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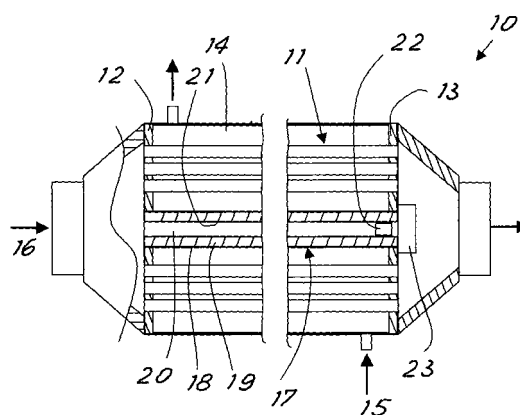
(71) Applicant: **OLMI S.p.A.**  
**24040 Suisio (BG) (IT)**

(72) Inventors:  
• **Zanardi, Luca**  
**24125 Bergamo BG (IT)**  
• **Ricci, Pierluigi**  
**26013 Crema CR (IT)**  
• **Galatello Adamo, Gaetano**  
**20035 Lissone MI (IT)**

(74) Representative: **Faraggiana, Vittorio**  
**Ingg. Guzzi & Ravizza S.r.l.**  
**Via Vincenzo Monti 8**  
**20123 Milano (IT)**

(54) **Heat exchanger**

(57) A tube-nest heat exchanger with bypass for process fluid output temperature control comprises a chamber (14) traversed by an exchange fluid and closed at opposite ends by a pair of tube plates (12,13) with a tube nest (11) between them. The tube-nest tubes are traversed by the process fluid and are in contact externally with the exchange fluid in the chamber. Between the tube plates (12,13) is at least one bypass tube (17) made up of an external shell (18) in contact with the exchange fluid and a thermally insulating layer (19) on the inner wall to surround an internal passage (20) traversed by the process fluid. The material of the external shell of the bypass tube and the material of the tube-nest tubes are mutually different and chosen with different thermal expansion coefficients such that the functions  $\Delta L_t(T)$  and  $\Delta L_b(T)$  of the lengthening starting from the length under assembly conditions as a function of temperature and respectively of the tube-nest tubes and the bypass tube shell identify at said respective mean operating temperatures  $T_{et}$  and  $T_{eb}$ , values  $\Delta L_t(T_{et})$  and  $\Delta L_b(T_{eb})$  such that  $|1 - \Delta L_t(T_{et}) / \Delta L_b(T_{eb})| \leq 0.15$ . This produces reduced stress on the welds between tubes and tube plates and allows realization of more economical and stronger exchangers.



**Fig. 1**



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| Place of search<br><b>Munich</b>   |  | Date of completion of the search<br><b>9 January 2008</b> | Examiner<br><b>Vassoille, Bruno</b>        |
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