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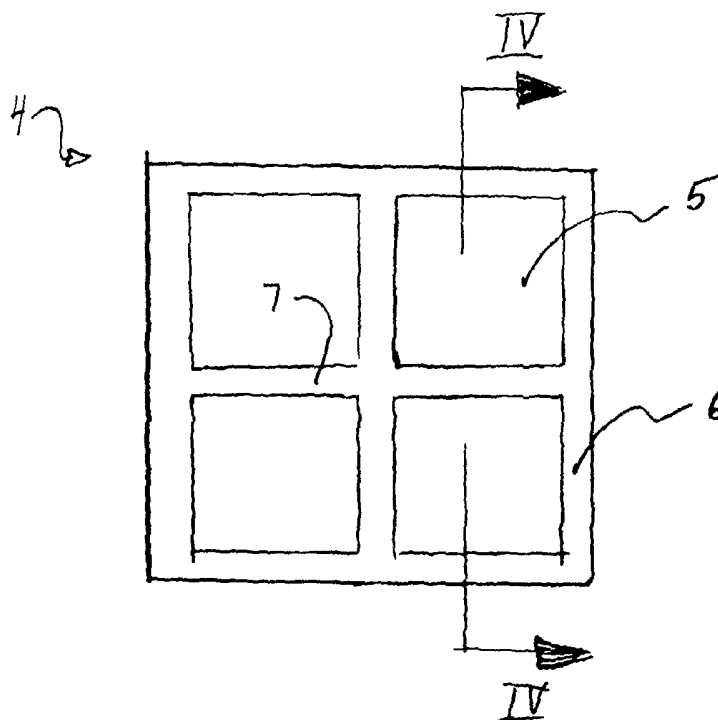
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(54) Title: VERTICALLY LAPPED FREE STANDING FILTER



(57) Abstract: A free standing filter (4) includes a non-woven material formed by vertical lapping of fibers to form a pleated structure. The non-woven material has decreased thickness portions (5-7) to increase the structural rigidity of the non-woven material. The free standing filter (4) is a frame free structure. The free standing filter (4) is manufactured by forming a non-woven material by vertical lapping of fibers to form a pleated structure. The non-woven material is then compressed to form decreased thickness portions (5-7) to increase the structural rigidity of the non-woven material and avoid the necessity of a separate frame element. The decreased thickness portions (5-7) can be formed having a thickness slightly greater than a thickness of a support of a machine in which the free standing filter (4) is usable. Accordingly, the free standing filter (4) can be a gasket free structure.

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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : B01D 27/06  
 US CL : 210/493.1; 55/521; 264/287

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)  
 U.S. : 210/493.1, 493.3, 493.5, 495; 55/521, DIG. 5; 264/287, DIG. 48

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

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,674,302 A (NAKAYAMA et al) 07 October 1997 (07.10.1997), column 3, line 54 to column 5, line 66.	1, 2, 5, 6 ----- 3, 4, 7, 8
Y	EP 1,080,770 A2 (HINTENLANG et al) 07 March 2001 (07.03.2001), column 3, line 34 to column 5, line 20)	3, 4, 7, 8
Y --- P	US 6,428,594 B1 (HINTENLANG et al) 06 August 2002 (06.08.2002), column 3, line 12 to column 4, line 37).	3, 4, 7, 8

Further documents are listed in the continuation of Box C.

See patent family annex.

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