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(54) **Underground garage including an improved ventilating system**

(57) An underground or basement garage (1) with an improved ventilating system comprises a series of recesses (2) arranged on several floors and coupled to one or more ventilating ducts, through openings (4) including a deviating device, wherein the deviating or switching device comprises a plurality of fins (5), each of which is pivoted at an opening and being coupled to one another by a coupling element (7) including driving means (8) for driving the fins to a closed position.

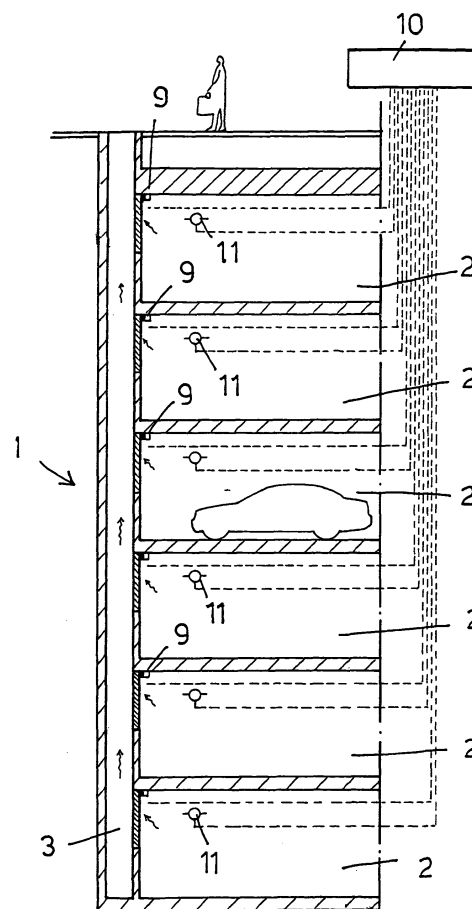


FIG 1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an underground or basement garage construction including an improved ventilating system.

[0002] Prior underground or basement garages conventionally comprise a ventilating system having a double function: that of assuring a circulation of the inside air under normal operating conditions, and that of evacuating fumes, in a fire event.

[0003] To that end, suitable cross-section chimneys are usually included, which have a cross-section proportioned to the underground garage area.

[0004] In a case of multiple floor underground garages, to reduce the total cross-section of the chimneys, which could assume a comparatively large value, a plurality of branched manifolded barrels, also called "shunt barrels" are used, to provide a proper division into compartments of the floors.

[0005] In such an event, the ventilating system comprises a main barrel or shaft, or manifold, to which the secondary channels or barrels are coupled by a so-called deviating or switching system.

SUMMARY OF THE INVENTION

[0006] Accordingly, the aim of the present invention is to provide such an underground or basement garage construction, including an improved ventilating system, i.e. a ventilating system which is greatly improved with respect to prior like ventilating systems.

[0007] Within the scope of the above mentioned aim, a main object of the invention is to provide such a ventilating system including a specifically designed type of deviating or switching element.

[0008] Another object of the present invention is to provide such a ventilating system allowing to easily control and adjust the configuration of the switching element, as required, for example in a fire or other dangerous condition.

[0009] Yet another object of the present invention is to provide such an underground or basement garage construction, the ventilating system of which is adapted to operate in a much more efficient manner, both in normal and in emergency conditions.

[0010] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by an underground or basement garage construction, including an improved ventilating system, said ventilating system comprises a plurality of recesses or compartments arranged according to a plurality of floors and coupled to one or more ventilating ducts through coupling openings including a switching device, said underground garage construction being characterized in that said switching system com-

prises a plurality of switching fins, each pivoted at a said opening and being coupled to one another by a coupling element including driving means for driving said fins to a closed position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of the invention which is illustrated, by way of an indicative, but not limitative example in the accompanying drawings, where:

Figure 1 is a schematic elevation cross-sectional view illustrating an underground or basement garage construction including an improved ventilating system according to the present invention, and being shown in a normal condition;

Figure 2 is a schematic view similar to figure 1, but illustrating the garage construction in an emergency condition;

Figure 3 is an enlarged view illustrating in a more detailed manner the deviating or switching device in a normal operation condition thereof; and

Figure 4 is a schematic view, similar to figure 3, but illustrating the deviating or switching device in an emergency condition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] With reference to the number references of the above mentioned figures, the underground or basement garage construction according to the invention, which has been generally indicated by the reference number 1, comprises a plurality of recesses or compartments 2, arranged on several floors and coupled to one or more shunt barrels or shafts 3, through openings 4 including a deviating or switching device.

[0013] More specifically, said switching device comprises a plurality of switching fins or wings 5 each of which has an end portion 6 pivoted to the bearing framework and a free end portion, coupled to a coupling element including, in the disclosed embodiment, a coupling chain 7.

[0014] In particular, the coupling element 7 comprises a weight element 8 which, in a fire condition, will drive the wings or fins to a vertical position, thereby closing the air and fire fume passage.

[0015] The coupling element comprises an electrically driven bolt element 8, allowing to hold, in cooperation with the weight element 8, the mentioned fins or wings 5 at an opened position.

[0016] In a normal operation of the underground garage, the fins will be arranged in an opened condition, as is clearly shown in figures 1 and 3.

[0017] In a fire and/or fume condition, on the contrary,

the bolt 9 will disengage the chain 7 which, downward driven by the weight element 8, will allow the fins 5 to close the passage at those connections corresponding to the regions in which fumes are not present.

[0018] This is obtained by a command 10 sent from an anti-fire central unit coupled to fume sensors 11 arranged in the recesses or compartments 2.

[0019] In a normal or regular operation condition, the vortex patterns at the two-shaft passage point, i.e. between the main and secondary shafts, are very reduced, because of the configuration of the fins, and the fluid streams will have a great evenness thereby reducing the load loss and providing a very efficient operation.

[0020] In a fire condition, on the contrary, the closure of the secondary shafts, corresponding to the regions not involved by the fumes, will prevent the fumes from cooling, as they are introduced into the manifold shaft, so that said fumes cannot be mixed with the cool air which would exit the other floors.

[0021] Thus, in a fire condition, fumes and flames cannot be propagated to the top floors.

[0022] It has been found that the invention fully achieves the intended aim and objects.

[0023] In fact, the invention provides an underground garage construction including an improved ventilating system which, in the above disclosed condition, is very efficient both in a normal operating condition and in an emergency or fire condition.

[0024] To allow a shaft or barrel to properly operate, it is necessary to meet the condition: T (draught or draft) larger than R (sum of the resistances);

R (sum of the resistances) depending, the cross section being the same, on the shaft shape, in which any sudden direction changes must be prevented, to prevent vortex patterns from being generated;
 T (the draught or draft) depending on the height of the chimney or shaft and the difference of the outside air and fume densities: the higher being the fume temperatures, the larger being said difference and accordingly the draught.

[0025] Moreover, in a fire condition, the fire floor and other floors thereabove are prevented from communicating.

[0026] In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, depending on requirements and status of the art.

Claims

1. An underground or basement garage construction, including an improved ventilating system, said ventilating system comprises a plurality of recesses or compartments arranged according to a plurality of floors and coupled to one or more ventilating ducts through coupling openings including a switching de-

vice, said underground garage construction being **characterized in that** said switching system comprises a plurality of switching fins, each pivoted at a said opening and being coupled to one another by a coupling element including driving means for driving said fins to a closed position.

2. A garage construction according to claim 1, **characterized in that** each said fins comprises an end portion pivoted to a bearing framework and a free end portion coupled to the coupling or connecting element, said connecting element comprising a connecting chain.

3. A garage construction according to claim 1 or 2, **characterized in that** said driving means comprise a weight element associated with said connecting element and an electrically driven bolt allowing, in cooperation with said weight element, to hold said fins in an opening position whereas, in a fire condition, said weight element drives said fins to a vertical position thereby closing the fire air and fume passage.

4. A garage construction, according to one or more of the preceding claims, **characterized in that**, in a normal operation condition of said garage construction, said fins are arranged in an opened condition whereas, in a frame and/or fume condition, said bolt will disengage said chain which, as downwardly driven by said weight element, will cause said fins to close the passage at all the connections corresponding to regions at which fumes are absent.

5. A garage construction, according to one or more of the preceding claims, **characterized in that** said garage construction further comprises an anti-fire central unit coupled to fume sensors, arranged in said recesses or compartments, and adapted to control said electrically operated bolt.

6. A garage construction, according to one or more of the preceding claims, **characterized in that**, in a normal operation condition, said garage construction is so designed to reduce to a minimum vortex patterns at passage regions between the two shafts, i.e. a main and secondary shaft, which reduction is obtained by said specifically designed thins allowing to reduce the load loss thereby allowing said construction to operate in a very efficient operating condition.

7. A garage construction, according to one or more of the preceding claims, **characterized in that** said garage construction comprises one or more of the disclosed and/or illustrated features.

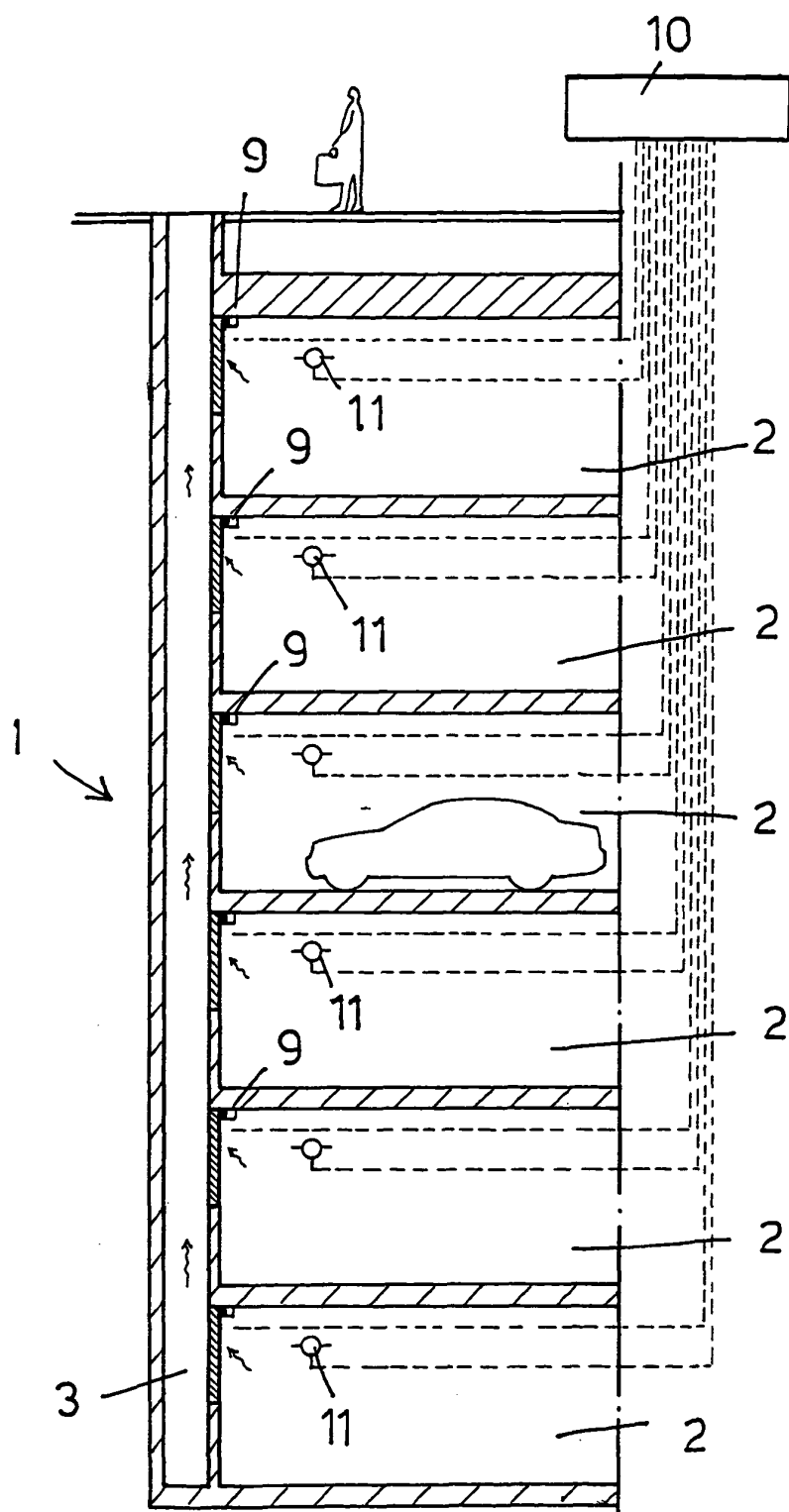


FIG 1

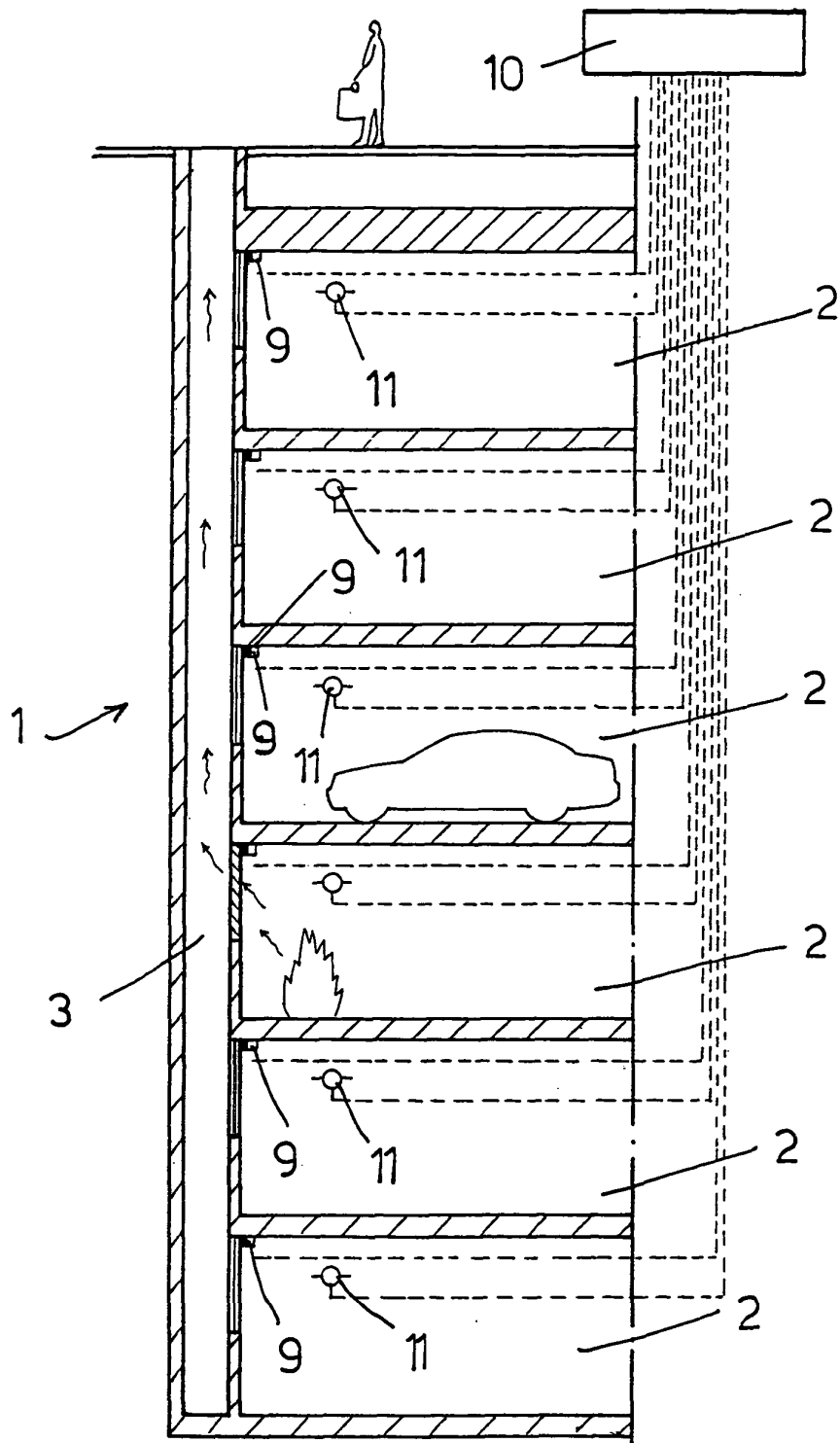
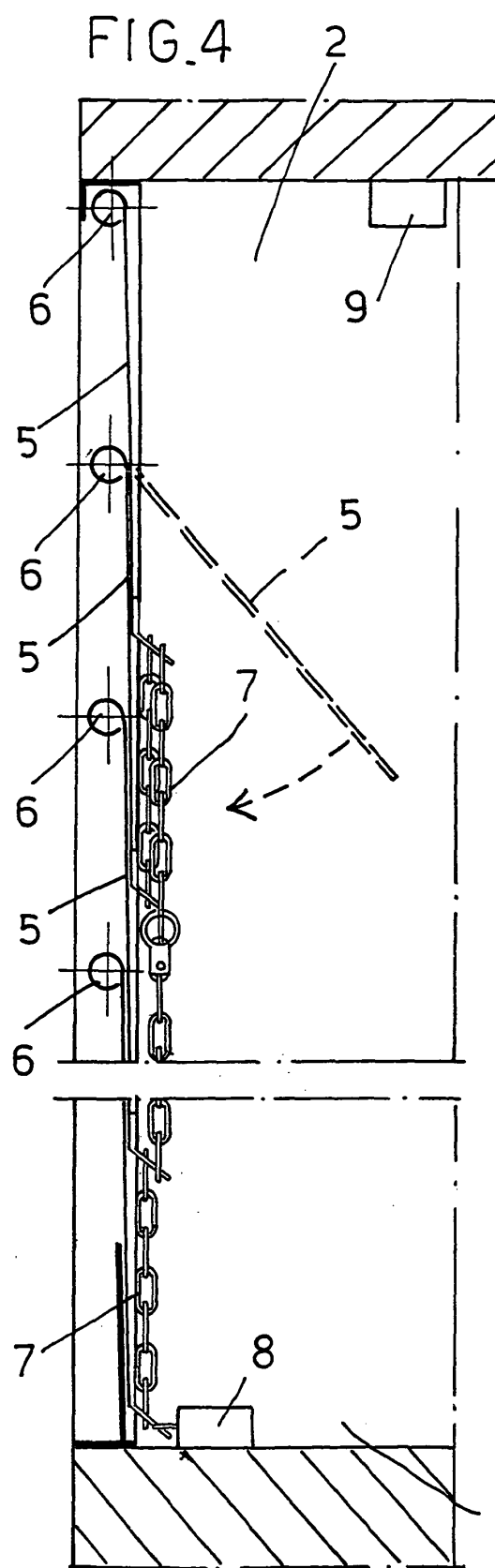
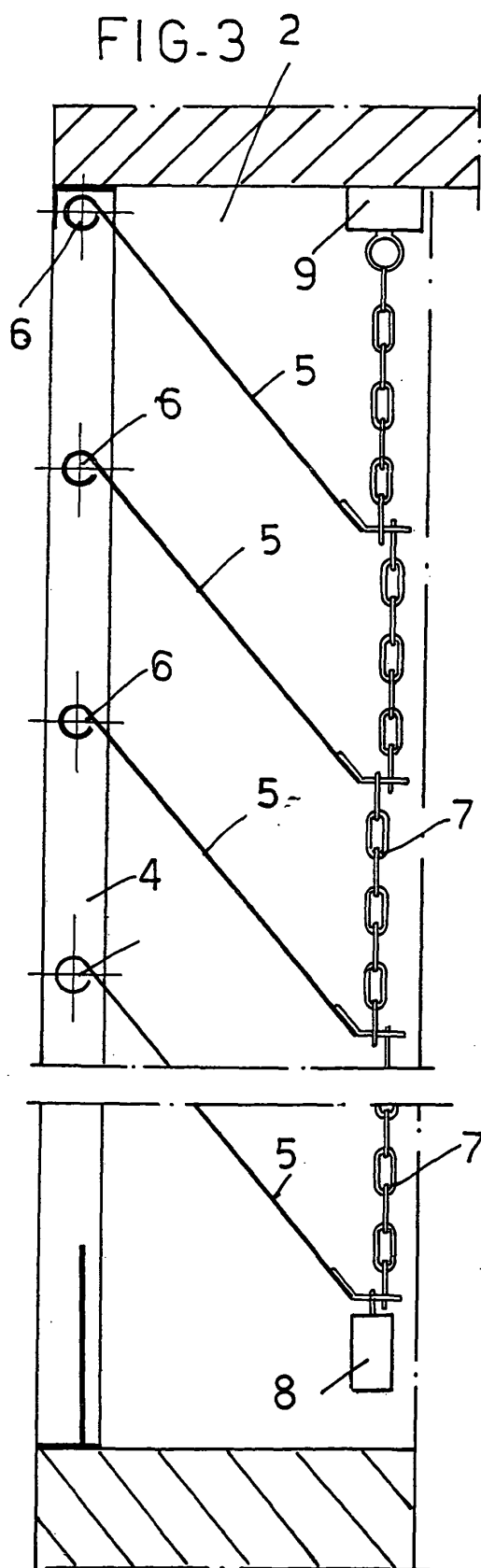


FIG 2





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PARTIAL EUROPEAN SEARCH REPORT

Application Number

which under Rule 45 of the European Patent Convention EP 04 02 9497 shall be considered, for the purposes of subsequent proceedings, as the European search report

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 832 680 A (MUR01 ET AL) 10 November 1998 (1998-11-10) * column 14, line 11 - column 16, line 3; figures 12a,12b,13,14 * * column 20, line 40 - column 20, line 49; figure 25 *	1,5,6	E04H6/10
A	US 1 909 728 A (SNYDER RUDOLPH E) 16 May 1933 (1933-05-16) * the whole document *	1-4	
A	US 6 386 969 B1 (O'BRIEN ROBERT D) 14 May 2002 (2002-05-14) * column 3, line 55 - column 4, line 46; figures 1-5 *	1,4,5	
A	GB 1 431 670 A (ALBERT OHG HEINRICH) 14 April 1976 (1976-04-14) * page 2, line 13 - page 2, line 77; figures 1-3 *	1,6	
A	GB 2 177 136 A (* UP AND DOWN GARAGE SYSTEM A/S) 14 January 1987 (1987-01-14) * page 5, line 110 - page 7, line 30; figures 1,4-7 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E04H F24F E06B
INCOMPLETE SEARCH The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims. Claims searched completely : Claims searched incompletely : Claims not searched : Reason for the limitation of the search: see sheet C			
Place of search Munich		Date of completion of the search 23 March 2005	Examiner Stefanescu, R
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	

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EPO FORM 1503 03.82 (P04C07)



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**INCOMPLETE SEARCH
SHEET C**

Application Number
EP 04 02 9497

Claim(s) searched completely:
1-6

Claim(s) not searched:
7

Reason for the limitation of the search:

Dependent claim 7 is not clear (Article 84 EPC), because it does not disclose clear additional technical features. Moreover, claim 7 contains unnecessarily references to the drawings, contrary to Rule 29(6) EPC.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 02 9497

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
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23-03-2005

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