

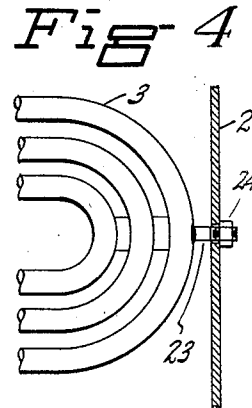
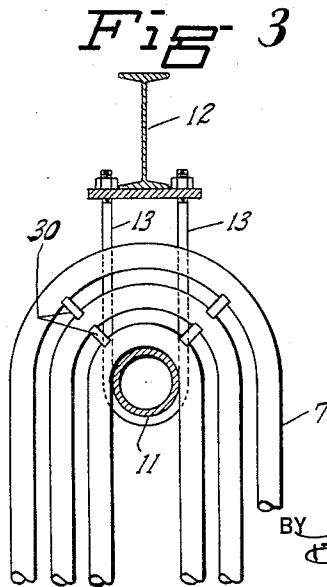
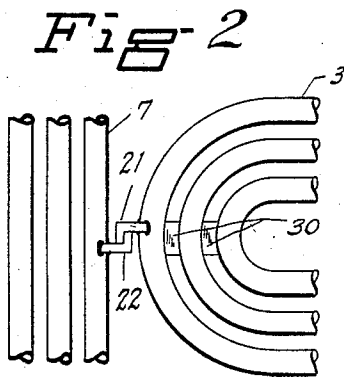
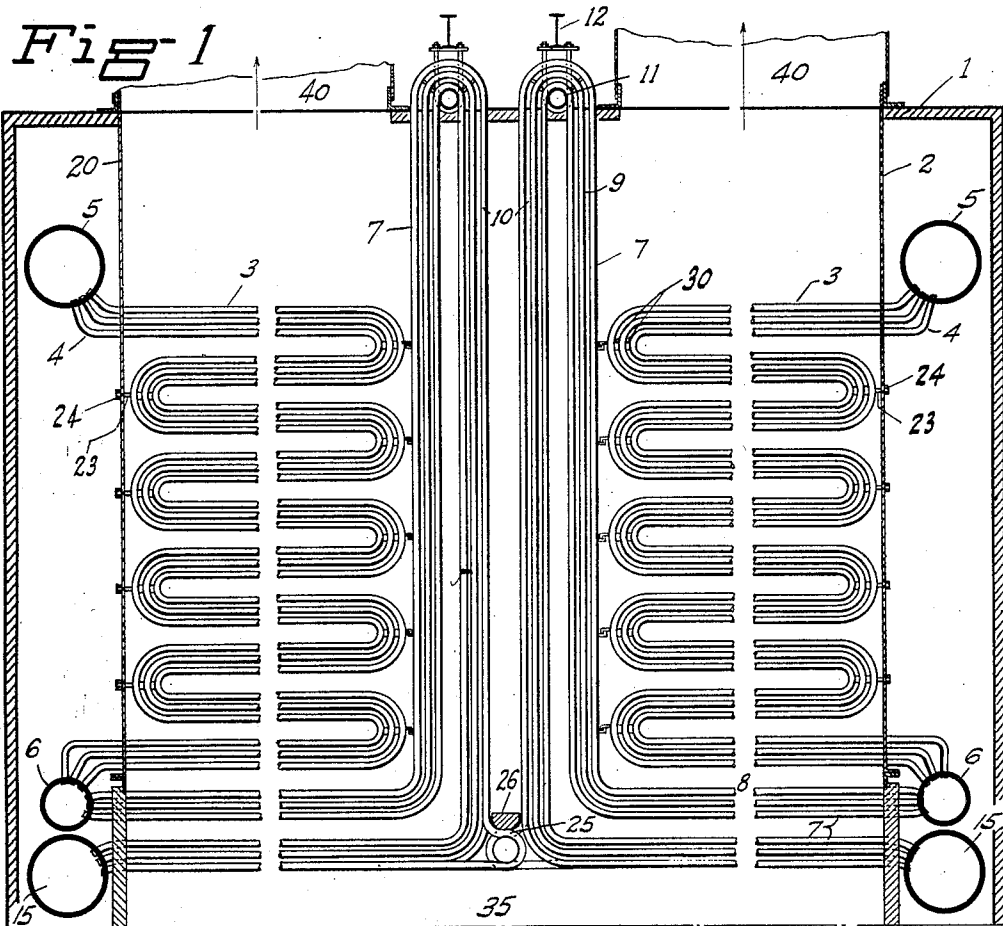
Jan. 17, 1933.

H. J. KERR ET AL

1,894,692

TUBE SUPPORT

Filed Feb. 18, 1931



INVENTOR
Howard J. Kerr and
Charles U. Savoye
BY *Ben. R. Newcomb*
ATTORNEY

UNITED STATES PATENT OFFICE

HOWARD J. KERR, OF WESTFIELD, AND CHARLES U. SAVOYE, OF HACKENSACK, NEW JERSEY, ASSIGNORS TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY

TUBE SUPPORT

Application filed February 18, 1931. Serial No. 516,559.

This invention relates to heat transfer devices, and more particularly to heat transfer devices in which groups of tubes of considerable length may be adequately supported within a casing, in which ordinary structure supports are unsuitable due to the high temperature gases to which they are exposed. Such heat transfer devices might be economizers, superheaters, reheaters, or any other device in which tubes are exposed to gases at high temperatures.

An object of the invention is to provide a vapor heating device in which a group of tubes extends interiorly of a casing and is suitably supported thereby and by tubes located in the interior of the casing at an angle to the first named tubes.

Another object of the invention is to provide an effective support for tubes within the casing of a heat transfer device.

A specific object of the invention is to provide a heat transfer device within a casing, characterized by groups of tubes formed into loops disposed within the casing with alternate loops supported by the casing side and other loops supported by a group of tubes in series therewith which in turn are supported at the top of the casing.

Other objects will be apparent to those skilled in this particular art from the description in the specification in connection with the appended drawing in which—

Fig. 1 is a side view of a reheater illustrative of the invention;

Figs. 2, 3 and 4 are side views of illustrative details of the invention.

In the embodiment of the invention that has been chosen for purposes of illustration, there is shown in Fig. 1 a reheater illustrative of the invention. A group of tubes 3 is located within a casing 1 adjacent a side wall 2 thereof. The tubes 3 extend in a horizontal direction well within the casing and are made up of a plurality of loops which extend in a series of return bends down through the casing. The inlet ends 4 of the tubes are connected to an inlet header 5, and the outlet ends thereof are connected to an auxiliary header 6. The headers 5 and 6 are located outside the casing and are shielded

from combustion gases therein by the side wall 2.

A second group of tubes 7 of the same cross-sectional diameter as the tubes 3 is connected to the auxiliary header 6 and has a leg 8 parallel to the bottom row of tubes 3. Beyond the interior ends of the tubes 3, the tubes 7 are bent upward and extend at right angles to the tubes 3 to the top of the casing 1. At the top of the casing 1 these tubes are looped downward for a distance slightly beyond the horizontal leg 8, at which point they are bent at right angles and extend parallel to the leg 8, through the bottom of the side wall 2, and are connected to an outlet header 15. The tubes 7 in their upper portion are looped around a supporting member 11 outside the casing, which is suspended by hangers 13 from an I-beam 12.

Similar tubes and headers with supporting structure are provided on the other side of the casing adjacent the side wall 20. The several elements have been given the same reference characters as the elements just described, and since their assembly is the same, further description is thought to be unnecessary.

The alternate loops of the tubes 3 and the outer row of the vertical section of the tubes 7 have oppositely faced lugs 21 and 22 welded thereto in good thermal contact therewith. The lugs 21 on the loops of the tubes 3 engage the lugs 22 on the tubes 7, so that the tubes 7 serve as a support therefor. This structure is shown in detail in Fig. 2.

The sides of the loops adjacent the walls of the casing have members 23 welded thereto, which extend through the casing wall and are secured to the outer face thereof by nuts 24 threaded thereon. This supporting structure is shown in detail in Fig. 4.

The innermost row, with respect to the walls of the casing, of both groups of tubes 7, near the bottom thereof, has alternate tubes bent inwardly and then looped, and these loops form a cradle 25 for a baffle 26. This baffle 26 closes the short circuit lane between the two groups of tubes 7 and deflects combustion gases across the tubes 3 and 7.

The suspension support of the tubes 7 is

shown in detail in Fig. 3 and, as before mentioned, includes a member 11 about which the tubes are looped, suspended by hangers 13 from an I-beam 12. This supporting structure is disposed outside the casing and is shielded from combustion gases at high temperatures by the casing roof.

Spacer members 30 are provided between tubes at the looped portions and prevent distortion of the loops during the operation of the reheater. These spacers serve to keep the tubes making up the several loops in correct spacial relation with each other.

In the operation of this device, combustion gases from a source 35 sweep successively across the horizontal legs of the tubes 7, and the horizontal portions of the tubes 3. A portion of the gases sweep along the vertical legs of the tubes 7. When the combustion gases in the center of the device strike the baffle 26 they are deflected outwardly so that the short circuit lane between the two groups of tubes 7 is largely eliminated. After crossing the tubes enumerated, the combustion gases pass from the casing 1 through the gas outlets 40.

The vapor to be heated is admitted to the inlet headers 5 and from there flows through the tubes 3 in a generally counterflow direction, with respect to the combustion gases, to the auxiliary outlet headers 6. From there the vapor flows through the horizontal legs 8 of the tubes 7, up the vertical legs 9, around the loops at the top of the casing, down the vertical legs 10 and through the other horizontal legs 8 to the outlet headers 15.

By virtue of this arrangement of heat transfer elements, the vapor to be heated is effectively exposed to combustion gases at high temperatures, and at the same time the groups of tubes 7, connected in series with the groups of tubes 3, for a portion of their length serve as a support therefor, and the heat absorbing vapor being circulated through the system serves to keep the supporting portions of these tubes within safe temperature limits.

This invention permits the mounting of tubes of considerable length in a heat transfer device, as some of the heat transfer elements of the device are provided as a support for the interiorly disposed portions of the tubes and they may be safely exposed to combustion gases at high temperatures without injury thereto. The suspended tubes which constitute the main portion of the supporting structure contain the heat absorbing medium circulated through the system, and the lugs attached to the two groups of tubes are in good thermal contact therewith; hence, the supporting elements are cooled and will have long life under ordinary operating conditions.

While a specific apparatus has been described as illustrative of the invention, it is

understood that changes, substitutions, additions and omissions may be made within the spirit of the invention as defined by the appended claims.

What we claim is—

1. In a heat transfer device, a casing, a plurality of tubes formed into loops and disposed within said casing, an inlet and an auxiliary outlet header to which the inlet and outlet ends of the tubes are connected, and a second group of tubes connected to the auxiliary outlet header and extending parallel to the first named tubes for a portion of their length and at right angles thereto in a loop extending to the top of the casing, with a support for said last named tubes at the top of the casing, alternate loops of said first named tubes being supported on the right angle section of said last named tubes.

2. In a heat transfer device, a casing, groups of tubes disposed interiorly thereof formed into loops with their outer loops supported on the sides of the casing, and other groups of looped tubes having sections at right angles to the first named groups supporting the interior loops of the first named groups.

3. In a heat transfer device, a casing, a group of tubes extending within the casing from one side thereof and having looped unsupported immersed portions, and a second group of tubes in series therewith having a looped section at right angles thereto, the innermost portions of the first named tubes being secured to and supported by said last named tubes.

4. In a heat transfer device, a casing, a group of horizontal tubes extending interiorly of the casing having unsupported vertically looped inner portions, and a second group of tubes having a section at an angle thereto supporting the inner portions of the first named tubes.

5. In a heat transfer device, a casing, groups of tubes extending interiorly of the casing, and groups of tubes having sections at an angle thereto supporting the inner portions of the first named tubes, alternate tubes of said last named groups being looped to form a support for a baffle wall.

6. In a heat transfer device, a casing, a plurality of tubes formed into loops, a group of looped tubes at right angles to the first named tubes, the loops of the first named group of tubes being alternately supported on the casing and tubes of the last named group.

7. In a heat transfer device, a casing, a plurality of tubes formed into loops, a group of tubes in series with said tubes and at right angles thereto, the loops of the first named group being alternately supported on the casing and tubes of the last named group.

8. In a heat transfer device, a casing, a plurality of tubes formed into loops, a group

of looped tubes at right angles to the first named tubes and having their looped ends suspended at the top of the casing, the loops of the first named group being alternately supported on the casing and on vertical portions of the tubes of the last named group.

9. In a heat transfer device, a casing, a plurality of tubes formed into loops, a pair of headers in which the ends of said tubes are expanded, a group of tubes having one end expanded in a header common to both groups and extending for a portion of its length at right angles to the first named group and suspended at the top of the casing, the loops of the first named group being alternately supported on the side of the casing and right angle portion of the last named tubes.

10. In a heat transfer device, a casing, a plurality of tubes disposed within the casing and extending in downward sequence in a plurality of return bends, and a group of tubes in series with the first named tubes and at right angles thereto, the bends of the first named group being alternately supported on the casing and tubes of the last named group.

11. In a heat transfer device, a casing, and a plurality of tubes formed into loops within the casing, including a series of horizontal return bend loops arranged in a vertical tube bank.

12. In a heat transfer device, vertically spaced inlet and outlet headers, a tube having its ends connected to said headers and having an intermediate portion formed with a series of loops, and a second looped tube having a substantially vertical portion arranged adjacent to looped portions of said first named tube and having means for supporting the same.

13. In a heat transfer device, a heating gas conduit, groups of substantially vertical tubes in said conduit, adjacent tubes of said groups having overlapping looped portions, and a baffle in said conduit and supported on said looped tube portions.

HOWARD J. KERR.
CHARLES U. SAVOYE.

50

55

60

65

CERTIFICATE OF CORRECTION.

Patent No. 1,894,692.

January 17, 1933.

HOWARD J. KERR, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 96, claim 3, for "immersed" read "innermost", and line 98, strike out the word "looped"; same page, line 106, claim 4, before "section" insert the word "looped"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of April, A. D. 1933.

M. J. Moore,

(Seal)

Acting Commissioner of Patents.