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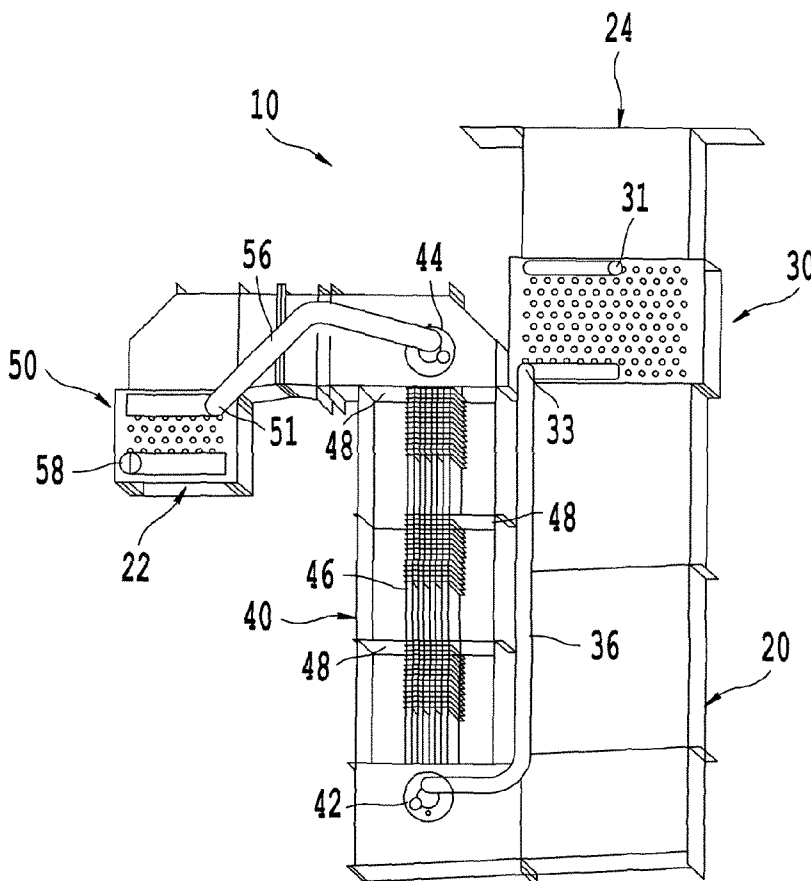
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(54) Title: HEAT EXCHANGER HAVING A COUNTERFLOW EVAPORATOR



(57) Abstract: An evaporator including a lower drum, an upper drum, and at least one tube extending between the lower drum and the upper drum. The plurality of tubes have fluid passageways therein extending from the lower drum to the upper drum. A duct is provided having a heating gas passageway provided therein. The at least one tube extends through the heating gas passageway. The fluid passageways define an overall flow path from the lower drum to the upper drum extending in a direction substantially counter-current to an overall flow path defined by the heating gas passageway extending from a gas inlet of the heating gas passageway to a gas outlet thereof.

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European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,
PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
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 IPC(8) - F28F 1/42 (2008.01)
 USPC - 165/179
 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)
 IPC(8): F28F 1/42 (2008.01)
 USPC: 165/179

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 IPC(8): F28F 1/42 (2008.01) (text search)
 USPC: 165/104.11, 104.13, 104.18, 104.34, 164, 165, 172, 174, 177, 179, 182 (text search)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 PubWEST(USPT,PGPB,EPAB,JPAB); Internet search via Google Web and Google Scholar search engines. Search terms: boiler heat exchanger superheater economizer heatexchanger preheater flue plenum duct passageway tube tubular conduit pipe vapor mist fog coalesce steam liquor dew vapor steam boiling liquid dew point condensation cro

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 7,017,529 B1 (LOMAX, JR. et al.) 28 March 2006 (28.03.2006) col. 1 ln. 10-19, col. 3 ln. 53 to col. 9 ln. 54, Fig. 1-4	1, 4, 14-19, 24, 26, 35, 37-43 and 46
Y	US 5,787,844 A (PAJU) 04 August 1998 (04.08.1998) col. 1 ln. 54-55, col. 3 ln. 35-54, col. 6 ln. 26-31, Fig. 2, 4	2 and 12
Y	US 2005/0194120 A1 (LOMAX, JR. et al.) 08 September 2005 (08.09.2005) para. [0024], [0025], Fig. 1	3, 10-13, 20-23, 25, 33 and 34
Y	US 5,626,103 A (HAWS et al.) 06 May 1997 (06.05.1997) col. 3 ln. 50-64, col. 9 ln. 51 to col. 10 ln. 5, col. 11 ln. 26-40, Fig. 1-3, 14, 20, 21	5-9, 27-34, 36, 44 and 45
A	US 4,282,926 A (HOLLAND) 11 August 1981 (11.08.1981) col. 2 ln. 44 to col. 3 ln. 28, Fig. 2	1-46

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:
 "A" document defining the general state of the art which is not considered to be of particular relevance
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 "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

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Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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