Dec. 27, 1955 C. O. E. HÄGER 2,728,561

HEAT EXCHANGER

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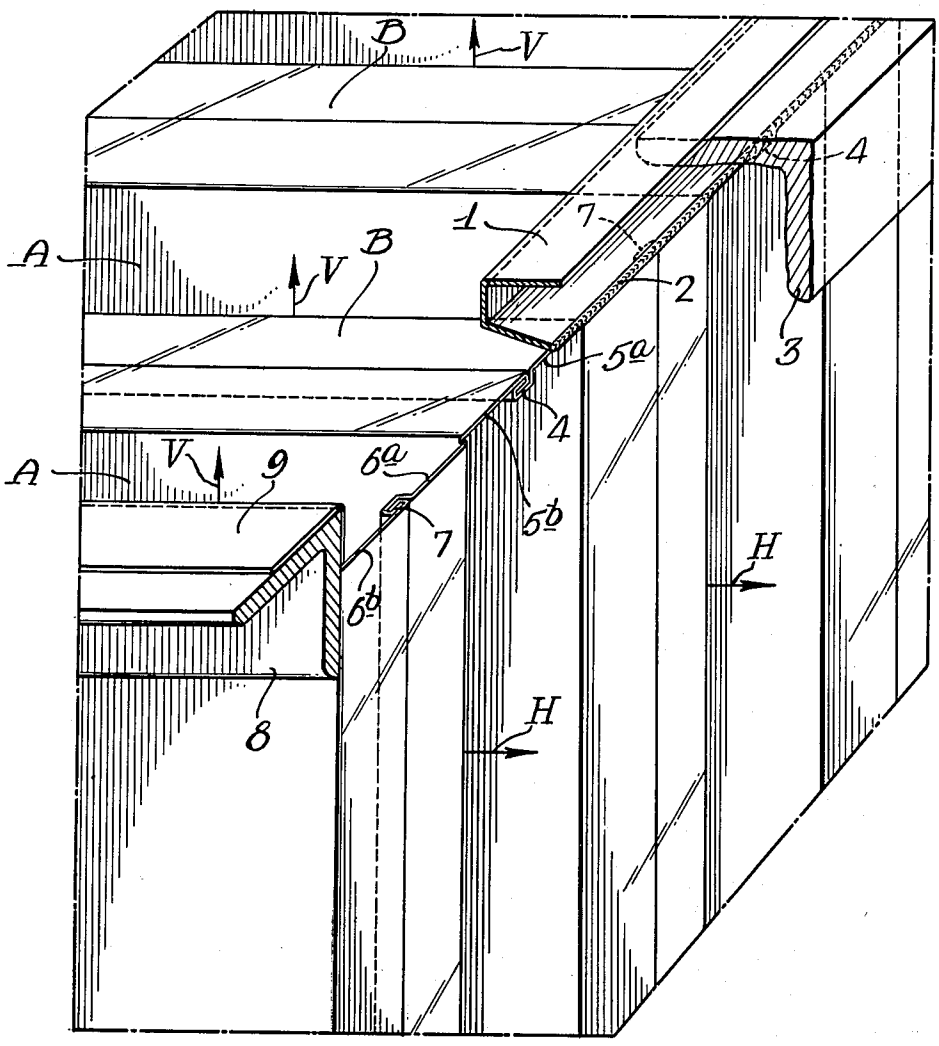

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HEAT EXCHANGER

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1 Claim. (Cl. 257—245)

The present invention relates to a heat exchanger, and has particular reference to a heat exchanger of the cross-flow type construction of a plurality of equally spaced parallel plates having corresponding pairs of their opposite edges bent toward one another and seamed together to provide opposite side walls cooperating with adjacent plates to define a series of channels for the passage of two heat exchange media, the side walls of alternate channels being disposed at right angles to the side walls of the other channels so that flow of one heat exchange medium through said alternate channels takes place at right angles to the flow of the other medium through said other channels.

In heat exchangers of this general type, it has always been difficult to prevent leakage of the heat exchange media between the edges of two mutually adjacent channels, and numerous attempts have been made in the prior art to avoid this leakage, the Lewis Patent No. 2,064,928 of December 22, 1936, being an example of a packing joint for preventing such leakage in this type of heat exchanger. In accordance with the principle of heat exchange involved in heat exchangers of this type, the adjacent channels convey two separated media, between which media heat is exchanged from the heating medium to the medium to be heated directly through the plates which define the channels, and it will be obvious that any direct mixing of the media is to be avoided, as such mixing would result in a reduction of the efficiency of the heat exchanger. The present invention has as one of its objects, the provision of means for eliminating leakage between the edges of two mutually adjacent channels.

The present invention is characterized by the provision of a U-shaped channel member disposed along a marginal edge of the heat exchanger and extending transversely of all of said channels, said U-shaped channel member having its open side facing outwardly with one of its legs resting on the side walls defining alternate channels, and said one leg having its free or outer edge extending coincident to a line along the marginal edge of the heat exchanger and welded along said marginal edge to the end edges of the walls defining said channels, the U-shaped channel member and the welded seam serving to seal the marginal edge of the heat exchanger and to prevent leakage of the heat exchange media between the edges of two mutually adjacent channels.

The present invention is also characterized by the provision of a channel iron of L-shaped cross section, one flange of which is passed through the open side of the aforementioned U-shaped channel member and is disposed between the legs thereof, and the other flange of which is provided with spaced holes for the reception of bolts or like fastening means, whereby said channel iron may be secured to a suitable framework or support and thus serve as a means for supporting the heat exchanger in operative position.

The invention will now be more fully described in

connection with the accompanying drawing, in which drawing the single figure is a fragmentary perspective view of a heat exchanger made in accordance with the present invention.

Referring more particularly to the accompanying drawing wherein for the purpose of illustration I have shown a preferred embodiment of my present invention, the reference letters A designate the channels or spaces of the heat exchanger through which the passage of the heat exchange medium has a vertical direction of flow as indicated by the arrows V. The reference letters B designate, on the other hand, the channels or spaces of the heat exchanger through which the passage of the heat exchange medium has a horizontal direction of flow as indicated by the arrows H. The said channels are defined by a plurality of equally spaced plates having corresponding pairs of their opposite edges bent toward each other as indicated by reference characters *5a*, *5b*, and *6a*, *6b*, and seamed or otherwise secured together as indicated by reference numerals **4** and **7**, respectively, to provide opposite side walls cooperating with adjacent plates, this construction providing a series of channels for the passage of two heat exchange media. It will be noted that the side walls which define alternate channels in the series are disposed at right angles to the side walls which define the other channels so that flow of one heat exchange medium through said alternate channels takes place in a direction at right angles to the direction of flow of the other medium through said other channels, all as clearly indicated by the arrows V and H appearing in the accompanying drawing.

A U-shaped channel member **1** extends along a marginal edge of the heat exchanger and is disposed transversely of all the channels, said U-shaped channel member having its open side facing outwardly, and having one of its side flanges resting on the side walls of alternate channels B, B. The free or outer edge of the said one flange extends coincident to a line along said marginal edge and is welded as indicated by the reference numeral **2** to the alined edges *5a*, *5b* and *6a*, *6b* of the side walls of channels B and A, respectively. Hence, the U-shaped channel member **1** and the welded seam **2** serve to seal the marginal edges of the channels A and B of the heat exchanger and prevent leakage of the heat exchange media between the edges of two adjacent channels.

An angle iron **3** of L-shaped transverse cross section is disposed adjacent the said one marginal edge of said heat exchanger and has its horizontal flange passed through the open side of the U-shaped channel member **1** to a position wherein at least the outer edge portion of said horizontal flange occupies a position within, and longitudinally of, said U-shaped channel member. The other flange of angle iron **3**, i. e. the vertical flange as viewed in the accompanying drawing, projects downwardly in spaced parallel relation to the adjacent side of the heat exchanger below said marginal edges, said downwardly projecting flange having holes therein by means of which the angle iron may be bolted or otherwise secured to a framework or other supporting structure, whereby said angle iron, due to its engagement between the flanges of the U-shaped channel member **1**, serves as a means for supporting the heat exchanger.

As an additional means for supporting the heat exchanger, I extend the outer, end wall of the outermost channel A above the top of the heat exchanger and bend this extended portion outwardly at right angles to the plane of said outer end wall to form an outwardly extending, horizontal flange **9** which overlies the horizontal flange of a second angle iron **8** secured to a suitable framework or support.

By virtue of the construction above described it is unnecessary to perforate or puncture the walls defining the channels A or B for the reception of bolts or other fastening means, as is the usual case in prior art devices of this general character as exemplified, for example, by the patent to Lewis 2,064,928 above referred to. Hence, it is possible to employ the features of the present invention with heat exchangers in which the channels are defined by relatively thin plates, which is a decided advantage from the standpoints of economy and ease of manufacture.

While I have illustrated and described herein the construction existing at the marginal edge of one corner only of the heat exchanger, it is to be understood that the invention may be, and preferably is, applied along the marginal edges of all corners of the heat exchanger.

It is to be understood that the form of my present invention illustrated and described herein, is to be taken as a preferred embodiment of the same, and that various changes may be made in the construction and arrangement of parts without departing from the spirit of my invention or from the scope of the subjoined claim.

I claim:

In a cross-flow heat exchanger, a plurality of equally spaced parallel plates having corresponding pairs of their opposite edges bent toward one another and seamed together to provide opposite side walls cooperating with adjacent plates to define a series of channels for the passage of two heat exchange media, the side walls of alternate channels being disposed at right angles to the side walls of the other channels so that flow of one heat exchange medium through said alternate channels takes place at right angles to flow of the other medium through said other channels, a U-shaped channel member secured along one marginal edge of the heat exchanger and extending longitudinally along said marginal edge and transversely of all of said channels, said U-shaped channel member having its open side facing outwardly with respect to the adjacent side of said heat exchanger and having one of its flanges resting on the side walls of the alternate channels and said one flange having its free edge extending coincident to a line along said one marginal edge and welded to the end edges of the side walls defining said channels, and an angle iron of substantially L-shaped transverse cross section having one flange thereof positioned inwardly of the open side of said U-shaped channel member and extending longitudinally of said U-shaped channel member, the other flange of said angle iron being operable to support said heat exchanger from a framework or support.

References Cited in the file of this patent

UNITED STATES PATENTS

2,064,928	Lewis	Dec. 22, 1936
2,539,870	Simpelaar	Jan. 30, 1951