



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.07.2003 Bulletin 2003/30

(51) Int Cl.7: **E05B 15/00**

(21) Application number: **03250244.5**

(22) Date of filing: **14.01.2003**

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

- **Rogers, John, c/o Avocet Hardware PLC**
Brighthouse HD6 2RW (GB)
- **Chang, Edward, c/o Avocet Hardware PLC**
Brighthouse HD6 2RW (GB)

(30) Priority: **16.01.2002 GB 0200868**

(71) Applicant: **Avocet Hardware PLC**
Brighthouse, West Yorkshire HD6 2RW (GB)

(74) Representative: **Orr, William McLean**
Urquhart-Dykes & Lord,
Tower House,
Merrion Way
Leeds LS2 8PA (GB)

(72) Inventors:

- **Kent, David, c/o Avocet Hardware PLC**
Brighthouse HD6 2RW (GB)

(54) **Side hung closure member with vertical alignment device**

(57) A side hung closure member (10) which is intended to be mounted on a fixed outer frame (11) having a pair of opposed upright frame members (12, 13) with the closure member (10) being hingedly mounted on one of the frame members (12) for movement between open and closed positions and being capable of latching and / or locking engagement with the other of the frame members (13) when in the closed position; in which the closure member comprises: a rectangular frame having top and bottom frame components (15, 16) and a pair of opposed upright frame components (17, 18), a first of said upright components (17) being intended to be hingedly mounted (14) on the fixed outer frame (11) and a second of the upright frame members (18) being intended to form a closing face of the closure member (10); a locking element (22) mounted on the closing face (18) of the rectangular frame, and co-operative with a corresponding locking component (24) on the adjacent upright frame member (13) of the fixed outer frame (11), when the closing face (18) is in a required vertical alignment with said upright frame member (13); and, an alignment element (25) provided on the closing face (18) of the rectangular frame and co-operative with a corresponding element (26) on the adjacent upright frame member (13), when there is downward misalignment of the locking element (22) on the closure face (18) relative to the corresponding locking component (24) on the adjacent upright frame member (13) of the fixed frame (11), in order to effect downward adjustment movement of the locking component (24) and to compensate for the

downward misalignment of the locking element (22).

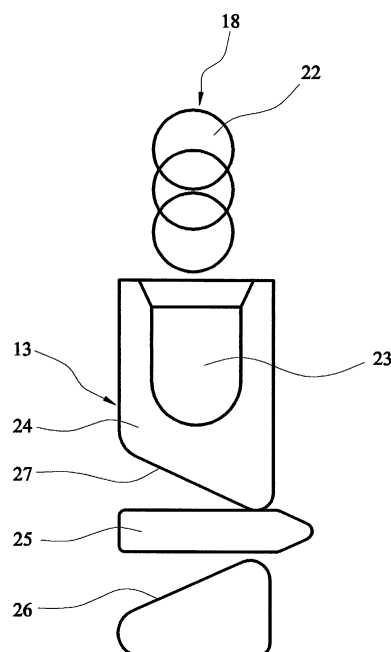


FIG. 2

Description

[0001] This invention relates to a side hung closure member, such as a door or window, and which is intended to be mounted on a fixed rectangular outer frame having a pair of opposed upright frame members, with the closure member being hingedly mounted on one of the frame members for movement between open and closed positions and being capable of latching and / or locking engagement with the other of the frame members when in the closed position.

[0002] In the case of a side hung door having a heavy glass infill panel mounted in a rectangular door frame, the weight of the glass panel is substantial, and during installation it is important, as far as is possible, to minimise the turning moment effect of the panel on the door frame. Bearing in mind that the centre of gravity of the panel is located approximately mid-way between the two upright frame members of the fixed outer frame (in the absence of special precautions during installation of the panel in the rectangular door frame), a substantial downward turning moment would be applied by the weight of the glass panel to the hinges which mount the door frame on the fixed frame.

[0003] The rectangular door frame in which the glass panel is mounted is composed of upper and lower horizontal frame components, and a pair of opposed vertical frame components, which are secured together by corner joints (e.g. welded joints) at each of the four corners of the rectangular frame.

[0004] The inherent rigidity of the frame components, and the strength of the corner joints, are the main features available in order to resist the turning moment effect of the weight of the glass panel, but (in the absence of special installation precautions), there will be a tendency for the rectangular frame to behave like a stiff parallelogram linkage over a period of time. This can result in the vertical closing face of the door (which is provided with latching and / or locking components) tending to "creep" downwardly, by yielding of the corner joints.

[0005] This causes two possible problems. First of all, downward movement of the latching / locking components which are mounted on the closing face of the door may move them at least partly out of registry with corresponding components (keepers etc) mounted on the adjacent frame member of the fixed outer frame, and which can make the smooth operation of the components more difficult. Secondly, in the case of excessive downward creep, the lower horizontal frame member of the door frame (at its end remote from the hinges) may strike against the lower horizontal frame component of the fixed outer frame, during opening and closing movement, which clearly is highly undesirable.

[0006] With a view to overcome these problems, special precautions are usually taken during the mounting of a glass panel in the door frame, and which involves use of "toe and heel" spacer blocks which are placed between the top and bottom horizontal frame compo-

nents of the door frame and the adjacent top and bottom horizontal edges of the glass panel. Importantly, the lower spacer block is located near to the "hinge" side of the door frame, and the upper spacer block is located close to the closing face of the door frame, whereby the downward action of the weight of the glass panel is transmitted to the door frame mainly via the lower spacer block, and therefore only a small turning moment is applied about the hinge axis.

[0007] However, even with such precautions (when properly carried out), there is still a tendency for a door frame to "creep" over a period of time, with resulting downward movement of the closing face of the door and the accompanying disadvantages. Furthermore, in the case of faulty workmanship (improper "toe and heel" assembly, or even complete failure to install spacer blocks), this creep will arise more quickly, and with resulting customer demand for adjustment of the latching / locking components to be carried out. This is actually a frame assembly fault, but the blame tends to attach unfairly to the supplier of the latching / locking components, and who is faced with a demand for remedial action to be taken on site, possibly a considerable time after the initial installation.

[0008] The present invention therefore addresses this problem from a different aspect, and by accepting the possibility / probability that downward creep will occur, but providing an automatically operating adjustment arrangement which applies compensating adjustment movement (when necessary) as the closure member (door) moves to the closed position.

[0009] According to the invention there is provided a side hung closure member which is intended to be mounted on a fixed outer frame having a pair of opposed upright frame members, with the closure member being hingedly mounted on one of the frame members for movement between open and closed positions and being capable of latching / locking engagement with the other of the frame members when in the closed position; in which the closure member comprises:

a rectangular frame having top and bottom frame components and a pair of opposed upright frame components, a first of said upright frame components being intended to be hingedly mounted on the fixed outer frame and a second of the upright frame members being intended to form a closing face of the closure member;

a locking element mounted on the closing face of the rectangular frame, and co-operative with a corresponding locking component on the adjacent upright frame member of the fixed outer frame, when the closing face is in a required vertical alignment with said upright frame member; and,

an alignment element provided on the closing face of the rectangular frame and co-operative with a corresponding element on the adjacent upright frame member, when there is downward misalign-

ment of the locking element on the closure face relative to the corresponding locking component on the adjacent upright frame member of the fixed frame, in order to effect downward adjustment movement of the locking component and to compensate for the downward misalignment of the locking element.

[0010] Therefore, a side hung closure member according to the invention is able to adjust itself automatically, to compensate for any downward misalignment or "creep" of the closing face which may arise over a period of time, in order to restore the required vertical alignment and thereby permit smooth continued co-operation between the locking element mounted on the closing face of the rectangular frame, and the corresponding locking component on the adjacent upright frame member of the fixed outer frame.

[0011] In a preferred embodiment, the locking element on the closure face comprises a roller, and the corresponding locking component on the adjacent upright member of the fixed frame is a keeper slot.

[0012] The keeper slot is preferably mounted slidably in the upright member, and may have a cam face which is engageable by the alignment element on the closing face of the rectangular frame (when there is downward misalignment of the locking element) so that the keeper slot is moved downwardly through a sufficient distance so that smooth interengagement between the roller and the keeper slot can take place.

[0013] Conveniently, a spring loaded keeper block or plate is provided, having a keeper slot formed therein, and which is spring biased towards a position in which it lies in the path of movement of the alignment element, when there is vertical misalignment so that the alignment element then moves the block against the spring biasing and to compensate for the initial misalignment of the locking component.

[0014] The alignment element is preferably arranged to project from the closing face, so that it is engageable, when necessary, with the corresponding element on the upright frame member, in advance of movement of the locking component(s) into engagement with the corresponding keeper elements.

[0015] In order to compensate for upward or downward misalignment between roller and the keeper slot, two cam faces may be provided, one cam face being engageable by the alignment element to lift the keeper slot and the other cam face being engageable by the alignment element to lower the keeper slot, depending upon whether the initial misalignment of the locking element (roller) is higher or lower relative to the locking component (keeper slot).

[0016] Preferably, a common actuator handle is mounted on the closure member and is arranged to actuate the locking element between locking and release positions relative to the locking component. Conveniently, the actuator handle provides simultaneous actuation

of a number of separate locking elements, each co-operating with a respective locking component, and the alignment element may be arranged to apply common adjustment of all of the locking components, when necessary in case of initial misalignment.

[0017] A preferred embodiment of side hung closure member according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic front view of a typical side hung door to which the invention may be applied; and,

Figure 2 is a side view illustration of part of an embodiment of the invention and showing the co-operation between a locking roller mounted on a closing face of the door shown in Figure 1 and a co-operative keeper slot provided on the adjacent upright member of the fixed frame.

[0018] Referring first to Figure 1 of the drawings, there will be described a diagrammatic illustration of a typical side hung door to which the invention may be applied. In this example, the side hung closure member therefore comprises door 10 which is intended to be mounted in a fixed outer frame 11 having a pair of opposed upright frame members 12 and 13, with the door 10 being hingedly mounted on upright frame member 12 via hinges 14 for movement between open and closed positions, and the door being capable of latching and / or locking engagement with the other frame member 13 when in the closed position.

[0019] The door 10 has a rectangular frame with top and bottom frame components 15, 16 and a pair of opposed upright frame components 17 and 18. The upright frame component 17 is hingedly mounted on frame member 12 via hinges 14, whereas upright frame component 18 is intended to form the closing face of the door 10.

[0020] A rectangular opening is defined by the frame of the door 10, and a glass infill panel 19 is mounted in the door frame, and using heel and toe spacer blocks 20 and 21, as referred to in the introduction, and also side spacer blocks 28.

[0021] Locking elements (not shown in detail) are mounted at predetermined heights on the closing face 18 of the door frame, and co-operate with locking components at corresponding heights on the adjacent upright frame member 13 of the fixed outer frame, when the closing face 18 is in a required vertical alignment with the upright frame member 13.

[0022] However, over a period of time, there is a risk that a door 10 of the type shown in Figure 1 may undergo some "creep", whereby the closing face 18 moves downwardly, and what was previously a rectangular door frame of door 10 takes-up a slightly parallelogram type arrangement. When this arises, this then involves the risk that a locking element, and its corresponding

locking component e.g. a locking roller and a keeper slot, may not be in proper registry to allow smooth co-operation therebetween, upon actuation of a latching and / or locking mechanism of the door 10.

[0023] The design and operation of locking bolts, shootbolts, sealing cams and hooks, controlled by operation of an actuator handle, will be well known to those of ordinary skill in the art, and need not be described in detail herein. All such components are normally mounted on the closing face 18 of the door, and are movable relative to the closing face between locking and release positions.

[0024] In the case of existing door bolt constructions, hooks and deadbolts can be used for security, and which move into and out of locking engagement with corresponding recesses in the adjacent face of the upright frame member of the fixed outer frame. It is possible that there will be sufficient tolerance between these interengaging components, to allow proper operation, even in the event of "dropping" of the door leaf over a period of time. However, in the case of locking rollers and corresponding keeper slots, these are employed to provide compression of seals etc, and possible vertical misalignment may involve a more significant problem. Thus, with current door bolt construction, there is approximately 17mm of travel that a locking roller moves during normal operation. However, door leaves can drop up to a maximum of 12mm, and therefore it is not possible with the size of the roller used to cater for this movement.

[0025] Accordingly, as will be described below with reference to Figure 2, in a preferred embodiment of the invention a spring-loaded roller keeper is used, which can be automatically adjusted in order to align the keeper with the roller, even in the event of door leaf drop, while still using otherwise conventional constructions of door bolts.

[0026] Referring now to Figure 2, there is shown a locking element in the form of locking roller 22 which is vertically displaceable by operation of an actuator handle (not shown) between engaged and release positions with respect to a keeper slot 23 formed in an adjustable keeper block 24. Locking roller 22 is movable vertically relative to closing face 18 of the closure member (door) 10 during actuation, whereas keeper block 24 is normally immovable relative to the upright frame member 13 of the fixed outer frame 11 on which it is mounted.

[0027] In the event of downward misalignment of the locking roller 22 (by reason of "creep" of the rectangular door frame), there may be no longer possibility of smooth interengagement between locking roller 22 and keeper slot 23, upon actuation. Therefore, an alignment element 25 is mounted on the closing face 18 and co-operates with a corresponding element on the adjacent upright frame member 13, when there is downward misalignment. The corresponding element, in the illustrated embodiment, comprises cam face 26 provided on the keeper block 24, and which, when engaged by the alignment element 25, moves the entire keeper block 24

downwardly by a suitable compensating amount, to correspond with the downward misalignment of the locking roller 22.

[0028] Conveniently, a tapering guide formation is formed in the keeper block 24, having an upper cam face 27 which co-operates with lower cam face 26, to guide the engagement of alignment element 25, and which then applies suitable vertical adjustment movement to the keeper block 24. The interengagement between the alignment element 25 and the corresponding element (cam face 26) on the keeper block 24 is such as to take place before the locking elements (such as locking roller 22 or other locking elements) move into full co-operation with their respective keeper slots, recesses etc.

[0029] Although not shown, a common actuator handle may be provided, which operates a number of separate locking elements simultaneously, and the alignment element 25 may be arranged to effect simultaneous vertical adjustment of all of the corresponding keeper slots, recesses etc, in the event of downward misalignment initially.

[0030] The keeper block 24 is spring biased against movement from a datum position, and preferably against compensating movement (up or down) upon engagement by the alignment element 25.

[0031] Also, the movement of the locking element (roller 22) from a released position to an engaged position (upon operation of the actuating handle) is downward movement, as shown in Figure 2. However, it is within the scope of the invention for the arrangement to be such that upward movement takes place to the engaged position, in which case the keeper slot 23 will face downwardly.

Claims

1. A side hung closure member (10) which is intended to be mounted on a fixed outer frame (11) having a pair of opposed upright frame members (12, 13) with the closure member (10) being hingedly mounted on one of the frame members (12) for movement between open and closed positions and being capable of latching and / or locking engagement with the other of the frame members (13) when in the closed position;

in which the closure member comprises:

a rectangular frame having top and bottom frame components (15, 16) and a pair of opposed upright frame components (17, 18), a first of said upright components (17) being intended to be hingedly mounted (14) on the fixed outer frame (11) and a second of the upright frame members (18) being intended to form a closing face of the closure member (10);
a locking element (22) mounted on the closing face (18) of the rectangular frame, and co-op-

erative with a corresponding locking component (24) on the adjacent upright frame member (13) of the fixed outer frame (11), when the closing face (18) is in a required vertical alignment with said upright frame member (13); and, an alignment element (25) provided on the closing face (18) of the rectangular frame and cooperative with a corresponding element (26) on the adjacent upright frame member (13), when there is downward misalignment of the locking element (22) on the closure face (18) relative to the corresponding locking component (24) on the adjacent upright frame member (13) of the fixed frame (11), in order to effect downward adjustment movement of the locking component (24) and to compensate for the downward misalignment of the locking element (22).

2. A closure member according to claim 1, in combination with a fixed outer frame (11). 5
3. A closure member according to claim 2, in which the locking element on the closure face (18) comprises a locking roller (22), and a corresponding locking component on the adjacent upright member (13) of the fixed frame is a keeper slot (23). 10
4. A closure member according to claim 3, in which the keeper slot (23) is formed in an adjustable keeper block (24), and has a cam face (26) which is engageable by the alignment element (25) so that the keeper slot (23) is movable downwardly through a sufficient distance such that smooth interengagement between the roller (22) and the keeper slot (23) can take place, when there is initial downward misalignment of the locking element (22). 15
5. A closure member according to claim 4, in which the keeper block (24) is spring-loaded. 20
6. A closure member according to any one of the preceding claims, and having a common actuator handle mounted thereon, and operative to actuate the locking element between locking and release positions with respect to the corresponding locking component. 25
7. A closure member according to claim 6, in which the common actuator handle is operative to apply simultaneous operation of a number of separate locking elements, at least one of which is adjustable in the event of misalignment. 30
8. A closure member according to any one of the preceding claims, in which the closure member is a door (10) having a glass infill panel (19). 35

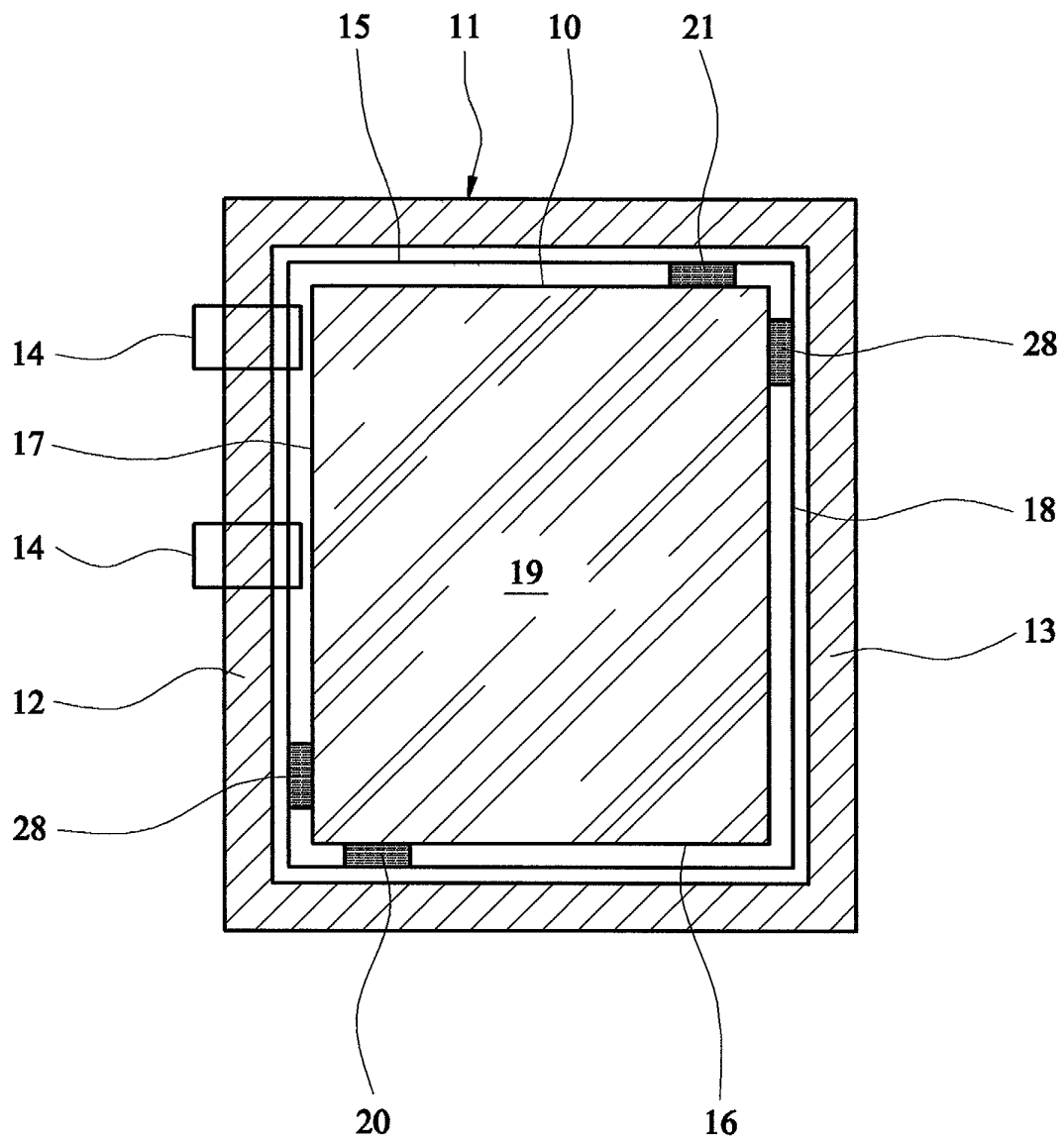


FIG. 1

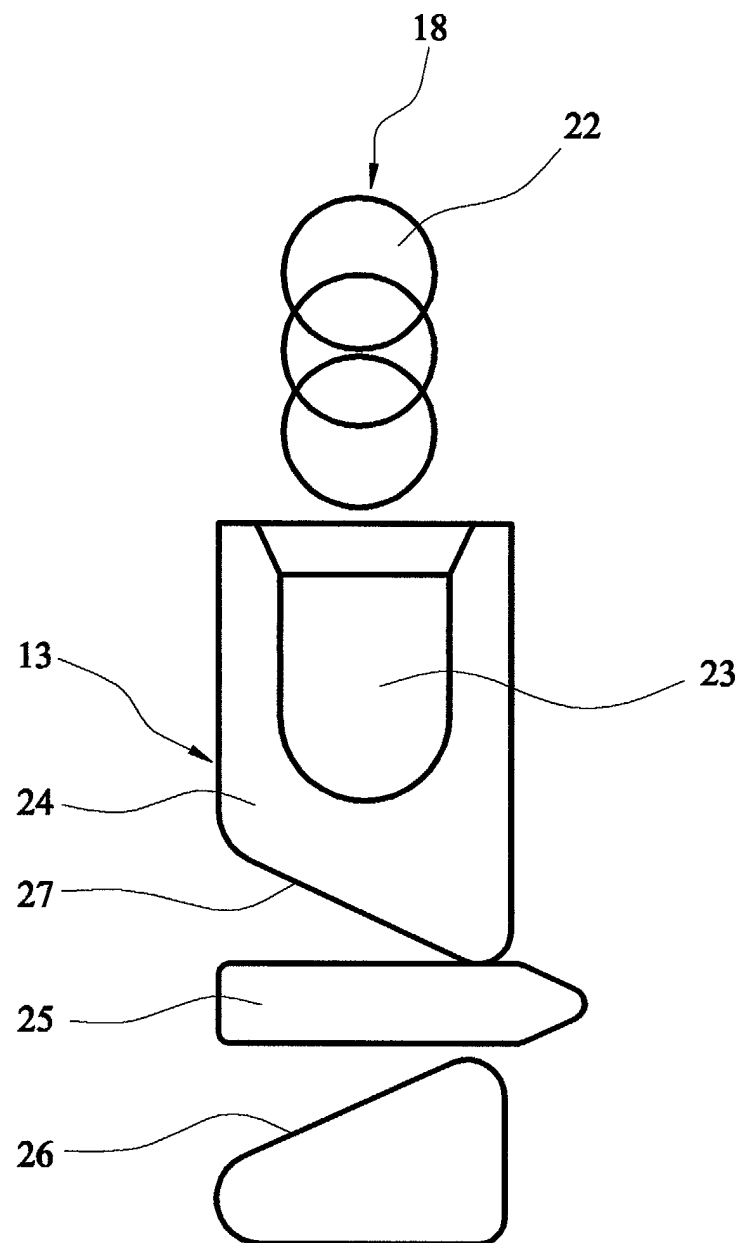


FIG. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 0244

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)
X	EP 0 890 696 A (SCHROFF GMBH) 13 January 1999 (1999-01-13) * the whole document *	1,2,6	E05B15/00
X	US 1 654 163 A (EVANS) 11 February 1922 (1922-02-11) * the whole document *	1,2,6	
X	US 1 766 183 A (ALBERT MEALIA TONY) 24 June 1930 (1930-06-24) * the whole document *	1,2,6	
X	BE 647 016 A (S.A. JEAN MAWHIN) 17 August 1964 (1964-08-17) * the whole document *	1-4,6,7	
X	US 5 098 139 A (LARSSON LEIF T) 24 March 1992 (1992-03-24) * the whole document *	1,8	
A	EP 0 314 075 A (FIAT AUTO SPA) 3 May 1989 (1989-05-03) * the whole document *	5	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E05B E05C
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 29 April 2003	Examiner Henkes, 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			

EPO FORM 1503 03.82 (P04C01)

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

EP 03 25 0244

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.

29-04-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0890696 A	13-01-1999	EP 0890696 A2	13-01-1999
		US 6039364 A	21-03-2000

US 1654163 A		NONE	

US 1766183 A	24-06-1930	NONE	

BE 647016 A	17-08-1964	NONE	

US 5098139 A	24-03-1992	CA 1324401 A1	16-11-1993

EP 0314075 A	03-05-1989	IT 212714 Z2	28-08-1989
		BR 8805723 A	18-07-1989
		DE 3867425 D1	13-02-1992
		EP 0314075 A1	03-05-1989
		ES 2028239 T3	01-07-1992

EPO FORM P0459

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