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(54) **Fire heat exchanger for liquid heaters**

(57) The fired heat exchanger's design is characterised by the fact that it contains a spiral tubular heat exchanger (1) with a heated liquid medium where each coil of the tube in the cross-section has a point contact with adjacent tube coils creating, after their inseparable thermal linear integration, a uniform surface of the combustion chamber (2) together with the heat medium flow chamber (3) in the further part of the unit. There is also a tubular multi-chamber core (4) inside the spiral tubular heat exchanger (1) whose internal surface features ra-

dially distributed plate lamella elements (5) inseparably fitted on the external surface of the core, thanks to which a maze-like heating medium stream flow system is achieved. The internal shape of the tubular multi-chamber core (4) directs the air stream to flow around all its internal surfaces, which prevents the tubular multi-chamber core walls (4) from overheating. At the same time, the air used in later thermal processes of liquid heating is heated as well.

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Description

[0001] The invention described here is a fired heat exchanger for liquid heaters designed to be best utilised in throughflow water heaters.

[0002] Taking into account the current level of technology, well-known and widely utilised water heater solutions are characterised by a heat exchange rate whose outlet gas temperature is so high that it makes it impossible for the process of condensation of steam in exhaust gases to occur. This effect lowers the heat exchanger efficiency rate together with other operational parameters. Moreover, burners used in current solutions do not always facilitate the process of lowering the content of detrimental combustion products, which adversely influence the natural environment.

[0003] The invention features a solution where the fired heat exchanger for liquid heaters is equipped with a spiral tubular heat exchanger with a heated liquid medium whose each coil in the cross-section has a point contact with adjacent tube coils. After their inseparable thermal linear integration, a uniform surface of the combustion chamber is created together with the heat medium flow chamber in the further part of the unit. There is a tubular multi-chamber core inside the spiral tubular heat exchanger. There are radially distributed plate lamella elements inseparably fitted on the external surface of the core, thanks to which a maze-like heating medium stream flow system is achieved. The internal shape of the tubular multi-chamber core directs the air stream to flow around all its internal surfaces, which prevents the core from overheating. At the same time, the air, to be used in later thermal processes for liquid heating, is heated as well.

[0004] The invention features a solution where the construction of the fired heat exchanger for liquid heaters makes it possible to lower the exhaust gas temperature below the dew-point, which results in condensation of moisture contained in the exhaust gases, which, in turn, has a favourable ecological effect. Another advantage of this solution is the possibility of fitting the latest generation burners to the heat exchanger, which enables their users to optimally minimise the emission of detrimental combustion products to the air. The design of the invention facilitates gaining very favourable operational parameters and a high degree of thermal efficiency. Additional features are a simple, compact and light housing and the ease of operation.

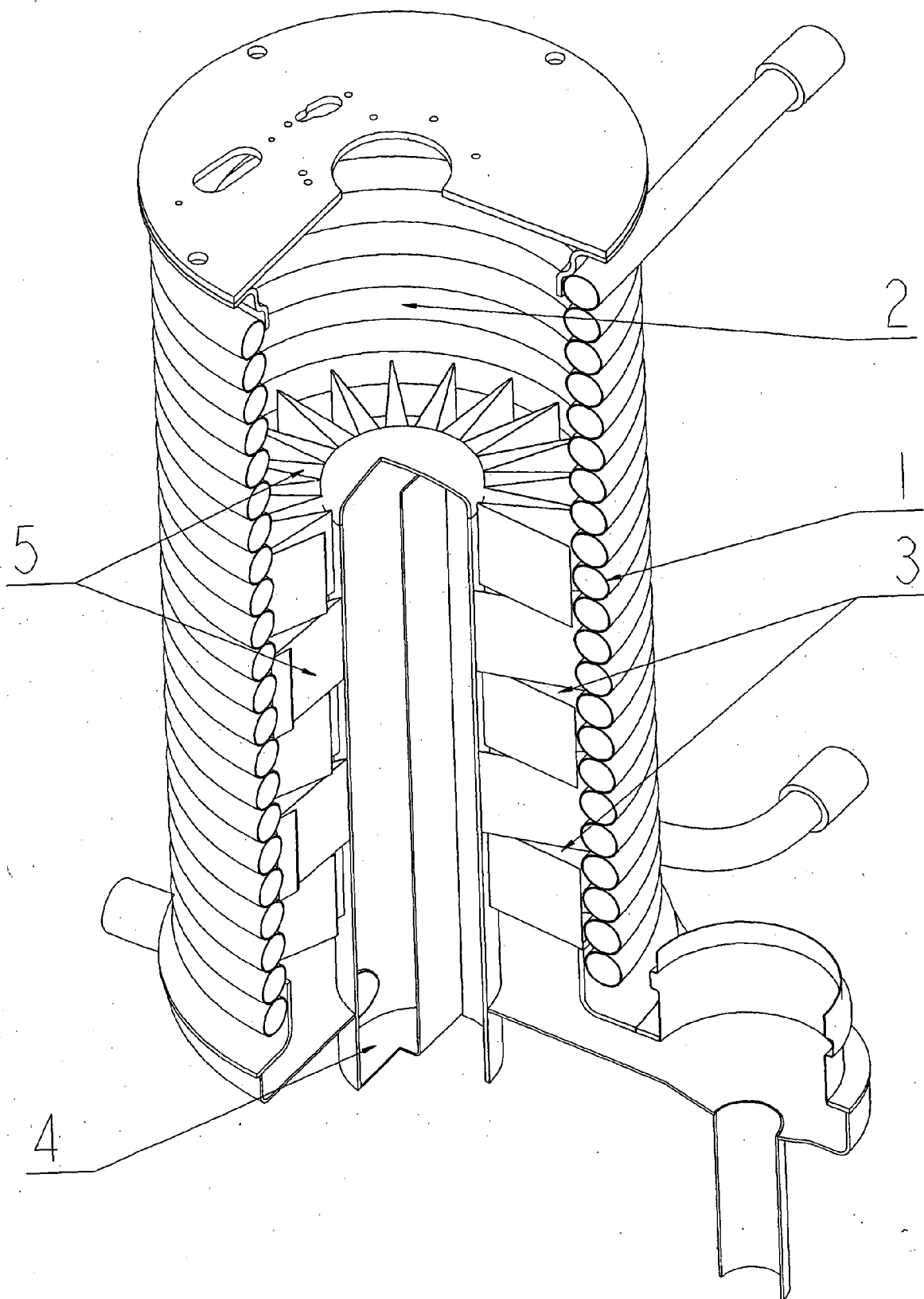
[0005] An example of the subject of the invention is shown in the picture attached. It depicts a fired heat exchanger for liquid heaters in the axonometric view with a broken-out section of the side part of the device featuring a view of the internal structure.

[0006] The fired heat exchanger for liquid heaters is built from a spiral tubular heat exchanger (1) which heats the liquid medium. In the spiral tubular heat exchanger (1) each coil of the tube in the cross-section has a point contact with adjacent tube coils. After their inseparable thermal linear integration (e.g. by means of a soldering

technique), a uniform surface of the combustion chamber (2) is created together with the heat medium flow chamber (3) in the further part of the unit. There is a tubular multi-chamber core (4) inside the spiral tubular heat exchanger (1). There are radially distributed plate lamella elements (5) inseparably fitted (e.g. by means of a soldering technique) on the external surface of the core, thanks to which a maze-like heating medium stream flow system is achieved. The internal shape of the tubular multi-chamber core (4) directs the air stream to flow around all its internal surfaces, which prevents the core walls from overheating. At the same time, the air used in later thermal processes of liquid heating is heated as well.

Claims

1. The fired heat exchanger for liquid heaters is designed to work with a burner (e.g. a gas burner) and its construction is **characterised by** the fact that it contains a spiral tubular heat exchanger (1) with a heated liquid medium where each coil of the tube in the cross-section has a point contact with adjacent tube coils creating, after their inseparable thermal linear integration, a uniform surface of combustion chamber (2) together with the heat medium flow chamber (3) in the further part of the unit. There is also a tubular multi-chamber core (4) inside the spiral tubular heat exchanger (1) whose internal surface features radially distributed plate lamella elements (5) inseparably fitted on the external surface of the core, thanks to which a maze-like heating medium stream flow system is achieved and the internal shape of the tubular multi-chamber core (4) directs the air stream to flow around all its internal surfaces, which prevents the tubular multi-chamber core walls (4) from overheating. At the same time, the air used in later thermal processes of liquid heating is heated as well.





EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 845 640 A (FASTO NEFIT BV [NL] NEFIT BUDERUS B V [NL]) 3 June 1998 (1998-06-03) * column 2, line 38 - column 4, line 3; figure 3 *	1	INV. F24H1/43 F24H9/00
A	EP 0 825 392 A (WOLF GMBH [DE]) 25 February 1998 (1998-02-25) * column 4, line 16 - column 8, line 24; figures 2,3 *	1	
A	EP 1 431 697 A (BOSCH GMBH ROBERT [DE]) 23 June 2004 (2004-06-23) * the whole document *	1	
A	DE 91 01 375 U1 (MANN, WILHELM, DIPL.-ING., 6301 ALLENDORF, DE) 11 July 1991 (1991-07-11) * the whole document *	1	
A	FR 1 052 256 A (CALIQUA SOC) 22 January 1954 (1954-01-22) * the whole document *	1	
A	EP 0 146 976 A (REMEHA FABRIEKEN BV [NL]) 3 July 1985 (1985-07-03) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC)
			F24H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 December 2008	Examiner Arndt, Markus
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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08-12-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0845640	A	03-06-1998	NL 1004639 C2	29-05-1998
EP 0825392	A	25-02-1998	AT 208027 T	15-11-2001
			DE 19634200 A1	26-02-1998
EP 1431697	A	23-06-2004	DE 10259951 A1	01-07-2004
DE 9101375	U1	11-07-1991	NONE	
FR 1052256	A	22-01-1954	NONE	
EP 0146976	A	03-07-1985	CA 1252352 A1	11-04-1989
			DE 3470799 D1	01-06-1988
			DK 553384 A	25-05-1985
			NL 8304041 A	17-06-1985
			US 4679528 A	14-07-1987

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82