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**EUROPEAN PATENT APPLICATION**

②① Application number: **81104809.9**

⑤① Int. Cl.<sup>3</sup>: **F 28 F 13/02, F 28 F 3/02,  
F 15 D 1/06**

②② Date of filing: **22.06.81**

③⑩ Priority: **24.06.80 US 162414**

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④③ Date of publication of application: **30.12.81**  
**Bulletin 81/52**

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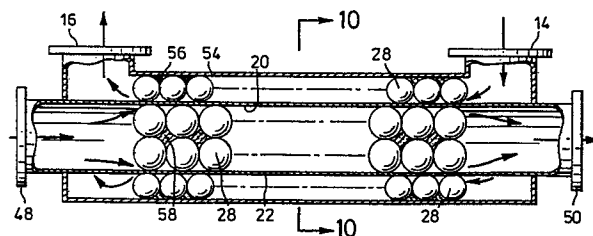
⑧④ Designated Contracting States: **AT BE CH DE FR GB IT  
LI LU NL SE**

⑧⑧ Date of deferred publication of search  
report: **11.08.82 Bulletin 82/32**

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⑤④ **Apparatus and process for heat transfer.**

⑤⑦ Apparatus and a process of heat transfer employ a fluid flow passage in which the flow consists of non-turbulent boundarylayers (30) adjacent the surfaces and a non-turbulent core-layer (30) between the boundary-layers and interfacing therewith. An interrupter-structure (28) is disposed within the flow passage and interrupts the full development of the boundary-layers at a multitude of spaced spots (34), leaving the heat transfer surfaces unaltered, unmodified and uninterrupted, so that the boundary-layers cannot increase in thickness but will partially separate from the surfaces and mix non-turbulently with the core-layer to effect the required heat transfer between the walls and the fluid. The interrupter-structure preferably consists of a plurality of spheres (20), or a sheet in which spherical, elliptical, drop-shaped or egg-shaped protrusions have been formed, all of which can be obtained readily on the market place at very low cost. This is to be contrasted with prior art apparatus which increase the heat exchange by rendering the fluid turbulent e.g. by turbulence promoters or roughening, ridging or interrupting the heat transfer walls. The increased turbulence increases heat transfer but produces a proportionally much greater increase in pumping power that makes these proposals uneconomic for many applications.





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# EUROPEAN SEARCH REPORT

0042613  
Application number

EP 81 10 4809

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. 3)
Y	US-A-2 834 582 (KABLITZ) *The whole document*	1,5,28	F 28 F 13/02 F 28 F 3/02 F 15 D 1/06 F 28 F 13/08
Y	--- US-A-3 921 712 (RENZI)  *The whole document*	1,4,5, 7,8,9, 20,22, 27,28	
A	--- DE-C- 895 459 (METALLGESELLSCHAFT)  *Page 2, lines 11-73; figures 1,2,3*	7,8,16 ,19,20 ,21,22	
A	--- US-A-3 921 711 (WESTBROCK)  *Column 1, line 48 - column 7, line 2; figures 1,2,3,4*	2,16, 18,25	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	--- US-A-3 372 743 (PALL et al.)  *Column 7, lines 3-15; column 7, lines 30-35; figures 9,11,12*	6,12, 13	F 28 F F 15 D
A	--- DE-C- 872 212 (BROWN BOVERI) *Page 2, lines 64-72; figure 3*	10	
A	--- GB-A-1 314 097 (RAYTHEON CO.)  *Column 2, lines 69-76; figures 1,2,9*	11,19, 20,21, 22	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-05-1982	Examiner FILTRI G.
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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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)	
A	GB-A-1 163 953 (AIR PREHEATER CO.) *Figures 1,2*	15		
A	FR-A-2 362 354 (PRONKO et al.) *Page 8, lines 16-21; figures 3,4*	26		
A	FR-A-2 249 704 (KLOSSE) *Page 13, lines 30-34; figure 43*	23,24		
A	GB-A-1 257 041 (ROLLS-ROYCE)			
A	US-A-3 732 919 (WILSON)			
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)	
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<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>				