Aug. 30, 1960 O. L. BOCK 2,950,740

FLUE CONDUITS WITH HEAT TRANSFER ELEMENTS THEREIN

Filed April 29, 1957

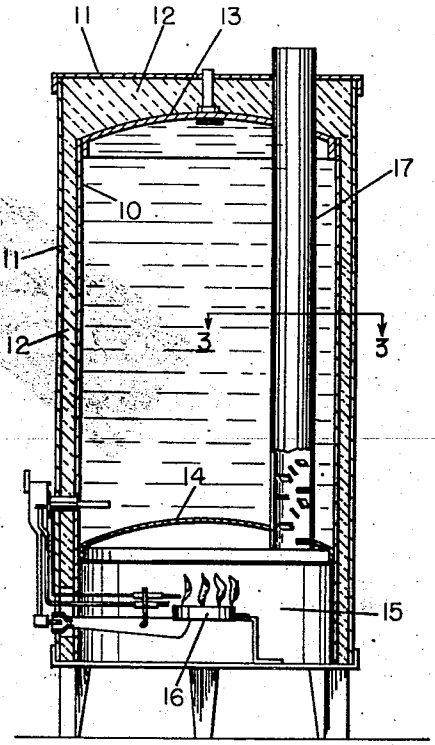


Fig. 1.

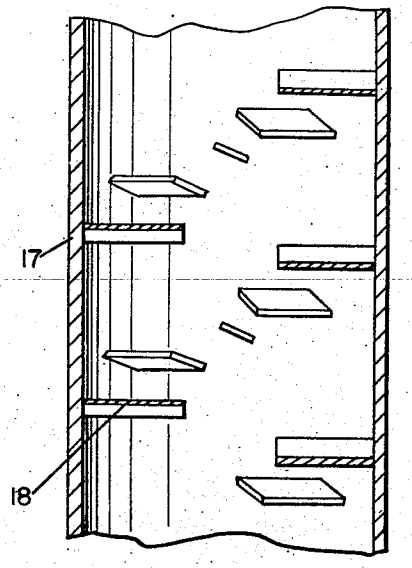


Fig. 2.

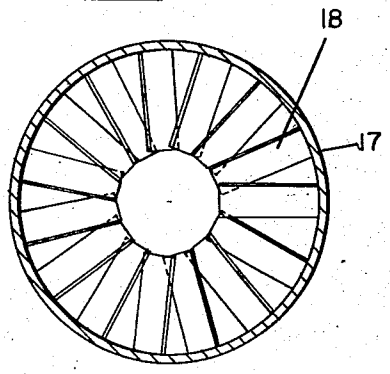


Fig. 3.

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2,950,740

Patented Aug. 30, 1960

2,950,740

FLUE CONDUITS WITH HEAT TRANSFER ELEMENTS THEREIN

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Filed Apr. 29, 1957, Ser. No. 655,775

2 Claims. (Cl. 138—38)

This invention relates to flues and particularly to flues for providing heat transfer means between hot gases passing through the flue and a medium to be heated surrounding the flue.

An object of the invention is to provide an improved flue for use primarily with a water heater wherein a greater heat exchange between the hot gases passing up the flue and the water surrounding the flue is effected.

It is customary in water heaters to provide a combustion chamber below the tank and a flue from the combustion chamber passing up through the tank and the water therein whereby the heat from the hot gases heats the water surrounding the flue. The object of the invention is to provide a flue of such construction as to effect a better heat exchange between the hot gases passing up through the flue and the water surrounding the flue.

A still more specific object is to provide a flue with baffle plates therein of such construction as to provide a maximum of heat exchange from the gases to the water without substantially impeding the upward travel of the hot gases.

The invention is an improvement over the heat transfer flue shown in my prior Patent 2,687,747, August 31, 1954.

In the above patent a flue for the purpose indicated is shown wherein baffle plates are secured within a heating flue. In this patent the baffle plates lie in a horizontal position. In carrying out the objects of the instant invention the baffle plates are set at an angle. It will be obvious that with the new arrangement a greater number of baffle plates can be secured in the flue and thereby effect a greater degree of heat exchange from the hot flue gases to the water in the tank. In the new arrangement the baffle plates are tilted so that at their inner ends one may overlap the preceding one in a series so that not only may a greater number of baffles be used but the plates will create less back pressure on the gases passing through the flue. In the arrangement shown in the patent the baffles lay flat with a result that the hot gases passing about them passed both sides of them. This tended to impede the passage of the gases. With the baffles arranged in a tilted manner as shown and arranged in a spiral around the inner side of the flue the gases travel rapidly in a spiral up the flue in such a manner to allow a relatively large output of heat.

Another advantage lies in the fact that baffles of uniform width can be used instead of having the ends tapered. In forming the baffles it is easier to cut off straight pieces of strip material than to make tapered ones.

Further objects and advantages will become apparent from the description which follows and from the illustrations in the drawings, in which

Fig. 1 is a vertical section of a water heating boiler showing my invention incorporated therein;

Fig. 2 is an enlarged partial section of the heat transfer tube; and

Fig. 3 is a top view of the heat transfer tube and may be regarded as a section on line 3—3 of Fig. 1.

In the drawings numeral 10 indicates a conventional water tank or boiler having a surrounding casing 11 confining a heat insulating material 12 between itself and the tank 10. The tank 10 preferably has a rounded

top 13 and a rounded bottom portion 14. The walls of the tank extend down below the bottom portion 14 to provide a combustion chamber 15, the combustion chamber containing the usual burner elements essential for heating the boiler. A flue or tube 17 has its lower inlet end secured in the bottom end 14 and its upper outlet end secured in the top 13 of the tank, the flue extending up through the water in the tank. The flue is suitably sealed against leakage as by welding to the top and bottom ends of the tank.

Baffle plates 18 are secured at their ends to the inside of the flue 17 and these baffle plates are arranged to extend in a spiral up through the flue as shown in Fig. 2. These baffle plates are set at an angle to the axis of the flue in a direction counter to the direction of their spiral pattern and with their lower surfaces which face the inlet end of the flue slanting upwardly toward the outlet end of the flue. The flue gases passing up through the flue will contact the tilted baffles and will be given a spiral movement in a direction counter to the spiral arrangement of the baffles. Because of the tilted arrangement of the baffles a better heat transfer between the hot gases and the baffles will be effected resulting in a better heat exchange between the gases and the water in the boiler.

It is to be understood that the present invention is not confined to the specific form thereof herein illustrated and described and that the principles thereof may be embodied in various modificed structures within the scope of the appended claims. For example, while the heat transfer tube has been shown and described as for use in a water boiler it is not necessarily limited to this use. It may be used wherein a hot fluid, gas or liquid is intended to heat a surrounding fluid, gas or liquid or possibly a solid material wherein the heat from the fluid in the flue is transferred through the walls of the flue to the media surrounding the flue.

I claim:

1. A heat transfer device comprising a tube having a fluid inlet end and a fluid outlet end, a plurality of substantially flat baffles for heat exchange contact with fluid flowing through the tube, said baffles being secured to the inner wall of said tube in heat exchange relation and projecting inwardly a substantial distance toward the central axis of said tube, the said baffles having opposed surfaces facing respectively toward said inlet and outlet end, the said baffles being arranged successively along the inner wall of said tube in a spiral pattern and the said baffles being tilted at a substantially uniform angle in a direction counter to the direction of their spiral pattern with their inlet end facing surfaces inclining toward said outlet end whereby to guide fluid flow through the tube in a spiral path counter to the direction of the spiral pattern of said baffles.

2. The device of claim 1 wherein the baffles are elongated and are end connected to the inner wall of the tube.

References Cited in the file of this patent

UNITED STATES PATENTS

641,911	Wilkins et al.	Jan. 23, 1900
1,451,272	Robinson	Apr. 10, 1923
1,662,178	Yuille	Mar. 13, 1928
2,079,144	Appa	May 4, 1937
2,273,157	Tenny	Feb. 17, 1942
2,281,206	Schoen	Apr. 28, 1942
2,290,784	Turpin	July 21, 1942
2,687,747	Bock	Aug. 31, 1954
2,756,032	Dowell	July 24, 1956

FOREIGN PATENTS

830	Great Britain	of 1860
760,701	France	Dec. 14, 1933