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APPARATUS FOR THE EXCHANGE OF HEAT

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Fig. 1.

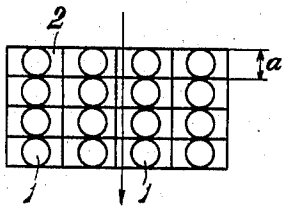
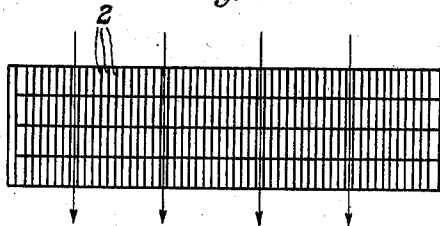


Fig. 2.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR THE EXCHANGE OF HEAT

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In Great Britain May 6, 1938

1 Claim. (Cl. 257—241)

This invention relates to improvements in tubular heat exchangers such as economizers, and has for its primary object the production of tubular apparatus for the exchange of heat between fluids of a better and more economical construction than hitherto.

Tubular heat exchangers are well known in which a plurality of tubes furnished with square or rectangular ribs or wings are arranged adjacent to one another, so that the heating gases are divided into individual streams. In some cases, tubes of an elongated cross section and having wing ribs on their longer sides have been proposed, in which the internal cross section of said tubes is bounded by segments of two or more overlapping or intersecting circles.

It has also been proposed to furnish the tubes of heat exchangers with square or rectangular corrugated ribs, said ribs being corrugated in a direction parallel to the direction of flow of the flue gases, and so arranged as to guide the gases along sinuous paths from one end of the economizers to the other, whereby the gas streams are subject to variations both in velocity and direction of flow. It has further been proposed in such a heat exchanger to fill up or form the dead gas spaces between the tubes in each row by curved walled filling in pieces to form a corrugated surface for the gas flow.

With tubular heat exchangers embodying the present invention not only is building space economized by materially reducing the vertical height of the apparatus, but the draught, and therefore the velocity of the heating gases, is increased with a consequent better utilization of the heat. Moreover due to the particular construction employed, the ribs or wings are more readily cleaned than with known apparatus, particularly when the latter employ corrugated ribs or wings.

According to the present invention a tubular heat exchanger comprising a plurality of superposed tubes each of which is provided with plane rectangular ribs or wings is characterized in that the sides of said ribs or wings parallel with the direction of flow of the heating gases are

equal in height to the diameter of the tubes in each vertical row so as to provide passages for the heating gases only between adjacent perpendicular rows of tubes in order to reduce the dead heating surfaces to a minimum without the use of filling pieces formed integrally with or mounted on said tubes exteriorly on said tubes.

This invention will be now more particularly described making reference to the accompanying drawing in which:

Figs. 1 and 2 are diagrammatic views in end and side elevation respectively of a tubular heat exchanger embodying the present invention, the parallel vertical lines of Fig. 2 designating the lateral faces of the fins.

Referring more particularly to Fig. 1 the tubes 1 which are of circular cross section both interiorly and exteriorly are superposed in vertical rows. The shorter sides *a* of each rib or wing 2 are arranged parallel with the direction of flow of the heating gases, and are so reduced in height that the tubes 1 in each vertical row are practically in contact with one another so as to provide passages for the heating gases only between adjacent vertical rows of tubes, thereby obviating the use of filling pieces formed integrally with or mounted on said tubes in order to reduce the dead heating surfaces to a minimum.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed,

What I claim is:

A heat exchanging device comprising a plurality of superposed pipes forming adjacent pipe rows, said pipes being provided with plane rectangular fins extending parallel with the flow direction of the heating gases, each pipe of a row being arranged in direct lengthwise contact with the adjoining pipes of said row and with its fins directly abutting the fins of said pipes and with the fins of the pipes of the adjacent side rows so as to provide separate closed passages for the heating gases between adjacent perpendicular rows of pipes and to reduce without the use of filling pieces the dead heating surfaces.

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