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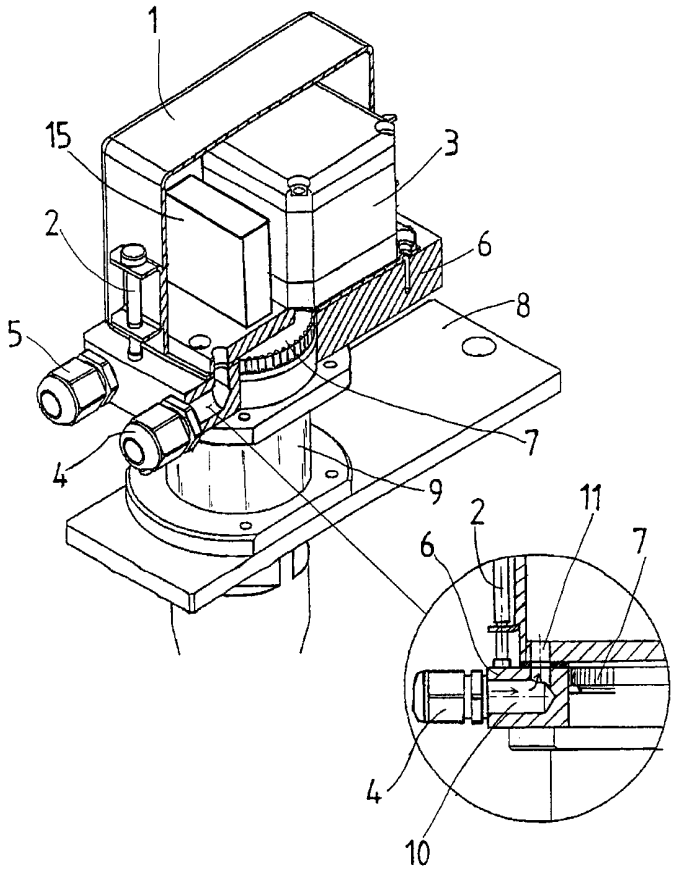
(54) Title: ARRANGEMENT IN CONNECTION WITH AN ACTIVATOR



(57) Abstract: An arrangement in connection with an electromechanical actuator, which actuator includes electrical components in a housing (1), such as a power unit (3) and control electronics (15), further a transmission mechanism (7), (14) of motion from said power unit to the movable member (13) of the actuator, and in which arrangement a major part of the actuator is placed in a space with a temperature over 120 C. For the actuator a cooling flow is arranged that is conducted at least to the housing (1) and out from it, and that the arrangement includes regulating devices for control of pressure formed in the housing or of temperature.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

ARRANGEMENT IN CONNECTION WITH AN ACTIVATOR

The invention relates to an arrangement in connection with an electromechanical actuator, which actuator includes electrical components in a housing, such as a power unit and control electronics, further the transmission mechanism of motion from said power unit to the movable member of the actuator, and in which arrangement a major part of the actuator is placed in a space with a temperature over 120 C.

Previously known, among others from the Finnish application publication No. 954712, are air blowing arrangements for electric housings in dirty environment, where compressed air flow of low pressure level from a compressed air driven device is conducted into a housing of electric equipment, which is in connection with the device. It is not intention to use the air flow for cooling but the aim is to keep with it clean air in the housing all the time and, possibly, also overpressure, so that air from dirty environment would have no access into the housing.

The actuator as per publication FI 954712, is placed with regard to its temperature to quite a normal environment, whereat no cooling is needed. Neither does the actuator produce any heat. The arrangement is suited only for an actuator using compressed air.

The arrangement as per this invention solves problems arising when actuators are mounted into hot locations. The invention is characterized in what is presented in the characterizing parts of the patent claims.

By means of this invention cooling problems in connection with actuators used in a hot location are solved. For instance, the construction of the steam distributing valve can be made short, though a major part of the valve is in a hot steam space and conducts heat out of there to the electric components and bearing members of the valve. By means of the housing the cooling flow can be controllably conducted to the most important, cooling requiring components, e.g. the electric power unit, the motor for instance. When the pressure of flow to be conveyed to the housing is regulated and, likewise, the quantity of flow at least by one regulating element that is placed either in the inlet or outlet, the produced cooling

effect remains uniform enough.

In the following the invention is disclosed with reference to the enclosed drawing, where

Fig. 1 shows the actuator end with housing and a part of the components in profile.
Fig. 2 shows the embodiment of figure 1 viewed from another direction and in profile.
Fig. 3 shows a steam valve actuator without housing in profile.

In figure 1 there is mounted by means of flange 8 on the steam distribution tube surface a steam valve actuator comprised of body parts 9 and 6. On the surface of body part 6 housing 1 is fastened by means of fixing component 2. In the housing there is an electric motor 3 rotating by means of gearing 7 the axle leading to the valve spindle. In addition to motor 3 there can also be regulating electronics in the housing to control the valve and an electronic or mechanical thermostat element to adjust the air flow or the pressure. It is also possible to place into the housing a temperature sensor to measure the temperature or, for instance, a bimetal element for direct adjustment of the flow of cooling air. From the enlarged figure the conduction of the cooling flow through inlet 4 along channels 10 and 11 to the housing can be seen. The flow is let out, for instance, through inlet 5 from the housing.

Figure 2 shows the figure 1 embodiment seen from another direction. There is between housing 1 bottom and body part 6 a packing, advantageously of heat insulating material, as cork.

Figure 3 shows, also included in the housing, a steam valve member, an axle 14 and a valve spindle 13, which is a regu lating and closing member, the motion of which is upward. About the valve spindle there is a cylinder body, partly open, placed in the steam distributing tube and through the openings of which steam can enter the cylinder and the closing member regulate the outlet of steam through the hole in the cylinder bottom.

The quantity of flow is determined and the pressure regulated by means of at least one regulating element in connection with the inlet 4 or outlet 5. Regulation is carried out by means of the temperature sensor or the thermostat element in the housing. Most suitably the

pressure of the cooling flow is regulated a little higher than the steam pressure in the valve, so that no steam would leak alongside the valve spindle and axle towards the housing. For instance, if the steam pressure is 1 bar, a pressure of 1,5 bar, for instance, is chosen for the cooling flow. As flow medium water or inert shielding gases are used. For instance, in connection with assemblies 4 and 5 the housing can have a pressure relief valve, a shut-off valve, a safety valve and a valve regulating the quantity of flow. By means of the actuator gas or liquid flows, for instance, are regulated.

PATENT CLAIMS

1. An arrangement in connection with an electromechanical actuator, which actuator includes electrical components in a housing (1), such as a power unit (3) and control electronics (15), further a transmission mechanism (7),(14) of motion from said power unit to the movable member (13) of the actuator, and in which arrangement a major part of the actuator is placed in a space with a temperature over 120 C, c h a r a c t e r i z e d in that for the actuator a cooling flow is arranged that is conducted at least to housing (1) and out from it, and that the arrangement includes regulating devices for control of pressure formed in the housing or of temperature.

2. An arrangement according to patent claim 1 c h a r a c t e r i z e d in that the cooling medium is compressed air and in order to regulate pressure there is a regulating element either in connection with inlet (4) or outlet (5) or both of them.

3. An arrangement according to patent claim 1 and 2 c h a r a c t e r i z e d in that as pressure, active inside the housing, a higher pressure has been chosen than that of the gas or liquid flow regulated by means of the actuator.

4. An arrangement according to patent claim 1 c h a r a c t e r i z e d in that the quantity of cooling flow steered into the actuator housing is regulated by means of information received from the temperature sensor.

5. An arrangement according to patent claim 1 c h a r a c t e r i z e d in that the quantity of cooling flow steered into the actuator housing is regulated by means of the thermostat element, e.g. a bimetal element.

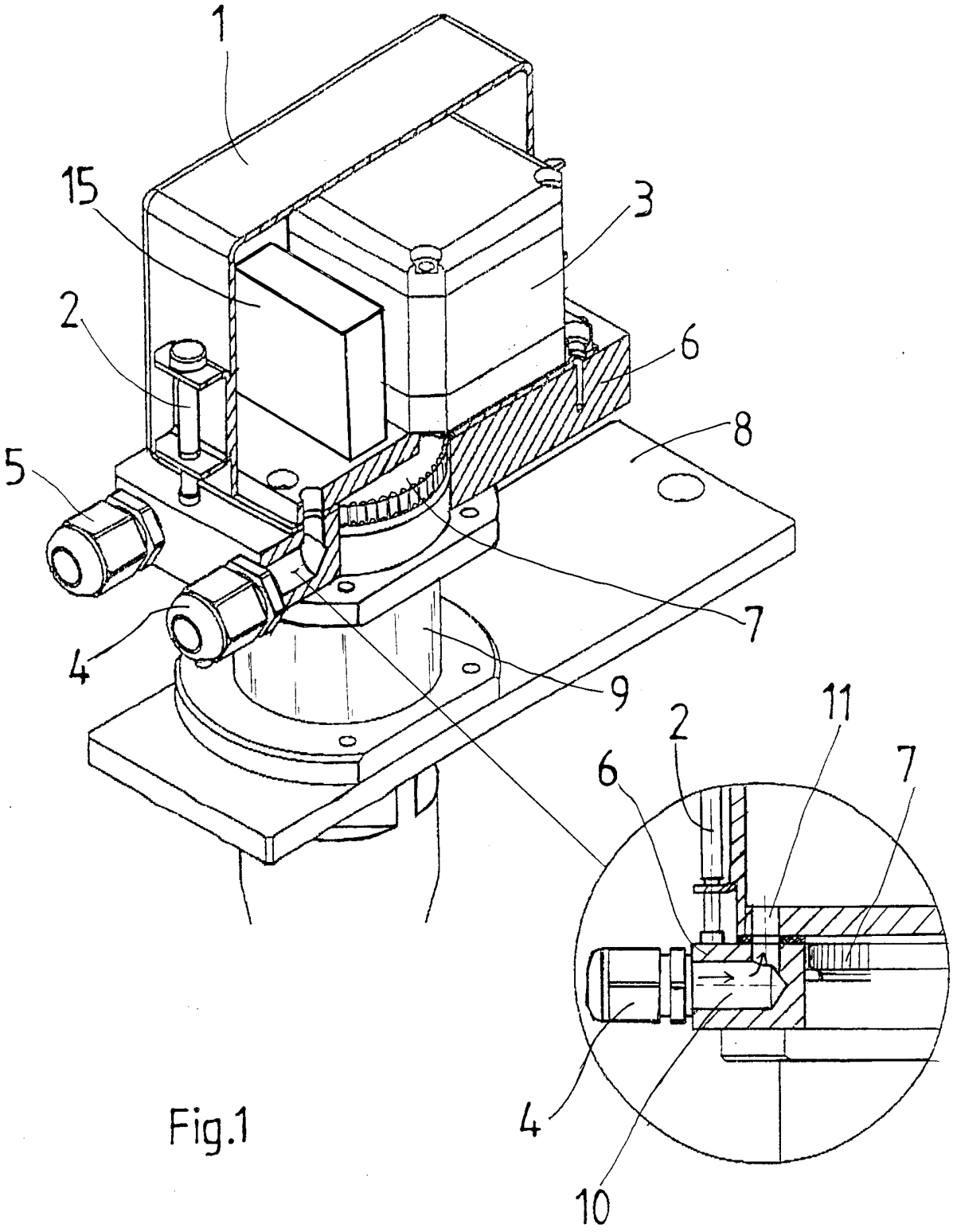

Fig.1

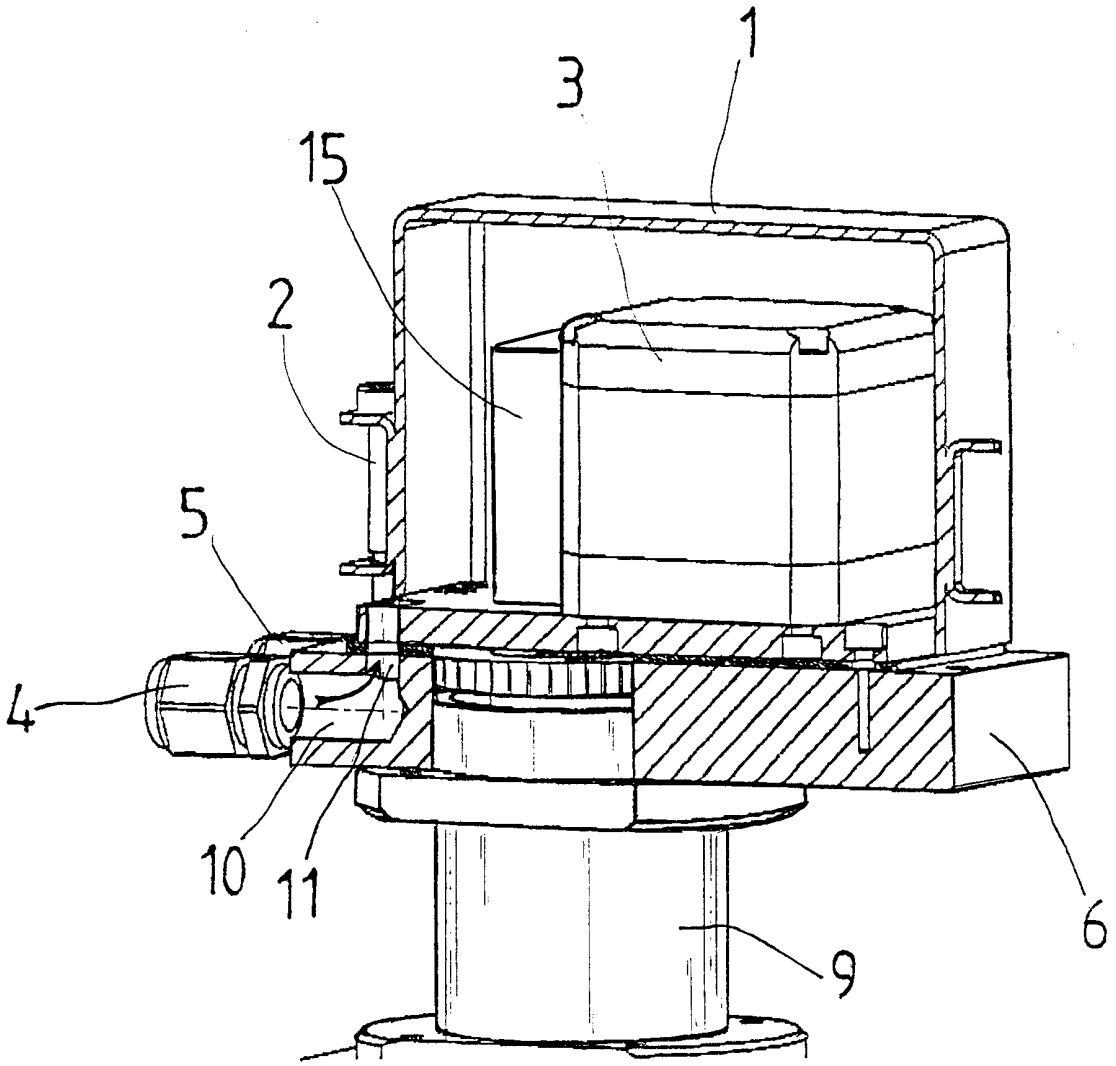

Fig. 2

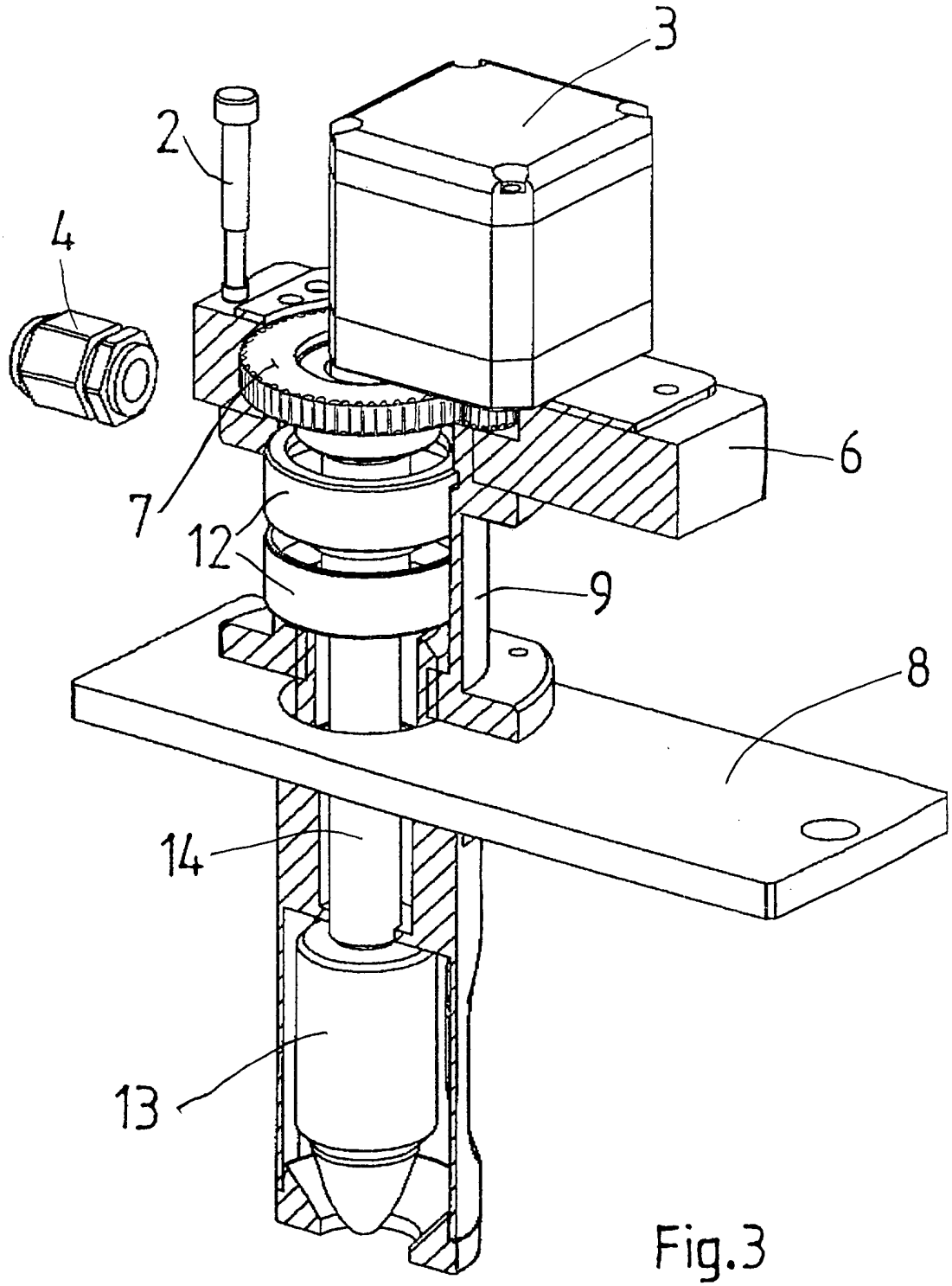

Fig.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 01/00144

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H05K 7/20, F01P 7/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H05K, F01P, F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, EPO-INTERNAL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4894748 A (SHEFET), 16 January 1990 (16.01.90), column 3, line 54 - column 4, line 3	1,2,3,4
A		5
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Y	US 3609236 A (HELLMAN, WESLEY H.), 28 Sept 1971 (28.09.71), column 1, line 67 - line 75; column 3, line 1 - line 35	1,2,3
A		4,5
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2001	16 -07- 2001
Name and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Stig Edhborg /OGU Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 01/00144

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5155358 A (LARSON), 13 October 1992 (13.10.92), column 1, line 53 - line 65; column 4, line 57 - line 62	1,2,4
A		3,5
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A	US 5878630 A (FESSLER ET AL.), 9 March 1999 (09.03.99), column 2, line 1 - line 17; column 2, line 55 - line 60	1,2,3,4,5
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INTERNATIONAL SEARCH REPORT

Information on patent family members

02/07/01

International application No.
PCT/FI 01/00144

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4894748 A	16/01/90	NONE	
US 3609236 A	28/09/71	NONE	
US 5155358 A	13/10/92	NONE	
US 5878630 A	09/03/99	DE 19517491 A	14/11/96
		DE 59600633 D	00/00/00
		EP 0824644 A,B	25/02/98
		SE 0824644 T3	
		JP 11505310 T	18/05/99
		WO 9635894 A	14/11/96