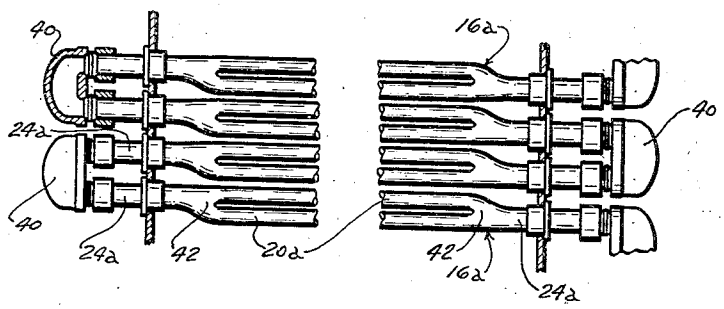
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SYMMETRICAL HEATING UNIT

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SYMMETRICAL HEATING UNIT

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My invention relates to heat exchangers and aims to provide a novel arrangement of parallel tubes having return bend connections and with clean-out openings such that the number of clean-out openings need not be greater than the number of tubes while each of the tubes may be inspected and cleaned.

The novel features of my invention are pointed out in the appended claims. In order, however, that my invention, together with the objects and advantages thereof may best be understood, I will now describe in detail, in connection with the accompanying drawing, two forms of apparatus in accordance with my invention selected, by way of example from a number of possible embodiments thereof.

In the drawing:

The figure is a fragmentary elevation in section of a form of heat exchanger within my invention.

In many types of heat exchangers such, for instance, as economizers for heating feed-water for boilers and tube stills for petroleum oil, it is necessary or desirable that a tubular unit for conveying the fluid to be heated shall have clean-out openings permitting access to the interiors of the tubular elements or pipe lengths of the units.

In the ordinary arrangement, there are twice as many clean-out openings as there are straight tube lengths. Such an arrangement requires an unnecessary amount of labor in breaking and remaking the numerous joints. It has been proposed to reduce the number of openings and joints by one-half by using forged return bends having clean-out openings at the ends of extension throats projecting from the return bends. As previously proposed, however, the arrangement using forged return bends has been impractical for installations having straight pipe runs of any considerable length for the reason that the clean-out openings were placed, supposedly necessarily so, in the center of the return bends so that a given clean-out opening was not co-axial with either pipe run connected thereto and a pipe could not be cleaned therethru. In the arrangements in accordance with my invention, the difficulty just mentioned is avoided.

In the figure I have illustrated an arrangement having units 16A, 16A, each of which includes only 2 pipe lengths or elements 20A, 20A. Units 16A have long throats 24A, 24A, each unit having such a throat at both ends. The two throats 24A at given ends of a pair of adjacent units 20A are connected by a removable return bend 40. Similar return bends 40 connect the other ends of the two units in the said pair to the units lying on each side thereof so that the flow of fluid within the units passes therethru in series. The individual elements 20A of given units 16A and are connected together at both ends by integrally forged couplings 42. The couplings 42, however, serve merely as bifurcations of the throats 24A so that the fluid passes thru both the elements 20A of a given unit 16A in parallel. It will be noted, however, that the throat 24A at one end of a given unit is offset from the center of the coupling 42 from which it extends so as to lie substantially in alignment with one of the elements 20A of such unit. The throat 24A at the other end of such given unit is offset in the opposite direction from the center of the coupling 42 from which it extends so as to lie substantially in alignment with the other element 20A of the same unit. Throats 24A permit a view of the entire inner surface of element 20A for cleaning and inspection. It will be seen, therefore, that by removing the return bends 40 the elements 20A can be readily cleaned, one-half thru the throats at one side of the economizer and one-half thru the throats at the other side.

What I claim is:

1. In a heat exchanger, a plurality of units each having two parallel pipe lengths united at both ends of the unit into common throats, the throat at one end of a given unit arranged to permit inspection of substantially the entire inner surface of one of said lengths and the throat at the other end of said given unit arranged to permit inspection of substantially the entire inner surface of the other of said lengths, return bends arranged to connect said throats for series flow of fluid thru the units and means permitting the removal of said bends for cleaning and inspecting said lengths.

2. An element for heat exchangers having two parallel pipe lengths united at both ends of the element into common throats, the throat at one end of the element having its axis substantially in alignment with that of one of said lengths, and the other throat having its axis substantially in alignment with other of said lengths.

3. In a heat exchanger, an element comprising two spaced throats connected by bifurcated parallel pipe lengths, one of said throats substantially in alignment with one of said lengths and the other substantially in alignment with the other length.

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