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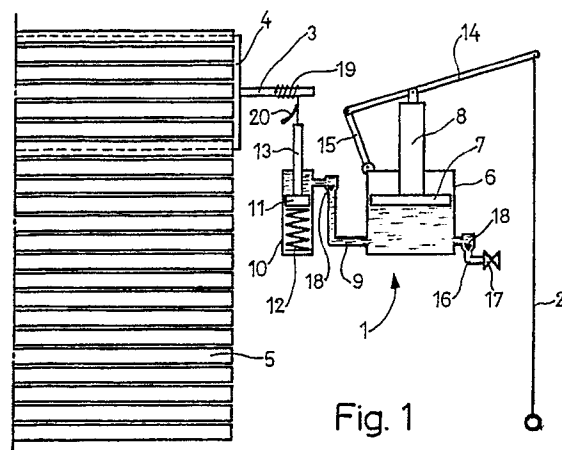
(71) Applicant: **Bayon Palomino, Juan José**
Purísima 3
E-08389 Palafolls Barcelona(ES)

(72) Inventor: **Bayon Palomino, Juan José**
Purísima 3
E-08389 Palafolls Barcelona(ES)

(74) Representative: **Pastells Teixido, Manuel**
c/o PASTELLS TEIXIDO, S.L. Pau Claris 138,
5-1a
E-08009 Barcelona(ES)

(54) **Transmission system for rotating shafts for winding up blinds, doors and the like.**

(57) A transmission system for rotating shafts, of the type formed by mechanisms transmitting rotary movements to the shaft of a cylinder for winding up or folding blinds, doors and the like, characterised in that, unlike the existing systems which transmit said movement by pulling belts which wind up automatically on appropriate pulleys or with devices driven by electric motors, this system operates through a transmission means which converts the linear movement of a piston (11) into a rotary movement of the shaft (3), said piston forming part of a hand operated hydraulic or pneumatic circuit (1) by way of a pertinent means whereby a press (6) of the circuit is actuated and which transmits the pressure thereof multiplied to said piston. Such transmission means may be indirect, for example by a cable (19) or direct, such as by way of a worm (13') or rack (13''), the circuit also being automatically controlled by the incorporation of solenoid valves.



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TRANSMISSION SYSTEM FOR ROTATING SHAFTS FOR WINDING UP BLINDS, DOORS AND THE LIKE

The invention relates to a transmission system for rotating shafts.

These systems are used generally for the vertical opening and closing of blinds, doors and the like by rolling up or folding.

To this end, the rotating shaft is either provided with a drum on which the blinds are wound or serves as a drive roller for a transmission for the folding of a door divided into articulated portions.

These shafts are presently caused to rotate with electric motor driven devices which consume a lot of power and are expensive to maintain or also, in the case of blinds, by pulling on a cord or tape which is wound around an appropriate spool or pulley as the tape is pulled to raise the blind. Such system is obviously much cheaper but rather unpractical, fails easily and is troublesome to repair.

All these drawbacks and others which may be derived therefrom are overcome with the system of the present invention. One of the most important features thereof is that the movement is transmitted to the rotating shaft by a hand operated hydraulic or pneumatic circuit.

This circuit comprises a press. When the press is operated, its force is multiplied and transmitted to a piston which moves the rod thereof linearly. This linear movement is converted by appropriate transmission means into a rotating movement of the shaft.

Said transmission means are formed by a cable which is attached to and wound round the shaft at one end and attached to the piston rod at the other end. When the rod is moved, it pulls the cable, unwinding it, thereby rotating the shaft.

A chain may also be used instead of the cable. The chain wraps round half a circular toothed means of the shaft and is attached at one end to the piston rod and will cause the shaft to rotate when the rod pulls on the chain.

Another form of transmission with the same members, except the windup cable, is obtained by cutting a helical screw thread on both the rotating shaft and the piston rod, one being engaged lengthwise with the other. When the piston rod is moved linearly, the direct engagement of the thread thereof with that of the shaft causes the latter to rotate.

Likewise, tothing may be cut on the piston rod and the latter may be engaged directly but perpendicularly with a peripheral tothing cut on the rotating shaft, whereby this embodiment is a positional variation of the previous embodiment.

It will be gathered from the foregoing how practical this system is, since it does not consume

electric power and even a child may operate it easily, owing to the multiplying force of the hydraulic press.

The system may also be operated by an automatic control by connecting the circuit to a pump or a compressor, mainly in the case of buildings where a large number of blinds may be installed. In such cases a single general compressor to which all the circuits of the installed systems will be connected is sufficient, each circuit being provided with respective directly or remotely controlled solenoid valves.

Advantageously, the system may be simplified if the piston cylinder is connected directly to a fluid conduit of convenient pressure to move said piston, the press being eliminated.

These and other features will be appreciated from the following detailed description which, to facilitate the understanding thereof, is accompanied by a drawing sheet wherein one embodiment which is given as a non-limiting example of the scope of the present invention is illustrated.

In the drawings:

Figure 1 is a schematic front elevation view of the system as applied to a blind,

Figure 2 is also a schematic front elevation view of the system with direct coaxial transmission of movement of the piston rod to the shaft,

Figure 3 is a schematic side elevation view of another embodiment with direct movement transmission turned in 90° ,

Figure 4 is a schematic side elevation view of the system with chain transmission, and

Figure 5 is also a schematic view of the piston cylinder connected directly to the water mains.

According to such figures, the illustrated transmission system comprises a hydraulic or pneumatic circuit 1 which, actuated by a hand operated control (an operating rod 2), indirectly (see Figures 1 and 4) or directly (see Figures 2 and 3) causes a shaft 3 to rotate, said shaft carrying a drum 4 on which a blind 5 is wound up in the illustrated embodiment.

The circuit 1 comprises a press formed by a cylinder 6 in which a press platen 7, when the rod 8 thereof is pushed, forces the fluid contained in said cylinder through a conduit 9 to the top portion of a cylinder 10, which is also full of fluid. The cylinder 10 is provided with a piston 11 which is urged from underneath by a spring 12 located in the lower portion of the cylinder 10. Under the pressure created by the platen, the piston 11 overcomes the opposition of the spring and moves downward, compressing the spring 12 and impressing a downward linear movement on the rod

13 thereof.

The press platen 7 is actuated through a manual action on the operating rod 2 which, by being pivotably connected to a lever 14 which in turn is pivotably connected at the other end thereof to a support (not shown) and at the mid portion thereof to the rod 8 of the said press platen 7, causes the latter to descend.

Instead of being pivotably connected to a support, the lever 14 may also be pivotably connected to an arm 15 (Figures 1 and 2), which is pivotably connected in turn to the upper edge of the cylinder 6.

The circuit 1 is also provided with a fluid inlet conduit 16 having a stop cock 17 at the lower portion of the cylinder 6, both this conduit and the conduit 9 comprising respective valves 18. When the press is operated these valves 18 prevent both a sharp fluid pressure against the stop cock 17 and the equally sharp return of the fluid from the cylinder 10 to cylinder 6 when the press action ceases. Thus the blind is held partly or wholly lifted by appropriate mechanical or manual fixing means (not shown), such as an attachment on the wall or window frame where the operating rod 2 may be held.

The transmission of the linear movement of the rod 13 to the shaft 3 and the conversion thereof into a rotary movement is effected by a cable 19 attached at one end thereof to said rod and at the other end to the shaft 3. Said cable 19 is wound around the shaft 3 in the unfolded position of the blind 5, and the latter winds around the drum 4 when the cable 19 is unwound as by being pulled by the rod 13 when the circuit 1 is actuated. The cable 19 is prevented from mounting on itself on the shaft 3 by a pusher means formed, for example, by a resilient strip 20 or like member which engages the cable in the portion extending from its point of departure from the shaft 3 to its attachment to the rod 13.

This transmission of movement from the rod 13 to the shaft 3 may also be effected by means of a chain 21 (Figure 4) which half wraps a circular toothed portion (or sprocket) 22 of the shaft 3, one of the ends of said chain being attached to the rod 13 and the other end to a spring 23 which, attached in turn to the cylinder 10, allows the chain 21 to be moved and, at the same time, keeps it in engagement with the sprocket 22, without any possibility of disengagement therefrom.

If necessary, the attachment of the chain 21 by means of the spring 23 could be replaced or complemented by means for guiding said chain, either by a tube 24 in which the part attached to the spring 23 would be attached, or by a cowling 25 arranged over the portion engaging the sprocket 22.

Obviously the transmission may also be formed by a belt or any other pertinent member logically having the appropriate strength and coupling means to the shaft 3 to cause it to rotate.

The said transmission means may also be dispensed with by providing a helical thread 13' on the shaft 13 (Figure 2) and engaging it directly linearly with the shaft 3 which, likewise, will be provided with a helical thread 3', forming a worm transmission.

A helically threaded longitudinal orifice may also be provided in the interior of the shaft which would act as a nut for the piston shaft.

A further embodiment of this direct action is the perpendicular arrangement of both members (Figure 3) acting as a rack and pinion system, with a toothed portion 13'' on the rod 13 meshing with a circular toothed portion 3'' of the shaft 3, causing the latter to rotate when the former moves linearly, and causing the drum 4 also to rotate, which drum in view of the larger diameter thereof relative to the shaft 3 will require the rod 13 to move over a short distance to wind up the whole blind. Logically, the circular toothed portion of the shaft 3 may be replaced by the arrangement thereon of a pinion or gear wheel.

When a large number of systems is installed in large buildings, the circuits of all of them may be connected by the conduit 16 thereof with stop cock 17 to a general compressor (not shown), with the valves 18 being replaced by other hand operated double acting valves or by direct control solenoid valves (e.g. by pushbutton or key) or remote control valves.

In this latter case, a limit device 26 may also be installed on the blind (Figure 3) which, on rising, actuates a microswitch 27. This, in turn, will start a preset timer (not shown), which will act on the appropriate solenoid valves to lower the blind after a preset time.

The circuit 1 forms a block which may be enclosed in a box which may be located in the compartment where the drum 4 will be mounted, arranging it alongside or inside the compartment, since its size so allows, it being different from the illustrated ones, which have been shown schematically so that they may be more comprehensible, and with a bevel gear being provided when the perpendicular transmissions have to be made longitudinally inside the drum 4.

Advantageously, the circuit may be significantly simplified if a pipeline containing a fluid of adequate pressure to activate the piston 11 is available. Such fluid may be, for instance, mains water and the conduit 16 will be connected to the mains. The conduit will be directly connected, in turn, by two branches 16' and 16'', to the upper and lower portions of the cylinder 10 to be able to move the

piston 11 in one way or the other, there being provided at the joint between said branches and the conduit 16 a valve 28 with which the mains water may be directed to one or the other branch, the cylinder 10 being provided with discharges (not shown) for the excess water on each operation of piston 11.

The object of the invention may be embodied, within the essence thereof, in other ways differing only in detail from the embodiment illustrated only as an example, and which will also fall under the protection requested. Thus, the transmission system for rotating shafts for winding up blinds, doors and the like may be embodied with the most appropriate means, components and accessories and the components may be replaced with other technically equivalent ones, since all is comprised within the scope of the following claims.

Claims

1.- A transmission system for rotating shafts, for winding up blinds, doors and the like, of the type formed by mechanisms transmitting rotary movements to the shaft of a cylinder on which the blind is wound up or folded, characterised essentially in that the system comprises a manually or automatically controlled hydraulic or pneumatic circuit (1) which converts the linear movement of a rod (13) of a piston (11) into a rotary movement for the shaft (3), acting by manual control on a press (6) the force of which is multiplied and transmitted to said piston (11).

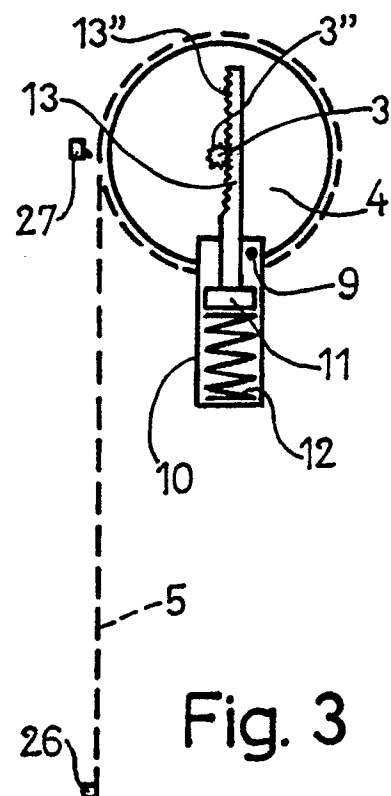
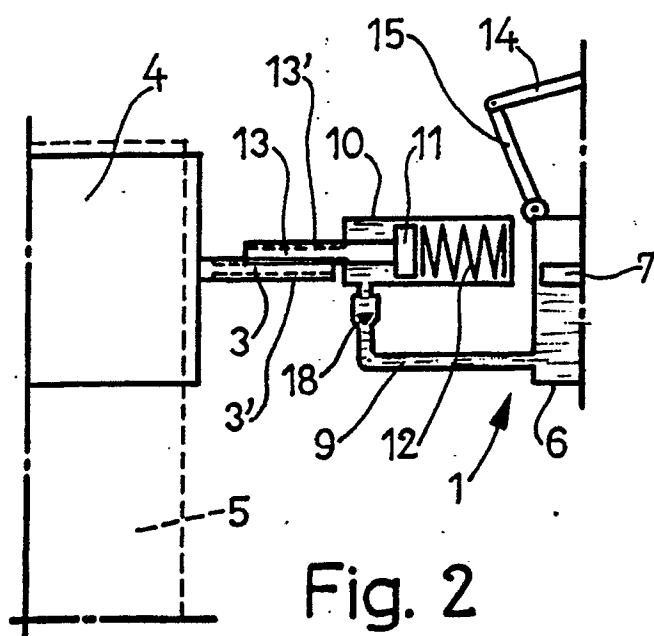
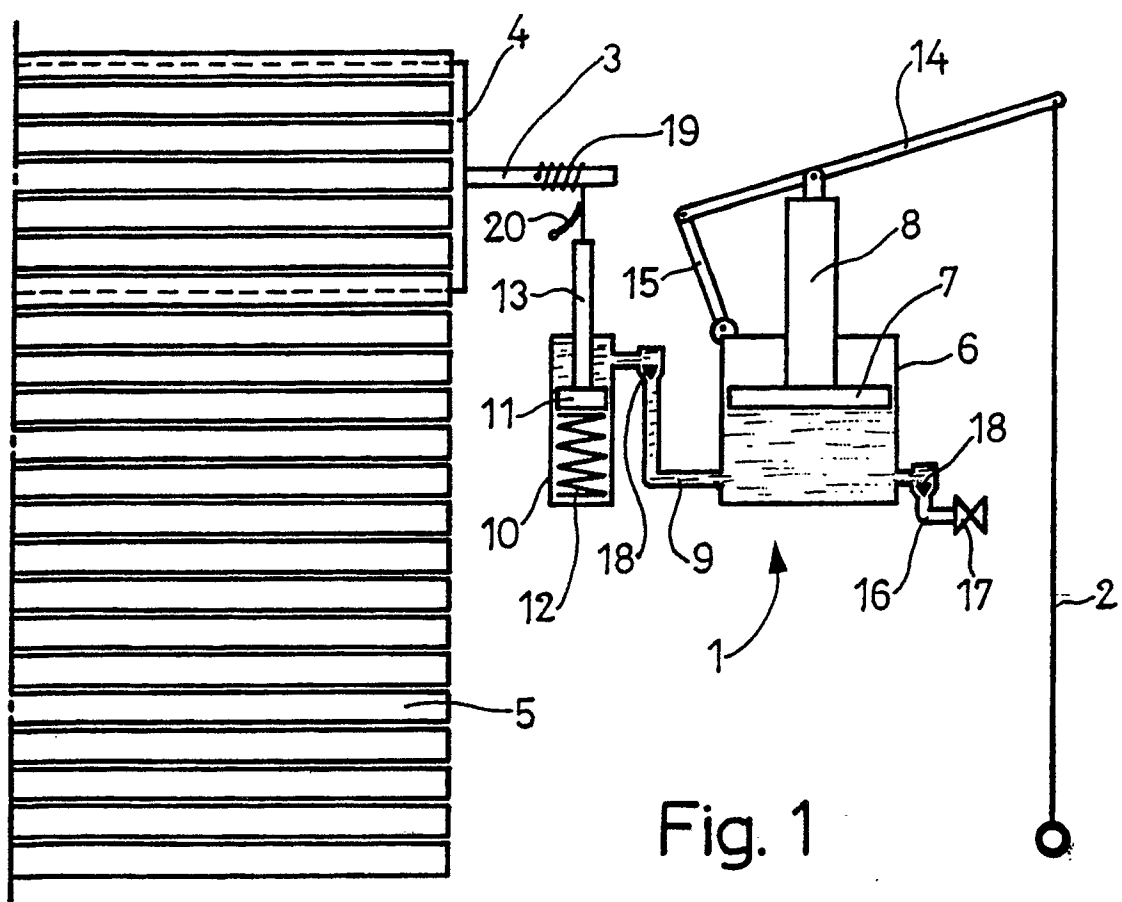
2.- A transmission system for rotating shafts, according to claim 1, characterised in that the means for transmitting the movement of the piston (11) to the shaft (3) of the cylinder (4) comprise a cable (19) attached at one end thereof to said shaft and capable of being wound thereon, said cable being pulled by the piston (11), to the rod (13) whereof there is attached the other end of the cable (19), or a chain (21), at least, half wrapping a circular toothed portion (22) of said shaft (3) and which is pulled by the piston (11), to the rod (13) whereof there is attached one end of the chain (21), which is resiliently urged at the other end and/or suitably guided by pertinent means preventing it from becoming disengaged from said toothed portion.

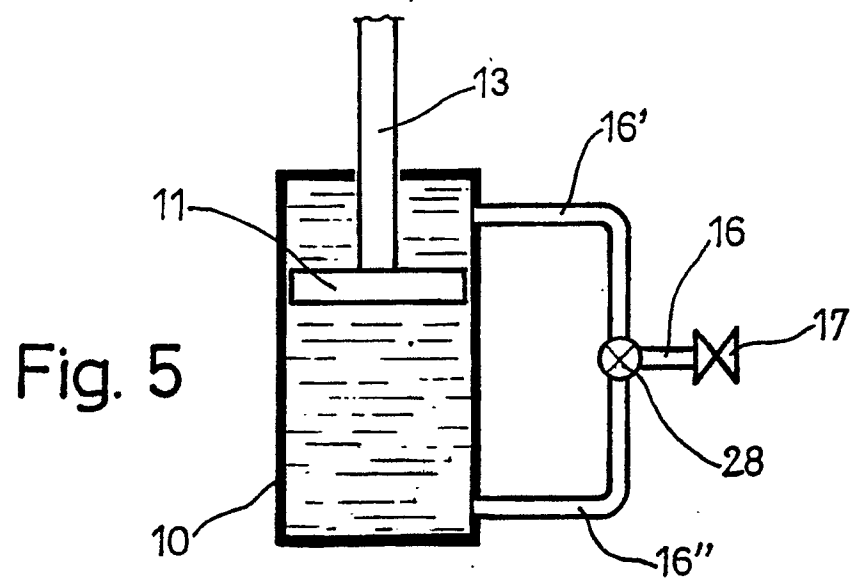
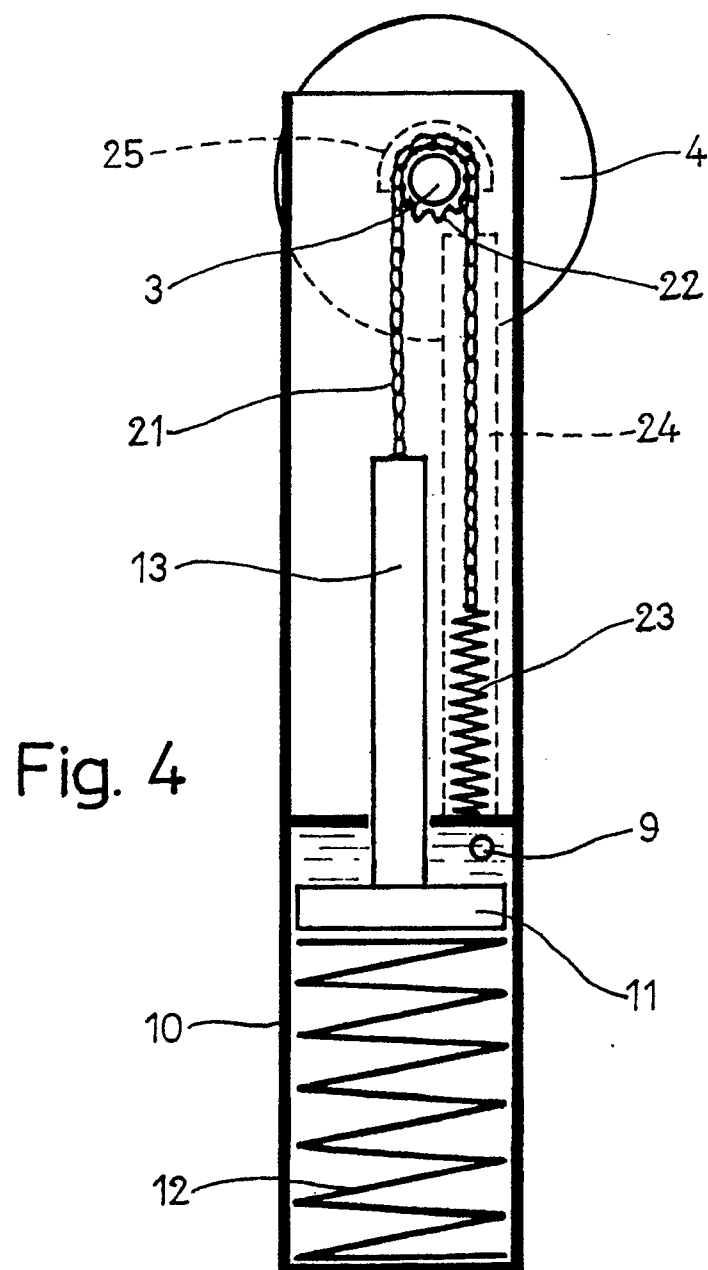
3.- A transmission system for rotating shafts, according to claim 1, characterised in that the means transmitting the movement of the piston (11) to the shaft (3) of the cylinder (4) are formed by a respective helical thread (3', 13'') or toothed portion (3'', 13'') of the shaft (3) and of the rod (13) of the piston (11) and which allow the direct transmission of movement, one or other of the variants being adopted according to whether the arrangement of

both members is longitudinal or perpendicular, the hand operated bar (2) of the press (6) being pivotably connected to a lever (14) which is pivotably connected to a support and pivotably connected intermediate the ends thereof to the rod (8) of the press platen (7).

4.- A transmission system for rotating shafts, according to claim 1, characterised in that the system is automatically controlled by direct or remote control on the double acting solenoid valves comprised in the circuit and which allow the action of a general pump or compressor to which it may be connected with the circuits of other shafts, the system also possibly comprising an adjustable timer to act on said solenoid valves and lower the folding blind (5) or door, once said timer has been actuated by a microswitch (27) against which there operates a limit device (26) mounted thereon when the blind (5) or the door rises.

5.- A transmission system for rotating shafts, according to claim 1, characterised in that, in a simplified embodiment, the cylinder (10) in which the piston (11) moves is connected directly to a conduit containing a fluid at a convenient pressure to activate said piston.







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EUROPEAN SEARCH REPORT

Application Number

EP 89 50 0089

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)
X	FR-A-1 006 934 (MALLARET) * Page 1, column 2, paragraph 1; figures *	1-3,5	E 06 B 9/68
Y	---	4	
X	US-A-1 837 129 (MAPLES) * Page 1, lines 1-23; page 1, line 84 - page 2, line 11; figures *	1-5	
Y	---		
Y	US-A-1 781 646 (KREGER) * The whole document *	4	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E 06 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-05-1990	Examiner KUKIDIS S.
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			