(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 655 120 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.05.2006 Bulletin 2006/19

(21) Application number: **05077400.9**

(22) Date of filing: **19.10.2005**

(51) Int Cl.:
B28B 7/00 *(2006.01)* ***E04B 5/02*** *(2006.01)*
E04B 5/48 *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **19.10.2004 NL 1027296**

(71) Applicant: **Betonson B.V.**
5692 CJ Son (NL)

(72) Inventors:
- **Stroeve, Hermanus Johannes Maria**
  7812 NX Emmen (NL)
- **Klösters, Gerardus Johannes**
  5143 JB Waalwijk (NL)
- **Breel, Cornelis Iman**
  5694 VJ Breugel (NL)

(74) Representative: **Bruin, Cornelis Willem et al**
Arnold & Siedsma,
Advocaten en Octrooigemachtigden,
Sweelinckplein 1
NL-2517 GK Den Haag (NL)

(54) Floorplate having a walkable mirror surface

(57) The present invention relates to a floor plate, formed in an open mould and of cured concrete, which floor plate comprises a bottom surface and a top surface, wherein the top surface is a walkable mirror surface and wherein the top surface is provided with at least one longitudinal gutter, side gutter or side gutter part extending over at least a part of the longitudinal direction of the floor plate, to a method for manufacturing the floor plate and to a floor comprising the floor plate.

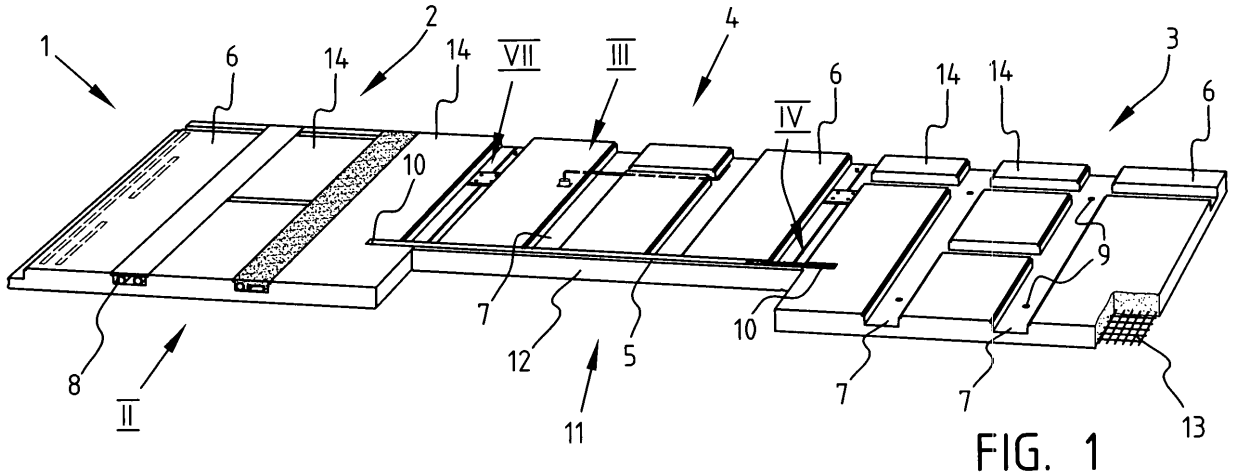

FIG. 1

EP 1 655 120 A1

Description

[0001] The present invention relates to a floor plate, formed in an open mould and of cured concrete, which floor plate comprises a bottom surface and a top surface, to a method for manufacturing floor plates, to floor plates obtainable with this method and to a floor comprising the floor plates according to the invention.

[0002] Such floor plates, such as solid floor plates, wing floor plates and channel plates, are known in the prior art and are frequently used in, among others, house building and public utility construction.

[0003] The floor plates are generally manufactured by casting concrete in an open mould, such as for instance a long track. Such an open mould comprises a container of a desired length and side walls, which is open on the top side, also the casting side. If desired, the mould is provided with means with which a reinforcement can be arranged in the floor plate to be formed. When the concrete is poured into the mould, the concrete is pressed against the relatively smooth bottom of the mould. The result hereof is that when the concrete has been allowed to dry a relatively smooth surface is obtained. The pouring side of the formed plate has a rough surface. The principle of a long track mould also comprises of pouring concrete into an open mould. In the longitudinal direction this long track mould is however not bounded to the length dimension of a floor plate. In view of the great length of the long track, it is possible to manufacture floor plates in continuous manner. When a floor is formed using the above described floor plates, the relatively smooth surface of the floor plate is used as the underside of the floor and the relatively rough surface as the upper side of the floor. This means that in many cases the relatively smooth underside of the floor plate is used as ceiling for the underlying storey. Installation fittings such as water pipes or power cables are generally arranged on the relatively rough upper side of the floor plate. The top surface of the floor plate may be relatively rough since a further finishing layer is also arranged thereon. A walkable floor surface is obtained by arranging such a finishing layer on the relatively rough upper surface of the floor plate. The finishing layer generally comprises a layer of concrete, although other materials can also be used. When this finishing layer is arranged, it is particularly important that the finishing layer has a thickness such that installation fittings arranged on the floor plate are not damaged when the floor is used.

[0004] The arranging of the above described finishing layer has a number of drawbacks. A first drawback is that arranging of such a finishing layer is relatively costly. This is because extra material and manpower has to be used to arrange the layer. A further drawback is that the floor cannot be walked on for a number of days. This means that further completion of the building takes longer. A third drawback of the use of the above described finishing layer is that, when there is a leak or other malfunction of one the conduits in the finishing layer, it is very difficult to reach these conduits in order to repair them.

[0005] In the Netherlands patent NL 1013136 a channel floor is described which is provided with gutters extending in longitudinal direction. Installation fittings can be arranged in these gutters. The upper side of the channel plate does not however form a walkable mirror surface since in the case of a channel plate a lower shell is first poured, and only then an upper shell. This upper shell functions as the walkable side of the plate, although this side must however still be provided with a finishing layer because it is relatively rough. Because a finishing layer must be arranged, the further finishing is delayed considerably and the possibility of changing the position of the installation fittings is lost.

[0006] The present invention has for its object to provide a solution for these problems.

[0007] A first aspect of the present invention relates to the above stated, wherein the top surface is a walkable mirror surface and wherein the top surface is provided with at least one longitudinal gutter, side gutter or side gutter part extending over at least a part of the longitudinal direction of the floor plate.

[0008] A walkable mirror surface is here understood to mean a surface which is so even that it can be used as a floor without arranging a finishing layer. An advantage of the present invention is that the top surface can be directly used as walkable mirror surface. A finishing layer does not therefore first have to be arranged thereon. The costs of arranging such a layer are thus avoided. It is moreover no longer necessary to wait until the finishing layer has cured. It is hereby possible to continue with completion of the building immediately after placing the floor (plates).

[0009] The required installation fittings can be arranged in the longitudinal gutters, side gutters and/or side gutter parts and do not therefore have to be arranged on the walkable mirror surface. A side gutter part can herein form, with a co-acting part of an adjacent floor plate, a side gutter. These longitudinal gutters and side gutters (or parts) avoid a finishing layer having to be arranged over the floor. The longitudinal gutters, side gutters and/or side gutter parts in which the installation fittings such as for instance water pipes, power cables, heating pipes, drain pipes, mechanical ventilation channels, data cabling etc. are arranged can be closed, optionally permanently. The gutters can thus be filled with for instance concrete or other type of material. Where desired it is however also possible not to fill the gutter, but to cover it with a removable cover. It is hereby possible to access the installation fittings in the gutter relatively easily, for instance for the purpose of repair or extension. The floor does not therefore have to be provided with a finishing layer, or at least only to a very limited extent, whereby the floor remains walkable during the whole of construction.

[0010] It is further recommended that the floor plate comprises at least two segments, which segments are separated from each other by means of a longitudinal

gutter, side gutter or side gutter part. An advantage hereof is that the floor plate can obtain a greater width, which has a favourable effect on the costs of arranging a floor.

[0011] If desired, the relatively rough bottom surface of the floor plate can further be made smooth or be provided with structure. This bottom surface is generally an unbroken surface which can thus be made smooth in relatively simple manner. The underside can also be provided with insulating material.

[0012] It is recommended still further that the longitudinal gutters are connected to each other by transverse gutters and/or side gutters and side gutter parts arranged transversely thereof. These gutters can have a variable length. The advantage of such transverse gutters being connected to the longitudinal gutters is that the installation fittings can be placed easily at practically any location during construction of a building. It is hereby possible to determine and/or change the position of installation fittings even after placing of the floor plates. It is also possible to arrange an annular conduit in the floor by means of transverse gutters/side gutters and longitudinal gutters. The transverse gutters (just as the longitudinal gutters) can further also be arranged at an angle.

[0013] In a preferred embodiment the transverse gutters arranged in the different segments are arranged in offset manner at a distance from the end surfaces of the floor plate. The moment force on the floor plate can be properly absorbed by arranging the transverse gutters offset relative to each other. The transverse gutters arranged on the end surface of the floor plate do not have to be offset relative to each other since the moment force to be absorbed is considerably smaller than in the case of for instance a part of the floor plate located more toward the centre. This makes it possible to arrange, among other things, an annular conduit in the floor.

[0014] It is further recommended that the floor plate is provided, at least in longitudinal direction, with a reinforcement which preferably comprises mild steel and/or so-called prestressed reinforcement. The floor plate can be given a larger, i.e. longer, form by providing a reinforcement in the longitudinal direction.

[0015] The floor plate is preferably also provided with a transverse reinforcement. The arranging of a transverse reinforcement is particularly recommended in the case of relatively wide floor plates. Particularly in the case of floor plates with a width of more than 1.2 metres.

[0016] It is recommended that the floor plate is provided with connecting means for mutually connecting floor plates adjoining each other in longitudinal direction. Such connecting means comprise for instance a so-called goblet-shaped connection and/or an adjusting connection.

[0017] In a preferred embodiment the floor plate is provided with adjusting means for relative height-adjustment of mutually adjacent floor plates. These adjusting means can be used, among other things, to obtain a substantially smooth, walkable surface.

[0018] It is further recommended that the floor plate comprises at least one filling piece and/or open space which is enclosed by the cured concrete. The advantage of arranging a filling piece and/or open space in the floor plate is twofold. Firstly, the weight of the floor plate is reduced, whereby it is easier to handle. Secondly, less concrete need be used, which has a favourable effect on the cost of manufacturing the floor plate.

[0019] The filling piece for instance comprises a cured plastic foam. The filling piece does not have to be wholly enclosed by the concrete, it can also be partly enclosed.

[0020] The floor plate is preferably provided with installation fittings. These installation fittings can for instance be lines for electricity or discharge of water. Sockets can also be pre-arranged in the floor plate, preferably on the underside, upper side of the floor plate or on the side of the gutter. By prearranging installation fittings in the floor plate, completion of the building can take place more quickly after the floor plate has been placed.

[0021] It is further recommended that at least a part of the floor plate on the underside and/or the top side is provided with concrete core-activating means. Such means can be used, among other purposes, to regulate the temperature inside a building.

[0022] The longitudinal and transverse gutters are preferably filled with cured material along at least a part of their length. Filling of the gutters preferably takes place after arranging of the installation fittings. It is particularly recommended here that parts of the gutters are not filled with cured material. This makes it still possible to make adjustments to the installation fittings after placing of the floor plate.

[0023] The floor plates are further preferably provided with lifting means for lifting the floor plate.

[0024] The bottom surface of the floor plate is preferably finished such that a relatively smooth surface is formed, or such that it is provided with a structure.

[0025] A second aspect of the present invention relates to a method for manufacturing a floor plate, which floor plate comprises a top surface and a bottom surface, wherein the method comprises of:

- providing an open mould, which mould is provided with a bottom and an open side situated a distance therefrom;
- pouring concrete for curing into the mould;
- allowing the concrete to cure at least partially, wherein during curing the top surface of the floor plate to be formed makes contact with the bottom of the mould such that the top surface becomes a walkable mirror surface; and
- providing at least one longitudinal gutter, side gutter or side gutter part in the top surface of the floor plate.

[0026] Because the bottom of the open mould is relatively smooth, a relatively smooth concrete surface results at the bottom of the mould by pouring the concrete into the mould. In the present invention this surface is used as walkable top surface of the floor plate.

[0027] The bottom surface of the floor plate is formed

on the open pouring side of the mould. Since the bottom surface is not pressed against a relatively smooth side of the mould, a relatively rough surface is created here. In the present invention this surface forms the bottom surface of the floor plate.

[0028] An advantage of the above described method is that a floor plate with a walkable floor surface is obtained in an advantageous and rapid manner without a finishing layer having to be arranged thereon. Completion of a building can thus be started immediately after placing of the floor plates in the building, without the finishing layer on the floor having to dry. The costs of arranging the finishing layer are moreover avoided. By simultaneously arranging longitudinal gutters, side gutters or side gutter parts, installation fittings can also be arranged in the floor quickly and easily without a finishing layer having to be arranged over the (whole) floor. All this has a favourable effect on construction costs.

[0029] It is recommended to arrange the longitudinal gutter, side gutter or the side gutter part in the floor plate during or after the (partial) curing of the concrete. The advantage of arranging the gutters or gutter parts during curing is that the concrete can still be removed relatively easily. After curing this is more difficult, although still possible.

[0030] It is further recommended to provide at least one transverse gutter in the top surface of the floor plate. It is thus possible in simple manner to install installation fittings at many locations in the floor plate.

[0031] It is further recommended to arrange forming elements on the bottom of the mould. These forming elements can then be used to arrange longitudinal gutters, side gutters and/or transverse gutters in the top surface of the floor plate. The gutters in the floor plate are formed in simple manner by making use of these forming elements in the mould. As stated, a number of advantages of longitudinal gutters and transverse gutters are that installation fittings can be arranged easily on the floor and that it is still possible to decide on site how for instance specific lines must run. In this case there is therefore a high degree of flexibility.

[0032] The relatively rough bottom surface of the floor plate is preferably given a smooth finish or provided with a structure. A relatively smooth surface is hereby created. Giving the bottom surface of the floor plate a smooth finish or providing it with a structure is preferably carried out when this bottom surface serves as a ceiling for a lower storey.

[0033] A third aspect of the present invention relates to a floor plate obtainable with the method according to the invention, whereby the top surface becomes a walkable mirror surface provided with gutters, preferably in longitudinal direction.

[0034] A fourth aspect relates to a floor comprising one or more of the above described floor plates.

[0035] The floor plates are preferably provided with a recess in which a trimming joist is received. By making use of a trimming joist it is for instance possible to provide a stairwell.

[0036] The trimming joist is further preferably provided with connecting means for the connection to the floor plates.

[0037] Mentioned and other features of the floor plate and floor according to the invention will be further elucidated hereinbelow on the basis of a number of exemplary embodiments, which are only given by way of example and without the invention being deemed limited thereby. Reference is herein made to the accompanying drawings, in which:

Figure 1 shows a schematic view of a floor provided with floor plates according to the invention.
Figure 2 shows a view on larger scale of detail II of Figure 1.
Figure 3 shows a view on larger scale of detail III of Figure 1.
Figure 4 shows a view of detail V of Figure 1, wherein a trimming joist is formed.
Figure 5 is a side view of a variant of Figure 5.
Figure 6 is a side view of a variant of Figure 5.
Figure 7 shows on larger scale a cross-section of detail VIII of Figure 1.
Figure 8 shows a view of reinforcement for a floor plate, which reinforcement is provided with concrete core-activating means.
Figures 9A, B and C show the manufacture of a floor plate according to the invention.

[0038] Figure 1 shows a floor 1 provided with a first floor plate 2, a solid second floor plate 3 and a third floor plate 4 provided with a trimming joist 5. Floor plates 2, 3 and 4 are provided on the walkable mirror top surface 6 with gutters 7 which extend in longitudinal direction of the plate. A number of the gutters 7 is provided with installation fittings 8. Lifting means 9 are further arranged on the bottom of gutters 7 for the purpose of lifting the floor plates. A trimming joist 5 is set into floor plate 4. The outer ends 10 of trimming joist 5 are supported on floor plates 2 and 3. A stairwell 11 is thus realized. The smooth end surface 12 forms part of floor plate 4. Floor plates 2, 3 and 4 are all provided with a reinforcement 13. The floor plates are further provided with segments 14.

[0039] Figure 2 shows the first floor plate 2 of figure 1 in more detail. The filling elements (or open spaces) 15 in the floor plate serve among other things to reduce the weight of floor plate 2. The floor plate is provided with segments 14 which are mutually separated by means of gutters 7. Gutters 7 extend in the longitudinal direction of floor plate 2. Installation fittings 8 such as ventilation ducts 16 are arranged in gutters 7. One of the gutters 7 is closed by means of cured material 17, such as for instance concrete. Another gutter 7 is provided with a cover 18 which can be removed. By making use of a cover 18 to cover gutter 7, possible modifications can be made to the installation fittings 8 arranged in gutter 7.

[0040] Figure 3 shows a plug socket 19 which is ar-

ranged in segment 14 of floor plate 4. A cast-in conduit 20 runs from the plug socket to gutter 7. Conduit 20 is provided with a coupling piece 21 so that something can be connected from gutter 7.

[0041] Figure 4 shows floor plates 3 and 4 in which trimming joist 5 is arranged. Trimming joist 5 is arranged in a recess 24 arranged in floor plates 3, 4. Trimming joist 5 is provided with a reinforcement 25 extending in the longitudinal direction of the trimming joist 5 to be formed. Floor plate 4 is provided with a smooth end surface 12. This smooth end surface 12 ensures that the cast trimming joist 5 is not in view. The trimming joist is formed by pouring concrete 26 for curing into recess 24.

[0042] Figure 5 shows a trimming joist 27 arranged in a floor plate 28, which floor plate 28 is provided with a reinforcement 29. Trimming joist 27 supports on another floor plate 30. A connection is obtained between floor plates 28 and 30 by arranging curing material in the goblet-shaped connection 31.

[0043] Figure 6 shows a support shoe 32 which is connected with a first outer end 34 to the reinforcement 35 of floor plate 36. A second end of support shoe 32 is connected to top surface 37 of a floor plate 38. A connection is obtained between the two floor plates 36, 38 by filling the goblet-shaped connection 39 with a curing material such as concrete.

[0044] Figure 7 shows two floor plates 41, 42 which are connected to each other by means of setting means 43. The setting means comprise a steel plate 44 and anchors 45. Once the floor plates 41, 42 have been set, floor plates 41, 42 can be permanently connected to each other by filling goblet-shaped connection 46 with curing material such as concrete.

[0045] Figure 8 shows a reinforcement 47 for a floor plate. The reinforcement extends in both transverse direction and longitudinal direction of the floor plate to be formed. Reinforcement 47 is provided with concrete core-activating means 48. These means comprise continuous meander tubes 49. Hot or cold water can for instance flow through these tubes 49 in order to regulate the temperature of a building in which the floor plate is placed. The advantage of such concrete core-activating means 48 is that a very constant temperature is obtained in the building.

[0046] Figure 9A shows an open mould 50 which is provided with forming elements 51 for forming other gutters 53 in the formed floor plate 52. The bottom 55 of open mould 50 is relatively smooth. Because the bottom 55 of open mould 50 is relatively smooth, the side of floor plate 52 lying against bottom 55 of open mould 50 becomes relatively smooth when concrete 54 is arranged in open mould 50.

[0047] Figure 9B shows open mould 50 completely filled with concrete 54. The pouring side (bottom surface) 56 of floor plate 52 is relatively rough. When this surface is used as a ceiling for an underlying storey of a building, the surface must then be given a smooth finish or be provided with a structure.

[0048] Figure 9C shows the cured floor plate 52 which is lifted out of open mould 50. The bottom surface 56 of the floor plate is provided with lifting means. The top surface 58 of floor plate 52 is relatively smooth since it has been pressed against the bottom 55 of open mould 50. Gutters 53 have further been formed in top surface 58 of floor plate 52.

Claims

1. Floor plate, formed in an open mould and of cured concrete, which floor plate comprises a bottom surface and a top surface, wherein the top surface is a walkable mirror surface and wherein the top surface is provided with at least one longitudinal gutter, side gutter or side gutter part extending over at least a part of the longitudinal direction of the floor plate.

2. Floor plate as claimed in claim 1, wherein the floor plate comprises at least two segments, which segments are separated from each other by means of the longitudinal gutter, side gutter or side gutter part.

3. Floor plate as claimed in claim 1 or 2, wherein the longitudinal gutters are connected to each other by at least one transverse gutter and/or side gutter or side gutter part arranged transversely thereof.

4. Floor plate as claimed in claim 3, wherein the transverse gutters arranged in different segments are arranged in offset manner at a distance from the end surfaces of the floor plate.

5. Floor plate as claimed in any of the claims 1-4, wherein the floor plate is provided, at least in longitudinal direction, with a reinforcement.

6. Floor plate as claimed in claim 5, wherein the reinforcement comprises mild steel and/or prestressed reinforcement.

7. Floor plate as claimed in any of the claims 1-6, wherein the floor plate is provided with connecting means for mutually connecting floor plates adjoining each other in longitudinal direction.

8. Floor plate as claimed in any of the claims 1-7, wherein the floor plate is provided with adjusting means for relative height-adjustment of mutually adjacent floor plates.

9. Floor plate as claimed in any of the claims 1-8, wherein the floor plate comprises at least one filling piece and/or open space which is enclosed by the cured concrete.

10. Floor plate as claimed in any of the claims 1-9,

wherein the floor plate is provided with installation fittings.

11. Floor plate as claimed in any of the claims 1-10, wherein at least a part of the floor plate is provided with concrete core-activating means.

12. Floor plate as claimed in any of the claims 1-11, wherein the gutters are filled with cured material along at least a part of their length.

13. Floor plate as claimed in any of the claims 1-12, wherein the floor plate is provided with one or more lifting means for lifting the floor plate.

14. Floor plate as claimed in any of the claims 1-13, wherein the bottom surface of the floor plate is given a smooth finish or is provided with a structure.

15. Method for manufacturing a floor plate, which floor plate comprises a top surface and a bottom surface, wherein the method comprises of:

- providing an open mould, which mould is provided with a bottom and an open side situated a distance therefrom;
- pouring concrete for curing into the mould;
- allowing the concrete to cure at least partially, wherein during curing the top surface of the floor plate to be formed makes contact with the bottom of the mould such that the top surface becomes a walkable mirror surface; and
- providing at least one longitudinal gutter, side gutter or side gutter part in the top surface of the floor plate.

16. Method as claimed in claim 15, wherein the longitudinal gutter, side gutter or side gutter part is arranged during or after curing of the concrete.

17. Method as claimed in claim 15 or 16, wherein a transverse gutter is provided in the top surface of the floor plate.

18. Method as claimed in any of the claims 15-17, wherein forming elements are arranged on the bottom of the mould in order to form longitudinal gutters, side gutters, side gutter parts and/or transverse gutters in the top surface of the floor plate.

19. Method as claimed in any of the claims 15-18, wherein the bottom surface of the floor plate is given a smooth finish or provided with a structure.

20. Floor plate obtainable with the method as claimed in claims 14-19.

21. Floor comprising one or more floor plates as claimed in any of the claims 1-14 or 20.

22. Floor as claimed in claim 21, wherein floor plates are provided with a recess in which a trimming joist is received.

23. Floor as claimed in claim 22, wherein the trimming joist is provided with connecting means for connection to the floor plates.

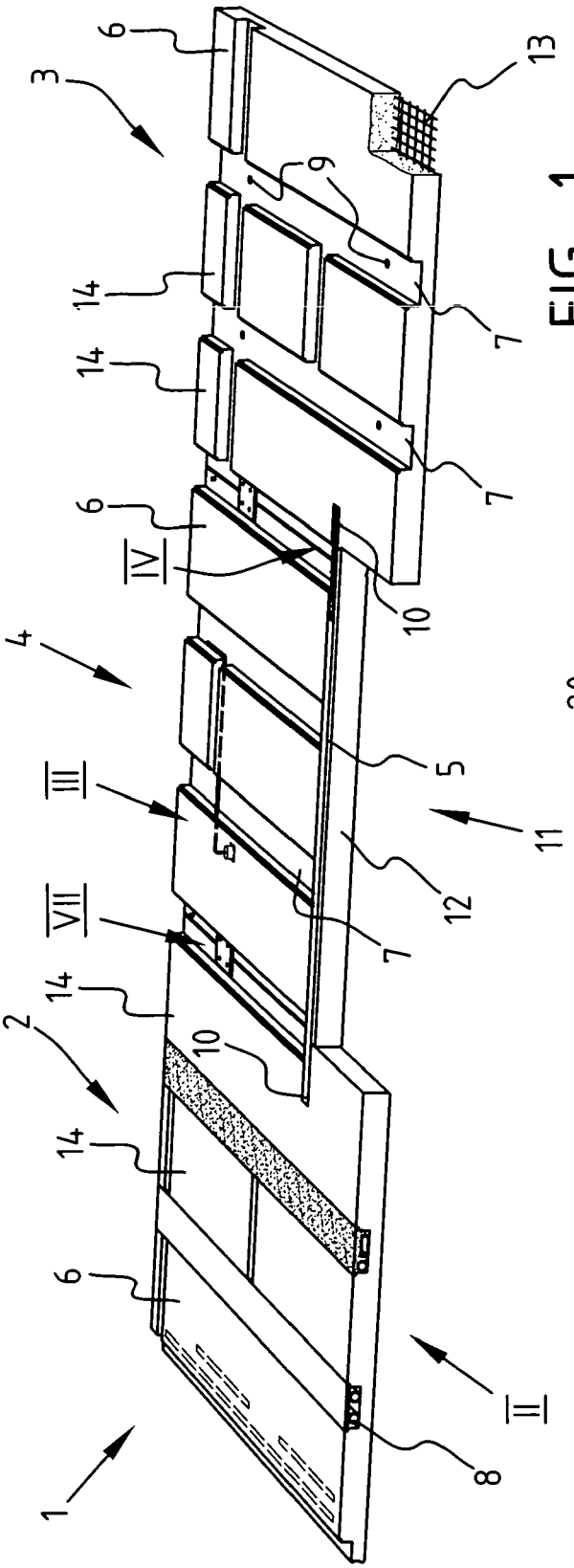

FIG. 1

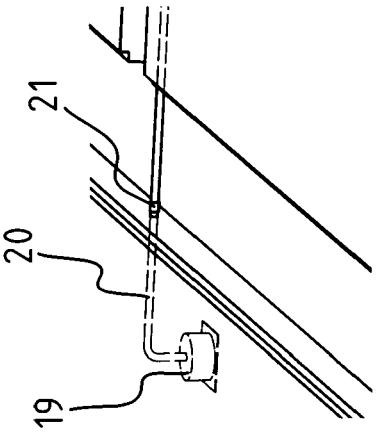

FIG. 3

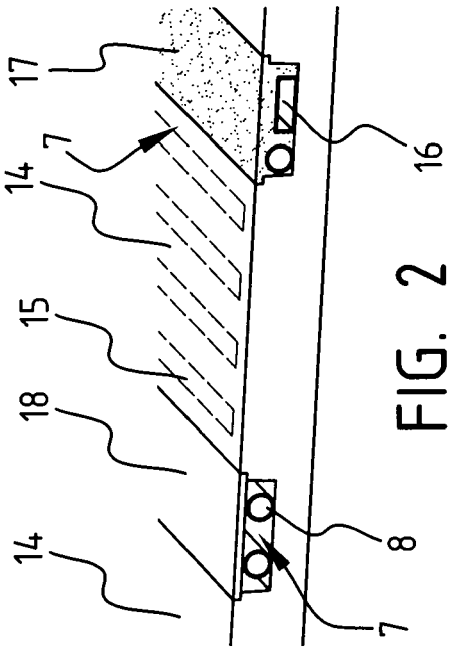

FIG. 2

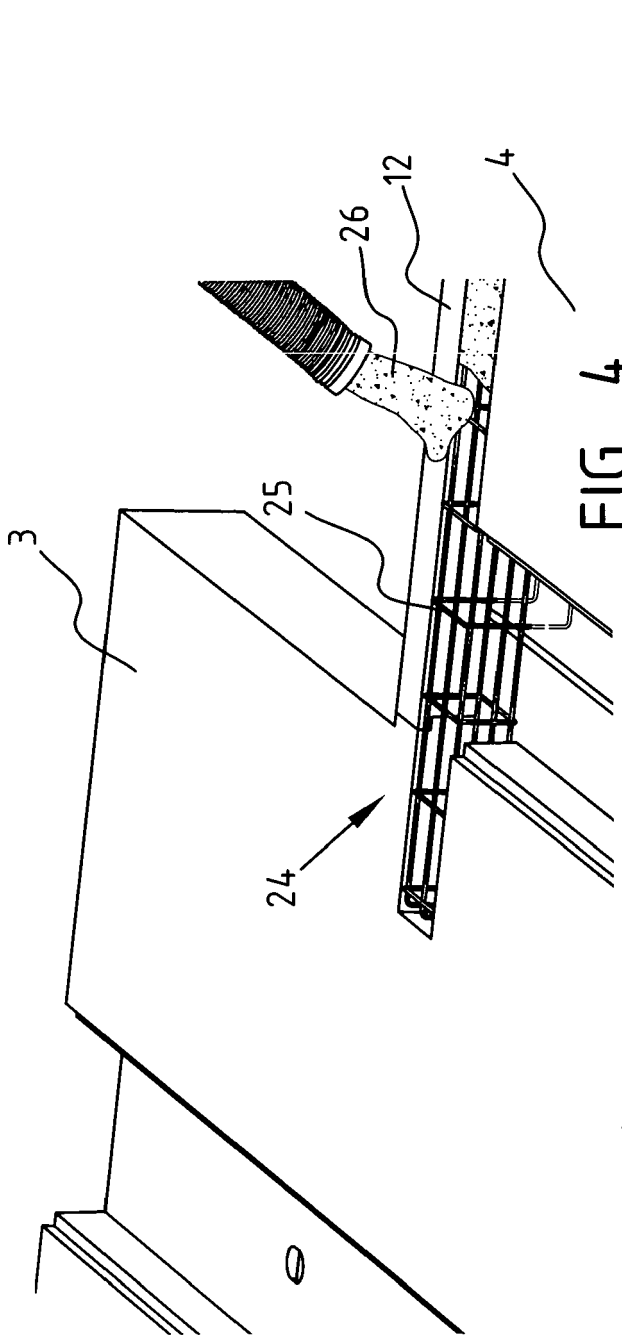

FIG. 4

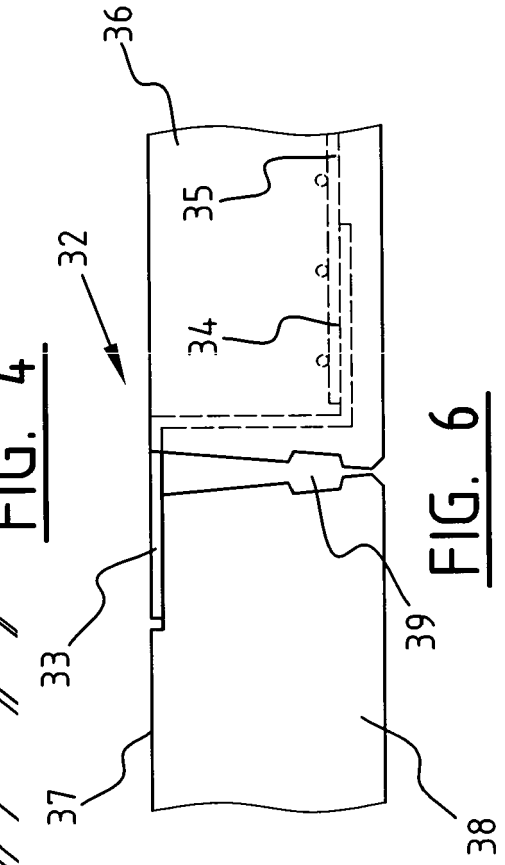

FIG. 6

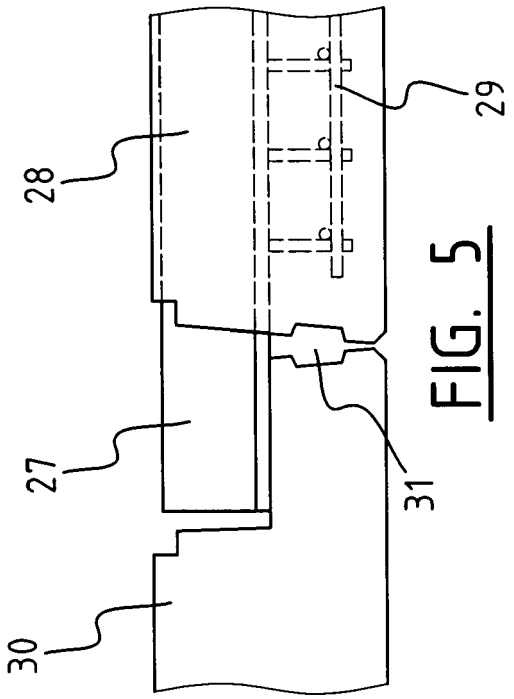

FIG. 5

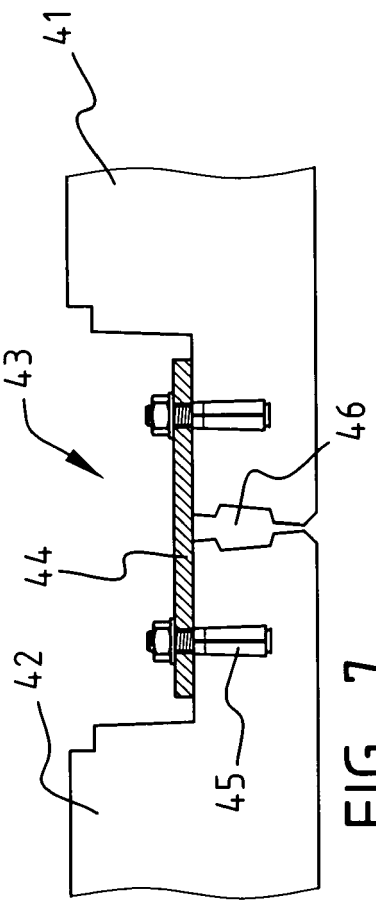

FIG. 7

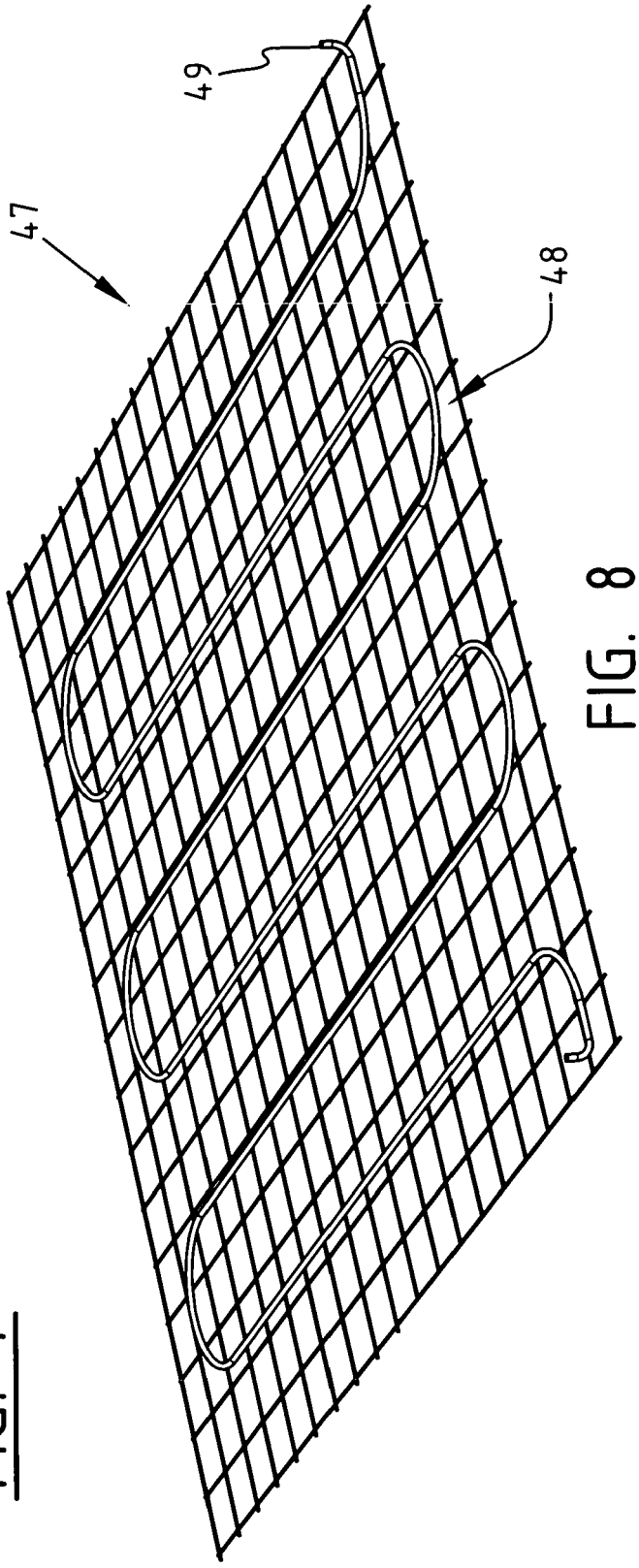

FIG. 8

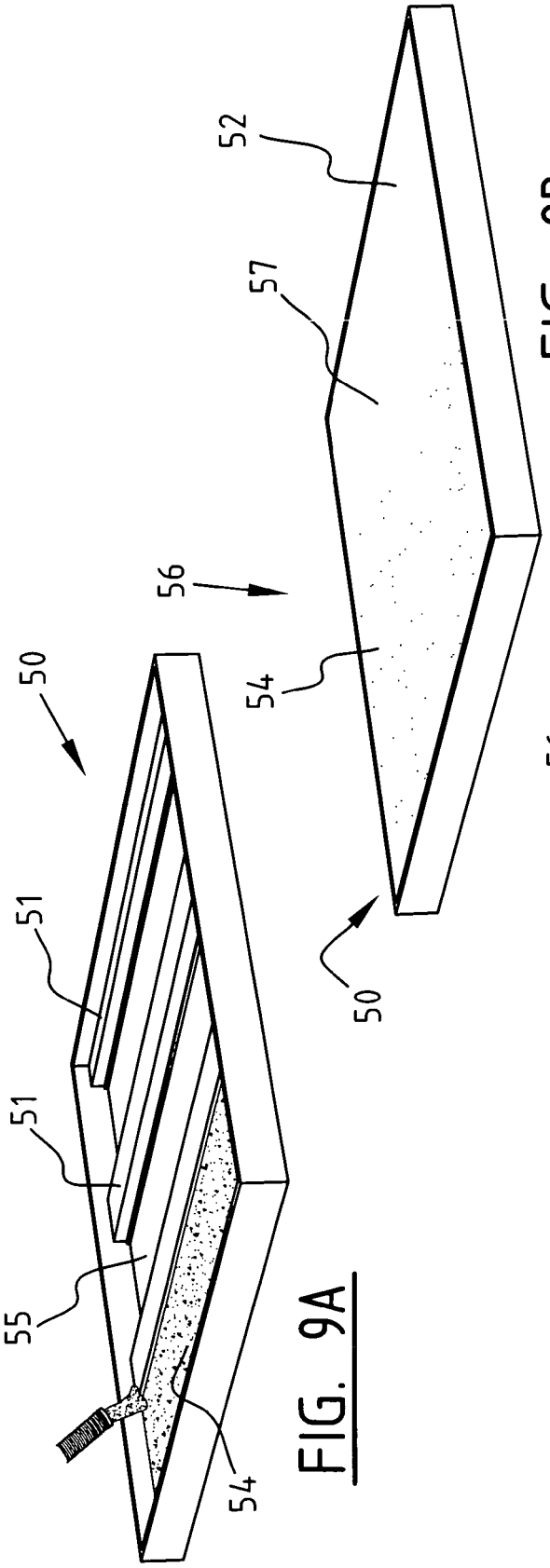

FIG. 9A

FIG. 9B

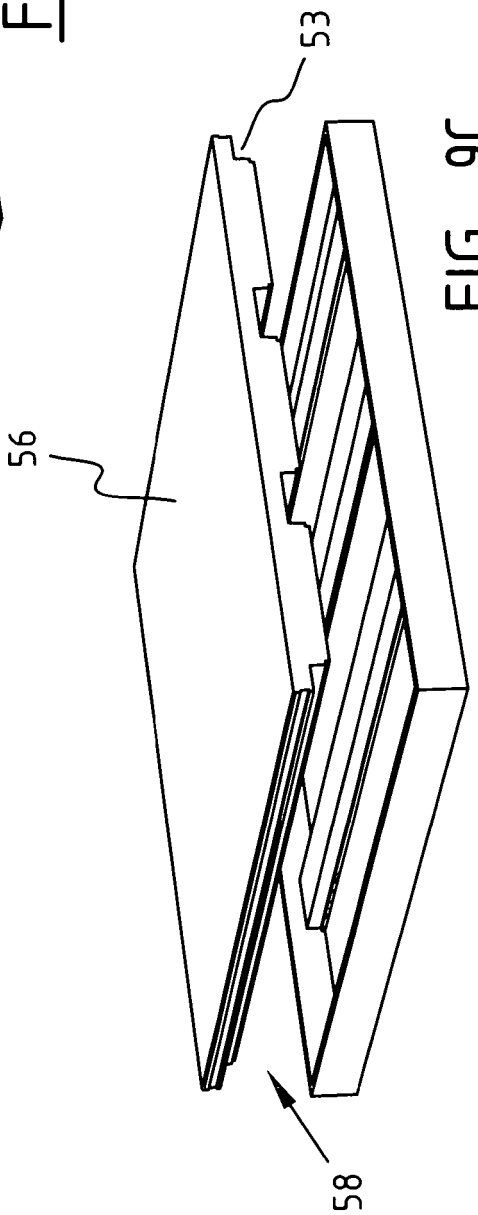

FIG. 9C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7400

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 830 404 C (WILHELM SCHAEFER) 4 February 1952 (1952-02-04)	1,2,5-7, 9-12, 14-16, 19-21	B28B7/00 E04B5/02 E04B5/48
Y	* page 2, line 52 - line 78; figure 2 *	8,13	

Y	WO 94/15037 A (THOR, JOERGEN) 7 July 1994 (1994-07-07) * page 5, last paragraph - page 6, paragraph 1 * * page 6, paragraph 3; figures 1,3,4,11 *	8,13	

X	NL 1 013 136 C2 (VBI ONTWIKKELING B.V) 31 July 2000 (2000-07-31)	1-7, 9-12, 14-17, 19-21	
Y	* page 5, line 14 - page 6, line 25; figures * * page 7, line 21 - page 8, line 23 * * page 9, line 5 - line 18 * * abstract *	8,13	
	-----		TECHNICAL FIELDS SEARCHED (IPC)
Y	DE 101 04 919 A1 (VEIT DENNERT KG BAUSTOFFBETRIEBE) 17 January 2002 (2002-01-17) * abstract; claims 1-3,6,7; figures 1-8 * * paragraph [0003] - paragraph [0006] * * column 2, line 1 - line 8 * * paragraph [0010] - paragraph [0012] * * paragraph [0029] *	8,13	B28B E04B

X	EP 1 380 703 A (VBI ONTWIKKELING B.V) 14 January 2004 (2004-01-14) * abstract; figures 1-4 * * column 6, line 44 - line 53 *	1-7, 9-12, 14-17, 19-23	

	-/--		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 January 2006	Demeester, J

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

EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 7400

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 323 281 A (WALTER WEST) 2 January 1930 (1930-01-02) * page 1; figures * -----	1,2,5,6, 12,15, 16,18,20	
X	US 2003/025235 A1 (TAKAGI KYOZABURO) 6 February 2003 (2003-02-06) * paragraph [0025]; claims 13,14; figures 3b,4 * -----	1-6, 15-18,20	
A	DE 30 06 672 A1 (RUPPMANN,OTTO) 10 September 1981 (1981-09-10) * page 2, paragraphs 1,2; figures 1,2 * * page 3, last paragraph * -----	10,11	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 January 2006	Demeester, J

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 07 7400

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-01-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 830404 C	04-02-1952	NONE	
WO 9415037 A	07-07-1994	EP 0678140 A1	25-10-1995
		NO 952430 A	10-08-1995
		SE 500785 C2	05-09-1994
		SE 9203816 A	19-06-1994
NL 1013136 C2	31-07-2000	AT 306594 T	15-10-2005
		AU 7970800 A	24-04-2001
		DE 60023159 D1	17-11-2005
		EP 1214483 A2	19-06-2002
		WO 0121905 A2	29-03-2001
		NO 20021442 A	23-05-2002
		US 6845591 B1	25-01-2005
DE 10104919 A1	17-01-2002	NONE	
EP 1380703 A	14-01-2004	NL 1021039 C2	13-01-2004
GB 323281 A	02-01-1930	NONE	
US 2003025235 A1	06-02-2003	NONE	
DE 3006672 A1	10-09-1981	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82