



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 205 622 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.05.2002 Bulletin 2002/20

(51) Int Cl.7: **E05F 15/20**

(21) Application number: **00830736.5**

(22) Date of filing: **08.11.2000**

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

(72) Inventor: **Lambertini, Marco**
40068 San Lazzaro di Savena (Bologna) (IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via Goito, 18
40126 Bologna (IT)

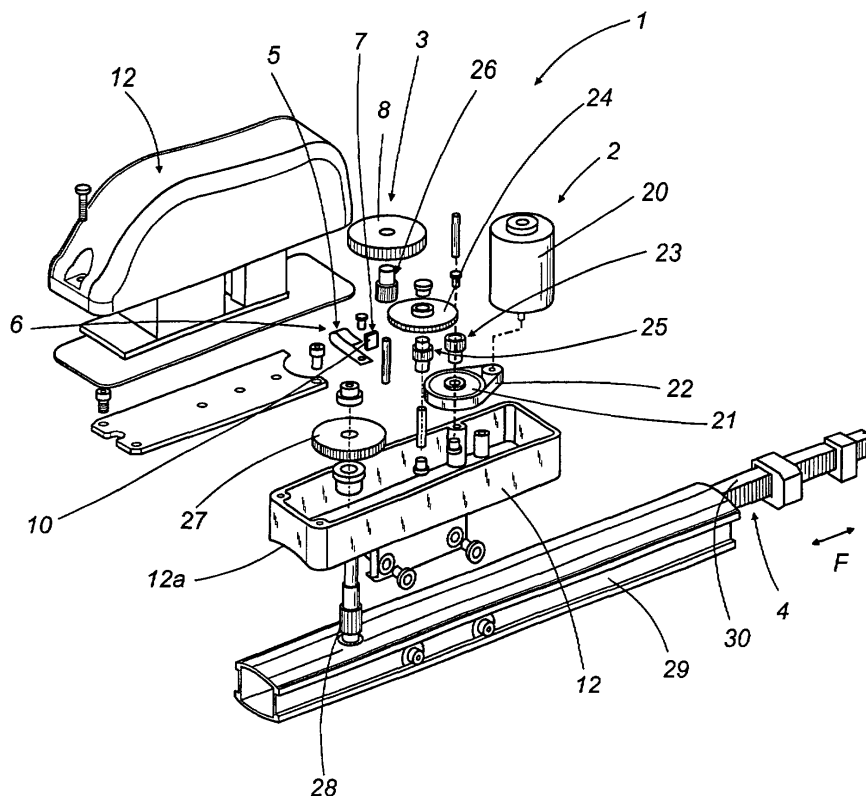
(71) Applicant: **GSG INTERNATIONAL S.p.A.**
40054 Budrio (Bologna) (IT)

(54) **An apparatus for the automated actuation of windows and doors**

(57) An apparatus for the automated actuation of windows and doors comprises a motorising unit (2) connected, through a kinematic motion transmission set (3), to means (4) for actuating a closure element and able to move said closure element between two extreme positions, respectively closed and open; the apparatus fur-

ther comprises means (5) for the irreversible locking of the actuation of the closure element in the open position, located in proximity to and acting on the kinematic motion transmission set (3), when a predetermined ambient temperature is exceeded in proximity to said closure element .

FIG.1



EP 1 205 622 A1

Description

[0001] The present invention relates to an apparatus for the automated actuation of windows and doors.

[0002] The field of application of the aforementioned apparatuses for automated actuation has been constantly expanding to different types of windows and doors, i.e. no longer just the classic gates but also doors, wing and/or top or bottom hinged windows, or windows and doors in general.

[0003] One of these apparatuses is provided with a gear motor having, at its output side, a driven shaft equipped with appropriated transmission organs able to interact, in the opening and closing operations, with a movable closure structure such as, for instance, a wing, a gate, a door, etc.

[0004] In the specific case of this discussion, the subject apparatus is constituted by a linear actuator and comprises an electric motor whose rotating shaft, thanks to a connection which can comprise, for instance, a series of cascaded gears to vary the transmission ratio, moves a driven shaft keyed onto a pinion which in turn meshes with a rack associated, at the free end, to the structure to be actuated.

[0005] This apparatus can be used, for instance, to actuate, in opening and closure, tilting wings for industrial sheds, greenhouses, etc., which can be positioned at a considerable height from the ground.

[0006] This use of the actuating apparatus, however, makes it necessary, in addition to the traditional controlled opening-closing actuation function, to provide also for a function of irreversibility in the actuation function in the open configuration - which shall be called emergency herein - of the window or door in case of particular conditions leading to an excessive temperature rise, such as a fire.

[0007] This irreversibility function is necessary to prevent the window(s) or door(s) from closing and, thus, to allow a safe aeration with the evacuation of the fumes outside the space.

[0008] The aim of the present invention therefore is to enhance traditional apparatuses for the automated actuation of windows and doors used in closed spaces with the function, also, of locking in the open position in the case, for instance, of a fire in the space; this through a structural variation of the apparatus that is extremely simple, economical, and with few variants in the constructive architecture of the traditional apparatus which, however, at the same time is always safe and reliable both under normal operating conditions and in emergencies.

[0009] The specified aim is substantially achieved by an apparatus for the automated actuation of windows and doors comprising motorising unit connected, through a kinematic motion transmission set, to means for actuating a closure element, which means move said closure element between two extreme positions, respectively open and closed; the apparatus further com-

prises means for the irreversible locking of the actuation of the closure element in the open position, located in proximity to and acting on the kinematic motion transmission set, when a predetermined ambient temperature is exceeded in proximity to the closure element.

[0010] The technical features of the invention, according to the aforesaid aims, can be clearly noted from the content of the claims set out below and its advantages shall become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which represent an embodiment provided purely by way of non limiting example, in which:

- Figure 1 shows an apparatus for the automated actuation of windows and doors, in accordance with the present invention, in a partial exploded perspective view with some parts removed, the better to highlight others;
- Figure 2 shows a part of the apparatus of Figure 1, in a front view with some parts removed the better to highlight others;
- Figure 3 shows a constructive detail of the apparatus of the previous figures in a perspective view.

[0011] In accordance with the figures of the accompanying drawings, and with particular reference to Figure 1, the subject apparatus is used for the automated actuation of windows and doors, such as doors, wing and/or swivelling windows etc.

[0012] As shown in Figure 1, the apparatus 1 comprises a motorising unit 2 connected, by means of a kinematic motion transmission set 3, to means 4 for the actuation of a closure element, not shown in the accompanying figures, as it is of a known kind (i.e. a wing of a window, a door, etc.), and is not strictly part of the invention.

[0013] These actuation means 4 move the closure element between two extreme positions, respectively for the closure and opening of the space or compartment whereto they are destined.

[0014] Delving deeper into the technical detail of the apparatus (see Figure 1, purely by way of non limiting example of the subject embodiment), the latter is of the so-called linear type, with the motorising unit 2 constituted by an electric gear motor 20 actuating a series of cascaded kinematic mechanisms, to vary the transmission ratio, comprised in the aforementioned kinematic set 3. Both the gear ratio 20, and the kinematic set 3 are housed and supported inside a box body or case 12.

[0015] The gear motor 20 actuates a pulley 21, by means of a related belt 22; the pulley 21 is, in turn, keyed onto a pinion 23 enmeshed with a first gear wheel 24 provided with a related first pinion 25 able to transmit the motion coming from the gear motor 20 to a second gear wheel 8, intermediate in the set of motion transmission kinematic mechanisms.

[0016] This second gear wheel 8 is provided with a related second pinion 26 enmeshed in a third gear wheel

27 fitted with a corresponding third pinion 28 housed inside a tubular element 29 for protecting the aforesaid actuation means 4.

[0017] The actuation means 4 comprise a track 30 connected, at its free end, with the aforesaid closure element; the rack 30 is enmeshed on the aforementioned third pinion 28, in such a way as to be able to move linearly in the two directions (see arrow F in Figure 1) and allow the opening and closing of the closure element through the motion transferred from the gear motor 20 to the third pinion 28 through the kinematic mechanisms described above.

[0018] In addition, the apparatus 1 summarily described above comprises means 5 for the irreversible locking of the actuation of the closure element in the aforementioned open position, which are situated in proximity to and act on the aforementioned motion transmission kinematic set 3, in correspondence with a temperature rise above a predetermined ambient temperature in proximity to the closure element.

[0019] The irreversible locking means 5 can comprise, in terms of generic solutions, at least an element 6 able to become deformed when a predetermined ambient temperature is exceeded.

[0020] Alternatively, the irreversible locking means 5 can comprise an elastic element 6 held, in a position not interfering with the kinematic set 3, by an element 7 able to be elastically deformed when a predetermined ambient temperature is exceeded, in such a way as to allow the aforementioned elastic element 6 to change its position at least until it interferes with the kinematic set 3 to obtain an interruption of the transmission of motion.

[0021] In the embodiment illustrated in Figures 1 through 3, the aforementioned irreversible locking means 5 are positioned and act on the aforementioned second gear wheel 8 to block the return motion to the closed position.

[0022] More specifically, the irreversible locking means 5 comprise a "U" shaped elastic element 6 rotated on a side, which is positioned (see also Figure 2) facing a surface 8a of the second gear wheel 8.

[0023] The second gear wheel 8 is provided, on the aforesaid surface 8a, with at least a groove 9 able to be oriented facing the elastic element 6 in correspondence with the attainment of the aforementioned open position.

[0024] The elastic element 6 is held, in a position removed from and not interfering with the second gear wheel 8, by a ring 10 able to be deformed, i.e. to expand when a predefined threshold of the temperature of the surrounding space is exceeded, thereby allowing an approaching motion (see arrow F1 in Figure 2) of a first wing 11 of the elastic element 6 towards the second gear wheel 8 until it engages the aforesaid groove 9 thereby obtaining an irreversible locking of the actuation of the apparatus 1.

[0025] Still observing Figure 2, the "U" shaped elastic element 6 is associated, with its second wing 13, to a base wall 12a of the aforementioned case 12 through

related fastening means 14, constituted by a screw, in such a way as to be positioned underneath the aforementioned second gear wheel 8 when the mounting of the apparatus 1 is complete.

[0026] The base wall 12a of the case 12 is also provided with a recess 15 for the positioning and stabilisation of a portion of the aforesaid deformable ring 10 that holds the "U" shaped elastic element 6: this allows for a stable and planar position of the second wing 13 of the "U" shaped elastic element 6 on the base 12a of the case 12.

[0027] Preferentially, the aforementioned second gear wheel 8 can be provided with multiple grooves 9, at equal angular distances from each other, on its own surface 8a facing the "U" shaped elastic element 6: this is to allow a possible locking in an even partially open position of the closure element. Obviously, none of these grooves 9 may be able to face the "U" shaped elastic element 6 in correspondence with the completely closed position of the closure element.

[0028] In regard to the ring 10, it is made of plastic material and it is preferably deformable when a temperature of about 100°C is reached. This deformability can lead, subsequently and under the thrust of the first wing 11 of the "U" shaped elastic element 6, to a complete rupture of the ring 10.

[0029] It is obvious that the deformability threshold to be reached can be varied, by diversifying the type of material whereof the ring 10 is made, according to the needs and the type of environment in which the closure element is mounted.

[0030] An apparatus thus structured functions in the following manner, for instance if mounted on a wing of a transom window in an industrial shed.

[0031] Subsequently to the movement of the apparatus to allow the opening of the wing, upon the occurrence of particular conditions in the shed, such as an excessive temperature rise, due to a fire, the ring 10, becoming deformed by effect of the high temperature, causes the first wing 11 of the elastic element 6 to lift until it breaks the ring 10 and engages one of the grooves 9 of the second gear wheel 8: in this way the possible activation of the motorisation 20 to return the wing to the closed position is contrasted by the block of the second gear wheel 8, keeping the wing open and allowing the evacuation of the fumes generated by the fire inside the shed.

[0032] The apparatus thus obtained therefore achieves the specified aims thanks to the use of a simple and economical locking assembly, which is extremely precise in the function to be performed avoiding the closure of the closure element under emergency conditions.

[0033] The elastic element and the ring are housed inside the case of the apparatus with no need to construct particular compartment inside the case itself, so there is no need to change the traditional constructive architecture of the apparatus.

[0034] The invention thus conceived can be subject to numerous modifications and variations, without thereby departing from the scope of the inventive concept. Moreover, all components can be replaced by technically equivalent elements.

Claims

1. An apparatus for the automated actuation of windows and doors; an apparatus (1) comprising a motorising unit (2) connected, through a kinematic motion transmission set (3) to means (4) for actuating a closure element and able to move said closure element between two extreme positions respectively closed and open, **characterised in that** it comprises means (5) for the irreversible locking of the actuation of said closure element in said open position, located in proximity to and acting on said kinematic motion transmission set (3), when a predetermined ambient temperature is exceeded in proximity to the closure element
 2. An apparatus as claimed in claim 1, **characterised in that** said irreversible locking means (5) comprise at least an element (6) able to be deformed when a predetermined ambient temperature is exceeded.
 3. An apparatus as claimed in claim 1, **characterised in that** said irreversible locking means (5) comprise an elastic element (6) held, in a position not interfering with said kinematic set (3), by an element (7) able to be elastically deformed when a predetermined ambient temperature is exceeded in such a way as to allow said elastic element (6) to change its position at least until it interferes with said kinematic set (3).
 4. An apparatus as claimed in claim 1, wherein said kinematic motion transmission set (3) comprises at least a gear wheel (8), **characterised in that** said irreversible locking means (5) are located and act on said at least one gear wheel (8) in such a way as to prevent the passage of said closure element from said open position to said closed position.
 5. An apparatus as claimed in claim 4, **characterised in that** said irreversible locking means (5) comprise a "U" shaped elastic element (6) positioned facing a surface (8a) of said at least one gear wheel (8) provided, on said surface (8a), with at least a groove (9) able to be oriented facing said elastic element (6) in correspondence with the reaching of said open position; said elastic element (6) being held, in a position removed from and not interfering with said at least one gear wheel (8), by a ring (10) able to expand when a predefined threshold of the temperature of the surrounding space is exceeded,
- thereby allowing an approaching motion of a first wing (11) of said elastic element (6) towards the second gear wheel (8) until it engages said at least one groove (9) thereby obtaining an irreversible locking of the actuation of said apparatus (1).
6. An apparatus as claimed in claims 4 and 5, wherein said apparatus (1) comprises a box body or case (12) for protecting and housing said motorising unit (2) and said motion transmission kinematic set (3), **characterised in that** said "U" shaped elastic element (6) is associated, with its second wing (13), to a base wall (12a) of said case (12) through related fastening means (14) in such a way as to be positioned underneath said at least one gear wheel (8).
 7. An apparatus as claimed in the claims from 4 to 6, **characterised in that** said base wall (12a) if provided with a recess (15) for the positioning and stabilisation of a portion of said deformable ring (10) for holding said "U" shaped elastic element (6).
 8. An apparatus as claimed in any of the claims from 4 to 7, **characterised in that** said at least one gear wheel (8) is provided with four grooves (9) at equal angular distances from each other on its own surface (8a) facing said locking means (5).
 9. An apparatus as claimed in any of the claims from 4 to 8, **characterised in that** said deformable ring (10) is made of plastic material.
 10. An apparatus as claimed in any of the claims from 4 to 8, **characterised in that** said ring (10) is made of plastic material able to become deformed when a temperature of 100°C is exceeded.

FIG. 1

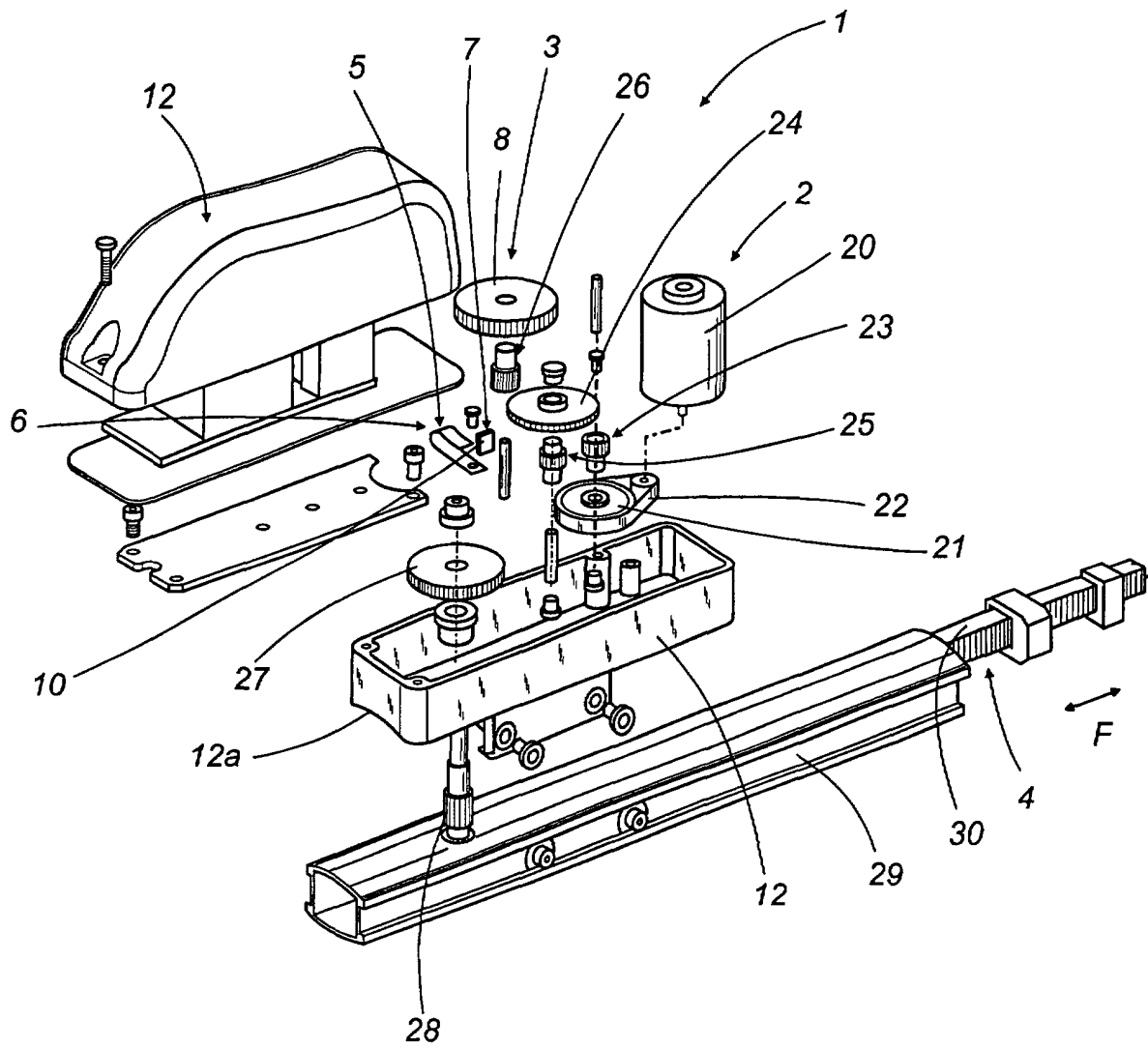


FIG.2

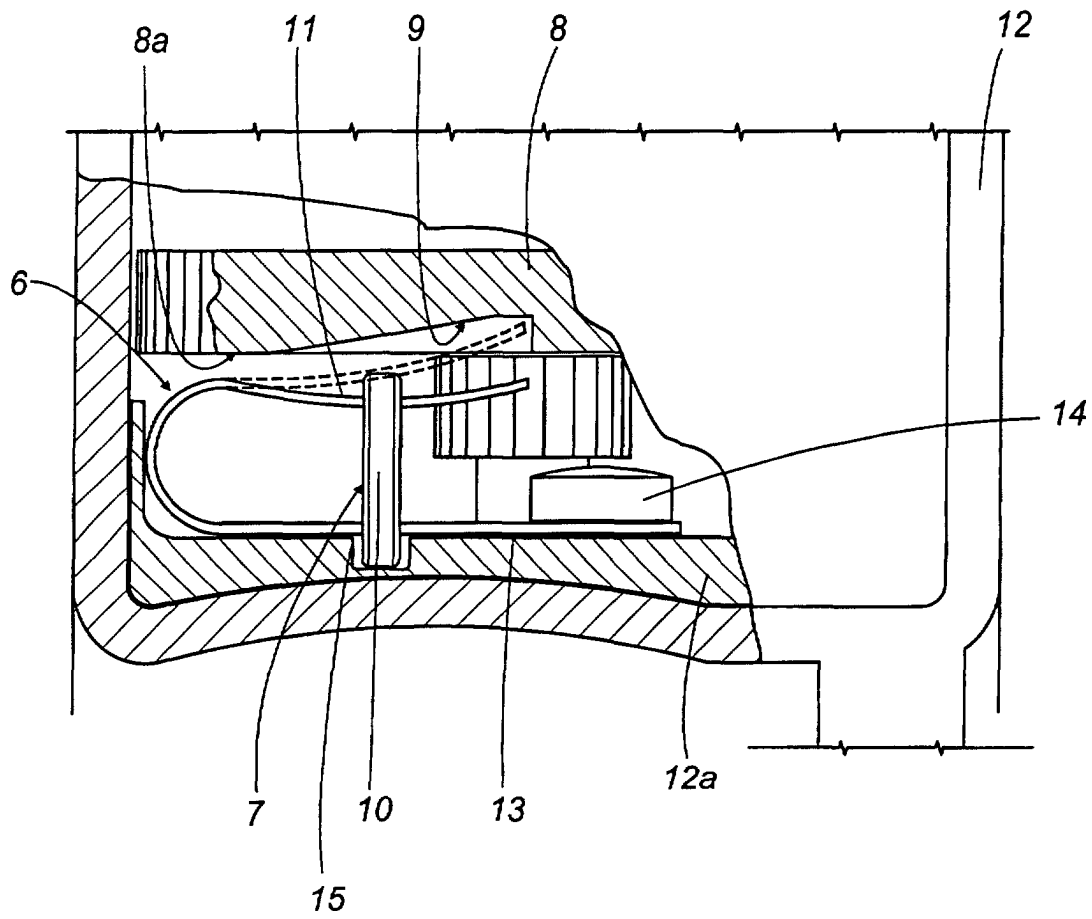
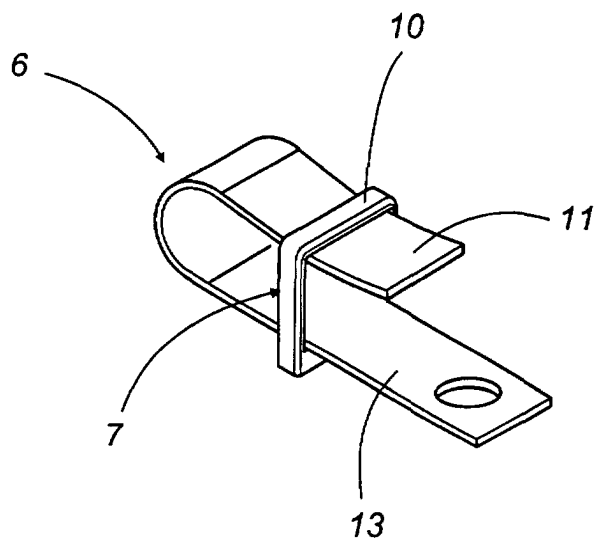


FIG.3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0736

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	DE 195 34 614 A (AUG. WINKHAUS) 20 March 1997 (1997-03-20)	1-4	E05F15/20
A	* column 3, line 4 - column 7, line 10; figures *	5,6,10	
X	DE 93 01 052 U (ELEKTRIK - ELEKTRONIK DINGFELDER + HADLER) 25 March 1993 (1993-03-25)	1-3	
A	* page 6 - page 8; figures *	5,6,10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05F E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 November 2001	Examiner Vijverman, W
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			

EP FORM 1503 03 82 (P4/C01)

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

EP 00 83 0736

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.

19-11-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19534614	A	20-03-1997	DE 19534614 A1	20-03-1997
DE 9301052	U	25-03-1993	DE 9301052 U1	25-03-1993

EPC FORM P0459

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