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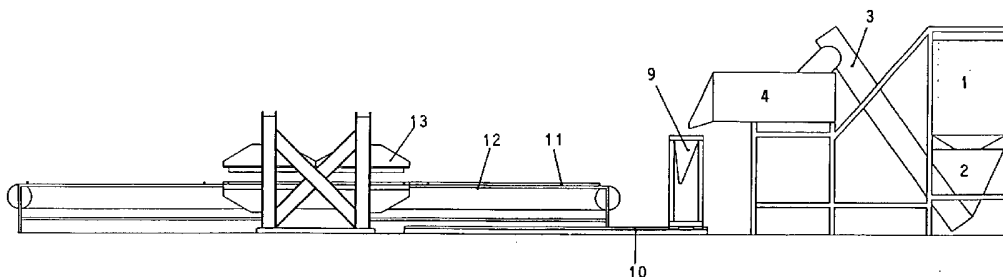
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(54) Title: PROCESS FOR CARRYING OUT PANELS, TILES AND THE LIKE USING AGGLOMERATES OF DIFFERENT MINERALS



(57) Abstract: The invention relates to a process for carrying out panels, tiles and similar using agglomerates of different minerals wherein the terracotta granules or other minerals are mixed with bi-components or thermosetting resins and spread by means of a dosing means onto a plan provided with side, in such a way to form a layer of desired thickness. Said layer is then inserted between the heated surface of a press, where, by virtue of the simultaneous effect of heat and pressure, it is carried out the polymerization of the resin, which hardens and transforms the agglomeration layer in a panel resistant to fire, water and mechanical stresses, usable for different applications.



WO 02/094523 A1

PROCESS FOR CARRYING OUT PANELS, TILES AND THE LIKE USING AGGLOMERATES OF DIFFERENT MINERALS

5 TECHNICAL FIELD

The present invention refers to a process allowing to carry out fire-proof, water-proof
mechanical stress-proof panels, tiles and the like with different superficial finishes, fit for
floorings and coverings generally. The process includes also the elements carried out by said
10 process.

BACKGROUND ART

There are known synthetic marbles and granites constituted by agglomerates of different
15 minerals, mixed with resins. A method presently used for carrying out said agglomerates
consists in inserting granules mixed with the resin in forms, where they are heated and subject
to high vibro-compression in order to achieve the hardening of the whole mass, which becomes
an enbloc. Afterward the enbloc must be cut, smoothed and worked, for carrying out the desired
elements. This method uses a low resin percentage, but requires presses and large dimension
20 equipments, with consequent investments and high operational expenses. Moreover the cuts and
the polishing of the raw plates produce large amount of powders and require long machining
times.

Another method consists in forming plates having a defined thickness by positioning the
25 powders mixed with resins into rubber trays or into belts with holding sides, and achieving the
hardening of the whole mass by vacuum vibro-compression and following free baking in oven.

Another method currently used for carrying out the agglomerates consists in pouring the
mixture of granules and resins into an open mold. In this case it is necessary to use a very large
30 amount of resin, with consequent decrease of the mechanical strength and resistance to heat of
the manufactured elements.

DISCLOSURE OF THE INVENTION

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The objects of the present invention consist in carrying out fire-proof, water-proof and

mechanical stress-proof panels, tiles and similar with finishes made of brickwork, melaminic, or of other types, also decorated with carvings or three-dimensional architectural elements, using means not excessively expensive and having a low resin percentage. The manufactured elements can be advantageously used for floorings, staircases, coverings and furnitures generally, or also for surface of kitchens, tables, benches and similar. Adding rubber granules or recycled plastic materials, high characteristics of acoustic insulation are achieved, which allow using the panels also for floors of suspended or floating type, with suitable female-male connections.

The terracotta granules, or of other minerals are mixed with bi-component or thermosetting resins and distributed with a dosing device on a plan, in such a way to form a layer of desired thickness. The layer is then inserted between the heated surfaces of a press, where the resin polymerizes, hardening by virtue of the simultaneous effect of pressure and heat. In particular, the surfaces can be constituted by wastes of grinded bricks, to carrying out elements similar to the brick, or constituted by granules of different minerals, to carrying out marble or granite type finishes. The surfaces can be also coated with melaminic sheets, or with ready laminated plastic, which are heat included into panels so manufactured already melaminic coated. A stiffening frame can be added in the base portion of the layer.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now described in detail, with particular reference to the attached drawings, which show by way of example some possible embodiment:

- figure 1 shows a side schematic view of a plant for carrying out panels, tiles and similar according to the process object of the present invention;
- figure 2 shows a top view of the plant of figure 1;
- figures 3 and 4 show respectively a transversal section and a top view of a panel with brick superficial finish;
- figures 5 and 6 show a transversal section and a top view of a panel with melaminic superficial finish;
- figures 7 and 8 show a transversal section and a top view of a panel with grooves creating a visible bricks effect;

BEST MODE OF CARRYING OUT THE INVENTION

With reference to figures 1 and 2, numeral 1 indicates a silo containing the granules of material to be agglomerated. Several silos could be provided, containing different material, for instance granules or powders of brick wastes, granules of other minerals, rubber granules or recycled plastic materials. The granules, positioned in the hopper 2, are transferred by a cochlea 3 into a mixer 4, where they are mixed with bi-component or thermosetting resin. The two components of the resin are introduced in the mixer 4 by means of pumps 5 and 6 and the ducts 7 and 8, shown in figure 2. The thermosetting resin is directly inserted into the granules.

The granules mixed with the resin are introduced in a dosing hopper 9, which can translate over rails 10 in order to scatter a layer of agglomerate 11 on the belt 12, provided with holding sides. The scattered layer is therefore introduced in the press 13, through the belt 12. The heated jaws of the press cause the polymerization of the thermosetting or bi-component resin: it is carried out a panel made of firmly bonded mineral agglomerates, with a low percentage of resin, resistant to fire, water, dirty and mechanical stresses.

While the heat pressing of the loaded agglomerate layer is operated, the dosing hopper 9 can depose on the belt 12 another layer of agglomerates mixed with bi-component resin. At the pressure stop, by means of the belt 12 the completed panel is discharged and a new layer is loaded.

The static press can be substituted with a continuous press in order to eliminate the opening and closing dead time. In this case a follower cutting device must be provided at the press outlet for carrying out panels from a continuous panel.

The panels can be homogeneous, or with a superficial portion different from the base portion, as shown for instance in figure 3. In such figure numeral 14 indicates the superficial portion and numeral 15 indicates the base portion. In particular, the superficial portion 14 could be carried out with brick powder, to achieve a brick finishing. The stamping superficial portion could be carried out also by agglomerating, with the same procedures, different mineral granules, in such a way to achieve a marble or granite type effect.

The base portion 15 may contain rubber granules or recycled plastic material, to confer to the panels suitable characteristics of flexibility and acoustic insulation.

On the layer 11, before the introduction into the press, it could be applied a melaminic sheet 16,

shown in figures 5 and 6, which polymerizes at the same time with the agglomerate layer or a ready plastic laminate, for which the same agglomerate acts as adhesive, in such a way to carry out a panel already coated. The panel can be afterwards finished on the surface with decorations and heat and cold ceramic enamels.

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The panels used in the building, shipbuilding fields and can be fit for floorings, also floating, or inner or external coverings of large surfaces, simulating the effects of the visible bricks with varied decorative patterns. The panels can be pantograph carved, for carrying out different

10 Deepening the incisions through a numerical control pantograph up to consume the whole rigid layer, the panels can be stick on curved surfaces, such as columns of reinforced concrete, internal spiral staircases, arcs and vaults generally. Grids of different shape and dimension can be carried out as well.

15 Using shaped molds, panels already having cuts can be carried out, such as, for instance, the cuts indicated with numeral 17 in figures 7 and 8.

In the layer 11 could be inserted a stiffening frame, made of fiberglass or other materials, to improve the mechanical characteristics of the panel. The sandwich panel so carried out can be
20 superficially calibrated using a sanding machine and superficially treated with wax or suitable varnishes or enamels and heat and cold ceramic decorations. The panels can be cut, squared and predisposed for joints, in the same way of MDF panels.

By agglomerating light minerals, such as pumice, pearlite, aluminium silicate or hollow glass
25 microspheres, with inner stiffening frames, shaped panels with different thickness can be carried out, with rusticated ashlar or other decorative elements, usable for false ceilings, for flame trap or other.

With the described process panels can be carried out with different types of finish, resistant to
30 fire, water, dirty, mechanical stress and acoustically insulated: the specified objects have been therefore achieved.

The dosing device could be fixed, or positioned on a mobile belt also during casting, for instance in case of continuous press.

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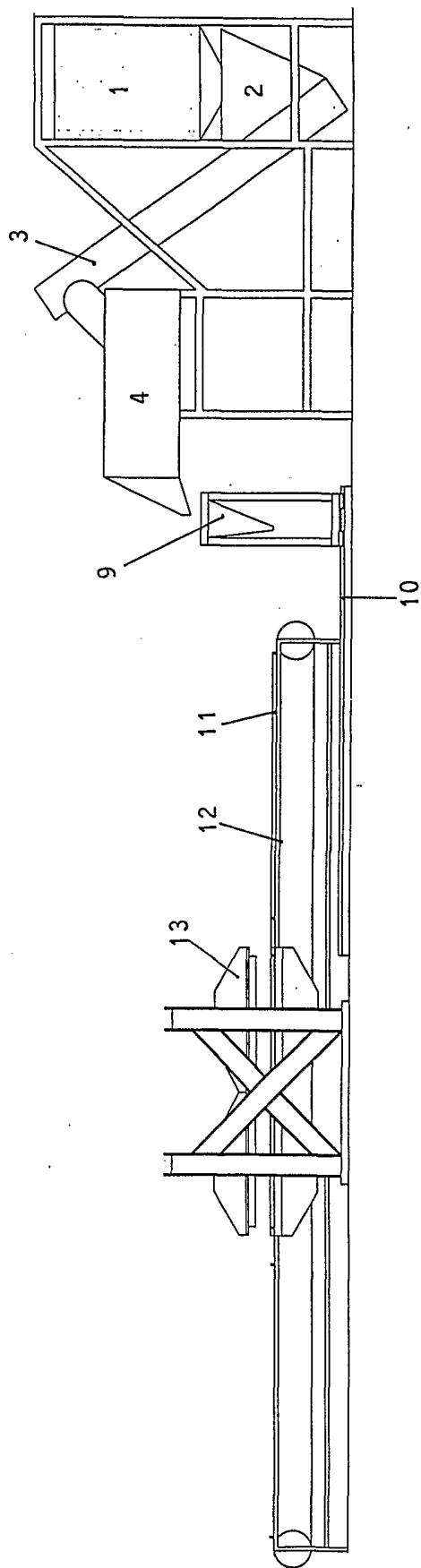
CLAIMS

- 1) Process for carrying out panels, tiles and similar using agglomerates of different minerals characterized in that the terracotta granules or other minerals are mixed with bi-
5 components or thermosetting resins and spread by means of a dosing means onto a plan provided with side, in such a way to form a layer of desired thickness, which is then inserted between the heated surface of a press, where, by virtue of the simultaneous effect of heat and pressure, it is carried out the polymerization of the resin, which hardens and transforms the agglomeration layer in a panel resistant to fire, water and mechanical
10 stresses, usable for different applications.
- 2) Process according to claim 1 characterized in that the deposited layer can be homogeneous, or can have a superficial portion different from the base portion; that in particular the superficial portion can be made of wastes of grinded bricks, to carried out elements similar
15 to the brick, or made of a mixture of different mineral, for achieving marble or granite type effects.
- 3) Process according to any of the preceding claims characterized in that before the introduction into press, the agglomerate and resin layer is covered with a sheet of melaminic material, or similar, which polymerizes at the same time with the agglomerate
20 layer, or is covered with a ready plastic laminate, to which said agglomerate acts as adhesive, in such a way to carried out a panel already coated or afterwards decorated with decorations and heat and cold ceramic enamels.
- 25 4) Process according to any of the preceding claims characterized in that shaped molds are used in the press, in order to carried out panels with cuts, with rusticated ashlar, or generally other decorations.
- 5) Process according to any of the preceding claims characterized in that, in the base portion it
30 is inserted a stiffening frame, and/or rubber or recycled plastic materials granules, fit for giving suitable flexibility and acoustic insulation to the elements.
- 6) Panels, tiles and similar carried out through the process according to any of the preceding claims characterized in that they are constituted by one or more layers of mineral
35 agglomerates, mixed with a low percentage of thermosetting or bi-component resin and

heat pressed; that said layers can be homogeneous, or with a superficial portion (14) different from the base portion (15), carried out for instance with brick powder, to achieve a brick finish, or with different mineral, for having marble or granulated type finishes.

- 5 7) Panels, tiles and similar according to claim 6 characterized in that the base portion (15) contains rubber or recycled plastic material granules, fit for giving suitable flexibility and acoustic insulation to the panels, which are engraved up to consume the whole rigid layer in order to cover curved surfaces.
- 10 8) Panels, tiles and similar according to claims 6 and 7 characterized in that they can be press shaped or pantograph carved, in order to carry out different throated, inclined or sloped connections, or straight or rounded grooves, or ornamental patterns, or grids with different shapes.
- 15 9) Panels, tiles and similar according to claims 6, 7 and 8, characterized in that they are made of agglomerates of light mineral, such as pumice, perlite, aluminium silicate or hollow glass microspheres, with stiffening frames and are used for false-ceilings, furnitures, trap-fire doors or other uses.

Fig.1



2 / 4

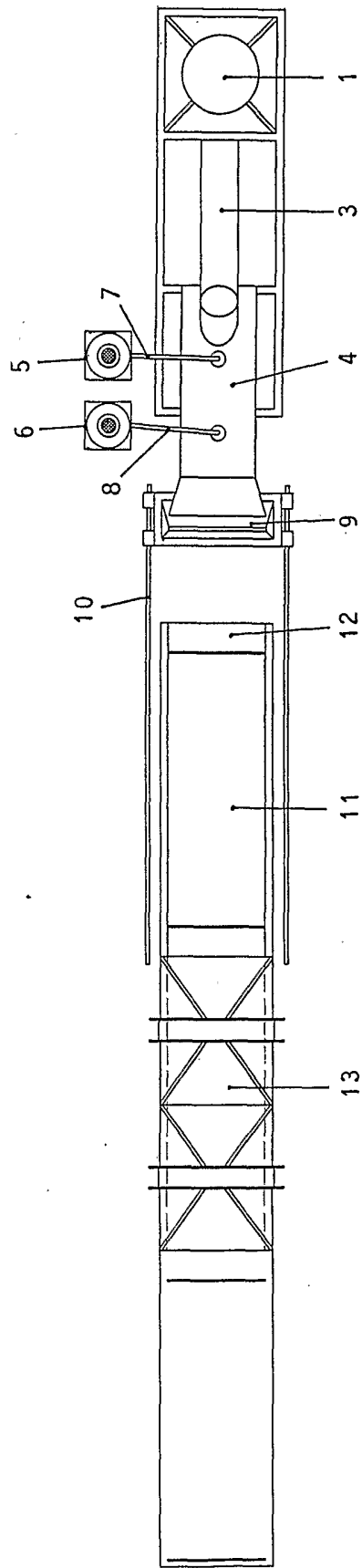


Fig.2

Fig.3

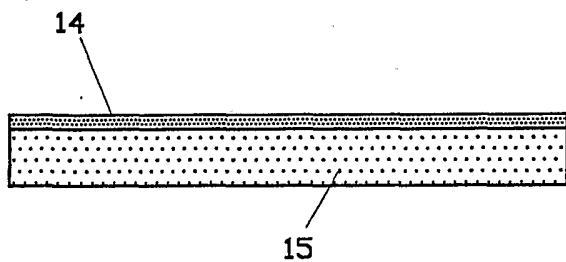


Fig.5

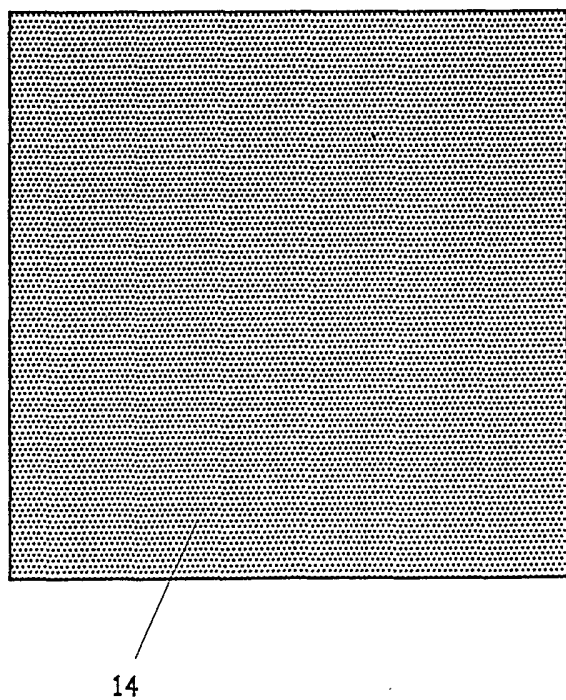
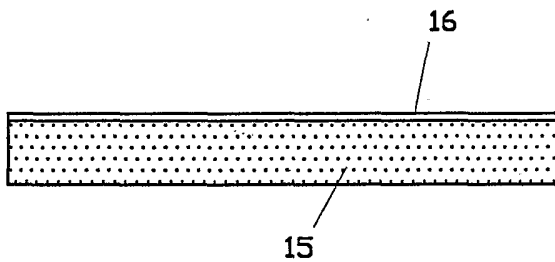


Fig.4

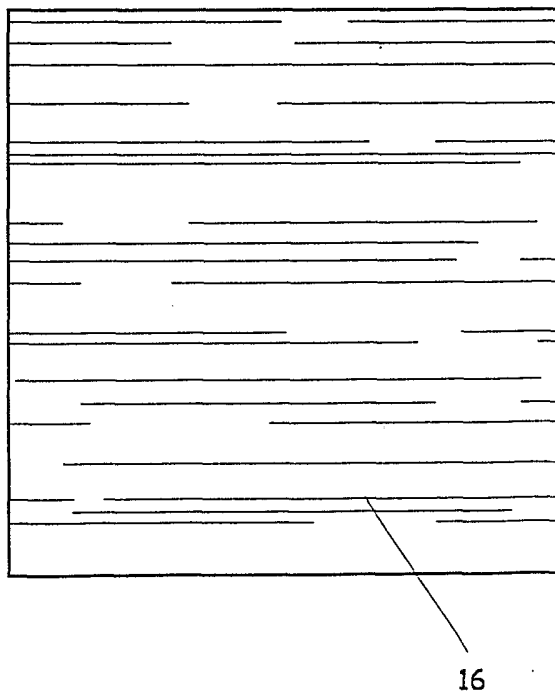


Fig.6

4 / 4

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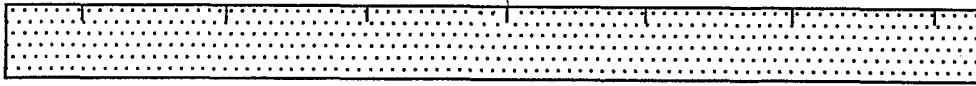


Fig.7

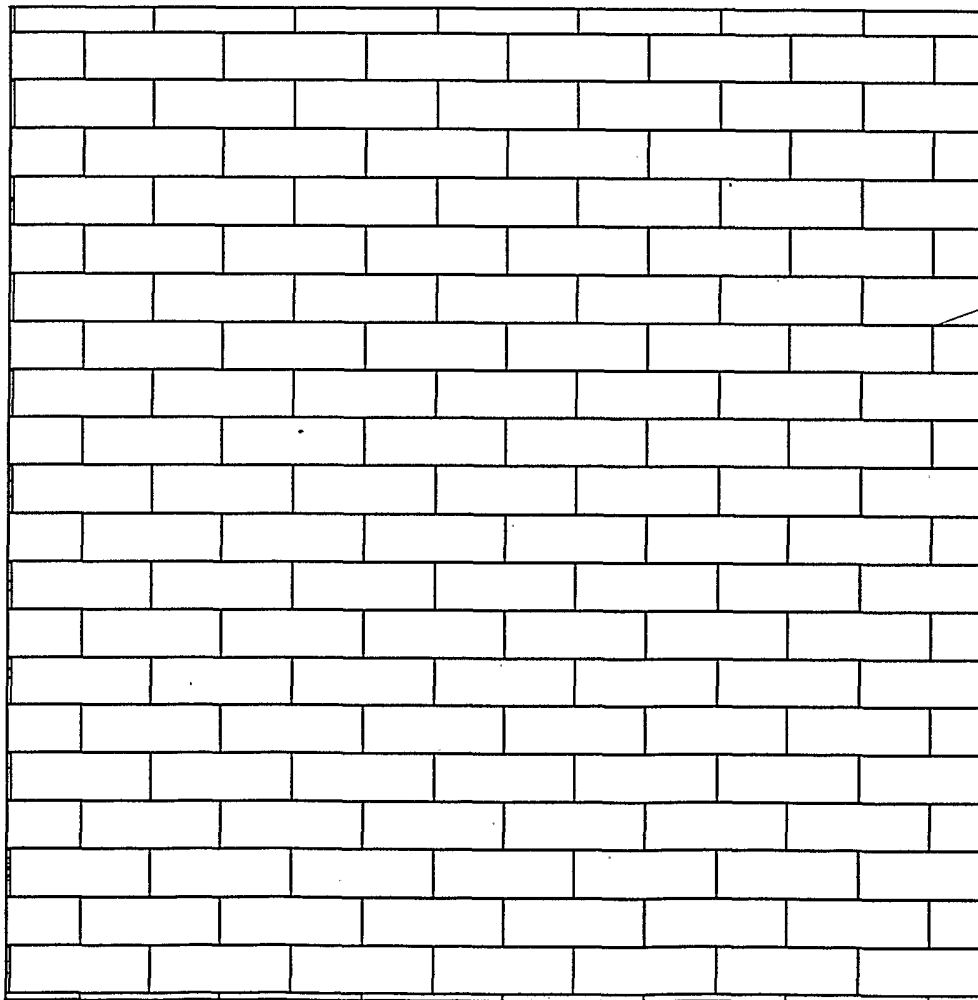


Fig.8

INTERNATIONAL SEARCH REPORT

International Application No

IB 02/01776

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B28B3/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B28B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 288 353 A (REVANKAR GOPAL S) 22 February 1994 (1994-02-22) abstract; claims 1,6	1,2,6
A	EP 0 274 702 A (SUMITOMO METAL IND) 20 July 1988 (1988-07-20) column 7, line 9 - line 12; claims 1,4; figure 1	1,6
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 300 (M-1426), 8 June 1993 (1993-06-08) & JP 05 024151 A (TOYODA DENKEN KOGYOSHO:KK;OTHERS: 01), 2 February 1993 (1993-02-02) abstract	1,6

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 02/01776

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
US 5288353	A	22-02-1994	CA 2086869 A1 EP 0552666 A1 JP 5261758 A MX 9300147 A1	22-07-1993 28-07-1993 12-10-1993 01-07-1993
EP 0274702	A	20-07-1988	JP 1765756 C JP 4056054 B JP 63215731 A JP 1766247 C JP 4058769 B JP 63154310 A DE 3777602 D1 EP 0274702 A1 US 4874564 A	11-06-1993 07-09-1992 08-09-1988 11-06-1993 18-09-1992 27-06-1988 23-04-1992 20-07-1988 17-10-1989
JP 05024151	A	02-02-1993	JP 2634508 B2	30-07-1997