gauges or in conjunction with a few specific mould face portions. Thereto the casing battery is characterized in that in the mould cavity are arranged recess gauges for recessing door and/or window apertures and in that at a level beneath the recess gauges vibrators are arranged
10 in the mould faces. Moreover, the mould cavity may be extended by an additional mould cavity recessed in the mould face. In the mould faces of the casing battery according to the invention at least one radiator of a hot water heating system is arranged between the opposite panels of the same mould
15 face.

The invention will be described more fully herein-after with reference to a drawing.

In the drawing there show schematically

Figures 1 and 2 a casing battery according to the
20 invention in two consecutive stages during the prefabrication of building elements,

Figure 3 a plan view of the casing of Figure 2,
Figures 4 and 5 each an enlarged sectional view
taken on the line IV-IV of Figure 3 relating to two different
25 mould faces,

Figure 6 an enlarged sectional view taken on the line VI-VI of Figure 3,

Figure 7 an enlarged sectional view taken on the line VII-VII of Figure 3,

30 Figure 8 an enlarged plan view of the supporting means of a mould face,

Figure 9 an enlarged perspective view of detail IX of Figure 2,

Figure 10 an enlarged perspective view of detail X
35 of Figure 2,

Figures 11 and 12 each a building element prefabricated by means of detail IX and X respectively,

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Figures 13, 14 and 15 each a perspective view of a mould face for a casing battery of Figure 1,

Figures 16, 17 and 18 each a fraction of a mould cavity associated with Figures 13, 14 and 15 respectively,

5 Figure 19 an elevational view in the direction of the arrows XIX in Figure 5,

Figure 20 a sectional view taken in the direction of the arrow XX in Figure 5, and

10 5. Figure 21 on an enlarged scale detail XXI of Figure

The casing battery 1 shown in Figure 1 comprises a sequence of mould faces 2 arranged parallel to and one behind the other and being displaceable in the direction 6 transverse of their planes 7, whilst apart from the outermost
15 mould faces 2 they have on both sides a skin 8 bounding a mould cavity 3. Each mould face 2 is composed of a plurality of mould face portions 9 joining one another in the plane 7 of the skin 8 (Figures 4, 5, 13, 14, 15), which are inter-coupled by coupling means. Referring to Figure 4, the
20 coupling means are formed by pull rods 10 with nuts 11, which firmly draw against one another the complementarily profiled rims 12 of contiguous mould face portions 9. Referring to Figure 4, the mould face portions 9 are formed by steel or plastic boxes filled out with stiffening material 13. The
25 mould face portions 9 preferably comprise each a panel 14 having a skin plate 15, which is provided on the inner side with stiffening profiles 16 to which steel strips 17 are welded. The coupling means are mainly formed by girders 18, for example, channel-section beams extending between the op-
30 posite panels 14 of the same mould face 2 and being connected by bolts 19 with the strips 17. As is shown in Figure 20, the panels 14 disposed in a first plane 7 bounding a mould cavity 3 as well as a plurality of panels 14 of the same mould face 2 disposed in a plane 7 bounding a consecutive mould cavity 3
35 are interconnected by the same girders 18. The panels 14 of the two planes 7 are relatively off-set because the bolts 19 have to be readily accessible for mounting and dismounting operations. For this purpose the panels 14 in one plane 7

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have, in order of succession, lengths of $1/2$ 1, 1, 1 en $1/2$ 1, whereas the panels 14 in the other plane 7 all have a length 1. An upper layer of panels 14 is connected with a lower layer of panels 14 by means of channel-section profiles 22 extending at the joint 21 and being interconnected by bolts 23.

The mould faces 2 are preferably supported by two sets of wheels 24 (Figure 8) with a V-shaped chassis 25, which is supported by three wheels 26 running along three of the six rails 27 laid on the bottom side of the casing battery 1. Since the consecutive V-shaped chassis 25 fit one into the other the mould faces 2 can be disposed at a short distance from one another, whilst the support of the mould faces 2 is stable. Each mould face 2 bears on a chassis 25 via tie beams 28, which are connected by bolts 29 with a channel-section profile 31 filled out with wood 30, which is provided on the bottom side of each panel 14 (see Figure 21). On the supporting beams 28 is, moreover, bearing the edge 32 of a strip 33, which carries a bottom 34 of a mould cavity 3.

Figure 8 shows that each mould cavity 3 is bounded on the sides by a side plate 35 supported by a strip 36, which is secured to the ends of the mould faces 2.

Referring to Figure 6, the side plate 35 is drawn in sealing engagement against the bottom 34 by means of a wing bolt 37, which engages a strip 33.

When the casing battery 1 is transported, preferably into the proximity of a building site, the mould faces 2 are assembled and arranged in order of succession on the rails 27. During the prefabrication of building elements 5 a first mould face 2 is fixed in place and shored up by cables or bars 39. Subsequently the required reinforcement 38 is disposed at its place in the mould cavity 3, after which conical spacers 41 are distributed along the plane 7 of the mould face 2 and arranged on pull rods 42 extending across the mould face 2a. As is shown in Figure 7, each pull rod 42 passes through an aperture 43 of the skin plates 15 and through spacer sleeves 44, which hold the skin plates 15 in each mould face 2 at a distance from one another and which are loosely accommodated in short bushings 45 welded to the

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skin plates 15. After the spacers 41 are disposed, the mould cavity 3 is closed by putting the next mould face 2 in its place, the side plates 35 and the bottom 34 being also put in place. In a similar manner the next mould cavities 3 are prepared, whilst the pull rods 42 are gradually shifted on. The whole casing battery 1 is complete after the pull rods 42 have been subjected to tensile stress by nuts 46. Thus the skin plates 15 are held in the flat state between their edges. As a matter of course, the edges of the mould faces 2 on the sides, the bottom side and the upper side are clamped tight at the required relative distances by means known and not completely shown. According to the invention an improved flatness of the mould faces 2 is obtained by the tie means extending through the mould cavities 3 and holding the mould faces 2 spaced apart and formed by the above-mentioned pull rods 42 provided with the nuts 46 and spacers 41, whilst preferably the skin plates 15 are supported also on the inner side by spacers, for example, sleeves 44.

It should be noted that the pull rods 42 may be arranged on only one level, for example, at 1.5 metres from the bottom 34 and with a relative pitch t of, for example, 125 cms. However, as an alternative they may extend at several levels through the mould cavities 3 and, for example, also across the upper panels 14. The lower panels 14 have a length l of 250 cms and a height h of about 250 cms so that they can be satisfactorily stacked and transported. The upper panels 14 are appreciably smaller.

As is shown in Figure 9, each mould cavity 3 may hold a recess gauge 47 to form a building element 5 with a recess 48 as shown in Figure 11. Then vibrators 49 are provided on and below the recess gauges 47 in the mould faces 2 for filling up the mould cavities 3 beneath the recess gauges 47.

Likewise, as is shown in Figure 10, the mould cavity 3 may be extended by an additional mould cavity 52 recessed in the mould face 2 to form a building element 5 with a protuberance 50.

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The girders 18 may be employed, in addition, for suspending radiators 51 of a hot water heating system arranged between the panels 14 of the same mould face 2 in order to accelerate curing of the concrete of the building elements 5 contained in the mould cavities 3.

The building elements 5 may consist of concrete, reinforced concrete or light-weight reinforced or non-reinforced concrete, for example, concrete filled with expanded polystyrene grains.

10 Figures 13, 14 and 15 illustrate that several relatively different building elements 5 to be formed by mould faces 2 can be composed by joining a plurality of different panels 14 so that the same panels 14, be it in conjunction with each time other panels 14 can be used in several mould
15 faces 2 to form different building elements 5 (Figures 16, 17 and 18).

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CLAIMS

1. A casing battery comprising a sequence of mould faces arranged parallel to and one behind the other and being displaceable in a direction transverse of their plane relatively to one another and having on both sides a skin bounding a mould cavity characterized in that each mould face is composed of a plurality of mould face portions joining one another in the plane of the skin and intercoupled by coupling means and in that every two opposite mould faces bounding the same mould cavity can be interconnected by a plurality of tie members distributed along the plane of the mould faces, extending through the mould cavity and holding the mould faces spaced apart.

2. A casing battery as claimed in claim 1, characterized in that the mould face portions are each formed by a panel having a skin plate carrying stiffening profiles

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on the inner side and in that the coupling means interconnect a plurality of panels arranged in a first plane bounding a mould cavity and a plurality of panels arranged in a second plane bounding a consecutive mould cavity.

3. A casing battery as claimed in claim 2, characterized in that the coupling means are mainly formed by girders extending between the opposite panels of the same mould face.

4. A casing battery as claimed in claim 1, 2 or 3, characterized in that the tie members are mainly formed by tubular spacers provided in all mould cavities and a plurality of pull rods extending through all mould cavities and being enveloped therein by the spacers.

5. A casing battery as claimed in claim 1, 3 or 4, characterized in that the mould faces bear each on two sets of wheels with a V-shaped chassis supported each by three wheels.

6. A casing battery as claimed in anyone of the preceding claims, characterized in that in the mould cavity are arranged recess gauges for recessing door and/or window apertures and in that at a level beneath the recess gauges vibrators are arranged in the mould faces.

7. A casing battery as claimed in anyone of the preceding claims, characterized in that the mould cavity is extended by an additional mould cavity recessed in the mould face.

8. A casing battery as claimed in anyone of the preceding claims, characterized in that between the opposite panels of the same mould face at least one radiator of a hot water heating system is arranged.

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FIG. 1

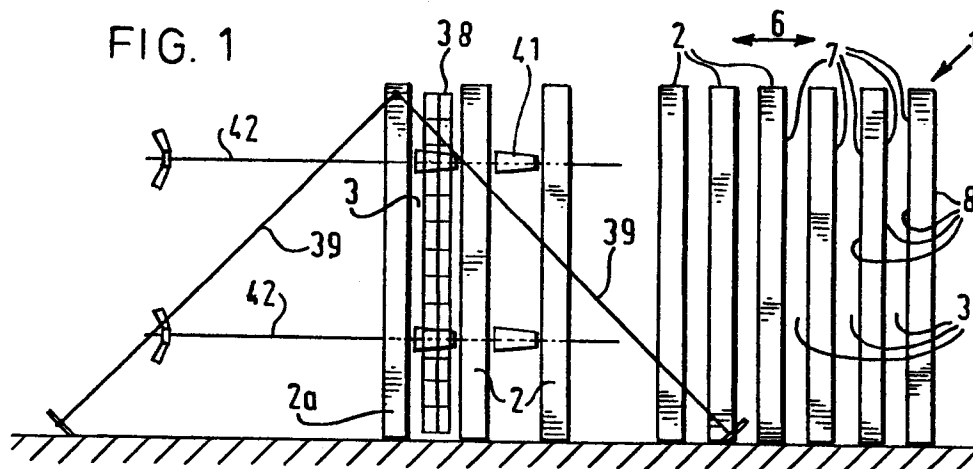


FIG. 2

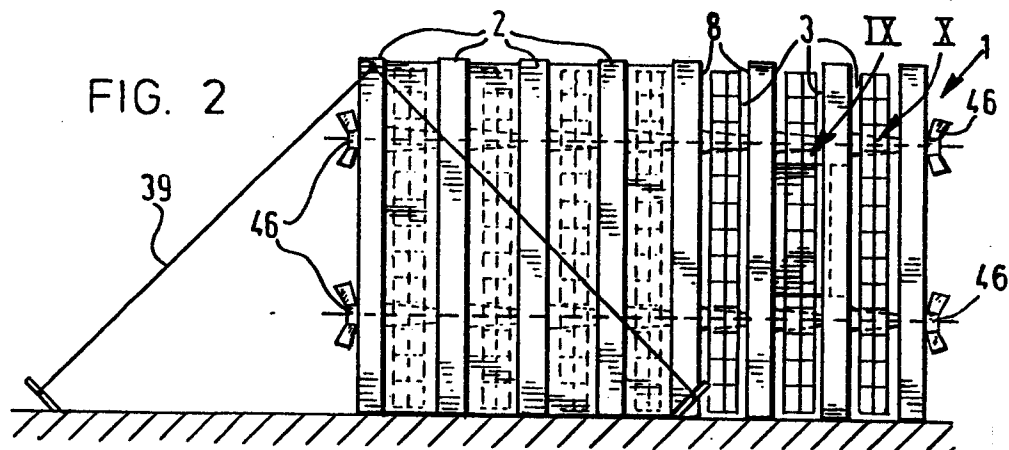
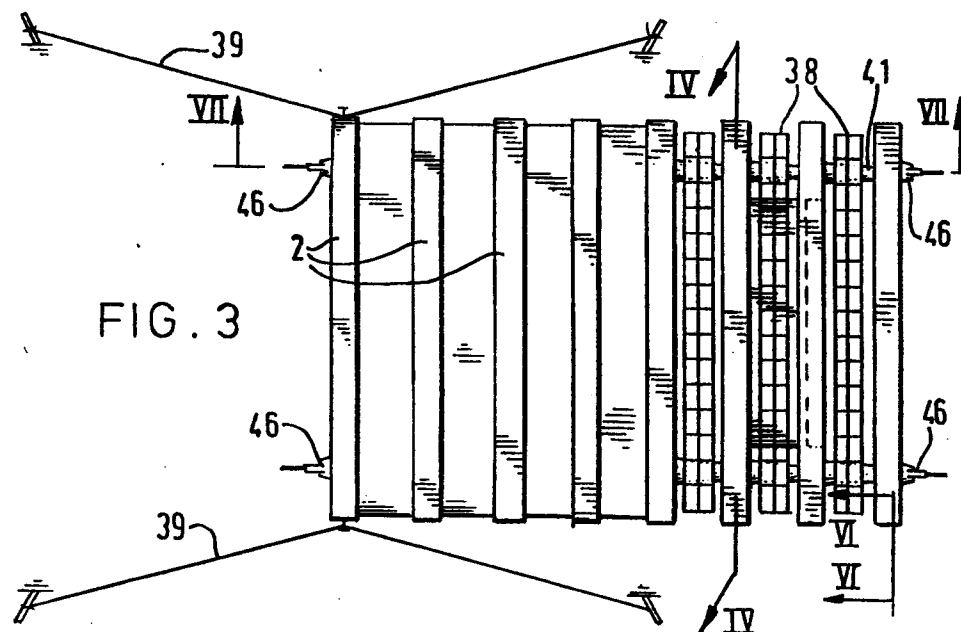
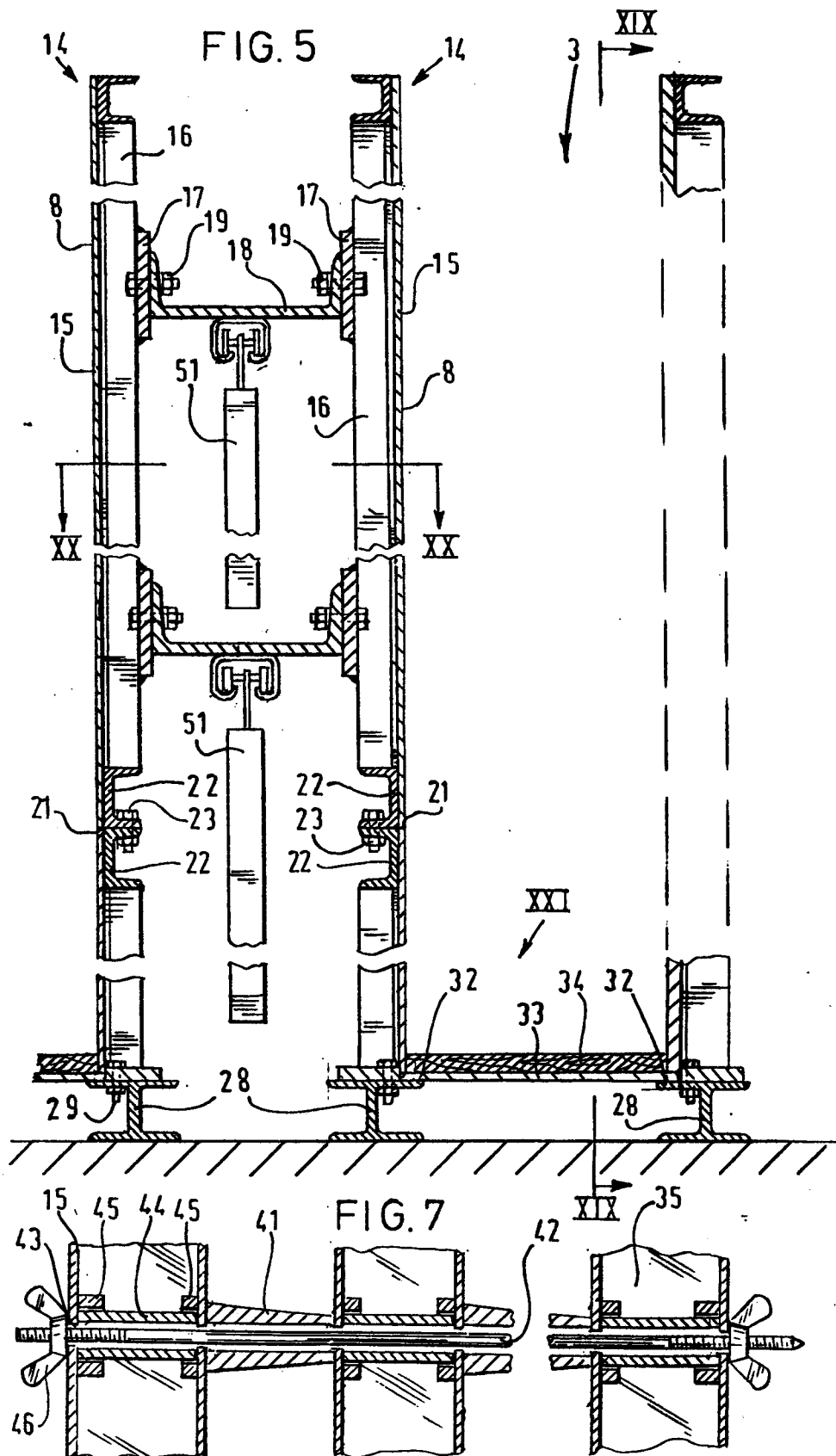


FIG. 3



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FIG. 6

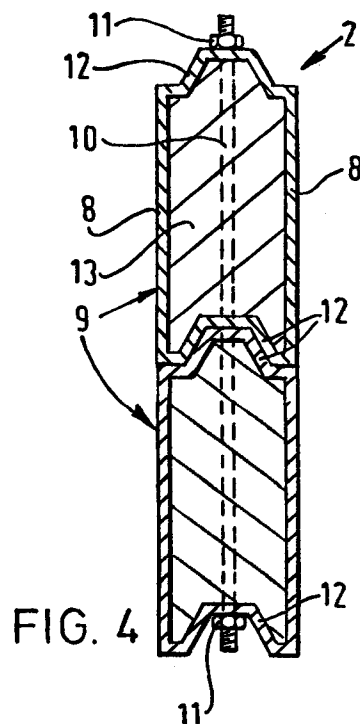
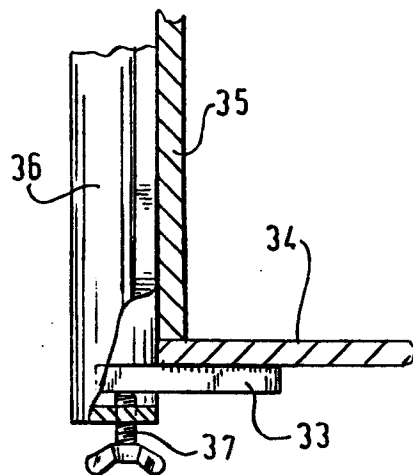


FIG. 4

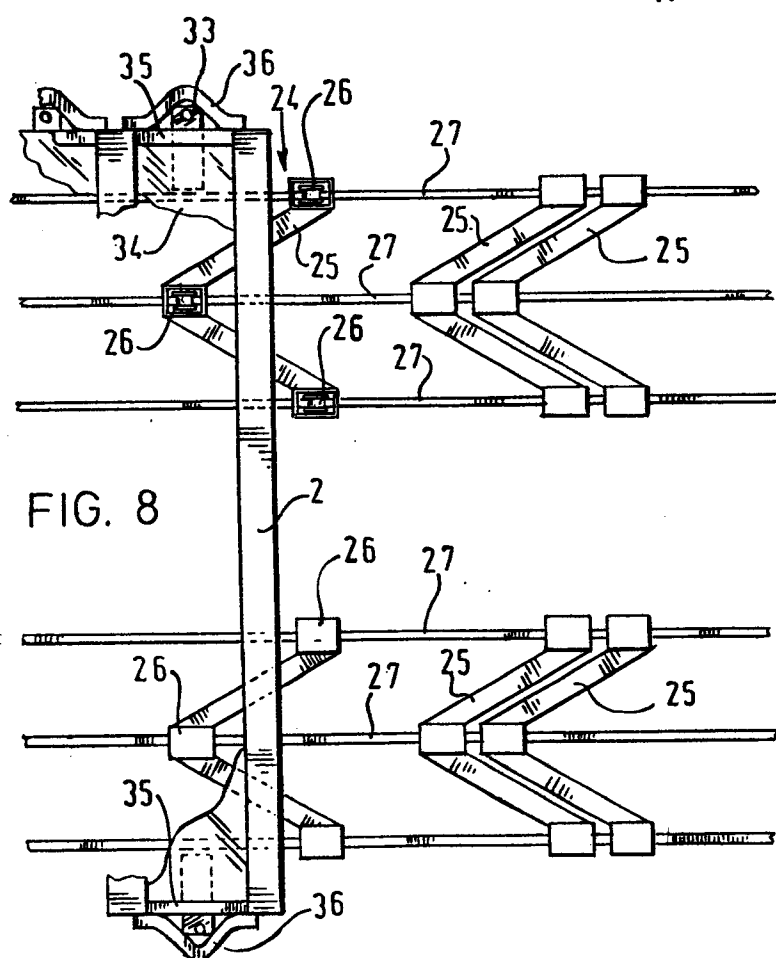


FIG. 8

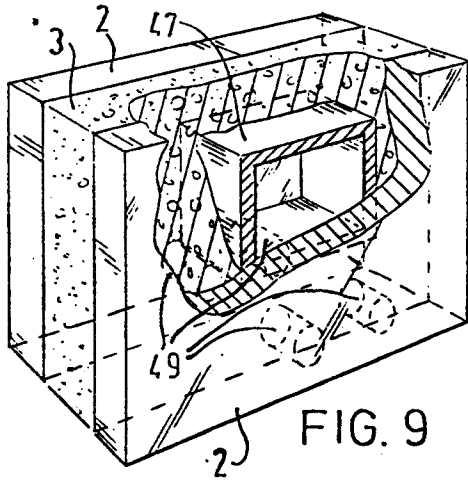


FIG. 9

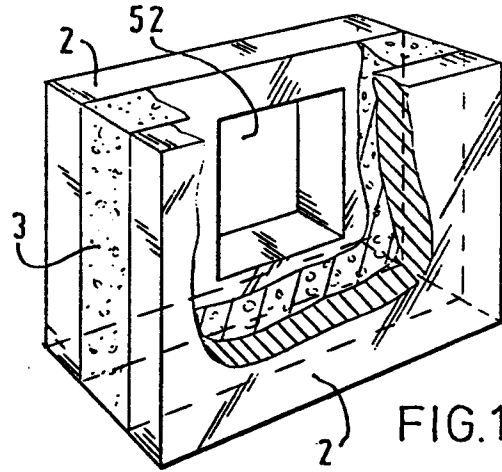


FIG. 10

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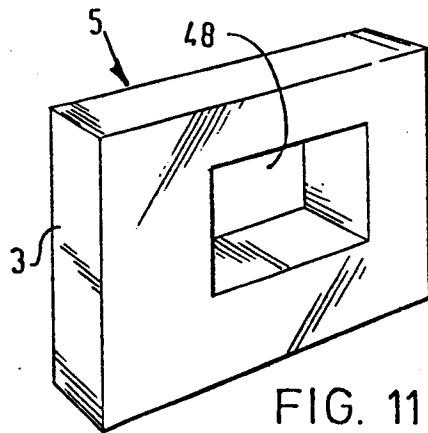


FIG. 11

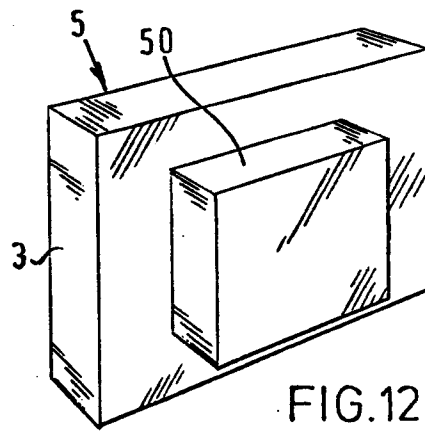


FIG. 12

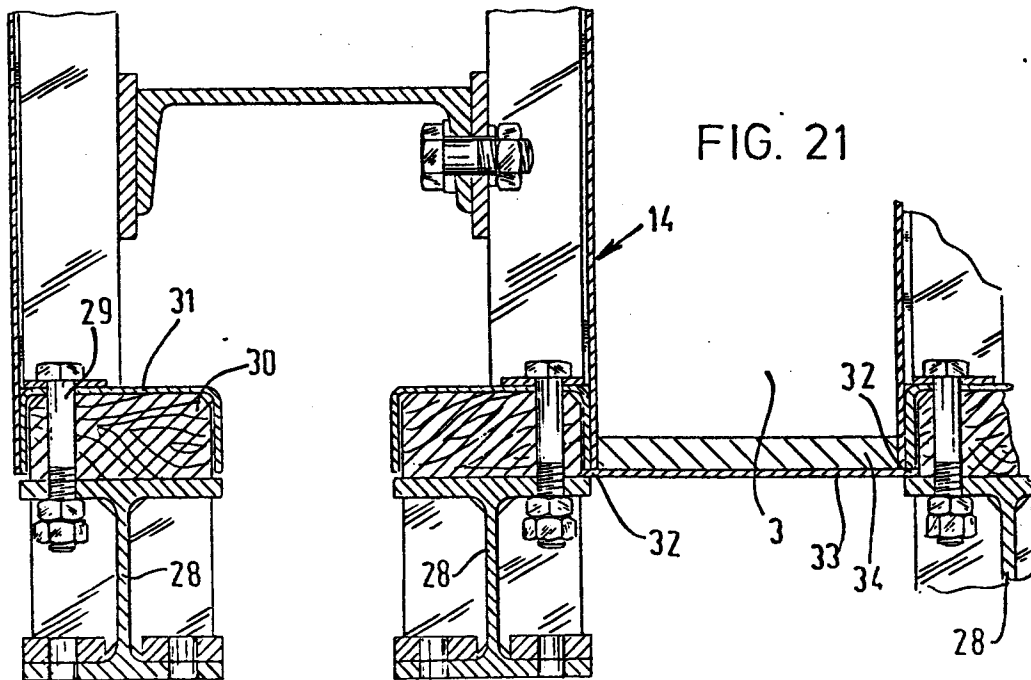


FIG. 21

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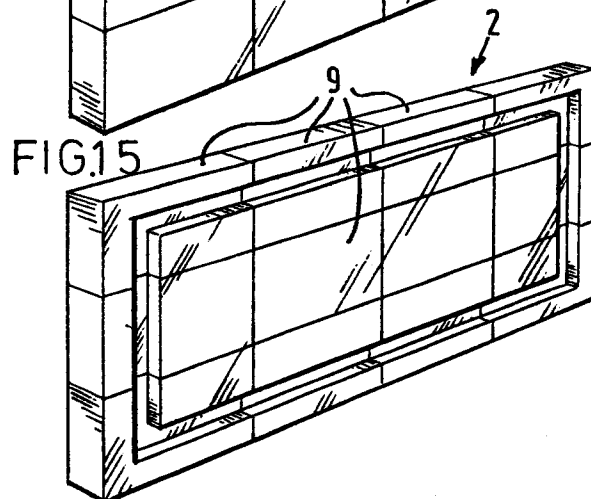
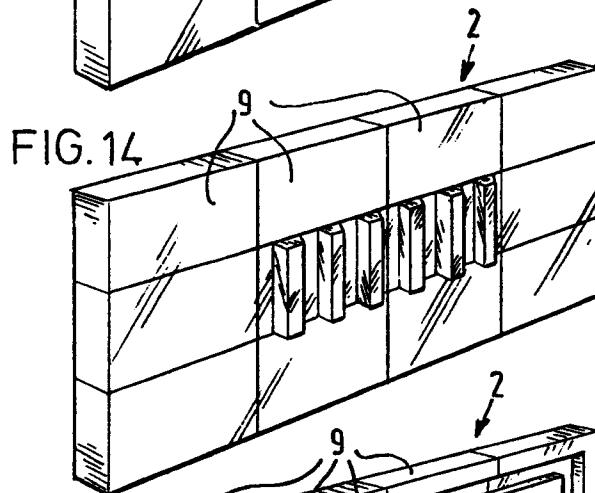
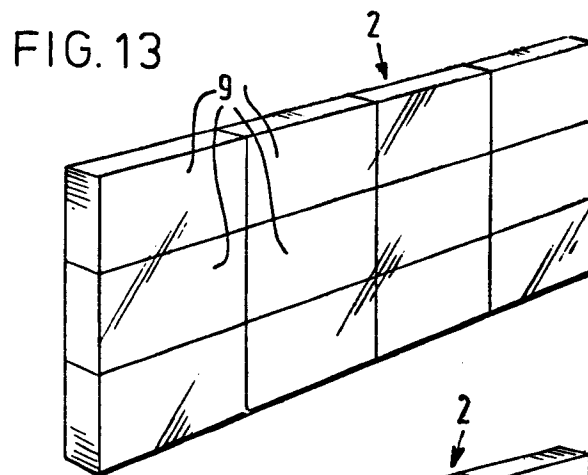


FIG. 16

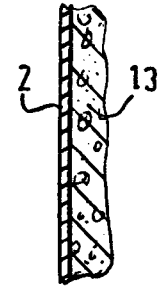


FIG. 17

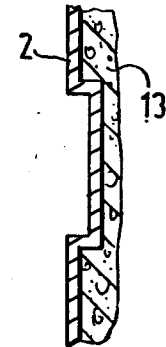
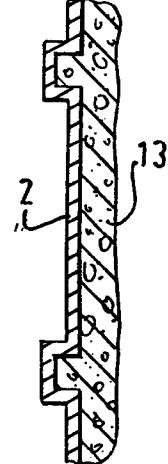


FIG. 18



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FIG. 19

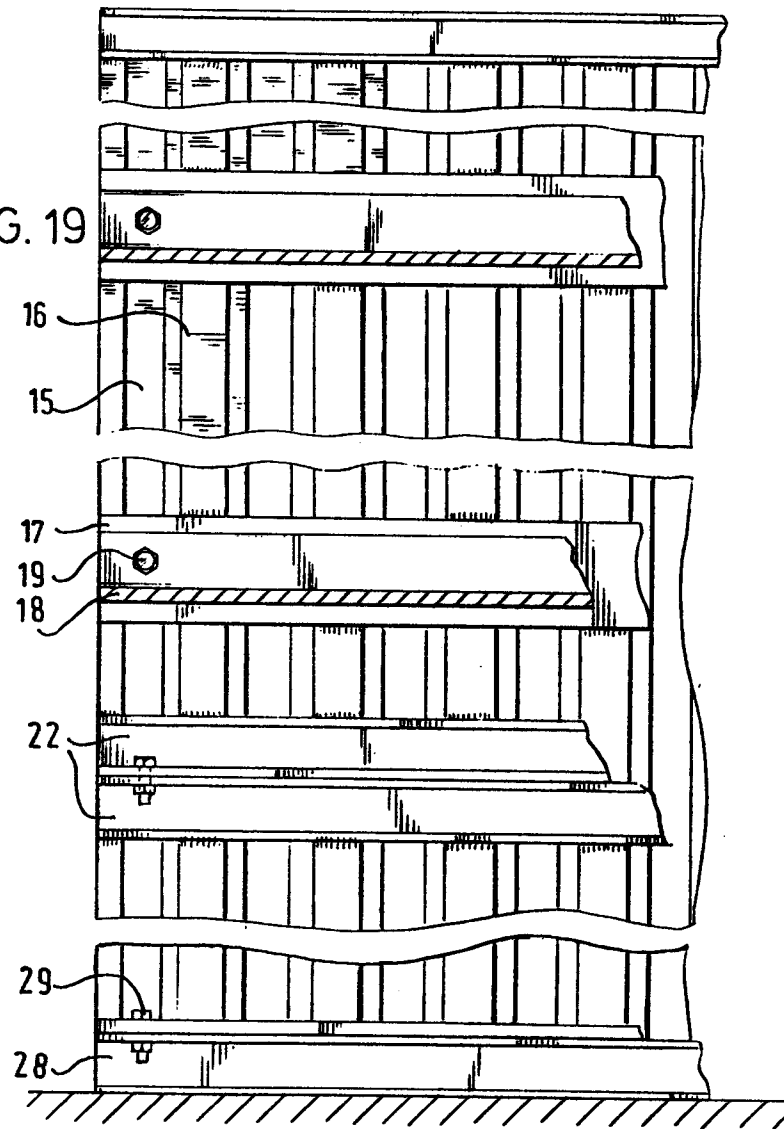
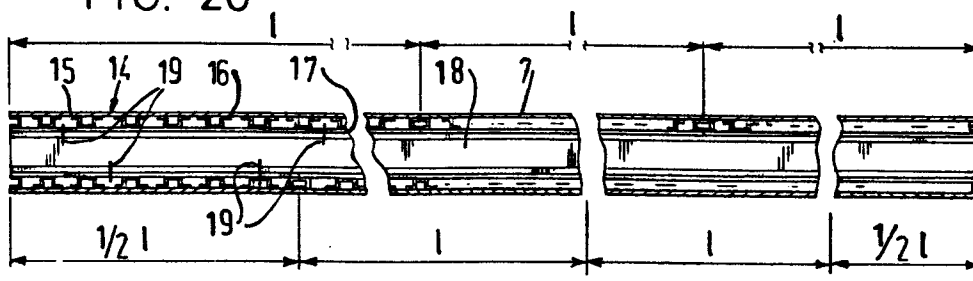


FIG. 20



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European Patent
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EUROPEAN SEARCH REPORT

Application number
EP 78 20 0192

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>GB - A - 1 106 542 (TRACOB)</u> * Page 2, lines 1-7, 86-115; figures 4,5 * --	1,3,4,6,8	B 28 B 7/24 E 04 G 11/10
	<u>GB - A - 779 390 (UNION JOINERY)</u> * Page 2, lines 13-26, 62-66, 73-75; figures 1,2 * --	1,3,4,6	
	<u>US - A - 2 997 769 (BOWDEN)</u> * Column 3, lines 67-75; column 4, lines 1-5, 13-29; figures 1,2 * --	1,2	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	<u>FR - A - 1 240 564 (BOURDIN)</u> * Page 2, right-hand column, paragraphs 4 and 5; page 3, left-hand column, paragraphs 3 to 5; figures 3,5,6 * --	1,3,4	B 28 B
	<u>DE - A - 2 345 202 (GEBERT)</u> * Page 9, paragraph 3; page 10, paragraph 1; figures 5,6,7 * ----	1,6	CATEGORY OF CITED DOCUMENTS
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <input checked="" type="checkbox"/> </div> <div> The present search report has been drawn up for all claims </div> </div>			&: member of the same patent family. corresponding document
Place of search The Hague	Date of completion of the search 07-05-1979	Examiner RUYMBEKE	