Nov. 17, 1936. J. HAAG, JR 2,060,936

HEAT EXCHANGE MEANS

Filed Feb. 15, 1936

Fig. 1

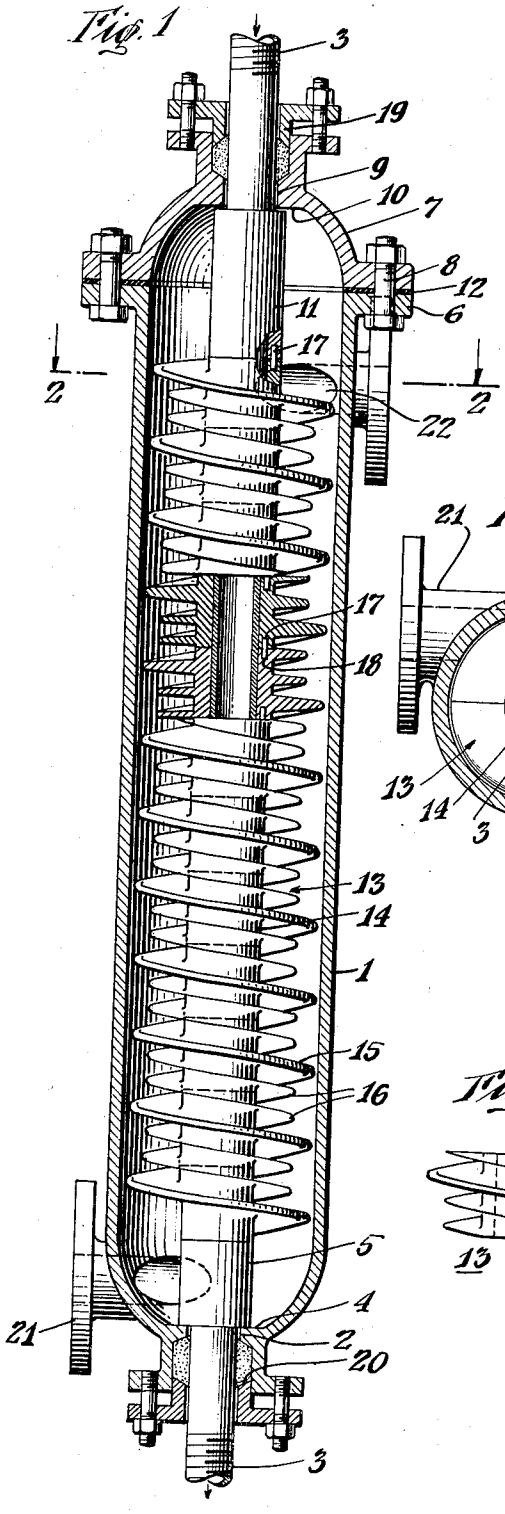


Fig. 2

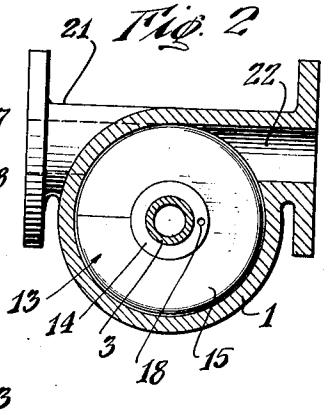


Fig. 3

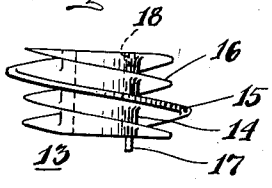
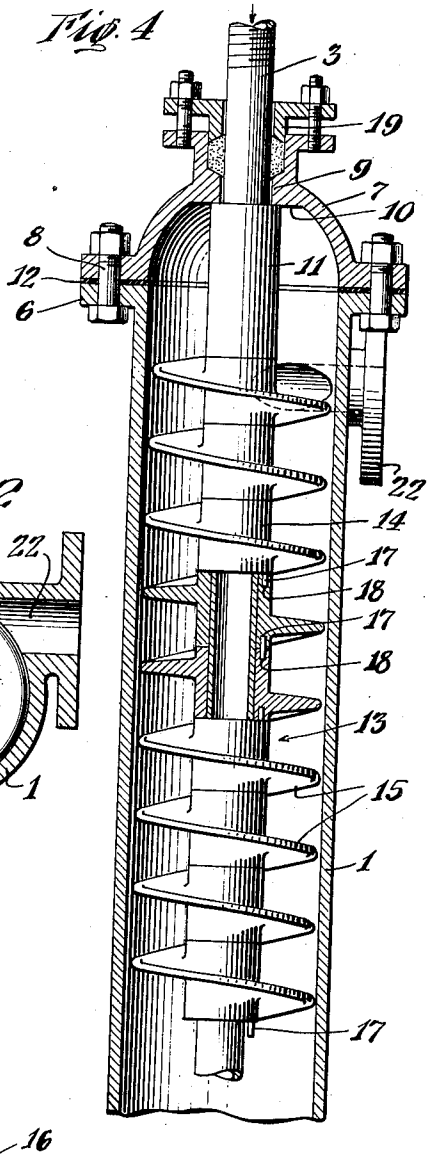


Fig. 4



INVENTOR
Joseph Haag, Jr.
BY
Frederick W. Barker
ATTORNEY

Patented Nov. 17, 1936 2,060,936

UNITED STATES PATENT OFFICE

2,060,936

HEAT EXCHANGE MEANS

Joseph Haag, Jr., New York, N. Y., assignor to Todd Combustion Equipment, Inc., New York, N. Y., a corporation of New York

Application February 15, 1936, Serial No. 63,990

8 Claims. (Cl. 257—246)

This invention relates to means of heat exchange whereby, for example, hot fluid may be used to raise the temperature of liquid that is caused to pass in contact with a passageway for such hot fluid, or vice versa.

In my improved device fuel oil intended for use in oil burning apparatus is passed spirally about an encased pipe that is traversed by steam, and it comprises a tubular jacket which may be slipped over the steam pipe, the said jacket having a spiral rib which extends outwardly into close proximity to the casing. A smaller rib or fin may be located between the turns of the first mentioned rib. The ribbed jacket may be either a single piece extending the full length of the interior of the casing or it may be made in sections properly fitted together so as to form a continuous spiral passage through the casing.

Other features and advantages of my invention will hereinafter appear.

In the drawing:—

Figure 1 is a vertical sectional elevation of my improved heater, said view being further sectioned to show the keys between adjacent spiral sections.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a detail elevation of a single spiral section or unit, and

Fig. 4 is a view, broken away, similar to Fig. 1, showing a modified form of spiral unit.

In Figs. 1 to 3 let 1 indicate a tubular heater casing, whose lower end or base is inturned and apertured as at 2 to receive a pipe 3 that is intended for the passage of a heating medium, such as steam, the base portion surrounding said aperture forming a seat 4 for the support of a tubular device, composed of sections, whose lowermost section 5 rests upon said seat.

As has been stated, the tubular spiral device, though here shown as composed of sections, may instead consist of a single extended element.

The upper end of casing 1 is flanged, as at 6, and supports a flanged cap 7 which is secured thereto as by bolts 8.

Said cap 7 is apertured, as at 9, to receive the upper end of pipe 3, the cap portion surrounding said aperture forming a seat 10 to engage the uppermost section 11 of the tubular spiral device.

The assembly of the casing and its cap is of such nature that upon tightly bolting them together, with suitable packing 12 interposed between the casing and cap flanges, the tubular spiral sections will be immovably bound together.

The tubular spiral sections, indicated at 13, which may consist of die castings, each have a hub portion 14 adapted to fit snugly over the pipe 3, and a spiral rib 15 that extends out radially to near the casing wall.

It is of course necessary that in assembling the sections 13 on the pipe 3 they be so positioned one upon another to register their flanges so that unitedly said sections will have a continuous spiral or screw which will enable a stream of oil to flow uninterruptedly through the casing, the walls and surfaces of the castings that form the spiral serving as convection heating surfaces, as well as directing the flow of the liquid.

A substantial increase in the heating surface is obtained by the incorporation of additional radiating fins, which may be relatively thin and of smaller radius, such fins being indicated at 16 and are shown as provided between the main spirals 15, spaced therefrom and running spirally and continuously therewith.

These additional radiating fins are equally applicable between the main spirals when the latter are formed upon the sections 13 or applied to an extended single unit.

As means for positioning the sections 13 in their relation of spiral registration they may be keyed together as by a pin 17 on each section which is entered within a hole 18 provided therefor in an adjacent section. All of the sections or units forming the spiral are thus keyed together so that as assembled they form a continuous screw, and the keying is so arranged that the sections cannot be assembled and reassembled in any other than the correct manner.

Obviously other suitable means may be employed for engaging the sections in registration.

This design lends itself to the economical construction of heaters having various lengths and diameters, covering a wide range of capacities.

Suitable stuffing boxes, indicated respectively at 19 and 20 are provided at the upper and lower ends of the casing.

An oil inlet, 21, supplies oil to be heated at the lower end of the casing, for pressure flow upwardly about the spiral device, and for delivery through the outlet 22 which is located near the upper end of the casing.

The heating medium, which may be steam, is introduced into the pipe 3 at the upper end, and passes to the condensate outlet located at the lower end of said pipe.

In the modified form of my invention illustrated in Fig. 4, the parts are identical with those of the preceding figures, excepting only that

the units 13 are devoid of the fins 16 intermediate succeeding spirals 15.

Variations within the spirit and scope of my invention are equally comprehended by the foregoing disclosure.

I claim:—

1. Heat exchange means comprising a tubular casing, means for passing liquid at a given temperature therethrough, a duct extended through said casing adapted for the passage of fluid at a different temperature, main spiral means surrounding said duct to prolong the path of liquid travel through said casing, and spiral fins located intermediate the main spiral means to increase the radiating effect.

2. Heat exchange means comprising a tubular casing, means for passing liquid at a given temperature therethrough, a duct extended through said casing adapted for the passage of fluid at a different temperature, a succession of spiral sections surrounding said duct to prolong the path of liquid travel through said casing, means of registration between said sections to constitute a continuous spiral, and means to bind said sections together and to said casing.

3. Heat exchange means comprising a tubular casing, means for passing liquid at a given temperature therethrough, a duct extended through said casing adapted for the passage of fluid at a different temperature, a succession of spiral sections surrounding said duct to prolong the path of liquid travel through said casing, said sections each including a radial spiral rib and an adjacent spiral fin, and means of registration between said sections to constitute a continuous spiral.

4. Heat exchange means comprising a tubular casing, means for passing liquid at a given temperature therethrough, a duct extended through said casing adapted for the passage of fluid at a different temperature, a succession of spiral sections surrounding said duct to prolong the path of liquid travel through said casing, said sections each including a radial spiral rib and an adjacent spiral fin, means of registration between said sections to constitute a continuous spiral, and means to bind said sections together and to said casing.

5. A liquid heater comprising a tubular casing having inlet and outlet means respectively near opposite ends thereof, a steam conveying pipe extended through said casing, a succession of removable spiral sections surrounding said pipe, means for keying said sections together to form a continuous spiral, and means within said casing for binding said sections together and to said casing.

6. A succession of spiral sections comprising each a hub and a radial spiral rib, together with means for relatively positioning said sections to form a continuous spiral.

7. A succession of spiral sections comprising each a hub, a radial spiral rib and a spiral fin spaced therefrom, together with means for relatively positioning said sections to form a continuous spiral.

8. A liquid heater comprising a tubular casing having inlet and outlet means respectively near opposite ends thereof, a removable cap at the upper end of said casing, a steam conveying pipe extended through said casing and cap, said casing at its lower end and in its cap respectively provided with seating means, a succession of removable spiral sections surrounding said pipe, and means for keying said sections together to form a continuous spiral, said seating means engaging the lowermost and uppermost sections to bind all the sections together and to the casing.

JOSEPH HAAG, JR.