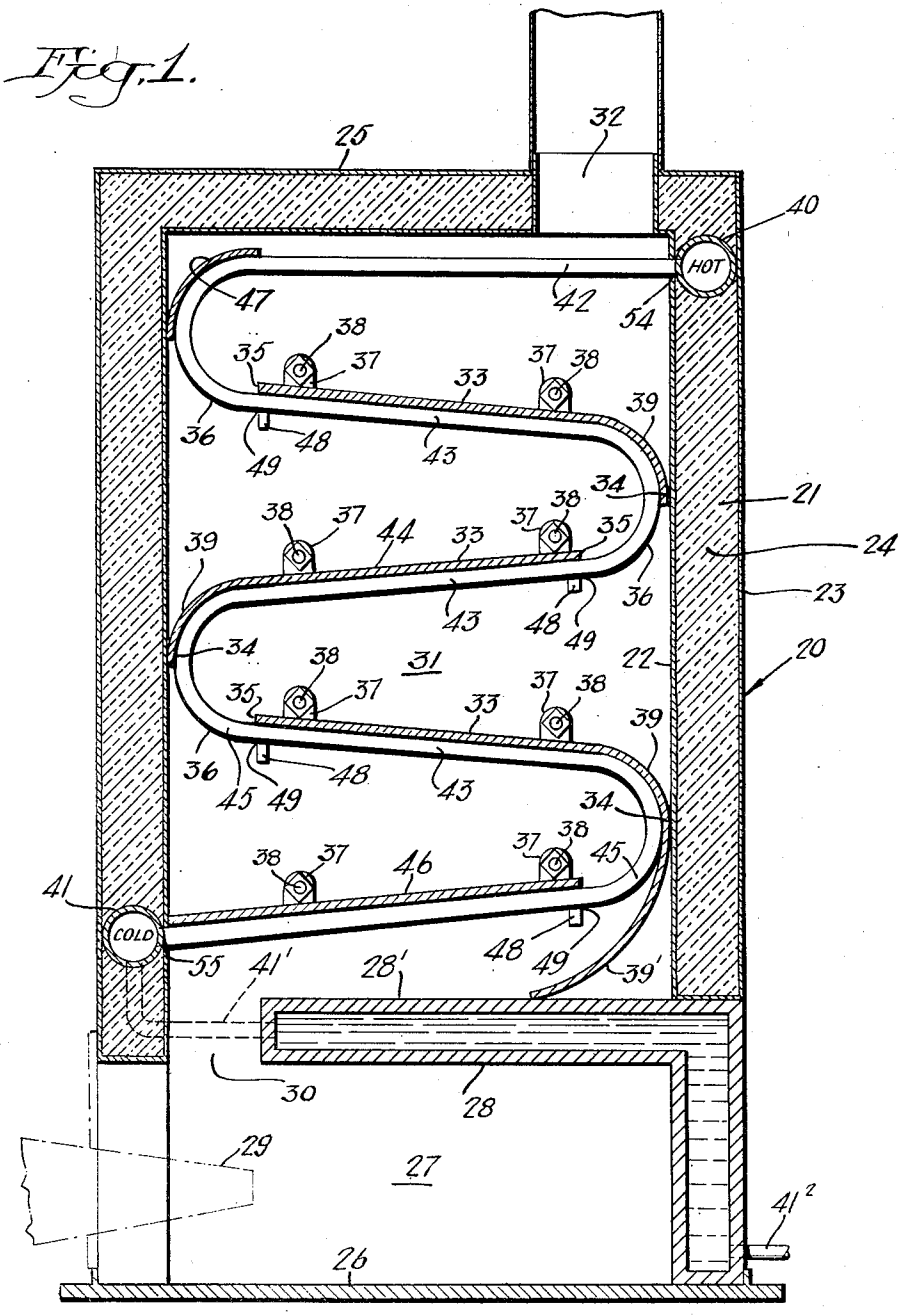
May 22, 1951 W. B. LEVIS 2,553,713

FUEL COMBUSTION FURNACE

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Fig. 1.



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Fig. 3.

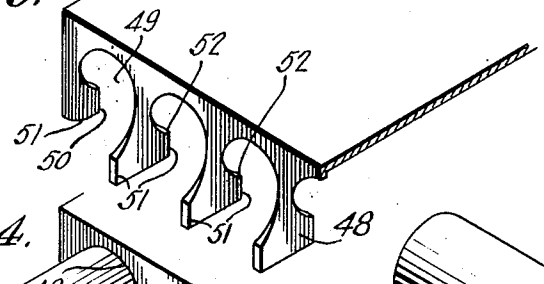


Fig. 4.

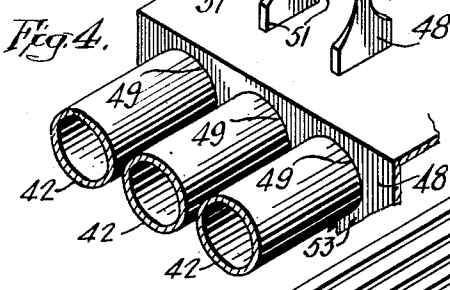


Fig. 2.

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FUEL COMBUSTION FURNACE

William B. Levis, Philadelphia, Pa.

Application March 2, 1948, Serial No. 12,532

3 Claims. (Cl. 122—356)

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My invention relates to a fuel combustion furnace.

A purpose of my invention is to simplify the fabrication and increase the durability of fuel combustion furnaces.

A further purpose is to provide a baffle type fuel combustion furnace in which the heat transfer tubes extend immediately below the baffles, and the baffles preferably conform to the curvature of the tube bends.

A further purpose is to support the heat transfer tubes from the baffles, preferably by an interlock between the same.

A further purpose is to provide a perforated flange having locking ears on the baffles for support of the heat transfer tubes.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate a few only of the numerous embodiments in which my invention may appear, choosing the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a vertical section across a fuel combustion furnace conforming to my invention.

Figure 2 is a fragmentary perspective of the headers, heat transfer tubes and baffles, showing a minor variation in one baffle.

Figure 3 is a fragmentary perspective of the baffle flanges showing the perforations and locking ears before the heat transfer tubes have been applied.

Figure 4 is a sectional perspective of the structure of Figure 3 after the heat transfer tubes have been applied.

In the drawings like numerals refer to like parts.

Describing in illustration but not in limitation and referring to the drawings:

The present invention is concerned with fuel combustion furnaces of the type likely to be used as domestic heating furnaces, commonly known as hot water heaters or furnaces. The invention may be applied to the heating of other media, as for example to the generation and heating of steam.

The furnace 20 of the invention has side walls 21 suitably consisting of an inner metallic housing 22, an outer metallic housing 23 and intermediate heat insulation 24, as well as a roof 25 similarly constructed. The furnace rests on a base 26. At the bottom is positioned a combustion chamber 27 which in some cases has a roof 28 and a water jacket 28' and is provided

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with a burner 29, intended to indicate any conventional type for introducing fuel and air, which might be oil, gas, pulverized coal, solid coal, or coke (using suitable fire bed supports not shown in the case of solid fuel). From the fire box a flue opening 30 extends upwardly into a heat transfer flue 31 occupying the entire upper portion of the furnace, and terminating in a stack 32 at the top.

The heat transfer flue 31 is of serpentine contour due to the presence of baffles 33 alternately extending from opposite side walls part only of the distance across to the wall opposite each baffle. Thus each baffle originates at 34 at a side wall but ends at 35 remote from a side wall so as to leave room for flue portions 36 where the serpentine bends of the flue reverse. The baffles at their ends have suitable attaching lugs 37 which are bolted or otherwise fastened at 38 to the end walls of the flue.

Several of the baffles near where they originate at the side wall of the flue are downwardly curved at 39 to aid in following the bend of heat transfer pipes to be described, and in Figure 1 the downward bend on one baffle is reversed at 39' to guide the gases. This is optional and is omitted in Figure 2.

Suitably positioned adjacent the top and bottom of the flue are a hot water header 40 for connection to the hot water heating system and a cool water header 41 for connection to the cool water return from the heating system, or to a cold water inlet. The water back 28', if used, is suitably connected to the header 41 by a pipe 41', and has inlet at 41^2. Connecting into each header and arranged side by side are serpentine bend heat transfer pipes 42, preferably of copper, brass or bronze for good heat conductivity, and having individual reverse bend portions 43 which conform to the bottoms of individual baffles. It will be understood that the shelf portions of the baffles preferably upwardly slope at 44 from their origins to their outer edges, and that the reverse bend portions 43 of the pipes conform and preferably are substantially in contact with the under sides of the baffles along the shelf portions and along the downwardly bent portions 39. This aids in deflecting gases and in metallic conduction of heat from the baffles to the heat transfer pipes in contact therewith.

In many prior constructions the gases at the reversals of serpentine bends have been carried far away from the heat transfer pipes, but this cannot be true in the present construction, since

the gases at each serpentine bend in the flue must flow between the pipes at 45 and then are compelled by the baffles to follow the curvature of the bends of the pipes by the next baffle above.

The bottom baffle 46 normally will not have this downwardly curved portion 39 and the top baffle 47 will conveniently comprise only the downwardly bent portion, since the furnace roof will perform much of the function of the shelf portion.

One of the problems in the prior art has been the tendency of the heat transfer tubes to sag or deform because of inadequate support. At the outer ends of several baffles I provide suitably downwardly directed flanges 48 having perforations 49 in the paths of the heat transfer pipes and severed at the middle of each perforation to the edge of the flange at 50 to provide retaining ears 51.

To support the heat transfer pipes the retaining ears in pairs are bent respectively backward and forward between each two perforations as shown at 52 in Figure 3, using pliers or the like, after which the pipes 42 are inserted in the perforations and the ears bent back to their normal positions as shown at 53 in Figure 4. The completed result is shown in Figure 4. This bending is possible as the baffles will be made of sheet steel, copper or the like. Thus the flanges serve to lock and support each heat transfer pipe at the outer edge of successive baffles. The attachment is extremely convenient as it merely involves bending the ears on the perforations back and forth.

In operation the device of the invention can conveniently be assembled by uniting the heat transfer pipes in the headers as by welding or spreading the ends of the pipes, then applying the baffles to the pipes by bending the ears on the baffle flanges, then assembling the pipes in suitable pipe channels 54 and 55 through the inner walls of the furnace, then uniting the baffles to the end walls and finally assembling the end. Compared to the assembly time usually required, a marked reduction in assembly time is accomplished by the present invention.

The furnace of the invention will function in an improved manner due to the close contact between the heat transfer tubes and the under surfaces of the walls of the baffles, with at the same time allowance of adequate lateral spacing between the pipes to permit flow of flue gas between the pipes at the ends of the baffles.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a fuel combustion furnace, a flue having flue walls, a plurality of baffles supported from the flue walls one above another, each baffle extending from one side of the flue part only of the distance to the opposite wall of the flue and each alternate baffle extending from the opposite wall to form a serpentine flue passage, headers at the top and bottom of the flue, serpentine heat transfer pipes extending side by side through the flue, connected at the top and bottom to the headers and individual bends of the pipes extending along the bottoms of individual baffles, and flanges on the baffles having openings through the flanges through which the pipes pass to interconnect the pipes with the baffles.

2. In a fuel combustion furnace, a flue having flue walls, a plurality of baffles supported from the flue walls and extending from one side of the flue part only of the distance to the opposite side, the alternate baffles extending from opposite sides, and individual baffles being downwardly curved across their lengths adjoining the side from which they extend, top and bottom headers, serpentine pipes extending through the flue between the baffles, connected at their ends to the headers and following the curvature and shape of the under portions of the baffles, the curvature of the pipes following the curvature of the baffles at the sides from which the baffles extend and flanges on the baffles having interconnecting openings through which the pipes pass.

3. In a fuel combustion furnace, a flue having flue walls, a plurality of superimposed baffles supported from the flue walls and extending alternately from opposite sides of the flue part only of the distance across the flue so as to produce a serpentine path, each baffle having at its outer end a downwardly directed perforated flange having integral locking ears, and serpentine pipes extending through the flue below the individual baffles and through the perforations of the flanges, being locked therein by the ears to support the pipes from the baffles.

WILLIAM B. LEVIS.

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