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Actuating device, particularly for the safety lever of a vehicle door lock.

An actuating device (1), particularly for the safety lever (2) of a vehicle door lock (3), comprising a control member (11) connected to the safety lever (2) of the lock (3); an electric motor (13) for activating the control member (11); a gear transmission mechanism (14) comprising an input member (15) connected angularly to the shaft of the motor (13),

and an output member (20); and a friction clutch device (30) interposed between the output member (20) of the gear mechanism (14) and the control member (11), and which provides for disengaging the control member (11) from the output member (20) upon the transmitted load exceeding a predetermined threshold value.

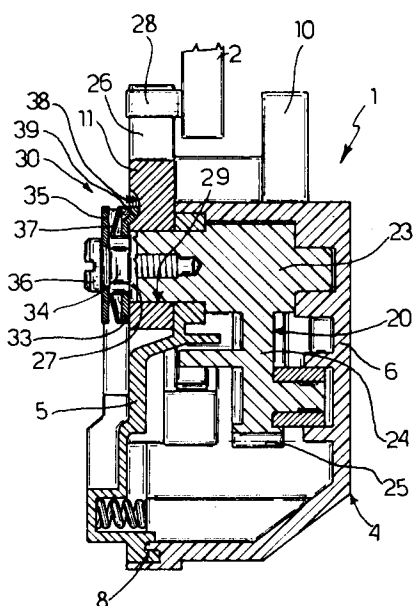


Fig. 2

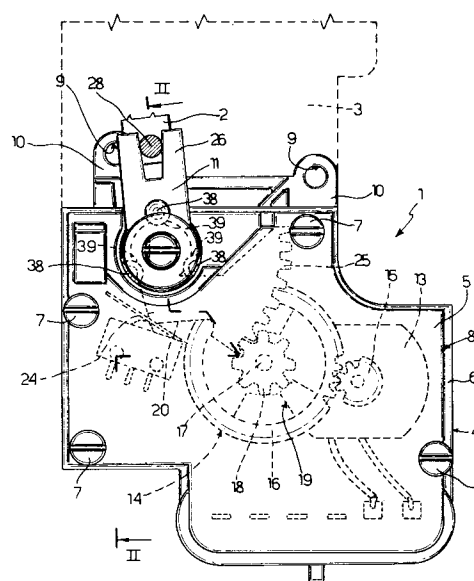


Fig. 1

The present invention relates to an actuating device, particularly for the safety lever of a vehicle door lock.

Actuating devices are known comprising a control member connected to the safety lever of the lock; an electric motor for activating the control member; and a gear transmission mechanism interposed between the electric motor and the control member.

The connection between the control member and transmission mechanism normally consists of a gear and, as such, is permanent, so that manual operation of the lock is necessarily transmitted from the safety lever to the control member and from this to the transmission mechanism and electric motor.

A common drawback of known actuating devices is the impossibility of manually operating the lock in the event of a breakdown involving seizure of any one of the transmission members (e.g. a gear) and, consequently, jamming of the transmission mechanism itself.

It is an object of the present invention to provide an actuating device, particularly for the safety lever of a vehicle door lock, designed to overcome the drawbacks typically associated with known devices of the aforementioned type.

According to the present invention, there is provided an actuating device, particularly for the safety lever of a vehicle door lock, comprising a control member connected to the safety lever of the lock; an electric motor for activating said control member; and a gear transmission mechanism in turn comprising an input member connected angularly to the shaft of said motor, and an output member; characterized by the fact that it comprises friction clutch means interposed between said output member of said gear mechanism and said control member; said friction clutch means being designed to disengage said control member from said output member of said gear mechanism upon the transmitted load exceeding a predetermined threshold value.

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Fig.1 shows a side view of a preferred embodiment of the actuating device according to the present invention;

Fig.2 shows a section along line II-II in Fig.1;

Fig.s 3 and 4 show alternative embodiments of a detail in Fig.2.

Number 1 in Fig.s 1 and 2 indicates an actuating device for the safety lever 2 of lock 3 of a vehicle door (not shown).

Device 1 is housed inside a casing 4 comprising two half shells 5 and 6 connected to each other

by means of a number of screws 7, and the peripheral mating portion of which forms a labyrinth seal 8. Casing 4 is fitted to lock 3 in a predetermined position, preferably by means of two screws (not shown) engaging respective holes 9 formed in two top assembly tabs 10.

As shown in Fig.s 1 and 2, device 1 comprises a control member 11 connected to safety lever 2; an electric motor 13 for activating member 11; and a gear transmission mechanism 14 interposed between electric motor 13 and control member 11.

Transmission mechanism 14, which is described only briefly, is of known type, as described in Italian Patent Application n. TO91A000580 filed on 23 July, 1991, and the content of which is included herein by way of reference as required.

As shown in Fig.1, transmission mechanism 14 comprises a pinion 15 fitted to the output shaft of electric motor 13; and an intermediate gear 16 meshing with pinion 15 and rotating about a pin 17. Gear 16 is connected to a coaxial pinion 18 by a known coupling 19 enabling a limited predetermined amount of rotation.

Pinion 18 drives an output member 20 of mechanism 14 (Fig.2) comprising, integrally, a pin 23 supported in angularly free manner on half shells 5 and 6 of casing 4; and a lever 24 having an end sector gear 25 meshing with pinion 18.

Control member 11 presents a fork-shaped end 26, and, at the opposite end, a through hole 29 engaged by a portion 27 of pin 23 projecting axially from half shell 4. The fork-shaped end 26 of control member 11 cooperates with a pin 28 integral with safety lever 2 of lock 3.

According to the present invention, control member 11 is normally maintained integral with pin 23 by a friction clutch device indicated as a whole by 30.

Device 30 substantially comprises a disk 33 mounted prismatically on a portion of portion 27 of pin 23 having two flat milled portions 34 (only one of which is shown in Fig.2); a washer 35 fitted to one end of pin 23 by means of a screw 36; and a Belleville washer 37 fitted to portion 27 of pin 23, and interposed axially between washer 35 and disk 33, so as to axially load and force disk 33 against control member 11.

Control member 11 presents a number of spherical impressions 38 formed about hole 29, on the face cooperating with disk 33, which in turn presents a corresponding number of spherical projections 39 designed to cooperate with impressions 38. The load of washer 37 is so selected that engagement of projections 39 and impressions 38 enables transmission of a predetermined maximum torque between output member 20 of transmission mechanism 14 and control member 11, which maximum torque must of course be greater than

that transmitted under normal, both manual and electric, operating conditions.

Device 1 operates as follows.

As we know, the safety lever may be operated either directly, i.e. manually, using the key or the knob on the inside of the door, or electrically by means of device 1.

Under normal manual or electric operating conditions, therefore, the load exerted by washer 37 maintains projections 39 on disk 33 inside respective impressions 38, so that control member 11 is angularly integral with pin 23 and, hence, with output member 20 of transmission mechanism 14 of which pin 23 forms part; and operation of electric motor 13 is transmitted to control member 11 and from there to safety lever 2 and vice versa.

In the event of a breakdown involving seizure of motor 13 or any part of transmission mechanism 14, electric operation is disabled, but not manual operation. Manual operation of safety lever 2 in fact rotates control member 11 in relation to pin 23, which is locked, so that the torque transmitted by friction clutch device 30 increases until it eventually exceeds the predetermined maximum value; and control member 11 rotates, in opposition to the load exerted by washer 37, so as to release projections 39 from respective impressions 38, and so disconnect device 1 and lock 3, which thus operates in the same way as a mechanical lock with no door lock device.

Figs 3 and 4 show alternative embodiments of friction clutch device 30, any parts of which similar or equivalent to those already described in connection with Figs 1 and 2 are indicated using the same reference numbers.

In the Fig.3 embodiment, device 30 has no disk 33, and washer 37 acts directly on control member 11 for maintaining it in contact with an axial shoulder 40 formed on pin 23. Projections 39 and corresponding impressions 38 are formed on control member 11 and shoulder 40 respectively.

In the Fig.4 embodiment, control member 11 is locked on to pin 23 by a fast-fit element 44 made of plastic material and comprising a head 45 cooperating axially with member 11, and a rod 46 housed in an axial hole 47 on pin 23 and having elastic end teeth 48 which snap on to an axial shoulder 49 formed in hole 47. As in the Fig.3 embodiment, projections 39 and corresponding impressions 38 are formed on control member 11 and shoulder 40 of pin 23 respectively. In this case, the elastic pressure forcing control member 11 against shoulder 40 is generated by the elasticity of rod 46, which is subjected to pull in the event of relative rotation between control member 11 and pin 23.

Devices 30 in Figs 3 and 4 operate in exactly the same way as that of Fig.1, and therefore re-

quire no further description.

The advantages of actuating device 1 in accordance with the teachings of the present invention will be clear from the foregoing description.

In particular, in the event of seizure of motor 13 or any part of transmission mechanism 14, manual operation of the safety lever on the lock is assured by virtue of the release function of clutch device 30.

To those skilled in the art it will be clear that changes may be made to actuating device 1 as described and illustrated herein without, however, departing from the scope of the present invention.

Claims

1. An actuating device (1), particularly for the safety lever (2) of a vehicle door lock (3), comprising a control member (11) connected to the safety lever (2) of the lock (3); an electric motor (13) for activating said control member (11); and a gear transmission mechanism (14) in turn comprising an input member (15) connected angularly to the shaft of said motor (13), and an output member (20); characterized by the fact that it comprises friction clutch means (30) interposed between said output member (20) of said gear mechanism (14) and said control member (11); said friction clutch means (30) being designed to disengage said control member (11) from said output member (20) of said gear mechanism (14) upon the transmitted load exceeding a predetermined threshold value.
2. A device as claimed in Claim 1, characterized by the fact that said output member (20) comprises a pin (23) to which said control member (11) is fitted with the possibility of relative rotation; said clutch means (30) being interposed between said control member (11) and said pin (23).
3. A device as claimed in Claim 1 or 2, characterized by the fact that said clutch means (30) comprise friction means (38, 39) formed on two surfaces respectively integral with said control member (11) and said pin (23); and elastic means (37) for maintaining said surfaces mutually contacting.
4. A device as claimed in Claim 3, characterized by the fact that said friction means comprise a number of front projections (39) formed on one of said surfaces; and a number of respective seats (38) formed on the other of said surfaces.

5. A device as claimed in Claim 3 or 4, characterized by the fact that one of said surfaces forms part of said control member (11); the other of said surfaces being formed on an element (33) connected prismatically to said pin (23). 5
6. A device as claimed in Claim 3 or 4, characterized by the fact that one of said surfaces forms part of said control member (11); the other of said surfaces being defined by an axial shoulder (40) of said pin (23). 10
7. A device as claimed in any one of the foregoing Claims from 3 to 6, characterized by the fact that said elastic means comprise a Belleville washer (37). 15
8. A device as claimed in one of the foregoing Claims from 3 to 6, characterized by the fact that said elastic means comprise a fast-fit snap-on element (44). 20
9. A device as claimed in any one of the foregoing Claims, characterized by the fact that said output member (20) comprises a sector gear (25) integral with said pin (23); said sector gear (25) being connected angularly to said input member (15) by means of a number of gears (16, 18). 25

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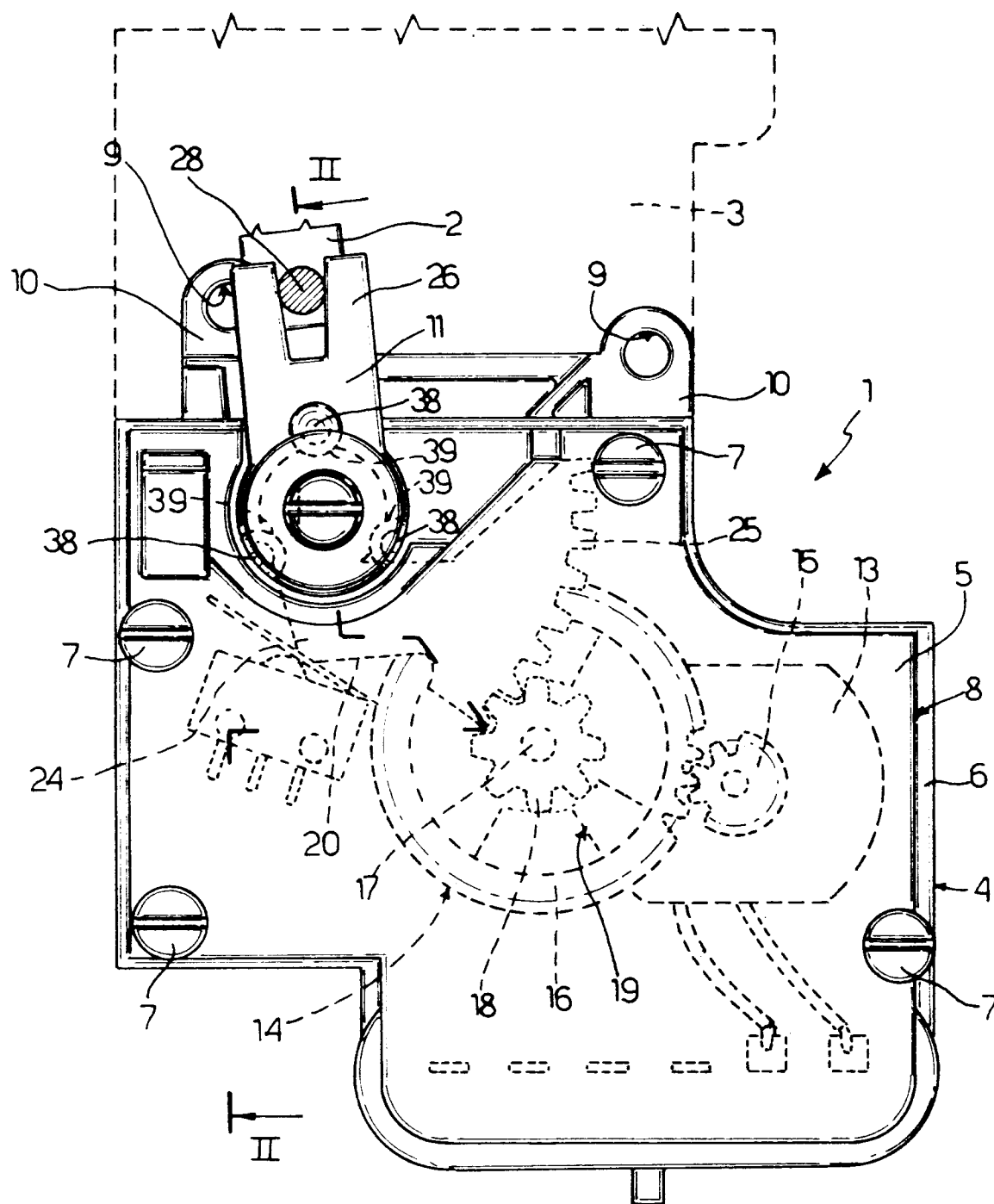
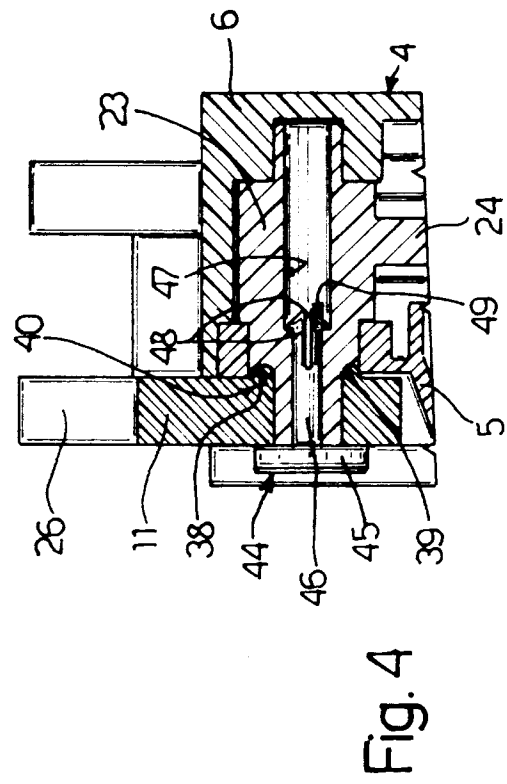
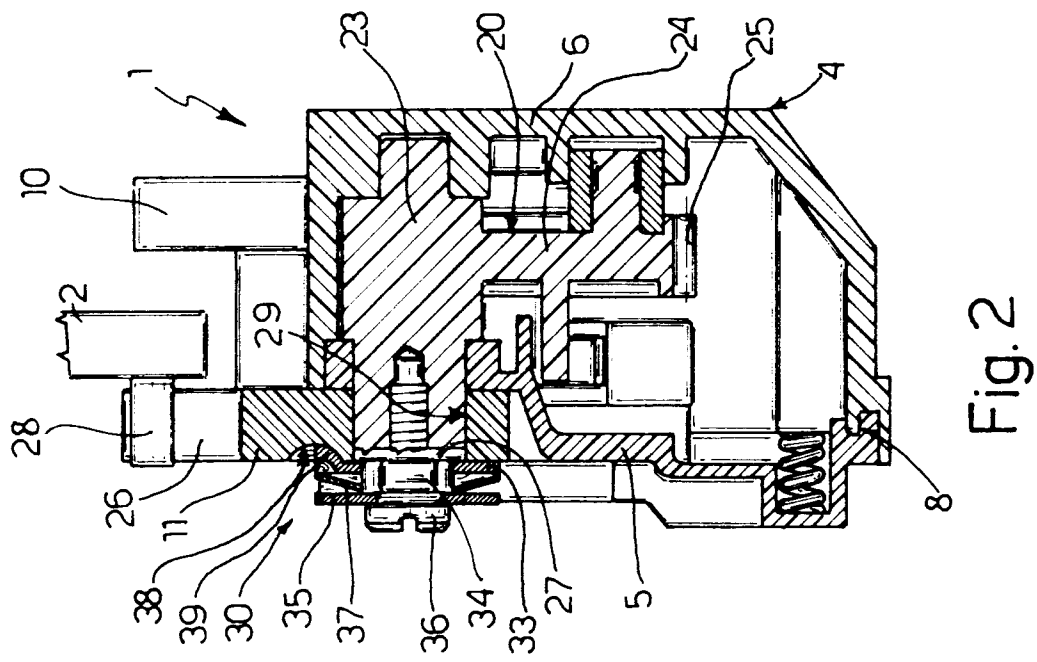
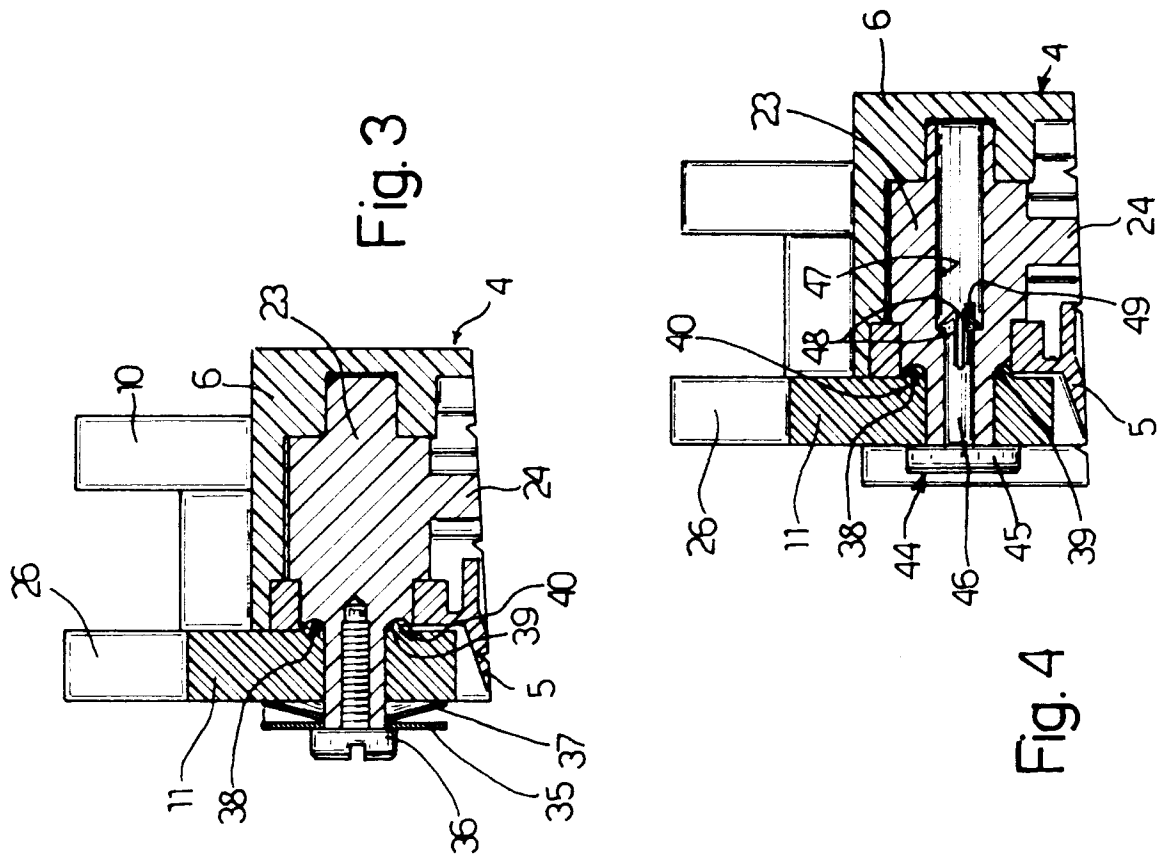


Fig.1





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 5209

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.5)
A	PATENT ABSTRACTS OF JAPAN vol. 013, no. 564 (E-860)19 September 1989 & JP-A-01 234 066 (ASMO) * abstract *	1-3, 7	E05B47/00
A	--- PATENT ABSTRACTS OF JAPAN vol. 015, no. 006 (M-1066)8 January 1991 & JP-A-02 256 776 (ANSEI KOJI) * abstract *	1, 9	
A	--- EP-A-0 320 008 (AUG. WINKHAUS) * page 5, column 7, line 14 - line 31; figure 8 *	1, 2	
A	--- EP-A-0 482 588 (AUG. WINKHAUS) * page 5, column 8, line 34 - page 6, column 9, line 16; figures 6-9 *	1	
A, D, P	--- EP-A-0 524 574 (ROLTRA-MORSE) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 January 1994	Examiner Teerling, J
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 I : document cited for other reasons & : member of the same patent family, corresponding document			