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ARRANGEMENT IN HEAT EXCHANGERS OF THE PLATE-TYPE

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ABSTRACT OF THE DISCLOSURE

Heat exchangers of the plate-type having a packet of thin, spaced heat transmission plates of thin sheet metal and provided with aligned passage holes or ports around which adjacent plates are pair-wise welded together. The plates of the heat exchanger for two sets of channels isolated from and alternating with each other, the channels of one set communicating with one set of ports and the channels of the other set communicating with the other set of ports.

Each of the ports in the plates is flanged in the same direction in the packet of plates in the form of a conically converging collar. In each set of aligned passage holes or ports the collars are alternately long and short, the free ends of the long collars being telescoped into the short collar on the next adjacent plate, so that at ports around which the adjacent plates are welded together the long collars bridge the interspaces between the plates. Such construction permits access through the series of ports to every second of the interspaces, which are closed to the outside, between the heat exchanging plates. The collars are fusion welded together on and around their opposing side surfaces; such welding is readily carried out by reason of the provision of the above described alternating long and short interfitted collars.

The invention will be further described below with reference to the accompanying drawing wherein:

FIG. 1 illustrates a plate packet according to the invention in cross section along line I—I in FIG. 2;

FIG. 2 illustrates a view of the plate packet according to FIG. 1 taken from the left side of that figure; and

FIG. 3 illustrates, on larger scale, a segment III—III of FIG. 1.

All figures are merely schematic and are intended as examples only without limiting the invention. Identical details in the various figures are indicated with the same reference characters.

As can be seen in FIGURES 1 and 2 four series (two designated *a* and two designated *b*) of aligned ports **1** and **2** alternately extend through the individual plates **3**. All of the ports are flanged in the same direction in the packet in the form of conically converging collars, **1***a* in ports **1** and **2***a* in ports **2**. Collars **1***a* in series *a* bridge across every second interspace **4** between the plates and in series *b* they bridge across the remaining interspaces **5** between the plates. These collars **1***a* are fitted into their respective adjacent collars **2***a* and leak-tightly joined to them by means of fusion weld **6** (see FIG. 3). In this way the port series *a*, which communicate with interspaces **5**, are closed to interspaces **4** and port series *b*, which communicate with interspaces **4**, are closed to interspaces **5** in accordance with the desired scheme in plate-type heat exchangers where a first heat exchange medium is led via two hole series through every second interspace between the plates and the other heat exchange medium is led via the other two hole series through the remaining interspaces.

The interspaces as well as the lengths of collars in relation to the diameters of the ports have been greatly exaggerated in the drawing in order to clearly illustrate the principle of the invention.

Fusion welds **6** between the opposing side surfaces of the collars form strong and reliable joints (for example much superior to what can be achieved if instead attempts are made to fuse together the outer edges of the collars) and are produced suitably by means of electric resistance welding so that a continuous row or possibly a closely spaced row of spot welds is obtained.

While the plate packet is being built up, welds **6** are completed between the temporarily outermost collar pair which can be reached on both sides with electrodes as the plates one after another are assembled as shown to the right in FIG. 1; that is with the left-most plate in FIG. 1 used as the base plate.

Each plate is furnished around its outer edge with a flanged edge portion **7**. By overlapping each other these edge portions close the interspaces between the plates. Since these edge portions are angled in the same general direction in the plate packet as the collars of the ports one can weld together the overlapping portions with a fusion weld **8** in the same manner as fusion weld **6**. If instead there is used an ordinary lap weld at **9**, this weld can be accomplished after the packet plate is completely assembled because the weld locations are accessible from the outside. However, such a weld requires special care to avoid burning through the plates. Of course there is nothing to prevent the joining by other conventional methods, for example by welding in a fillet between the plates.

A major aspect of the invention, namely the arrangement of the welded joint around the ports, does not require any special arrangement for joining the outer edges of the plates. If however the system of lapped fusion welded edge portions is to be used (which results in the strongest weld and a uniform fabrication method) it is necessary as suggested above to have these edge portions directed in the same direction as the collars of the ports.

What I claim is:

1. A plate type heat exchanger for two fluid media, comprising a stack of a plurality of thin plates disposed in spaced at least generally parallel relationship, means for sealing the bordering edges of adjacent plates together to form a succession of closed fluid receiving channels, every second channel constituting a first set of channels adapted to receive a first one of said fluid media and the remaining channels constituting a second set of channels adapted to receive the second of said fluid media, the two sets of channels being isolated from each other, a set of inlet ports and a set of exhaust ports communicating with each channel of the first set of channels, and a set of inlet ports and a set of exhaust ports communicating with each channel of the second set of channels, the ports in each set thereof being aligned and being formed by a tapered collar on each plate disposed about an opening through the plate, the collars projecting and converging in the same direction with respect to the plates in the stack, alternate collars forming each set of ports being long, the remaining collars forming said set of ports being short, the free ends of the long collars being telescoped within the short collar on the next adjacent plate, the free ends of the short collars being spaced radially inwardly from the roots of short collars on the next adjacent plate to form said ports, and fusion welds sealingly connecting the telescoped contacting side surfaces of the long and short collars.

2. A heat exchanger according to claim **1**, wherein the means for sealing the bordering edges of adjacent plates together comprises a flange on the outer edge of each

plate, said flanges projecting from the respective plates in the same direction as the collars thereon, the flange on each plate overlapping and telescopically receiving at least a portion of the flange on the next adjacent plate completely therearound, and fusion welds sealingly connecting the telescoped contacting surfaces of the flanges of said plates.

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