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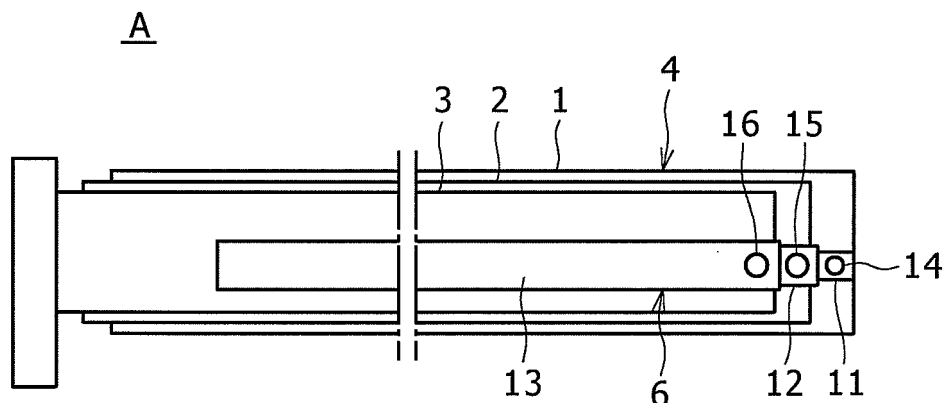
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(54) **Two-step telescopic cylinder**

(57) A two-step telescopic cylinder 5 of the present invention is provided with a piston rod 11, an inner cylinder tube 12, an outer cylinder tube 13, an inner extension oil chamber 17, an outer extension oil chamber 18, an inner stowage oil chamber 19 and an outer stowage oil chamber 20. The inner extension oil chamber and the outer extension oil chamber do not communicate with each other, and the inner stowage oil chamber and the outer stowage oil chamber communicate with each other. A first oil path 25 communicating with the inner extension oil chamber, a second oil path 26 communicating with

the outer extension oil chamber and a third oil path 27 communicating with the inner stowage oil chamber are formed in the piston rod so as not to communicate with each other. A communication line 28 is provided in a bottom portion of the inner cylinder tube. One end of this communication line is inserted into the second oil path. When the piston rod and the inner cylinder tube relatively perform an extension action, insertion length of the communication line into the second oil path is accordingly changed. Size of the two-step telescopic cylinder of the present invention is small so as to enhance usability.

FIG. 2





EUROPEAN SEARCH REPORT

Application Number
EP 08 16 7038

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 947 709 A1 (GROVE US LLC [US]) 6 October 1999 (1999-10-06)	1,3-6	INV. F15B15/16
Y	* paragraph [0018] *	2	
	* paragraph [0019] - paragraph [0020] *		
	* paragraph [0022] - paragraph [0024] *		

X	US 3 603 207 A (PARRETT JOHN T) 7 September 1971 (1971-09-07) * column 1, line 4 - column 3, line 16; figure 1 *	1	

Y	EP 0 446 115 A1 (PPM SA [FR]) 11 September 1991 (1991-09-11)	2	
A	* column 4, line 25 - column 5, line 4; figure 1 *	1	

The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 February 2010	Examiner Busto, Mario
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	

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EPO FORM 1503 03.82 (P04C01)

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

EP 08 16 7038

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
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15-02-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0947709	A1	06-10-1999	AU 741405 B2	29-11-2001
			AU 2363299 A	14-10-1999
			CA 2267910 A1	06-10-1999
			CN 1243920 A	09-02-2000
			DE 69927632 D1	17-11-2005
			DE 69927632 T2	22-06-2006
			ES 2251801 T3	01-05-2006
			JP 3592952 B2	24-11-2004
			JP 2000087913 A	28-03-2000
			MX PA99003183 A	10-09-2004
			US 6116140 A	12-09-2000

US 3603207	A	07-09-1971	NONE	

EP 0446115	A1	11-09-1991	DE 69102455 D1	21-07-1994
			DE 69102455 T2	17-11-1994
			ES 2057796 T3	16-10-1994
			FR 2659398 A1	13-09-1991
			JP 2881514 B2	12-04-1999
			JP 7089700 A	04-04-1995
			US 5111733 A	12-05-1992
