United States Patent [19]

Miller

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[54] **REGENERATIVE HEAT EXCHANGER**

[75] Inventor: **John H. Miller,** Youngstown, Ohio

[73] Assignee: **Hy-Way Heat Systems, Inc.,** Youngstown, Ohio

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[52] **U.S. Cl.** **122/33,** 122/136

[51] **Int. Cl.** **F22b 7/00**

[58] **Field of Search** ..... 122/33, 136, 149; 431/116; 126/343.5, 360 R

[56] **References Cited**

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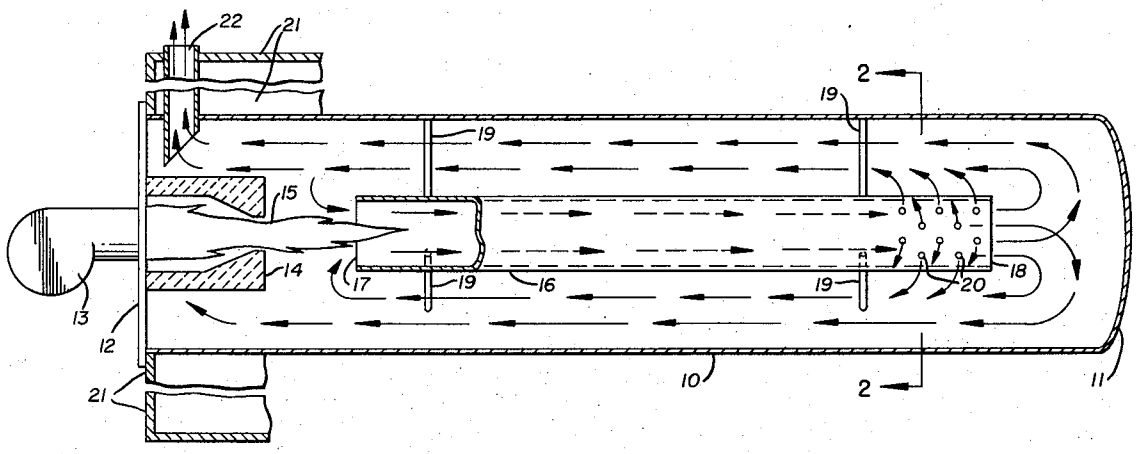
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Primary Examiner—Kenneth W. Sprague
Attorney—Webster B. Harpman

[57] **ABSTRACT**

A heat exchanger comprises a cylindrical body having closed ends with means in one end for introducing the products of combustion thereinto and venting the same therefrom. The introduction is by means of a directional nozzle positioned axially of the cylindrical body. A tubular baffle is positioned axially of the cylindrical body in spaced relation to the directional nozzle and the cylindrical body so that the action of the jet-like introduction of the products of combustion into the tubular baffle will recirculate gases from within the cylindrical body in a regenerative effect so as maintain an even temperature on the surface of the cylindrical body which is emerged in a tank of liquid to be heated.

5 Claims, 2 Drawing Figures



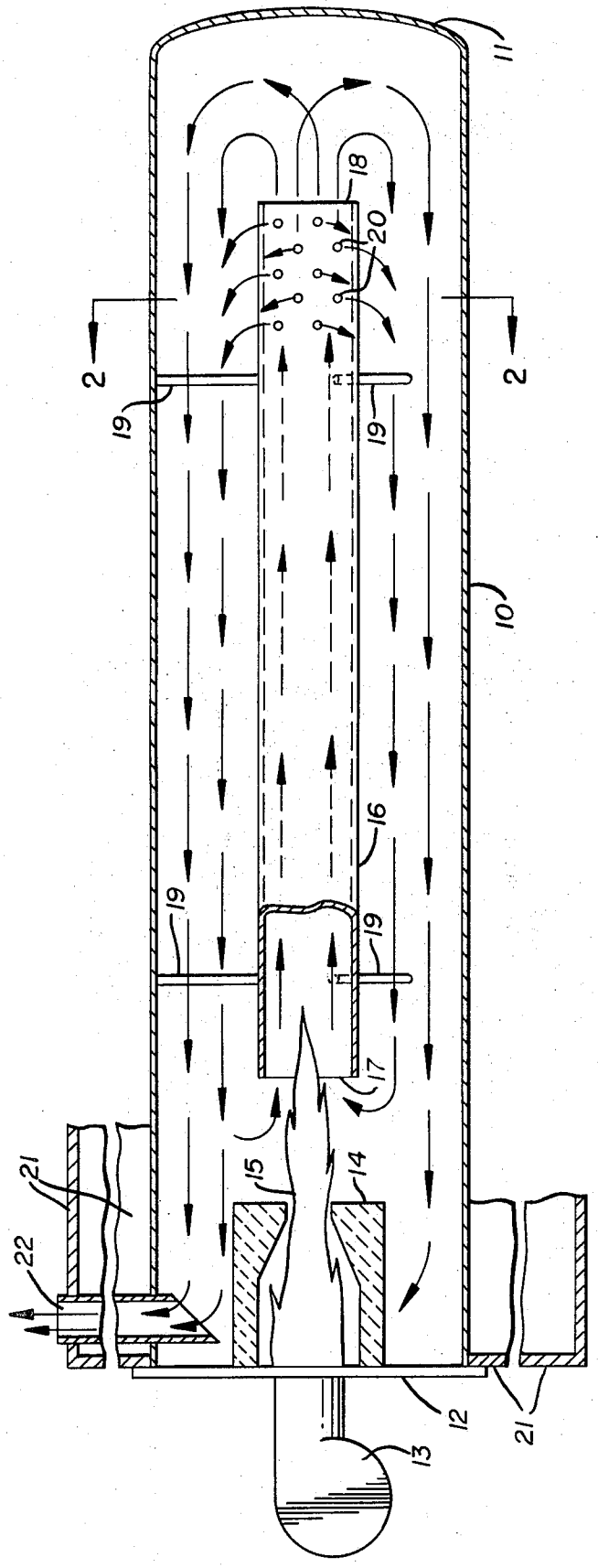


FIG. 1

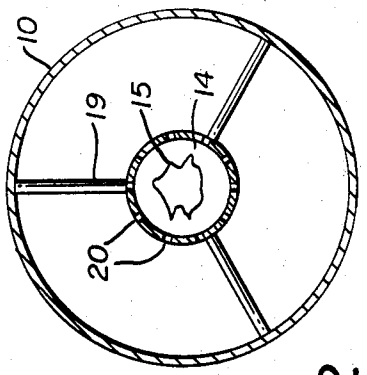


FIG. 2

REGENERATIVE HEAT EXCHANGER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to heat exchangers of the direct fire type and capable of emersion in a tank of liquid to be heated such as a heating oil or an asphalt or the like.

2. Description of the Prior Art

Prior structures of this type have employed tank-like or tubular constructions into which the products of combustion are introduced with the tank-like or tubular members being emersed or partly emersed in a tank of fluid to be heated and in order to avoid the creation of undesirably high surface temperatures, efforts have been made to baffle the products of combustion with respect to the surface of the heat exchanger. (See for example U.S. Pat. Nos. 3,266,485, 3,194,229, 3,503,382 and 3,319,709.)

This invention provides a substantially improved result by creating a circulation of the products of combustion within the heat exchanger so as to maintain an even surface temperature and thereby avoid coking of oil or asphalt materials in which the heat exchanger is emersed.

SUMMARY OF THE INVENTION

A heat exchanger, particularly suitable for heating oil for subsequent circulation to other heat exchangers or for heating asphalt so as to maintain the same at a desired fluid temperature consists of a cylindrical body with means in one end for directing the products of combustion as from an oil burner axially of the cylindrical body in a jet-like configuration and the positioning of a tubular baffle in spaced relation to the cylindrical body and in spaced relation to the directional nozzle for receiving the jet-like configuration of the products of combustion whereby recirculation of the gases within the cylindrical body is achieved which results in an even surface temperature over the entire cylindrical body making it particularly suitable for emersion heating in a tank of oil or asphalt or the like.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross sectional side elevation with parts broken away illustrating the heat exchanger and its positioning in a tank of fluid to be heated.

FIG. 2 is a vertical section on line 2—2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In its simplest form the heat exchanger of this invention comprises an elongated cylindrical body member **10** having a closed end **11** and an apertured end **12**. The apertured end **12** provides for the communication of an oil burner **13** and a directional nozzle **14** located with the cylindrical body **10** and prefereably axially thereof. The directional nozzle includes a discharge orifice **15** and is shaped so that the products of combustion indicated by the letter C as produced by the oil burner **13** will be directed axially of the cylindrical body **10** in a jet-like manner. A tubular baffle **16** having open ends **17** and **18** is disposed axially within the cylindrical body **10** and in spaced relation to the discharge orifice **15** of the directional nozzle **14**. A plurality of radially extending supports **19** position the tubular baffle **16** with respect to the cylindrical body **10** and it will be observed that the open end **18** of the tubular baffle **16** is spaced with respect to the closed end **11** of the cylindrical body and that the tubular baffle **16** is provided with a plurality of perforations **20** inwardly from the open end **18**.

Still referring to FIG. 1 of the drawings it will be seen that the cylindrical body **10** is positioned within a tank **21** and that a vent **22** extends through the tank **21** and into the cylindrical body **10** adjacent the apertured end **12** thereof. In FIG. 1 of the drawings the configuration of the products of combustion show the same extending from left to right from the oil burner **13** and out of the orifice **15** of the directional nozzle **14** and into the open end **17** of the tubular baffle **16**. Directional arrows in FIG. 1 within the tubular baffle **16** and within the cylindrical body **10** show the directional flow of the hot gases comprising the products of combustion and it will be observed that in addition to flowing longitudinally of the tubular baffle **16** and out of the open end **18** thereof where they are directed in the opposite direction toward the vent **22** the gaseous products of combustion will also flow out of the perforations **20** and thus reduce the end pressure at this point and provide for a more desirable rate of flow of the combustion gases in the end of the heat exchanger adjacent the closed end **11**.

Further directional arrows in FIG. 1 of the drawings will show that some of the recirculating gases moving toward the vent **22** are drawn into the open end **17** of the tubular baffle **16** by the jet-like action of the products of combustion.

By referring now to FIG. 2 of the drawings it will be seen that the axial positioning of the tubular baffle **17** is such that the space between the same and the cylindrical body **10** of the heat exchanger creates a realtively larger return passageway thereabout with the resultant slowing down of the flow of the combustion gases and contributes to the even surface temperature realized longitudinally of the device from the apertured end **12** to the closed end **11** of the cylindrical body thereof.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention.

I claim:

1. A direct fired heat exchanger for location in a tank of material to be heated and comprising an elongated body member having an apertured end and a closed end, a directional nozzle positioned in the apertured end in communication with said aperture arranged to receive products of combustion introduced into said heat exchanger through said aperture, a tubular baffle positioned in said body member on a common center line with said directional nozzle and in spaced relation thereto said tubular baffle being relatively smaller than said body member and terminating inwardly from the closed end thereof and means for venting the products of combustion from said body member said means being positioned adjacent said apertured end of said elongated body member.

2. The heat exchanger of claim **1** and wherein a discharge orifice in said directional nozzle is of smaller size than said tubular baffle whereby a jet-like configuration of the products of combustion directed by said nozzle may be realized.

3. The heat exchanger of claim 1 and wherein said tubular baffle is perforated inwardly from the end thereof oppositely disposed with respect to said directional nozzle.

4. The heat exchanger set forth in claim 1 and wherein the closed end of said elongated body member is arcuate in cross sectional configuration.

5. The heat exchanger set forth in claim 1 and wherein the elongated body member is cylindrical and the tubular baffle is cross sectionally circular and the area between the cylindrical body member and the tubular baffle is greater than the diameter of the tubular baffle.

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