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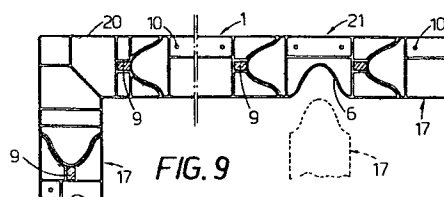
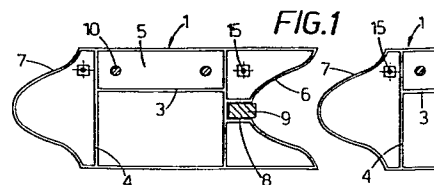
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54 Prefabricated modular panels for the construction of walls of cottages or of buildings in general.

57 Prefabricated modular panels for the construction of wall of cottages or buildings comprising: panels (1), each comprising a box-like body made of plastic and so shaped so as to constitute the form to be left in place for the casting therein of a concrete mix the box-like tubular body including two parallel main plate walls, inner partition walls (3, 4) for stiffening the main walls of the panel (1) and to define inner cavities, one of which may be used to form a reinforced concrete inner column (5) and the others are designed to the cast of thermo and/or acustical insulating mixes, the longitudinal edges of each panel (1) being shaped so as to form cylindrical concave and convex complementary surfaces so as to form female and male joint elements (6, 7) respectively, so as to allow to connect one panel to the adjacent one in aligned or slightly angled mutual position in each female joint member a groove (8) being provided to receive a band or strip (9) of a packing material so as to obtain a seal connection between the panels (1); modified panels similar to the panels (1), but having only inner transverse walls (4); panels having the same outline as that of the panels (1) but made of reinforced concrete and to be used, as carrying posts in substitution of one or more panels (1) when the resistance of a wall (17) composed by said prefabricated modular panels has to be increased; and corner panels (20 and 21) to connect two or more walls (17) set at right angles.



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Prefabricated modular panels for the construction of walls of cottages or of buildings in general.

The present invention relates to prefabricated modular panels designed to be used in juxtaposed relationship for the construction of walls of cottages or thermoinsulating, soundproofing walls of buildings in general and which comprise first panels, each comprising a box-like tubular body designed to constitute a form to be left in place for the casting therein of a mix, for instance, concrete, or reinforced concrete or other mixes having thermo-insulating or soundproofing characteristics, while their outer surfaces consist of plates which constitute the faces in sight of the panels so that it will be substantially unnecessary to provide to perform other finish operations thereon, second modular reinforced concrete panels to be used in substitution of one or more of the first modular panels for constructing walls of increased resistance and corner panels to connect to each other two or more walls set at substantially right angles.

Many prefabricated panels made of plastics are known in the building industry, the insulating property of which is only due to the presence of an inner hollow space provided

between the two main outer parallel plate walls forming each panel. Said known panels have considerable size so that the main outer walls of each panel have a low resistance owing to the elasticity of the plastics, which does not allow to construct hollow panels, having substantially rigid outer plate walls.

In addition said known plastic panels have side shaped joint edges including female and male elements respectively, which allow to connect the panels to each other only in an aligned relationship and which do not ensure any seal joining, unless auxiliary seal means are inserted between the joint surfaces.

According to the present invention prefabricated modular panels are provided which overcome said inconveniences and which allow to construct all the walls of a cottage, as well as soundproofing and thermo-insulating walls of buildings in general. Said panels comprise first panels consisting of a box-like body including a pair of opposite edges shaped so as to form female and male joint elements, having a substantially cylindrical mating surfaces, each female joint element also including in the central portion of said cylindrical surface a longitudinal groove designed to house an elastic seal strip or band, and second panels having the same outline as that of the first panels and made of reinforced concrete and to be used in substitution of one or more of the first panels, in order to increase the resistance of a wall.

The box-like body of the first modular panels of this invention made of plastic is obtained by a moulding process. Each box-like body is designed to constitute the form to be left in place for the casting of a concrete mix or a mix of other suitable substances into the cavities provided

therein. Said panels are designed to be used in juxtaposed relationship for the construction of all the walls and partitions of a cottage or of soundproofing and thermo-insulating curtain walls and partition walls of buildings in general, in which columns, made of reinforced concrete, may be embedded, while the outer faces of said panels can remain also in sight, since they have also a pleasing appearance, in particular, when colored plastic materials will be employed. In addition the outer faces of said walls substantially do not generally require any auxiliary finishing operation.

The second modular panels have the same outline as that of the first panels, but they are prefabricated in reinforced concrete according to the conventional technique.

15 The panels of this invention can be also connected to each another in a very close seal contact and under a very small friction effect so that by the use of said panels walls can be also constructed which extend according to a substantially curved line, or more exactly the wall will have

20 a prismatic surface, each face thereof being defined by one panel. In this case the adjacent panels are mounted in mutual slightly angled relationship, owing to the cylindrical shape of the cylindrical complementary joint surfaces of the joint members forming each joint connection.

25 Further each panel of the first type includes inner longitudinal and transverse partitions, these latter acting as stiffenings members for the outer main plate surfaces of these panels and at the same time define inner spaces inside each panel and which can be used for different intended

30 purposes, as, for instance, for the casting of a reinforced concrete column embedded into the panel or to constitute forms to receive different mixes so as to construct soundproofing or thermo-insulating or antifire walls.

When one of said inner cavities of each panel is used for the casting of a column, reinforcing rods will be inserted therein which pass through said vertical cavity. In the case of the panels of the second type the reinforcing rods can extend out of the upper and lower ends of each panel and can be connected or welded to the reinforcing rods extending out of the adjacent upper or lower beams of the ceiling or floor respectively of an inner room defined by the panel walls. Modified modular panels are also provided to connect walls set at right angles.

These and other features, objects and advantages of the present invention will be better understood from the following specification when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a top view of a panel of the first type and a fragmentary top view of the adjacent one, in an enlarged scale; Fig. 2 is a top view of a series of the first panels which are juxtaposed and interconnected to each other so as to form a straight wall portion; Fig. 3 is a top view of a metal plate for the locking of the interengaged joint elements of two adjacent panels; Fig. 4 is a top view of a variant for the panel, shown in Fig. 1; Fig. 5 is a top view of a panel of the second type, made of reinforced concrete; Fig. 6 shows a fragmentary front view of a wall formed by the juxtaposition of panels of the first and second type; Fig. 7 is a detail of the cross section of the wall shown in Fig. 6, taken along the line A-A, the upper edge of said wall being provided with locking means adapted to lock, at the same time, a plurality of the panels forming a wall; Fig. 8 shows

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the top view of two panels of the first type connected to one another with a slight angular displacement so as to form a substantially curved wall; Fig. 9 is a fragmentary top view showing the connection of two walls set at right angle, by means of a corner L-shaped panel; and Fig. 10 is a top view of the detail of the connection of three walls by means of a T-shaped panel.

10 With reference now to the Figg. 1, 2 and at 1 is generally indicated a modular prefabricated panel of the first type comprising a box-like tubular body which is constructed by a moulding process in any suitable plastic material and which comprises two main parallel plate walls 2 which are connected to one another at their ends by cylindrical surfaces having the shape of female and male complementary edge joint elements 6 and 7.

Said cylindrical concave and convex surfaces 6 and 7 are so shaped as to allow to connect a series of panels 1, either in a straight direction (Fig. 2) or according to a broken line (Fig. 8) so as to obtain a prismatic or substantially curve wall in the building.

The inner space inside the main plate walls 2 and the walls 6 and 7 forming the female and male elements for joining the panels 1 to each other, is separated by longitudinal and transverse partition walls 3 and 4, so as to define tubular cavities inside the panel 1 open at their both ends and designed to receive a mix. The transverse partitions 4 serve also as inner elements to support and stiffen the main peripheral plate walls 2 and, in combination with the longitudinal wall 3, they define at least a cavity designed to form the mould for the casting of

a reinforced column 5, by means of reinforced rods 10.

The remaining cavities of the panel 1 designed to form curtain walls of the building will receive a mix consisting of a mixture of cement and soundproofing and/or thermo-insulating and or antifire materials. In particular conventional concrete can be used for obtaining the column 5 or also cellular concrete having big grains and obtained by means of the use of a mixture of foamed clay, sand and cement.

Concrete may be also used having fine grains and obtained by means of chemical additives; this concrete is not only lightweight but also has very thermo-insulating and soundproofing properties.

Along the central portion of each female joint member 6 a longitudinal groove 8 is provided designed to house a strip or band 9 of an elastically deformable seal material, in particular, soft rubber, or other suitable material, and which partially extends beyond the entrance passage of the groove 8 so as to obtain a seal joint as the female and male joint elements 6 and 7 of two adjacent panels 1 are assembled in close contact one with another.

The variant 1a of the panel 1, shown in Fig. 4, is substantially similar to the panel 1, except that no longitudinal inner wall is provided. This type of panel 1a is adapted for the construction of thermo-insulating and soundproofing walls of no carrying character. On the contrary the panel 11, shown in fig. 5, which is prefabricated with conventional means and method, has an outline equal to that of the panels 1 and 1a, but it consists of a panel made of reinforced concrete, which can substitute a panel 1 or 1a in order to include at least a carrying element in a wall 17 constituted of juxtaposed panels 1 and 1a.

For such a purpose the reinforcing rods 10 could extend beyond the upper and lower ends of the panel 11 so as to be able to be connected, for instance, by welding, to the reinforcing rods of the carrying skeleton of the building.

5 The panels 1 and 1a of the embodiment of Figg. 1 and 4 and optionally one or more panels 11 can be used for composing peripheral walls, partition walls and main inside walls of cottages, as well as for composing insulating peripheral walls or partition walls of buildings, in general, and are also adapted to be easily connected to any other conventional structures made of reinforced concrete, constituting the carrying framework of a building.

According to the different intended purposes and to the loads, the modular panels 1, 1a and 11 have different
15 size and insulating degree. Their length will be equal to the height of the rooms of the cottages or buildings to be constructed.

The connection between each panel 1, 1a or 11 and the adjacent ones, can be improved by means of metal plates
20 12 mounted according to a bridge arrangement between the two adjacent end portions of the upper sides of the two panels 1, 1a or 11 connected to one another by means of the vertical joints elements 6 and 7, after a wall has been erected.

25 On said plates 12 short longitudinal duly spaced apart slots 13 are provided through which bolts 14 are caused to pass, designed to be screwed into screw nuts 15, previously embedded into the concrete or the like poured into the inner cavities of two adjacent panels 1, 1a or 11, and
30 positioned at predetermined distances on each upper ends of panels 1, 1a, or 11 (Fig. 2).

Figures 6 and 7 show another locking system, provided to lock to each other at their upper ends a plurality of

panels 1, 1a or 11 forming a wall, after the assembly of said panels. For such a purpose lengths of structural shaped metal elements 16 are provided, the cross section of which has an inverted U-shape and which are made of an metal sheet material of elastically deformable type; the free ends of the sides of the U-elements 16 are spaced apart from one another of a distance slightly lesser than the thickness of the wall generally indicated 17 so that said elements 16 can be forced so as to be mounted about the upper edge of the wall 17. The elements 16 are prefabricated in modular lengths so that for the locking of the panels 1, 1a or 11, forming a wall 17 two or more lengths of elements 16 have to be used. At the joint section of two adjacent elements 16 this joint section will be protected by an inverted U joint strap 18 which is mounted on and fixed to the elements 16 and to the upper edges of the panel placed therein by means of through bolts 19 or the like.

Fig. 2 shows the position of the panels 1, 1a or 11 for the construction of a straight wall 17, while Fig. 8 shows the disposition of two adjacent panels 1a, for instance, in order to form a substantially curved wall 17a. In this disposition the joint elements 6 and 7 are slightly rotated one with respect to the other, owing to the cylindrical shape of outer surfaces of said joint elements 6 and 7.

In this assembly condition the gap, created between the two interengaged female and male joint elements 6 and 7 will be filled by a band of a packing material 19, previously stuck along the bottom portion of each concave female joint surface 6.

For the corner solutions, i.e. when two walls 17 substantially

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set at right angle have to be connected, L-shaped corner panels 20 are provided (Fig. 9). Said panels 20 could include a corner pillar or column 5a made of reinforced concrete.

5 Fig. 10 shows a panel 21 adapted for the connection of three walls 17 so as to form a substantially T connection of said walls 17.

Of course, modified panels 1, 1a, 11 and 20 could be also provided in which the main outer planar plate surfaces

10 2 will be substituted by cylindrical coaxial main surfaces, if perfectly cylindrical walls have to be constructed.

CLAIMS

- 1 - Prefabricated modular panels for the construction of walls of cottages or building in general comprising:
- panels (1 or 1a), each constituted of a box-like body,
5 made of plastics and so shaped as to act as a form to be left in place for the casting therein of mixes as concrete and the like, said box-like tubular body having a pair of opposite open ends and including two parallel main outer walls (2) and inner longitudinal and/or transverse partitions (4, 3) for supporting and stiffening
10 the main walls (2) and for separating the inner space of each panel (1 or 1a) in cavities, one of which may be used to form a reinforced concrete column (5) embedded into said panel, while the other cavities are designed to receive
15 mixes of thermoinsulating and/or soundproofing materials, the other two side edges of the panel (1, 1a) being shaped as to form female and male joint elements (6,7) having complementary cylindrical outer surfaces so as to allow the connection of adjacent panels (1), either in straight
20 or in angled position, each female joint element (6) comprising at its central portion a longitudinal groove (8) housing a band or strip (9) of a packing material, adapted to obtain a seal connection between the interengaged female and male joint elements (6, 7) of the adjacent panels;
 - 25 - panels (11) having the same outline as that of the panels (1 and 1a), but which are made of reinforced concrete and are designed to substitute in a wall one or more panels (1 or 1a);
 - and corner panels (20 and 21 respectively) to connect
30 two or more walls (17) set at right angles, means (12 or 16) being provided to lock to each other at least pairs of adjacent panels (1, 1a or 11).

2 - Prefabricated modular panels, according to claim 1, wherein the mix for the construction of the panels (1, 1a and 11) comprises foamed clay, cement, and other sound-proofing and thermo-insulating materials.

5 3 - Prefabricated modular panels according to claim 1, wherein the panels (1, 1a, 11) have a length equal to the height of the rooms of the cottage or building, and each wall (17) formed by the juxtaposition of a plurality of panels (1, 1a or 11) is provided at its upper edge
10 of locking inverted U-metal sheet elements (16) connected to each other and to the interposed wall (17) by bolts (19), with the superposition of an inverted U-joint strap (18) mounted in the joint points of said elements (16).

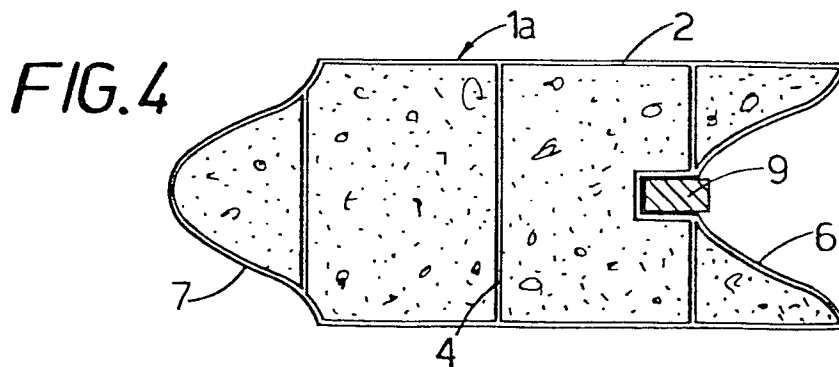
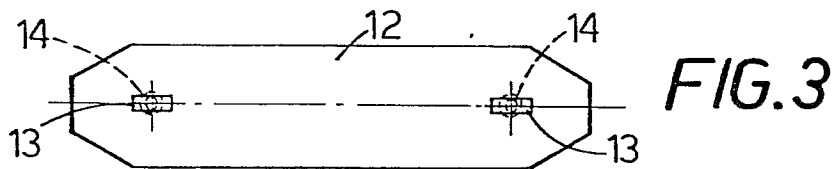
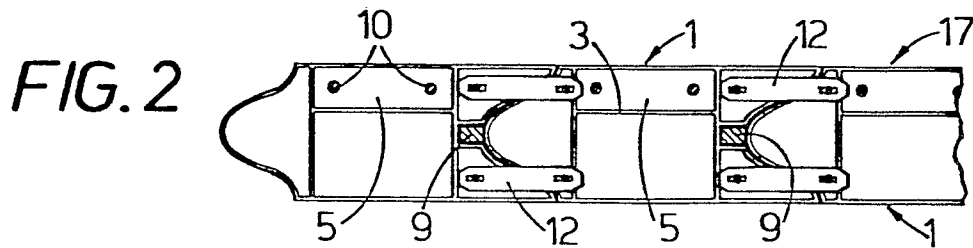
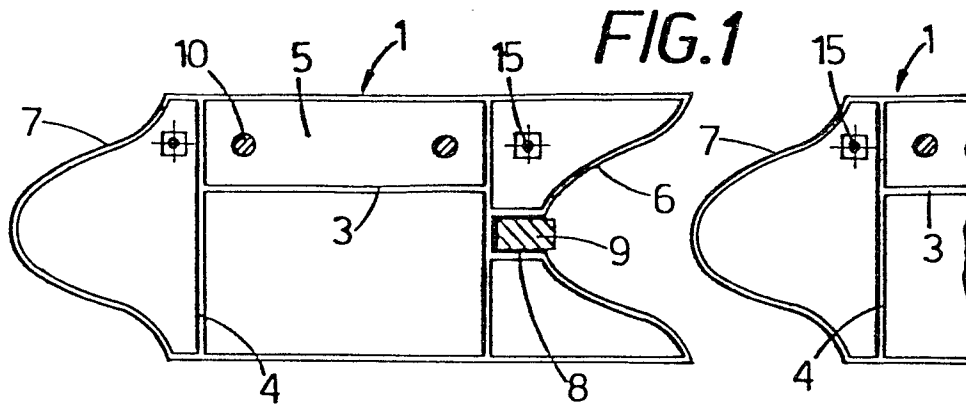


FIG. 7

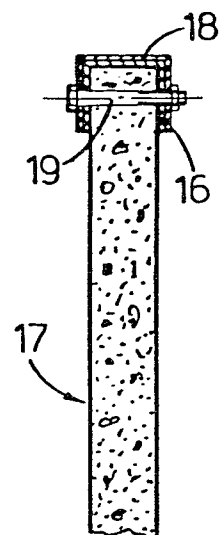
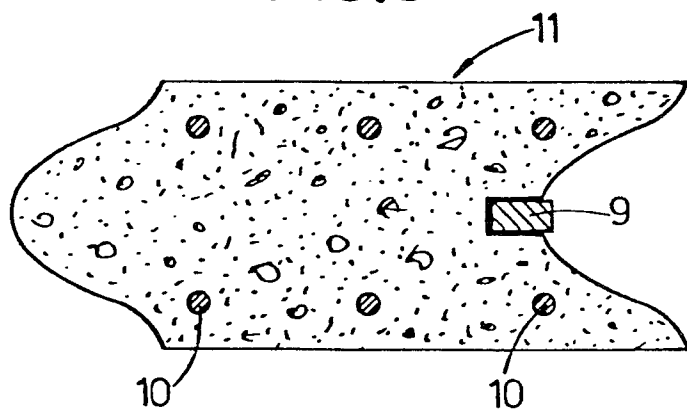
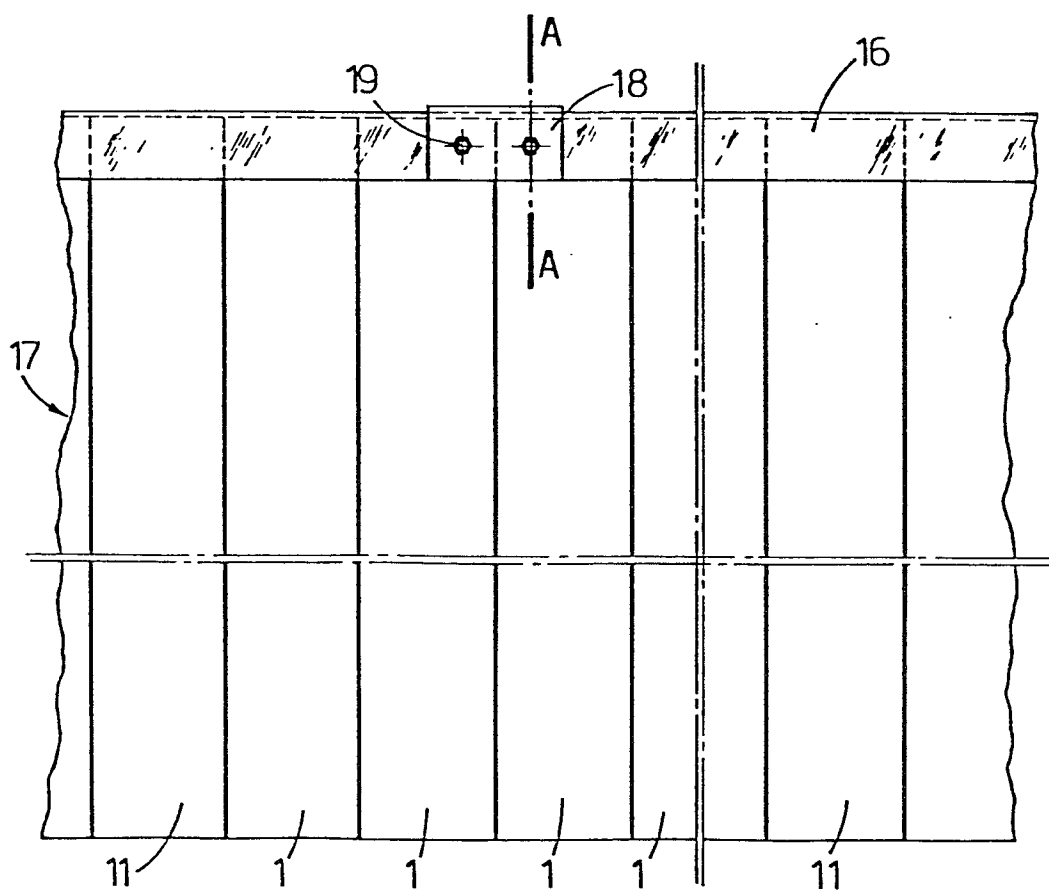
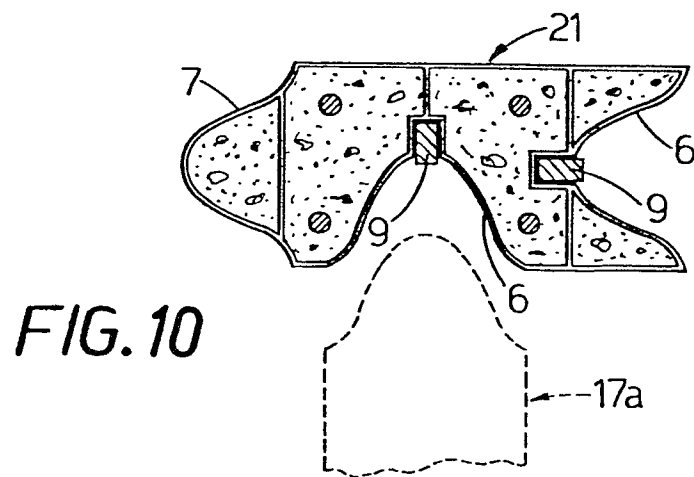
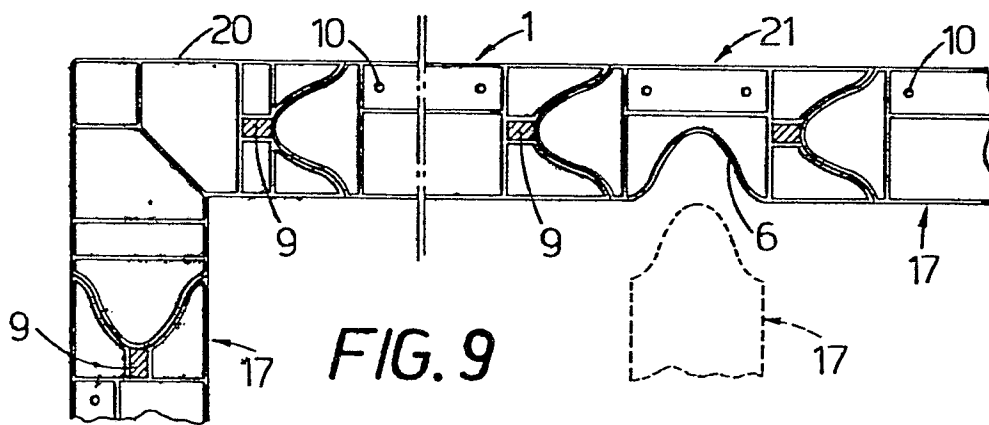
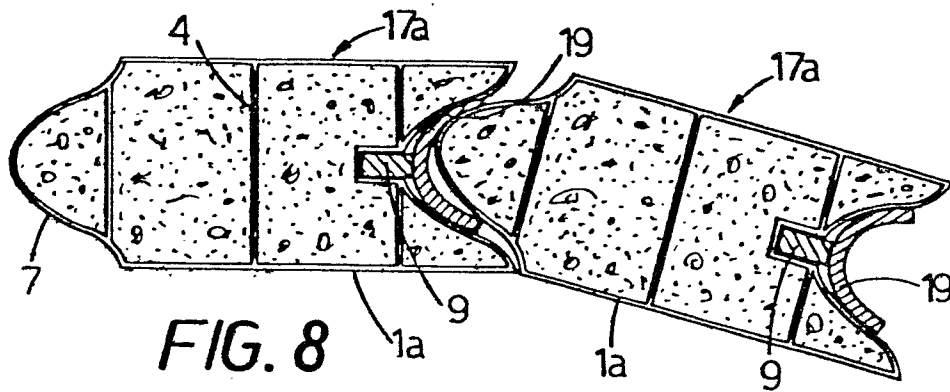


FIG. 6







European Patent
Office

EUROPEAN SEARCH REPORT

0025420

Application number

EP 80 83 0059.4

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	
A	<u>DE - A - 1 784 143</u> (S.P.A. LAVORAZIONE MATERIE PLASTICHE) * page 5; fig. 1 * --	1	E 04 C 1/10 E 04 C 2/34 E 04 B 2/86
	<u>DE - A - 1 759 377</u> (A. GRAVEL) * page 3, paragraph 2; fig. 4 to 6 * --	1	
	<u>FR - A - 1 581 629</u> (SOCIETE SECO) * page 4, paragraph 3; fig. 4, 6 * --	1	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	<u>DE - U - 1 814 826</u> (H. MAASSEN) * fig. 2, 5 * ----		E 04 B 2/00 E 04 C 1/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
Berlin		26-11-1980	v. WITTEN