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(54) **An up-and-over door assembly with safety device**

(57) An up-and-over door assembly comprising: a frame (10) comprising two upright members (1, 2) connected at their upper ends by a horizontal crossbeam (3), a door (4) movable from an substantially horizontal open position, projecting from the vertical plan defined by said frame at a substantially horizontal positioning, to a closed is position in which is vertically disposed, a door driving motor and a pair of lined up infrared transmitter-

receiver (TXb, RXb), positioned along the lower edge of the door (4). The assembly further comprises detecting means formed by pairs of infrared lined up transmitters and detectors (TXD, RXD; TXS, RXS), positioned along the side edges of said door (4). The three transmitter-detector pairs are connected to a control unit (12) adapted to interrupt the movement of the door in presence of an obstacle during the closing of the door (4).

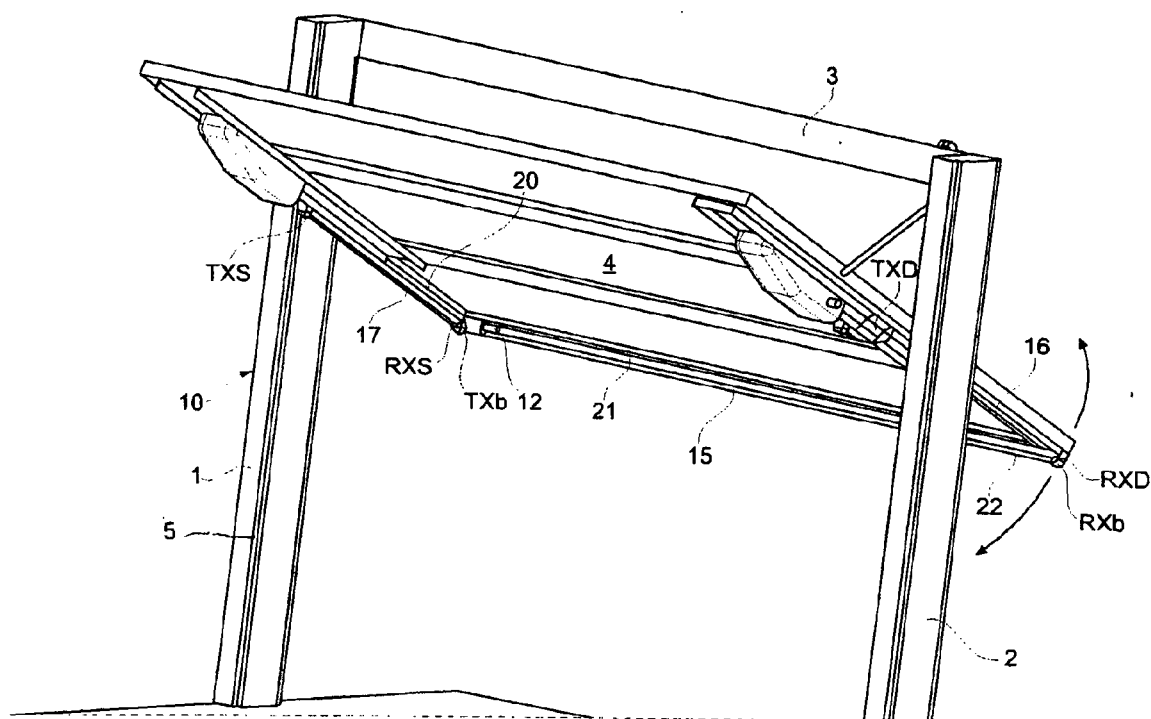


Fig. 1

Description

Prior Art

[0001] The present invention concerns in general the up-and-over doors and more particularly, although not exclusively, doors for closing private and common car garages and the like, also called motorized passages.

[0002] The invention concerns more precisely an up-and-over door assembly comprising a rigid (one-piece) door, restrained to a frame which in turn is secured to the structure to be closed, and movable around a horizontal axis from a vertical closed position to an open position in which the is lifted and lies in a substantially horizontal plane position.

[0003] The doors of this type provide for a driving motor and means for detecting the presence of an obstacle during the closing of the door, cooperating with a control unit to interrupt its movement in presence of an obstacle.

[0004] In order to evaluate the risks of a motorized passage requiring a physical contact for causing the intervention of a safety device, recent safety rules provides for taking into account the dynamical forces, both static and residual, in respect of the different door positions of the motorized passage. The measurements of such force values must be carried out with a special certified tool, see for example European Directive 2006/42/CE.

[0005] There are known doors equipped with safety devices that provides an emitter and a receiver of infrared radiations, such as for instance from US 2006/0071155 A1s (disclosing a garage door with mirrors for multiple reflection), and from US 5596840 (disclosing a garage door with sensors along the lower edge of the door) that nevertheless do not ensure a satisfactory response.

[0006] EP 1229200 discloses an up-and-over door assembly comprising a one-piece door restrained to a three-dimensional frame comprising a pair of vertical guides and a pair of horizontal guides arranged so that the door never projects outside of the plane defined by the vertical portion of the frame. To prevent a shearing risk between the door and the guides, both during the opening and the closing of the door, deformable edges are applied along the side edges of the door, each comprising a pair of elongated conductors that are short-circuited by the deformation caused by the presence of an obstacle. Along the lower edge of the door there is provided a pair of aligned IR transmitter and receiver devices and the short-circuit of the deformable edges obscures the IR beam and therefore stops the movement of the door. Such an arrangement provides therefore physical contact for the safety intervention in presence of an obstacle on the side edges of the door.

[0007] It is an object of the present invention to overcome the drawbacks and the limitations of the known safety devices of the up-and-over doors, and particularly to detect any possible obstacle before and without (any) impact therewith so as to improve the safety level of the door and making the contact strength measurements su-

perfluous.

[0008] The invention achieves these objects through an up-and-over door assembly with the characteristics recited in claim 1. Further advantageous characteristics are recited in the dependent claims.

[0009] According to the invention, pairs of lined up IR transmitter-detector forming so-called contactless barriers are provided along the door lower edge and at least partially along the door side edges.

Description of the invention

[0010] The invention will now be disclosed with reference to the attached drawings illustrating a non-limiting preferred embodiment thereof in which:

Fig. 1 is a partial perspective view illustrating an embodiment of the invention;

Fig. 2 illustrates details of the lower and side barriers of the up-and-over door assembly according to the invention;

Fig. 3 illustrates with more details a turret that houses the infrared devices of a door assembly according to the invention; and

Fig. 4 illustrates with more details a portion of a turret, also showing part of the infrared beam and of protecting rubber profiles.

[0011] Throughout all the Figures the same references have been used for designating equal or substantially equivalent components.

Description of a Preferred Embodiment

[0012] With reference to the Figs. 1 and 2, an up-and-over door assembly according to the invention includes a single-leaf panel 4 hereinbelow referred to as "door", and a frame 10, fixed to the structure to be closed and formed by two upright members 1, 2 connected at their upper ends by a horizontal crossbeam. The door 4 is monolithic, that is formed by a single piece and relatively rigid (i.e. it is not formed by hinged elements as in the sectional doors).

[0013] In the uprights 1, 2 there are provided elongated guides 5 (one shown in Fig. 1) within which pins, rolls or the like, fixed to the door 4 can slide in the opening-closing movements. In known manner for this type of doors, the door 4 vertically rotates around a movable horizontal axis so as to positioning itself in the open position near the crossbeam 3 with a substantially horizontal lying as shown in Fig. 1. During such opening movement, as well as in the open final position, the door protrudes from the vertical plane defined by the frame 10, or better by the uprights 1, 2 and the crossbeam 3.

[0014] With a reverse movement the door 4 reaches a closed position (not shown) in which it is vertically disposed without projecting from the above mentioned vertical plane defined by the frame 10, i.e. the uprights 1, 2

and the crossbeam 3.

[0015] The safety device according to the invention includes three pairs of IR transmitter-receiver indicated with TX and RX respectively, and a control unit 12 adapted to receive signals representative of the state of the beams and to control a motor (not shown) for carrying out the closing and the opening of the door. The components TX and RX comprise casings of plastic material, hereinbelow shortly indicated as "turrets", that house said transmitters and/or receivers. A preferred embodiment of such turrets will be described later with more details.

[0016] With particular reference to Fig. 1, a pair of turrets housing the transmitter TXb and the receiver RXb, are fitted to the lower edge of the door 4, the one abutting against a ledge when the door is closed, and are preferably located at the lower corners of the up-and-over door, so that the infrared beam 15 emitted by the transmitter TXb and received by the receiver RXb extends in a space immediately adjacent to the lower edge of the door, at a distance of 2-5 cm from it.

[0017] According to the invention, a similar pair of transmitter-receivers is positioned on each side edge of the door 4, indicated by TXD, RXD and TXS, RXS, respectively, that produces two infrared beams, respectively 16 and 17, parallel and running at a distance of 2-5 cm from the door side edges. Preferably, as shown in Fig. 1, the side beams 16, 17 extend only along the door edge portion susceptible of contacting obstacles and not along the whole side edge of the door.

[0018] According to the invention, the IR transmitters and receivers are advantageously housed inside casings or containers of a plastic material, that can be secured to the door by means of screws or the like.

[0019] Fig. 3 shows an embodiment of one of such turrets comprising a plastic container 30 formed by two members or parts that can be partially inserted one into the other. The turret houses an infrared transmitter and an infrared receiver TX and RX, typically a transmitter (or emitter) of infrared radiation, such as an IR source and a receiver (sensor) of infrared radiation, such as a photocell. In the embodiment shown in Fig. 3, that is particularly adapted for being mounted at the door corners, the container 30 is equipped with means 34, 35 for focusing the infrared beam, typically in form of two lenses with their axes forming a 90° angle, for concentrating the transmitted or received beams. The turret further provides for two seats 31, 32 also arranged at 90° to one another, for receiving the ends of elongated rubber members to minimize the effect of a possible impact against an obstacle.

[0020] The infrared sensor of the receiver RX generates a signal upon receiving the beam coming from the aligned transmitter, and doesn't generate any signal in case the beam is obscured or interrupted by an obstacle during the closing of the door.

[0021] By using known inverting circuits it is possible to obtain a reverse mode operation, i.e. a command signal (high level) when the beam is interrupted. However,

more generally, according to the invention there are provided means for checking the interruption of at least one of said beams.

[0022] These means (not shown since they are relatively conventional) can be connected to the control unit 12, or be incorporated in the same. For instance such means can include logical devices that produce a signal when the receiver receives the beam and the corresponding transmitter is contemporarily operating (in order to avoid false command signals due to a faulty transmitter).

[0023] As shown in Fig. 4, when using a turret 30 such as the one illustrated in Fig. 3, each turret advantageously houses a transmitter and a receiver operating (directed) along two orthogonal directions, thus making the construction of the assembly quite simpler. The side turrets TXS and TXD that are not positioned at the door corners can have a simpler construction since each of them has to contain only one transmitter. As an alternative, turrets as shown in Fig. 3 can be employed, but housing only a pair of receiver - transmitter, or leaving inactive (not connected) the second pair.

[0024] Although the closing of the door is stopped very quickly when an obstacle is detected along the beam extension, advantageously the side edges and the lower edge of the door are further provided with elongated rubber profiles, indicated in Fig. 4 by references 20, 22 and 21, respectively. They extend in a continuous or discontinuous way, to minimize the effect of a possible impact of the door against the body of a person that has interrupted the beam.

[0025] The control unit 12 is preferably mounted near one of the turrets of the door lower edge to simplify the assembling and the maintenance, but its position is by no means critical. The signals representative of the continuity of the beams reach the unit 12, and the closing of the door is stopped when there is detected an interruption of any one of the three beams. Under these circumstances the unit 12 causes not only the stopping of the door but also an inversion of the door movement (i.e. an opening movement) practically without any impact with the obstacle. As mentioned above, the control unit is capable to arrest the driving motor and to reverse its rotation when the presence of an obstacle interrupting at least one of the three beams is detected.

Claims

1. 1. An up-and-over door assembly comprising:
 - a frame (10) that is secured to structure to be closed and comprises two upright members (1, 2) connected at their upper ends by a horizontal crossbeam (3);
 - a one-piece door (4) restrained to said frame (10) through two guide members (5) formed in said upright members (1, 2), and movable from

- an open position near said crossbeam (3), at a substantially horizontal positioning and projecting from the vertical plane defined by said upright members and crossbeam (1, 2,3), to a closed position in which it is vertically disposed in said vertical plane;
- a driving motor for moving said door (4);
 - a pair of lined up infrared transmitter and detector (TXb, RXb), positioned along the lower edge of said door (4) to create a beam of infrared radiation (15) and cooperating with a control unit (12) for interrupting the door movement in presence of an obstacle in the path of said door (4);
 - anti-shearing means comprising two pairs of infrared lined up transmitters and detectors (TXD, RXD; TXS, RXS), positioned along at least a portion of the side edges of said door (4) for creating as many beams of infrared radiation (16, 17);
 - and means for detecting the interruption of said beams (15, 16, 17) to control the stop of the door and a cause a reverse motion thereof when at least one of said beams is interrupted when said door is being closed.
2. An up-and-over door assembly as claimed in claim 1, **characterized in that** said transmitters and detectors (TXD, RXD; TXS, RXS; TXb, RXb) are housed in turret-shaped containers (30) of a plastic material, each housing at least one infrared transmitter ad/or one receiver (TX, RX).
 3. An up-and-over door assembly as claimed in claim 2, **characterized in that** each of said turret-shaped containers (30) houses a transmitter and a detector oriented at 90° to each other, and two beam focusing means, typically in form of two lenses (34, 35).
 4. An up-and-over door assembly as claimed in claim 2 or 3, **characterized in that** it further provides rubber profiles (20, 22, 21) on the side edges and lower edge of said door (4) for reducing the effects of a possible impact of the door against the body of a person that interrupted the beam.
 5. An up-and-over door assembly as claimed in claim 4, **characterized in that** said rubber profiles (20, 22, 21) extend in a continuous way.
 6. An up-and-over door assembly as claimed in claim 4, **characterized in that** said rubber profiles (20, 22, 21) extend in a discontinuous way.
 7. An up-and-over door assembly as claimed in the preceding claims, **characterized in that** each of said turret-shaped containers (30) is equipped with seats (31, 32) for receiving the ends of two of said rubber profiles (20, 22, 21).
 8. An up-and-over door assembly as claimed in the preceding claims, **characterized in that** said turret-shaped containers (30) are located so as to generate, respectively to receive, an infrared beam extending in the space immediately adjacent the door edges, at a distance comprised between 2 and 5 cm.

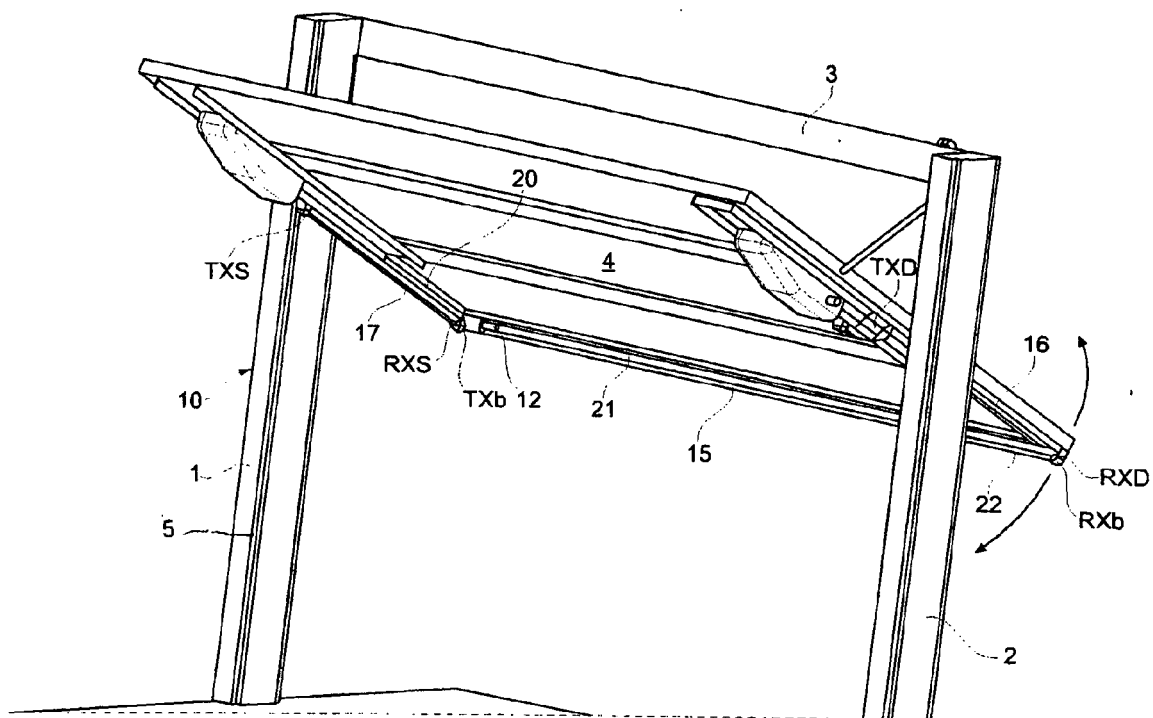


Fig. 1

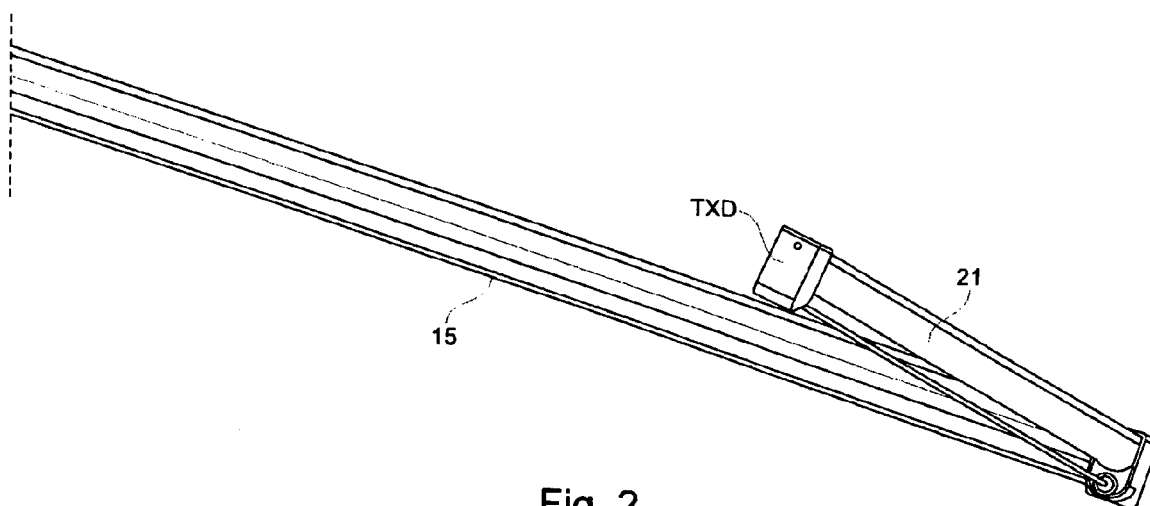


Fig. 2

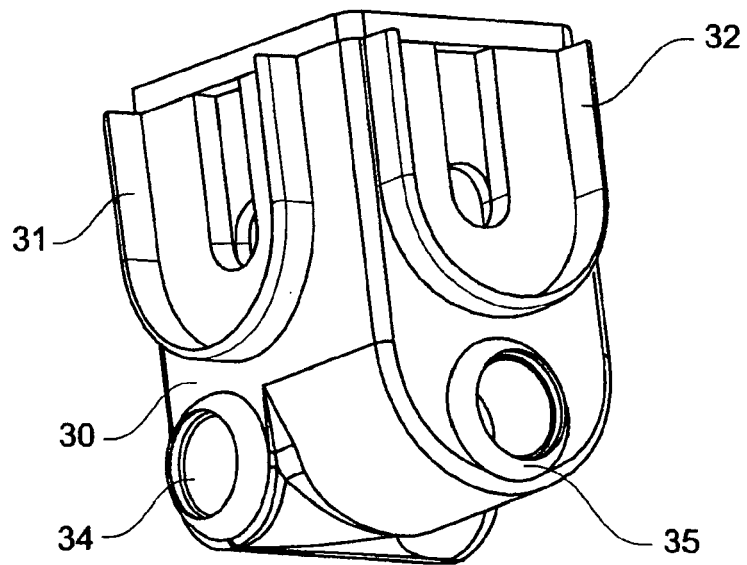


Fig. 3

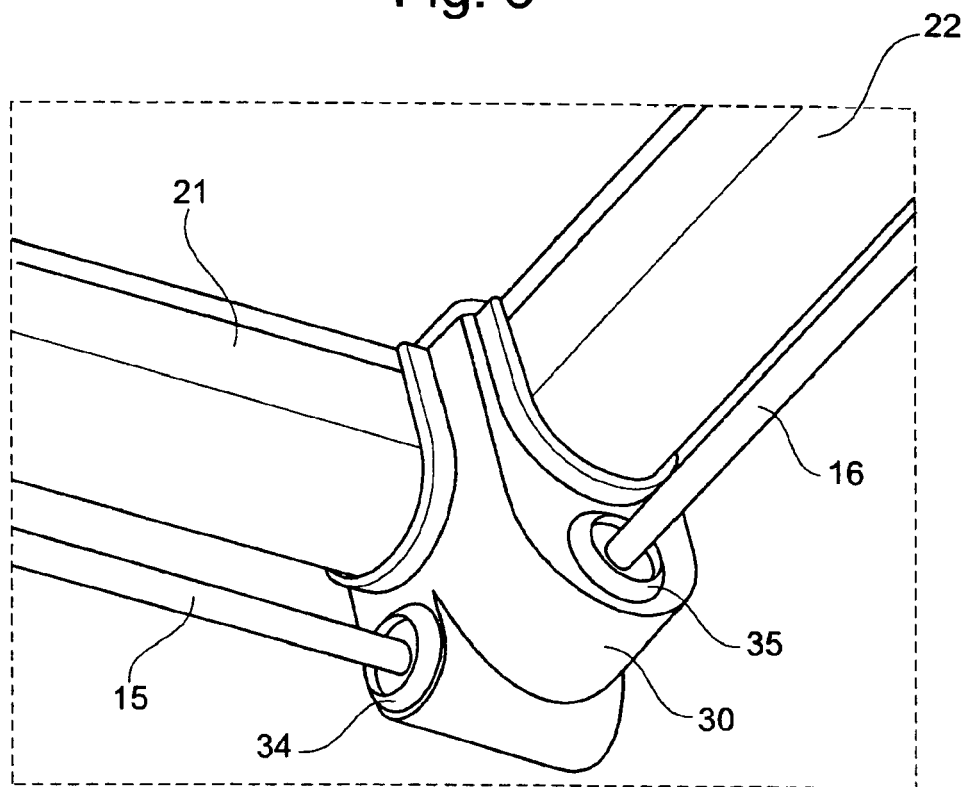


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 11 00 6005

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	EP 1 229 200 A1 (SYSTEMES D AUTOMATISMES FERMET [FR]) 7 August 2002 (2002-08-07) * paragraphs [0003], [0004], [0006], [0010], [0012] * * figures 1,2 *	1-8	INV. E05F15/00
A,D	US 5 596 840 A (TEICH RUDOR [US]) 28 January 1997 (1997-01-28) * column 8, line 33 - column 9, line 60 * * figures 4,5 *	1-8	
A	US 2005/001573 A1 (MILLER BEARGE [US] ET AL) 6 January 2005 (2005-01-06) * paragraphs [0029], [0032] - [0034], [0051], [0052] * * figures 1,6 *	1-8	
A,D	US 2006/071155 A1 (CHEN DUKE [TW]) 6 April 2006 (2006-04-06) * paragraphs [0010] - [0012] * * figures 2,3 *	1-8	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05F
Place of search		Date of completion of the search	Examiner
The Hague		7 October 2011	Klemke, Beate
CATEGORY OF CITED DOCUMENTS		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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 00 6005

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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 1229200	A1	07-08-2002	FR	2820452 A1	09-08-2002

US 5596840	A	28-01-1997	NONE		

US 2005001573	A1	06-01-2005	NONE		

US 2006071155	A1	06-04-2006	US	2005151066 A1	14-07-2005

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20060071155 A1 [0005]
- US 5596840 A [0005]
- EP 1229200 A [0006]