Title: FIRED HEAT EXCHANGER

Abstract: Fired heat exchanger, in its top section having a combustion chamber (1) with an opening (2) for the insertion of the burner, and in its bottom section fitted with a condensate accumulation bowl (3) and vertical pipe elements (4) for the flow of flues, which connect the combustion chamber (1) with the condensate accumulation bowl (3), fixed to the sieve bottoms (5, 6) of the jacket (7), inside which the heated fluid flows. The inlet stub pipe (8) and outlet stub pipe (9) are fitted in the lower sieve bottom (5) and end outside, which is achieved with the inlet connection stub pipe (10) and outlet connection stub pipe (11) integrated into the flange (12) of the condensate accumulation bowl (3). The flange (12) is fitted with sockets (13) for the elements fixing the heat exchanger to the casing. Under the upper sieve bottom (6) there is a partition (16) fixed and fitted with at least one slot (17) for the flow of the fluid above the partition. There is a pipe (18) fixed to the partition (16) so as to drain the heated fluid from above the partition (16), connected to the fluid outlet stub pipe (9).

Declarations under Rule 4.17:
— of inventorship (Rule 4.17(iv))
Fired heat exchanger

The invention concerns a fired heat exchanger applied in central heating and domestic water installations.

Known are heat exchangers equipped with a system of pipe elements which transfer hot fumes and are fitted in between two sieve walls inside a chamber enclosed in an outer jacket. Heated water circulating inside the chamber is supplied via an inlet stub pipe in the bottom section of the outer jacket, and discharged via an outlet stub pipe in the top section of the outer jacket. In such heat exchangers the combustion chamber is installed over the upper sieve bottom, with the condensate accumulation bowl fixed under the lower sieve bottom.

Known from the Polish patent application published under No. P.392560 is a heat exchanger having an outer jacket which encases a system of vertical pipe elements fixed to the sieve walls on both ends, and fitted with a gas combustion chamber positioned over the upper sieve wall, as well as with perforated partitions fitted crosswise in relation to the pipe elements with the latter piercing the partitions through the openings. Moreover, the heat exchanger is fitted with fluid inlet and outlet stub pipes fixed in the side wall of the outer jacket.

The heat exchanger according to the invention, in its top section having a combustion chamber with an opening for the insertion of the burner, and a condensate accumulation bowl fitted in its bottom section, as well as vertical pipe elements for the flow of the fumes, which connect the combustion chamber with the condensate accumulation bowl and
which are fixed to the sieve bottoms of the jacket inside which the heated fluid flows, and further fitted with the fluid inlet and outlet stub pipes, is characterised in that the fluid inlet and outlet stub pipes are fixed to the lower sieve bottom, while the partition having at least one slot for the fluid to flow above the partition is installed under the upper sieve bottom. There is a pipe fixed to the partition so as to drain the heated fluid from above the partition, which is connected to the fluid outlet stub pipe. Preferably, the fluid inlet and outlet stub pipes fixed to the lower sieve bottom end outside which is achieved with inlet and outlet connection stub pipes integrally built into the flange of the condensate accumulation bowl. The flange is equipped with sockets for the elements which fix the exchanger to the casing. Additionally, the condensate accumulation bowl is fitted with sockets for the fluid temperature sensors, and one socket for the fume temperature sensor.

Preferably, the partition under the upper sieve bottom has a fluid flow distribution element fixed on its top surface.

Preferably, there is a densely perforated partition fitted over the lower sieve bottom, above the fluid inlet stub pipe so as to distribute the fluid flowing into the exchanger.

Thanks to the position of the fluid inlet and outlet stub pipes fixed to the lower sieve bottom and owing to the fact that they end outside, which is achieved with inlet and outlet connection stub pipes integrally built into the flange of the condensate accumulation bowl, as well as due to the sockets in the accumulation bowl flange for anchoring the elements fixing the exchanger to the casing it is possible to mount the hydroblock directly on the heat exchanger and achieve a very tight sealed connection between the condensate accumulation bowl and the casing. The solution
according to the invention allows access to the fluid inlet and outlet stub pipes from the bottom without the need to dismount the heat exchanger.

The invention will now be described by way of example and with reference to the accompanying drawings in which:

Fig. 1 presents the axial section of the heat exchanger in an axonometric projection,

Fig. 2 - an axial section of the heat exchanger interior in an axonometric projection,

Fig. 3 - the interior of the heat exchanger in an axonometric projection,

Fig. 4 - an axial section of the heat exchanger interior,

Fig. 5 – top partition with the fluid flow distribution element in an axonometric projection,

Fig. 6 - bird’s-eye view of the top partition with the fluid flow distribution element,

Fig. 7 and Fig. 8 – condensate accumulation bowl in an axonometric projection,

Fig. 9 and Fig. 10 – axial section of the condensate accumulation bowl in an axonometric projection.

As shown on the drawing, in the top section of the fired heat exchanger there is a thin-walled combustion chamber 1 with an opening 2 for the insertion of the burner, in its bottom section having a condensate accumulation bowl 3 and vertical pipe elements 4 for the flow of fumes, which connect the combustion chamber 1 with the condensate accumulation bowl 3 and are fixed to the sieve bottoms 5 and 6 of the jacket 7 inside which the heated fluid flows. The fluid inlet stub pipe 8 and outlet stub pipe 9 are fixed to the lower sieve bottom 5 and end
outside, which is achieved with the inlet connection stub pipe 10 and outlet connection stub pipe 11 integrally built into the flange 12 of the condensate accumulation bowl 3. The flange 12 is equipped with four sockets 13 for the screws fixing the heat exchanger to the casing. Moreover, the condensate accumulation bowl 3 is fitted with a socket 14 for the sensor to measure the temperature of the fluid flowing in, socket 15 for the sensor to measure the temperature of the heated fluid, socket 22 for the fume temperature sensor, and a stub pipe 21 for discharging the fumes.

Under the upper sieve bottom 6 there is a partition 16 fixed and fitted with a slot 17 for the flow of the fluid above the partition. There is a pipe 18 fixed to the partition 16 so as to drain the heated fluid from above the partition 16, connected to the fluid outlet stub pipe 9. There is a fluid flow distribution element 19 in the form of a vertical U-shaped partition fixed on the top surface of the partition 16, through which a pipe 18 for the discharge of the hot fluid runs.

In order to achieve even distribution of the fluid supplied to the heat exchanger there is a partition 20 fitted over the lower sieve bottom 5 above the fluid inlet stub pipe 10, where the perforations for pipe elements 4 are larger than cross sections of those elements, thanks to which the supplied water gets through the thus-formed slots and flows even around the pipe elements 4.

The fumes generated in the combustion chamber 1 flow down through the pipe elements 4 and then, through the condensate accumulation bowl 3 get into the vent via the stub pipe 21. The cold fluid is supplied through the inlet connection stub pipe 10 and the inlet stub pipe 8 connected thereto, into the space between the lower sieve bottom 5
and the bottom partition 20. Then, through the slots formed around the pipe elements 4 the fluid gets into the chamber formed inside the jacket 7 and flows towards the combustion chamber 1 washing around pipe elements 4 on its way and absorbing the heat from the fumes. Flowing through the slot 17 in the partition 16, the fluid gets above the partition and flows around pipe elements 4 and the upper sieve bottom 6, absorbing the heat from the fumes, where the direction of the flow is forced by the fluid flow distribution element 19, whereupon the heated fluid flows into the pipe 18 to leave the heat exchanger via the outlet stub pipe 9 and the connection stub pipe 11.
Claims

1. A fired heat exchanger, in its top section having a combustion chamber with an opening for the insertion of the burner and in its bottom section fitted with a condensate accumulation bowl and vertical pipe elements for the flow of fumes, which connect the combustion chamber with the condensate accumulation bowl, fixed to the sieve bottoms of the jacket inside which the heated fluid flows, and further fitted with the inlet and outlet stub pipes, characterized in that the fluid inlet stub pipe (8) and outlet stub pipe (9) are fixed to the lower sieve bottom (5), and there is a partition (16) mounted under the upper sieve bottom (6) fitted with at least one slot (17) for the flow of the fluid above the partition, where there is a pipe (18) connected to the partition to drain the heated fluid from above the partition (16), connected to the fluid outlet stub pipe (9).

2. The fired heat exchanger according to claim 1, characterised in that the fluid inlet and outlet stub pipes fitted in the lower sieve bottom end outside, which is achieved with inlet (10) and outlet (11) connection stub pipes integrally built into the flange (12) of the condensate accumulation bowl (3), where the flange (12) is fitted with sockets (13) for the elements which fix the exchanger to the casing.

3. The fired heat exchanger according to claims 1 or 2, characterised in that the condensate accumulation bowl (3) is fitted with sockets (14, 15) for the fluid temperature sensors, and a socket (22) for the fume temperature sensor.

4. The fired heat exchanger according to claim 1, characterised in that there is a fluid flow distribution element (19) fitted on the top surface of the partition (16).
5. The fired heat exchanger according to claims 1 to 4, characterised in that there is a densely perforated partition (20) fitted over the lower sieve bottom (5), above the fluid inlet stub pipe (8) for the distribution of the fluid flowing inside.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24H1/28 F24H8/00 F24H9/00 F24H9/12 F24H9/14
ADD.

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)
F24H

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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>A</td>
<td>CH 491 335 A (W OERTLI AG ING [CH]) 31 May 1970 (1970-05-31) column 1 - column 2; figures 1,2</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search: 11 June 2014
Date of mailing of the international search report: 18/06/2014

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