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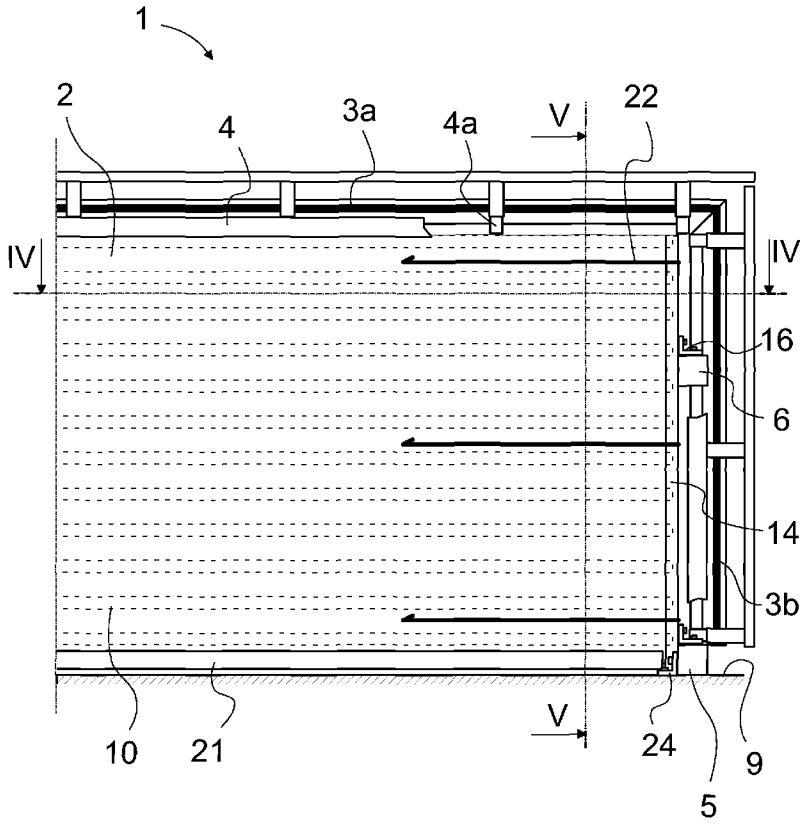
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Published:
— *with international search report*

[Continued on next page]

(54) **Title:** BALCONY STRUCTURE AND METHOD FOR MANUFACTURING IT



(57) **Abstract:** The invention relates to a balcony structure (1) and a method for manufacturing the balcony structure (1). The balcony structure has at least a support structure (5 and/or 6), railing structures (3a, 3b, 4, 4a) and a self- supporting balcony slab (2), comprising a unit formed by at least a corrugated plate (10) of steel sheet mounted to be supported by steel support beams (14) and auxiliary reinforcement and concrete, which unit forms a connection plate of reinforced concrete after the concrete has set. The corrugated plate (10) is mounted in the longitudinal direction of the balcony, and the balcony slab (2) has load-bearing support beams (14), the corrugated plate (10) of the balcony slab (2) being fitted to abut to said support beams (14) at both ends.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Balcony structure and a method to manufacture it

The invention relates to a balcony structure as defined in the preamble of Claim 1 and to a method for manufacturing a balcony structure as defined in the preamble of Claim 10.

The most common among prior art balcony structures is the conventional balcony structure consisting of concrete elements, in which a concrete balcony slab is supported by placing it to rest on a special recess or notch made in a frame element or column, or on a beam serving a similar purpose.

The problem with such a conventional massive concrete element system is, in addition to the construction of the recesses and notches or support beams, the time-consuming installation of balconies and, as a result, high installation costs. Constructing separate recesses and notches or support means for a massive slab is expensive as such, and as the time required for the setting of concrete casts in view of the required grouting and seaming casts prevents effective and rapid mounting of balcony structures in place, it has been necessary to find more cost-effective methods for realizing balcony structures.

Another balcony solution according to the prior art is represented by the prefabricated sheet-structure balcony slab disclosed in Finnish Patent No. FI93135, which comprises a slab element with railing and fixtures. The slab element comprises a profile frame surrounding the balcony slab, made of a steel sheet S profile, a load-bearing slab supported by the profile frame, a top element and a separate fire protection in accordance with the regulations, attached to a lower flange of the profile frame.

The problem with this balcony structure known from Finnish Patent No. FI93135 is providing fire protection according to the regulations, as the load-bearing structure as such does not meet the existing fire code R30 like a concrete slab does. Therefore, separate fire protection must be installed on said slab on the underside thereof, for example by using a fire protection plate or some other corresponding fire-retarding material, suited to the purpose. A discrete fire protection to be separately installed is naturally a

factor essentially increasing the costs and thus impairing the cost-effectiveness of said balcony structure.

A third balcony structure 100 according to the prior art is disclosed in the solution shown in Figure 1. It depicts a balcony slab including a unit comprising a corrugated plate 300 of steel sheet, mounted in the transverse direction of the balcony to rest on massive steel G-beams 200 circumscribing the edge of the balcony and welded into a continuous frame, and auxiliary reinforcement 400 and concrete 500, forming a connection plate 600 of reinforced concrete after the concrete has set. The balcony structure is supported at its ends on support columns 700, for example.

The problem with the above balcony slab depicted in Figure 1 is the use of massive and therefore expensive G profiles at the edges of the balcony, in order that the loads accrued from the connection plate mounted in the transverse direction of the balcony may be transferred via the front and rear edge of the balcony to the end of the balcony and thereby onto the load-bearing support columns.

It is an object of this invention to eliminate the above drawbacks and to provide an inexpensive balcony structure with railing and fixtures that is easy to manufacture and of a strong design, rapid to mount in place and meeting as such the fire requirements according to the regulations. The balcony structure in accordance with the invention is characterized in that which has been set forth in the characterizing portion of Claim 1. Correspondingly, the method in accordance with the invention for manufacturing a balcony structure is characterized in that which has been set forth in the characterizing portion of Claim 10. The other embodiments of the invention are characterized in that which has been set forth in the other claims.

The balcony structure of the invention has, among other things, at least the advantage that the balcony slab in accordance with the invention provides the good properties of a massive concrete slab, such as the fire resistance property according to the official regulations and the solidity feature of the slab that users find agreeable, simultaneously avoiding additional costs arising from the slowness of concrete building, since it is not necessary to perform separate time-consuming seam casting and there is no need to

await the setting of the seaming casts. When the load-bearing vertical structure is of steel, an outcome is achieved in which no separate support structures are needed beneath the balcony slab at the columns, which would hinder the mounting of balcony glasswork, for instance, compounded by the short mounting time and the advantages set out above. Furthermore, the corrugated plates of the lower surface of the balcony slab in accordance with the invention serve as a surface-treated and finished face on the underside of the slab.

Furthermore, by using the edge profile of the balcony slab of the balcony structure in accordance with the invention, one avoids making the expensive edge hollow chamfer needed in manufacturing a conventional concrete balcony slab. Likewise, fitting the balcony railing in the edge profile of the balcony structure according to the invention is considerably more inexpensive than attaching corresponding fixtures to a concrete slab. Further, the edge profile serves as a surface-treated and finished face in the edge region of the balcony slab.

The inventive content of the present application can also be constituted by several separate inventions and the inventive content of the application can also be defined in a manner other than that of the accompanying claims. In such a case, some of the definitions contained in the accompanying claims may be unnecessary in view of the discrete inventive ideas. The features of the different embodiments of the invention can also be applied in connection with other embodiments within the scope of the basic inventive idea.

The invention will be expounded in detail in the following by means of embodiments with reference to the accompanying drawings, in which

Figure 1 depicts one balcony slab in a balcony solution in accordance with the prior art in a sectional view seen from the front of the balcony,

Figure 2 depicts a balcony solution in accordance with the invention in a diagonal front and top view and partially in section,

Figure 3 depicts a balcony solution in accordance with the invention in a simplified top view and partially in section,

Figure 4 represents a balcony solution in accordance with the invention in a simplified front view cut along section line IV-IV of Figure 3,

Figure 5 represents a balcony solution in accordance with the invention in a simplified end view cut along section line V-V of Figure 3,

Figure 6 represents a detail in accordance with Figure 4 in which the attachment of the balcony slab of the balcony solution in accordance with the invention is shown on a larger scale in a front view cut along section line IV-IV of Figure 3, and

Figure 7 represents a detail in accordance with Figure 5 in which the attachment of the balcony slab of the balcony solution in accordance with the invention is shown on a larger scale in an end view cut along section line V-V of Figure 3.

In the figures, the structures have been simplified for clarity, and the figures have not necessarily been drawn on a correct scale. Furthermore, several of the figures show only a part of the balcony or balcony slab.

Figure 2 depicts a typical balcony solution 1 in accordance with the invention, in which the load-bearing structure is a connection plate 2 of reinforced concrete, serving as a balcony slab, which is abutted to columns 5 and 6 serving as support structures on both sides of the balcony. Furthermore, the balcony structure 1 includes at least a railing 4 with rail posts 4a and a substantially perpendicular front wall 3a and substantially perpendicular end walls 3b, said walls 3a and 3b being transparent in the case shown in the figure. Walls 3a and 3b may also be of non-transparent plate or for example lattice-like walls composed of battens, or other suitable wall structures. Thus, the front and end walls 3a, 3b herein denote all kinds of wall structures suited to the purpose, which also for their part serve as railing structures for the balcony. A covering strip is disposed to cover the front surface of the front edge and end edges of the concrete slab 2, of which covering strip 7 covering the end and covering strip 8 covering the front edge are shown in Figure 2.

Figure 3 depicts part of the balcony solution 1 in accordance with the invention in a simplified top view. The balcony slab 2 is substantially rectangular and measures substantially more than its depth in the direction of the wall 9 of the

building. Figure 3 shows the balcony slab 2 which is the load-bearing structure of the balcony solution 1 in accordance with the invention and which is a unit comprising a corrugated plate 10 of steel sheet, as known e.g. from Finnish publication FI921642, or a corresponding corrugated plate mounted to abut to steel support beams 14 a both ends, auxiliary reinforcement and concrete, said unit forming a connection plate known per se after the concrete has set. In the prefabricated balcony slab 2 in accordance with the invention, the corrugated plate 10 of steel sheet is mounted in the longitudinal direction of the balcony, i.e. substantially in the direction of the wall 9 of the building, and the ends of the corrugated plate are fitted to abut to the lower flange 14a of the support beams 14, said abutting being shown in further detail in Figure 6. After the concrete cast has set, the resulting connection plate is fixed to the load-bearing vertical frame of the balcony 1, for example to the columns 5 and 6 through the support beams 14 of the balcony slab 2 and connecting elements 16 of a substantially L-shaped profile. The support beam 14 also preferably serves as a concrete casting mould at both ends of the balcony slab 2 in the manufacture of the slab.

Threaded bars 22 left in the concrete cast and fitted in holes provided in the support beam preferably serve as a dowel-bar reinforcement between the support beam 14 and the concrete of the balcony slab 2. Customary upper-surface cambers for draining water to a desired edge and to drainage systems can preferably be provided in the concrete cast. It is of advantage to use a metallic water trough 21 as the water channel, said water trough also preferably serving as a concrete casting mould at the front or rear edge of the balcony slab 2 in the manufacture of the slab.

The load-bearing vertical frame of the balcony structure 1, for example column 5 on the side of the wall 9 of the building, to which the balcony slab 2 is abutted through the support beam 14, is preferably attached to the frame of the building by means of fixing elements 24 allowing vertical and longitudinal expansion of the balcony. In accordance with a preferred embodiment of the invention, the fixing element 24 allowing longitudinal expansion of the balcony is a steel profile having an L-shaped cross-section seen from the top, whose first flange has the direction of the wall 9 and second flange is rectangular to the first flange. The first flange of the fixing element is attached for example by

means of a bolted joint to the wall 9 of the building and the second flange is attached for example by means of a bolted joint to the column 5 substantially at the balcony slab. Bending of the second flange of the fixing element 24 allows said longitudinal expansion of the balcony. Correspondingly, the first flange attached to the wall 9 of the building can be adapted to slide along the wall surface as a result of expansion. Also other suitable solutions allowing such expansion can be used.

Figures 4 - 7 represent the balcony structure and the details of the balcony slab in closer detail. The support beam 14 preferably comprises at least one horizontal lower flange 14a, to which the corrugated plate 10 of the slab is abutted at its ends, and at least one vertical element 14b by means of which the balcony slab 2 is attached to the load-bearing vertical frame of the balcony, for example to columns 5 and 6. The vertical part 14b is substantially taller than the thickness of the concrete cast of the slab. Thus the fixing elements of the balcony slab, such as the bolted fixture 15, can advantageously be attached to the support beam 14 on the upper-side portion of the concrete surface of the slab 2. The support beam 14 preferably also has an upper flange having substantially the direction of the lower flange 14a, which upper flange can also constitute the edge hollow chamfer of the balcony slab, for instance.

When the prefabricated balcony slab 2 to which the invention relates is attached to the load-bearing vertical frame of the balcony, for example to the columns 5 and 6, by means of the support beam 14, the fixing element 16 is preferably fitted into holes made in the support beam 14 on the upper-side portion of the upper surface of the concrete cast, thus eliminating time-consuming welding operations giving rise to considerable additional costs or making specific voids in the concrete cast for attaching the fixing elements to the edge of the slab. The fixing elements by means of which the balcony slab 2 is attached to the load-bearing vertical frame of the balcony or the load-bearing frame of the building are preferably bolt/flange joints known per se. This again avoids construction of separate mounting bases or support beams in the frame elements of the balcony or the columns of the vertical frame for supporting the balcony slab. A wooden floor grate 11 is fitted to serve as the

finished surface and to cover the edge portions of the balcony slab 2, which affords an aesthetic entity.

In accordance with a preferred embodiment, when no columns 5 are provided at the rear edge of the balcony, a fixing element is preferably fitted at both corners of the balcony slab 2 on the side of the wall 9, either inside or outside the vertical part 14b of the support beams 14 for attaching the balcony slab 2 to the load-bearing frame of the building. In accordance with one preferred embodiment, this fixing element can be a tubular girder part protruding from the wall surface 9 of the building, in which an upwardly open slot is advantageously fitted, to which the fixing element attached to the support beam 14 of the balcony slab 2 can be abutted. In accordance with another preferred embodiment the balcony slab 2 can be attached to this fixing element protruding from the wall with a fixing element having a substantially vertical or horizontal direction, such as a bolt.

The lower-edge profiles 17 of the balcony slab 2 at the ends of the balcony slab and 19, 20 at the front edge of the balcony slab are adapted to support the railing structure and to serve as a mounting for the upper profiles 23 of balcony glasswork 12. The upper profile 23 can easily be attached to the lower edge profile 20 having a tubular rectangular cross-section. The rail posts 4a of the end railing are attached with their lower ends to the lower-edge profile 17. Furthermore, the lower-edge profiles 17, 19, 20 are adapted to cover the opening between balconies at the edge of the balcony.

Correspondingly, a shear batten 13 circumscribing the balcony slab is provided at the upper edge of the balcony slab, adapted to substantially cover the slot in the edges of the balcony between the rail posts 4a. The upper edge also has an upper-edge profile 18, attached to the upper surface of the front edge of the balcony slab 2. The railings in the front edge of the balcony slab with their rail posts 4a are attached to the upper-edge profile 18 in advance, thus making the mounting of the railings to the actual balcony slab uncomplicated and rapid.

It is evident to one skilled in the art that the different embodiments of the invention are not restricted to the examples disclosed in the above, but they can vary within the scope of the claims set forth hereinafter. Thus for example

the profile of the support beams and the covering strip and edge profile solutions can differ from those presented.

Likewise, it is evident to one skilled in the art that the ends of the corrugated plate 10 can abut also elsewhere in the support beam 14 than to the lower flange 14a of the support beam. However, what is essential is that the ends of the corrugated plate 10 abut either directly or indirectly to the support beam 14.

It is also evident to one skilled in the art that the support structures of the balcony can differ from those presented above. There may be only one pair of support columns close to the wall of the building and the balcony can be supported at its front portion by drawbars or draw lines, for instance,

Claims

1. A balcony structure (1), having at least a support structure (5 and/or 6), railing structures (3a, 3b, 4, 4a) and a self-supporting balcony slab (2), comprising a unit formed by at least a corrugated plate (10) of steel sheet mounted to be supported by steel support beams (14) and auxiliary reinforcement and concrete, which unit is adapted to form a connection plate of reinforced concrete after the concrete has set, in which the corrugated plate (10) of steel sheet is mounted in the longitudinal direction of the balcony, and wherein a load-bearing support beam (14) is provided at both ends of the balcony slab (2), said support beam having at least one horizontal flange (14a) and at least one vertical part (14b), **characterized** in that the height of the vertical part (14b) of the support beam (14) is substantially greater than the thickness of the concrete cast of the balcony slab (2).

2. A balcony structure (1) as claimed in Claim 1, **characterized** in that the corrugated plate (10) of the balcony slab (2) is fitted at both ends to abut to the horizontal lower flange (14a) of the support beam (14).

3. A balcony structure (1) as claimed in Claim 1 or Claim 2, **characterized** in that threaded bars (22) left in the concrete cast and fitted in holes provided in the vertical part (14b) of the support beam (14) serve as a dowel-bar reinforcement between the support beam (14) and the concrete of the balcony slab (2).

4. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that the prefabricated balcony slab (2) is attached by means of the support beam (14) to the load-bearing support structure (5, 6) of the balcony by means of a fixing element (16) and a bolted fixture (15) in such a manner that the bolted fixture (15) is disposed in the vertical part (14b) of the support beam (14) in fixing holes provided in the upper-side portion of the concrete surface of the balcony slab (2).

5. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that the column (5) on the side of the wall (9) of the building in the load-bearing support structure of the balcony structure (1) is attached to the frame of the building by means of fixing elements (24) allowing vertical and longitudinal expansion of the balcony structure (1).

6. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that the support beam (14) is adapted to serve as a concrete casting mould at the ends of the balcony slab (2) in the manufacture of the slab, and that a metallic water trough (21) is fitted in the concrete cast, said water trough being adapted to serve as a concrete casting mould at the front or rear edge of the balcony slab (2) in the manufacture of the balcony slab (2).

7. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that a fixing element is fitted at both corners of the balcony slab (2) on the side of the wall, either inside or outside the vertical part (14b) of the support beams (14), for attaching the balcony slab (2) to the load-bearing frame of the building.

8. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that lower-edge profiles (17, 19, 20) are provided in the end and front edges of the balcony slab (2) for supporting the railing structure, for covering the gap between balconies at the edge of the balcony and to serve as a mounting for the upper profile (23) of balcony glasswork (12), and an upper-edge profile (18) is fitted at least to the upper surface of the front edge of the balcony slab (2), the railings of the front edge of the balcony slab (2) with their rail posts (4a) being adapted to be attached to said profile (18).

9. A balcony structure (1) as claimed in any one of the preceding claims, **characterized** in that a floor grate (11) is fitted to serve as the finished surface and to cover, for its part, the edge portions of the balcony slab (2).

10. A method for manufacturing a balcony structure (1), having at least a support structure (5 and/or 6), railing structures (3a, 3b, 4, 4a) and a self-supporting balcony slab (2), said balcony slab (2) being manufactured as a unit comprising at least a corrugated plate (10) of steel sheet and appertaining auxiliary reinforcement and concrete, said unit forming a connection plate of reinforced concrete after the concrete has set, **characterized** in that the corrugated plate (10) of steel sheet is mounted in the longitudinal direction of the balcony to abut to steel support beams (14) at both ends.

11. A method as claimed in Claim 10 for manufacturing a balcony structure (1), **characterized** in that the steel support beams (14) are used as

concrete casting moulds at the ends of the balcony slab (2) in the manufacture of the balcony slab (2).

12. A method as claimed in claim 10 or Claim 11 for manufacturing a balcony structure (1), **characterized** in that threaded bars (22) left in the concrete cast prior to casting are provided as a dowel-bar reinforcement between the support beam (14) and the concrete of the balcony slab (2), said threaded bars being fitted in holes provided in the support beam (14).

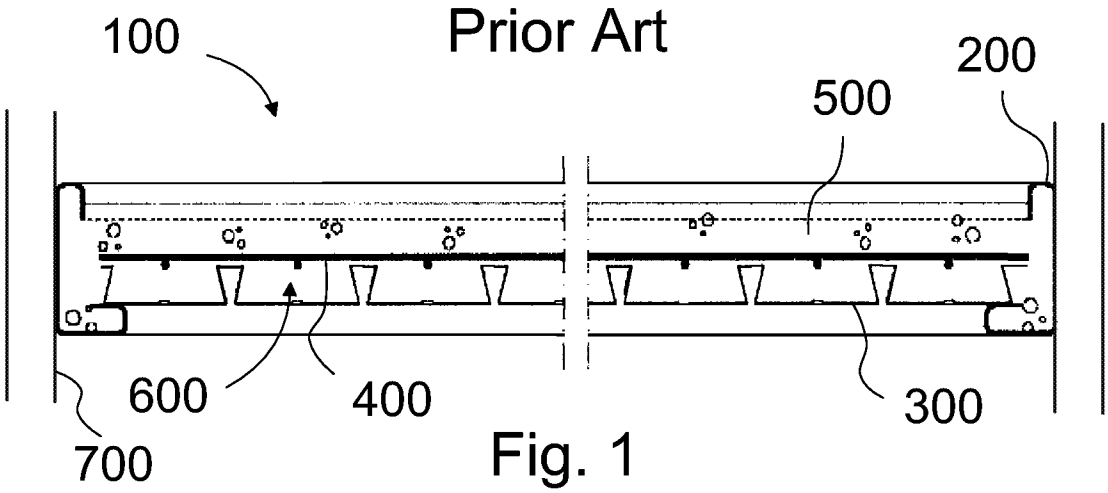


Fig. 1

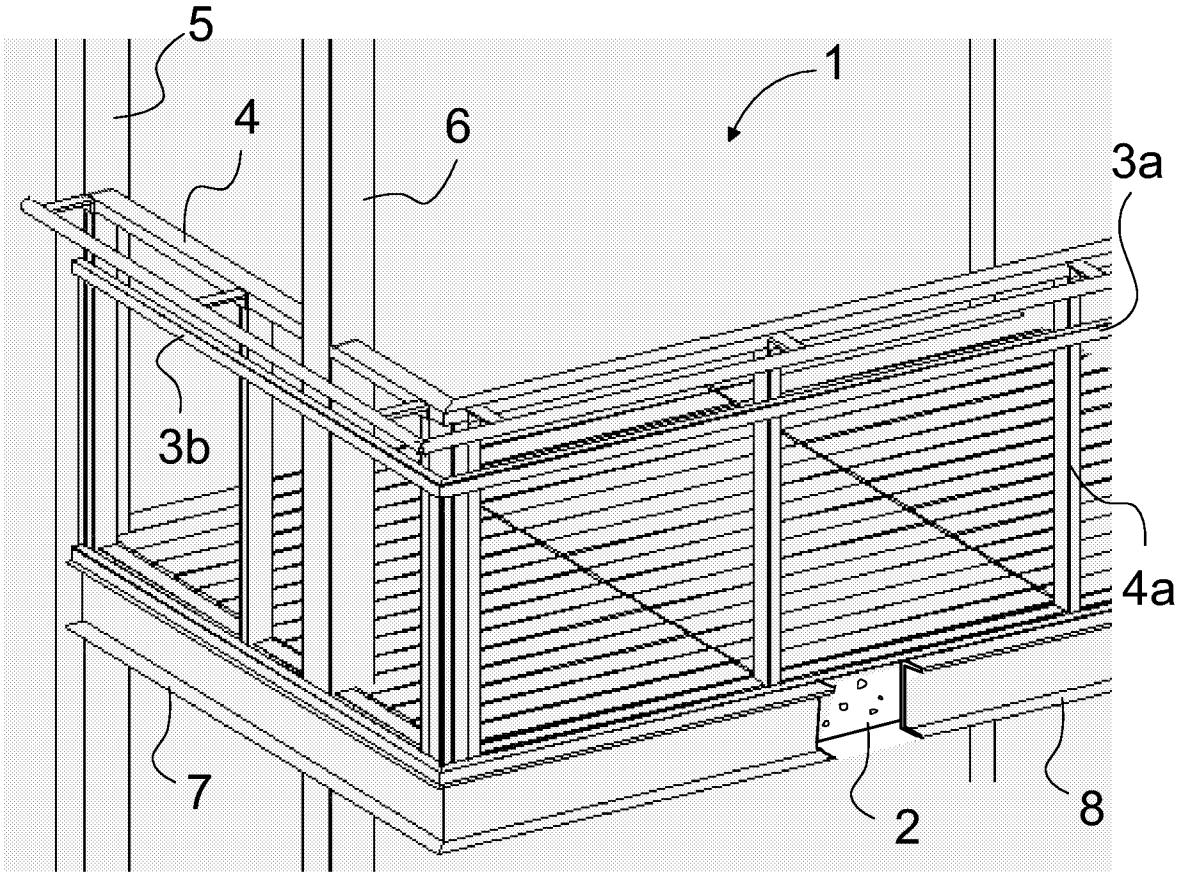


Fig. 2

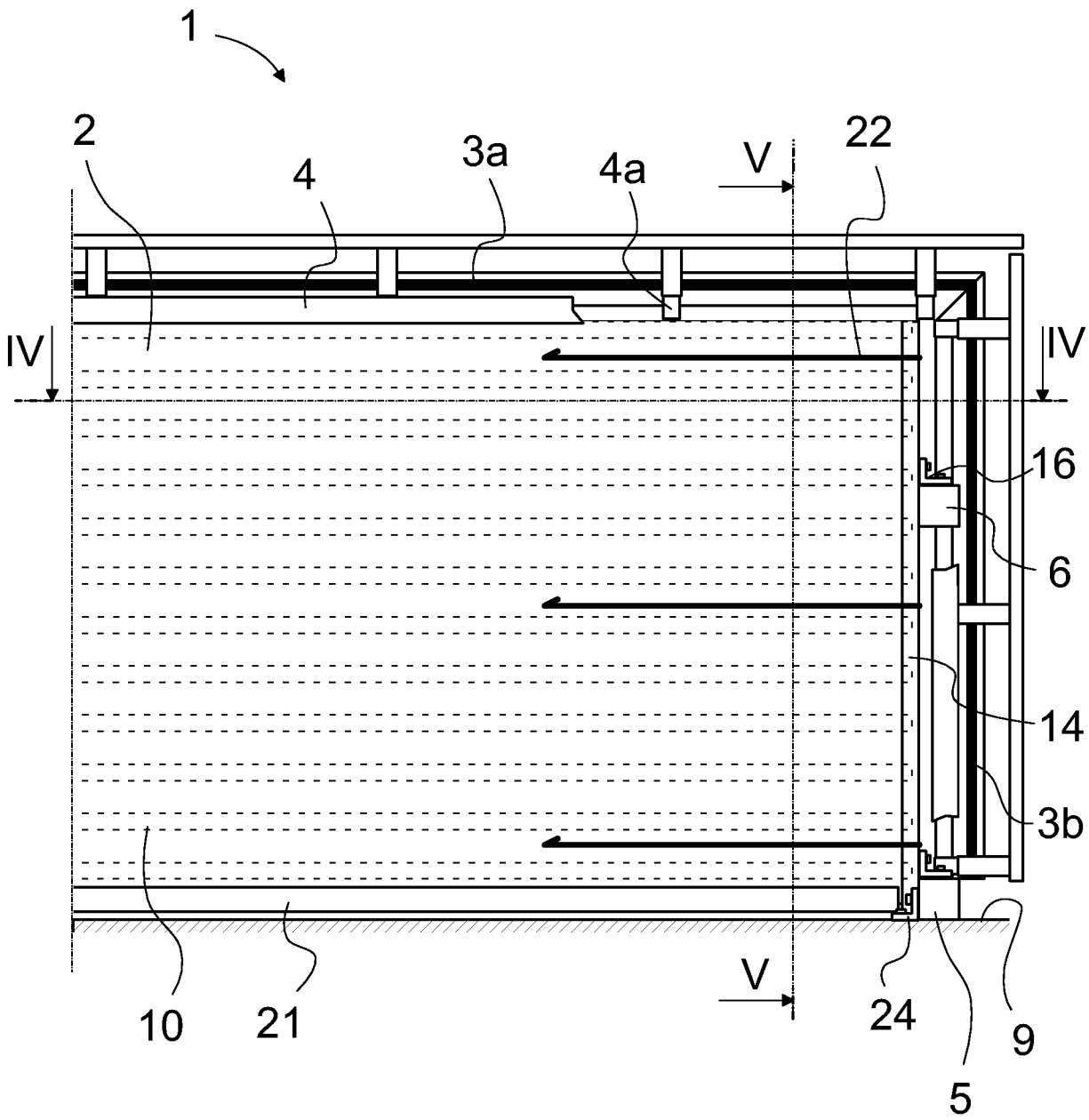


Fig. 3

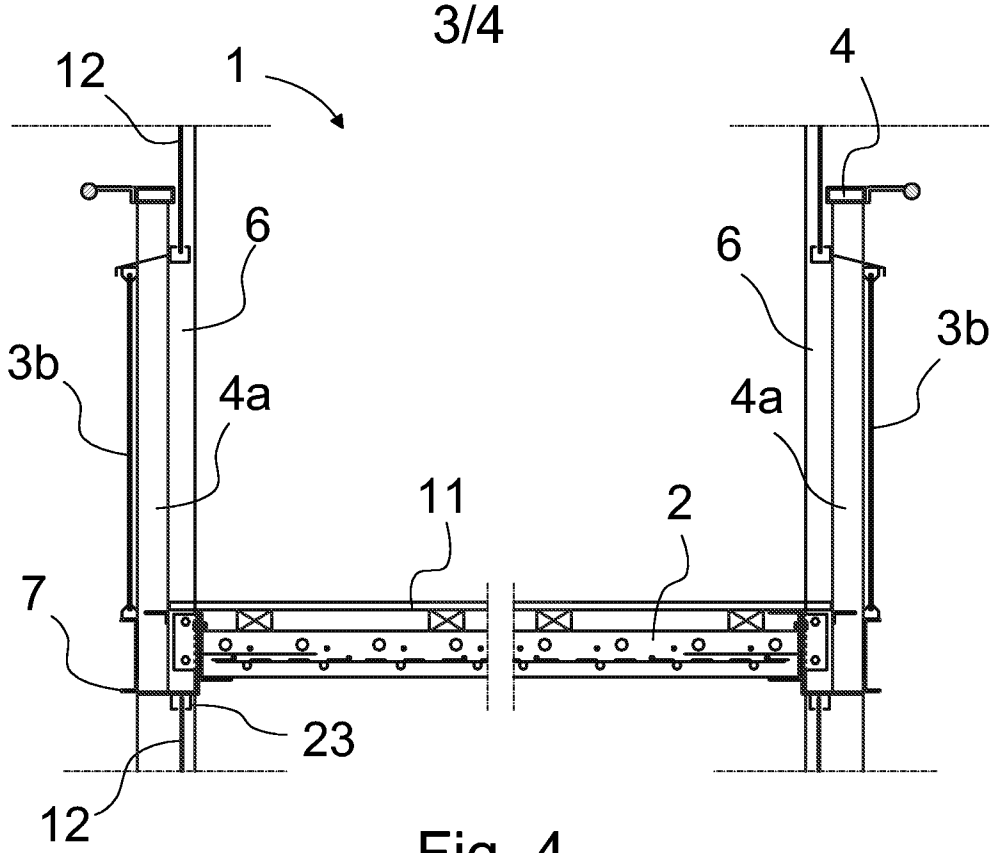


Fig. 4

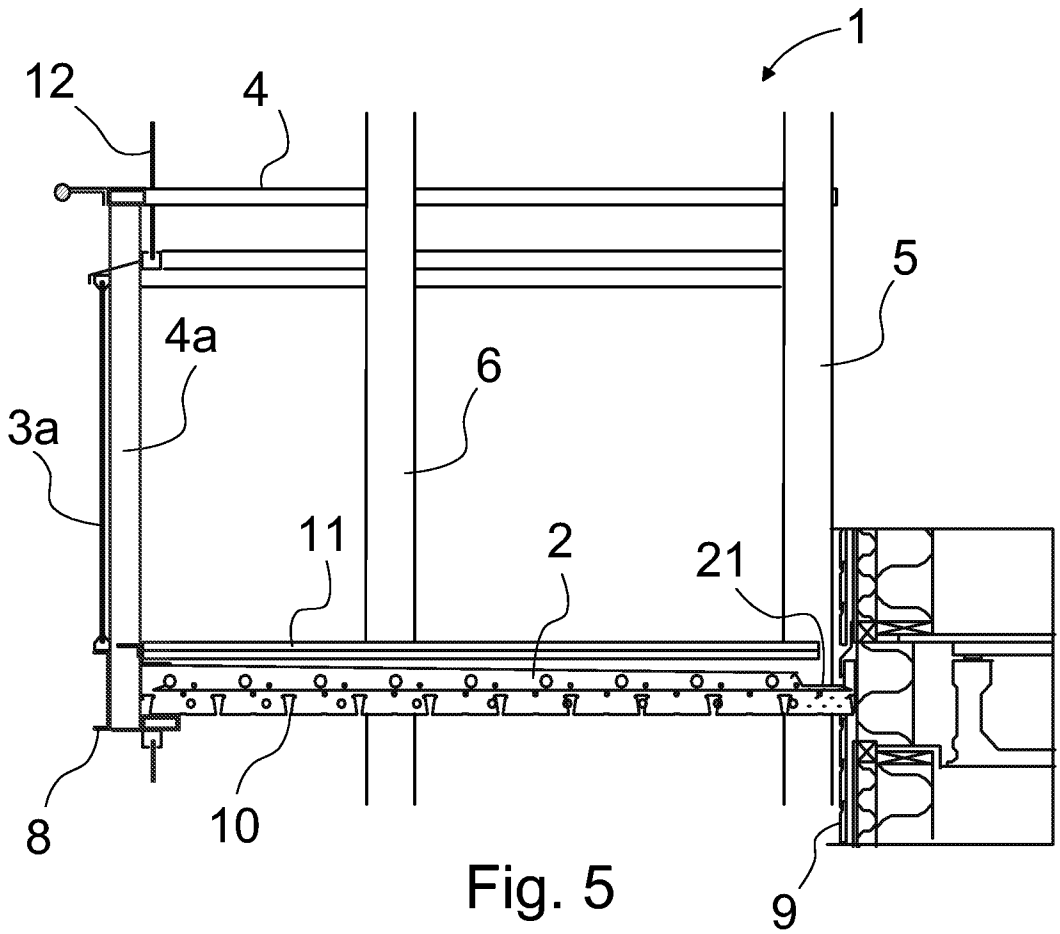


Fig. 5

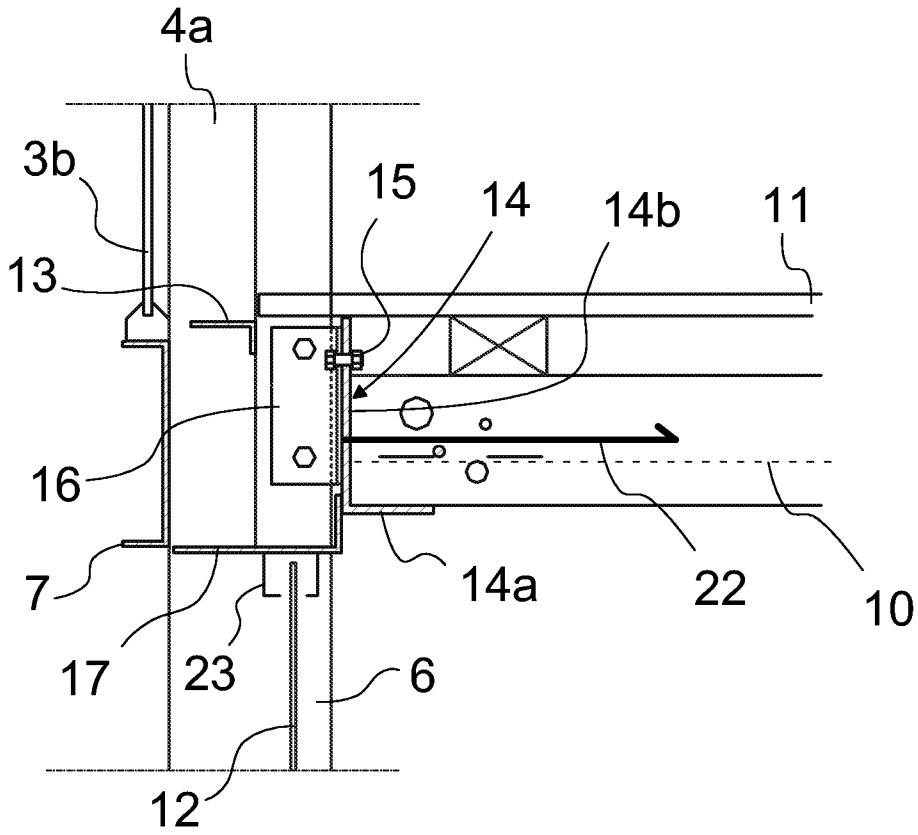

4a
3b
15
14
14b
11
13
16
7
14a
22
10
17
23
6
12

Fig. 6

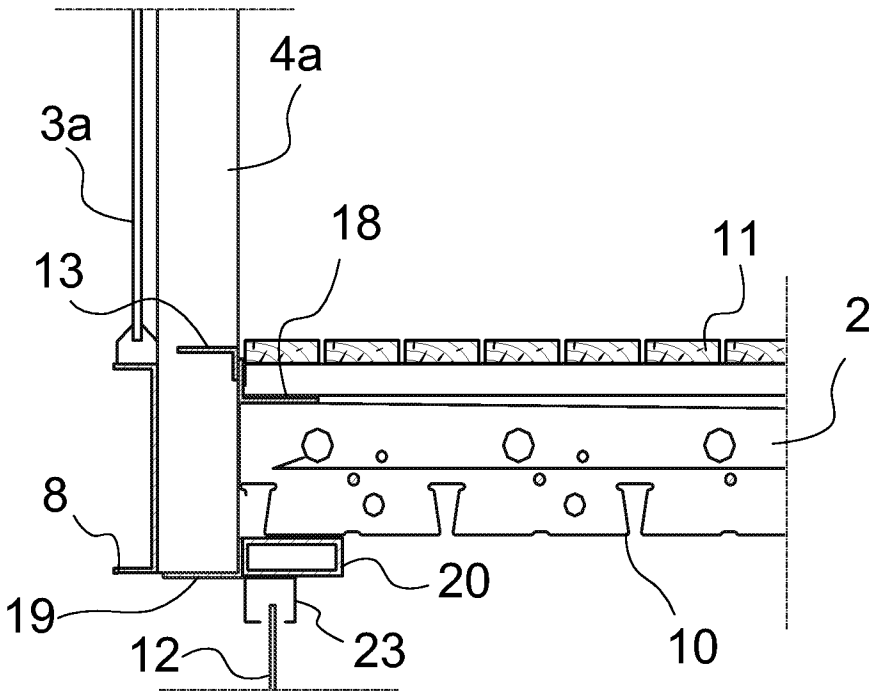

4a
3a
18
11
13
2
8
20
19
10
12
23

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2006/050339

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC8: E04B

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

FI, SE, NO, DK

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

EPO-internal, WPI & PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	DD 227478 A1 (VE KOMB BAU U MODERNISIERUNG D) 18 September 1985 (18.09.1985)	
X	Fig. 1	10
A	Whole document	1-12
A	FI 924677 A (LEMMINKAEINEN OY) 16 April 1994 (16.04.1994), Whole document	1-12
A	US 5791100 A (SCHIEFERLY STEPHEN B et al.) 11 August 1998 (11.08.1998), Whole document	1-12
A	WO 9321405 A1 (PAAVO RANNILA STEEL OY et al.) 28 October 1993 (28.10.1993), Whole document	1-12
A	JP 2001073450 A (SEKISUI CHEMICAL CO LTD) 21 March 2001 (21.03.2001), Patent Abstracts of Japan	1-12
A	JP 7127126 A (SEKISUI CHEMICAL CO LTD) 16 May 1995 (16.05.1995), Patent Abstracts of Japan	1-12

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 October 2006 (04.10.2006)	20 November 2006 (20.11.2006)

Name and mailing address of the ISA/FI
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2006/050339

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The application lacks unity within the meaning of PCT Rule 13.1. According to PCT Rule 13.1, an application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept.

Further, according to PCT Rule 13.2, the requirement of unity of invention is fulfilled only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" means those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

Continues on the Extra sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2006/050339

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.
E04B 1/00 (2006.01)
E04B 5/40 (2006.01)

Continuation of box No. III

This International Searching Authority considers that there are two (2) inventions claimed in the international application. These inventions are covered by the claims: Invention 1, claims 1-9; Invention 2, claims 10-12.

The two inventions and their special technical features in the international application found by the International Searching Authority are:

1. The special technical feature according to claims 1-9 is: that the height of the vertical part of the support beam is substantially greater than the thickness of the concrete cast of the balcony slab.

2. The special technical feature according to claims 10-12 is: that the corrugated plate of steel sheet is mounted in the longitudinal direction of the balcony to abut to steel support beams at both ends.

There exists no common special technical feature between invention 1 or 2.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2006/050339

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
DD 227478 A1	18/09/1985	None	
FI 924677 A	16/04/1994	SE 9303360 A	16/04/1994
US 5791100 A	11/08/1998	None	
WO 9321405 A1	28/10/1993	US 5566522 A	22/10/1996
		EE 3049 B1	15/10/1997
		RU 2103453 C1	27/01/1998
		PL 55816Y Y1	27/02/1998
		EP 0636199 A1	01/02/1995
		DK 636199T T3	26/01/1998
		DE 69311713D D1	24/07/1997
		AU 3954193 A	18/11/1993
		AU 671115B B2	15/08/1996
		FI 89961B B	31/08/1993
JP 2001073450 A	21/03/2001	None	
JP 7127126 A	16/05/1995	None	