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HEADER AND MANIFOLD

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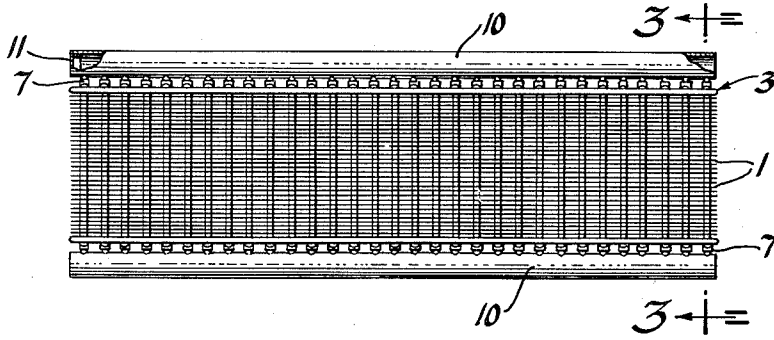


Fig. 1

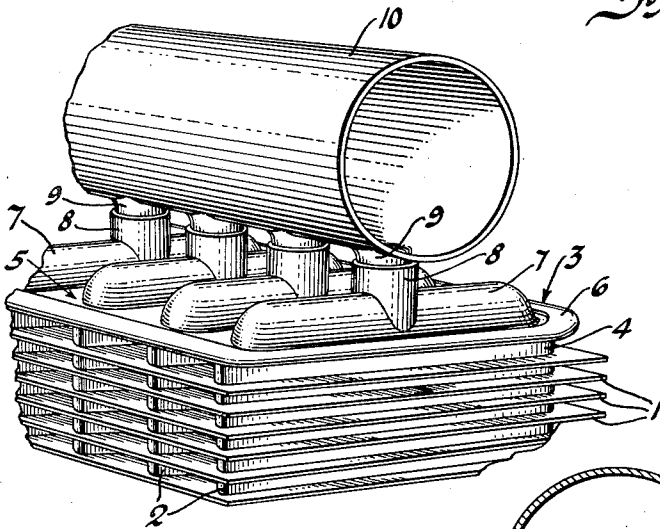


Fig. 2

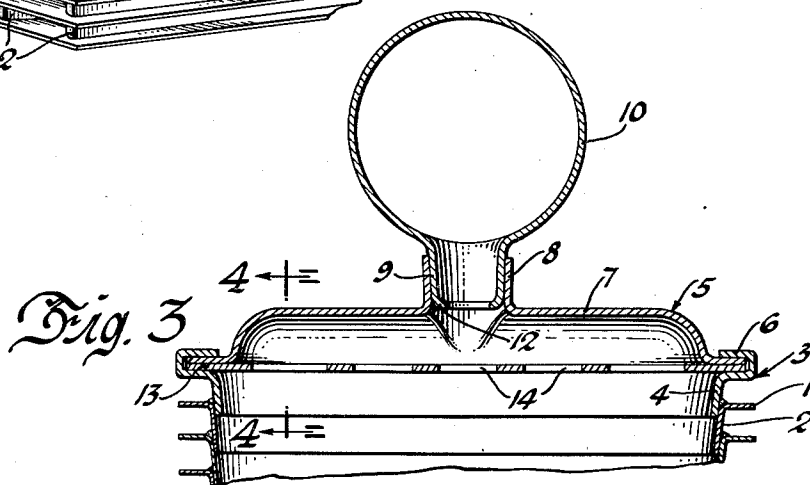


Fig. 3

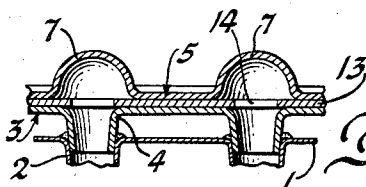


Fig. 4

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HEADER AND MANIFOLD

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6 Claims. (Cl. 257—154)

This invention relates to heat exchangers and particularly to an improved header and manifold construction. In the interests of low cost, light weight and ease of manufacture it is proposed to make an end structure of sheet metal having co-operating fluid flow formations therein which stiffen the parts and afford a durable assembly suitable for pressure systems.

An object of the invention is to provide a header for a nested tube core with tubular projections to fit in nested relation with the ends of the core passages, the whole interfitting assembly to be joined in the tube brazing operation.

A further object is to provide in a simple fashion, for uniform distribution of the heat exchange fluid to the several tube passages of the core by control in given order of the size or flow capacity of the communicating openings between the tubes and the manifold.

Additional objects and advantages will become apparent during the course of the following specification having reference to the accompanying drawing wherein Figure 1 is an elevation of an assembled heat exchanger; Figure 2 is an enlarged perspective view of an end portion of the assembly; Figure 3 is a large scale sectional view taken on line 3—3 of Figure 1, and Figure 4 is a section on line 4—4 of Figure 3.

The nested tube core involves a stack of fin plates 1, each having a number of tubular projections 2 which define openings through the plate. In the drawing the flanged openings are elongated transversely of the plate assembly and the dependent wall of each tubular projection 2 tapers inwardly so that its end can be fitted interiorly of the flanged opening in the next adjacent plate whereby the several nested tubular projections cooperate to form spaced passageways with the fin plates located in spaced relation to one another. To bond and seal the interfitting parts it is customary to braze the nested portions of the tubes.

To opposite ends of the core are fitted suitable end assemblies, the construction of which may be substantially the same and, therefore, but one needs to be illustrated in detail. The header plate 3 is of pressed metal and is provided at spaced intervals with dependent tubular projections 4 which have interfitting relation with the tubular projections 2 of an endmost core plate. In one instance the tubular projections of the header plate nest within the core passages while at the opposite end the plate projections are formed for the reception of the core tube projections. A complementary plate 5 also of pressed

sheet metal, is superposed on the header plate 3 and the two plates are joined together at their margins in any suitable fashion as, for example, by turning the edge of one over the other as at 6. In addition the adjoining parts may be sealed through the application of brazing material therebetween. At intervals in alignment with the projections 4 the plate 5 has pressed therein transverse embossments or ribs 7. Optionally and for reinforcement purposes, it is proposed to insert between the mating plates 3 and 5, a flat plate 13 having perforations or openings 14 for communicating the space within the ribs 7 with the tube sections 4. Between the sets of cooperating projections 4 and ribs 7, the two plates 3 and 5 are in flat contact with opposite faces of the plate 13 as seen in Figure 4, and the abutting surfaces are preferably bonded so as definitely to separate the core passages from one another.

In the top of each rib 7 is an opening defined by an upstanding outwardly flared wall 8 to receive therein the tapered nipple 9 of the header 10. The header may be formed in any suitable fashion as, for example, by forming the series of nipples 9 in a flat sheet and then bending the sheet to hollow cross section and joining the abutting edges by welding, seaming or the like. The interfitting walls 8 and 9, wedged one within the other, should be brazed together to insure against separation and leakage. The brazing of the several parts of the core and end assemblies may all be done in the same operation by applying brazing material adjacent the joints and placing the assembly in an oven according to well known practices. Stamped cups 11 may be inserted in the ends of the manifold tube 10 to close the same and the manifold can have applied to it any appropriate fitting connections for placing it in the heat exchange system.

The several spaced nipples 9 by which the manifold 10 is brought into communication with the core passages, may be so shaped as to control the distribution of the heat exchanging fluid and a convenient method of control will be to terminate the nipples in inturned annular flanges as seen at 12 in Figure 3. In other words, some of the inturned flanges may extend inwardly a greater distance than others to restrict to varying degree the flow capacity through the several nipples 9. In the case of the inlet header, for example, the size of the inturned flange 12 would be larger for greater restriction nearer the inlet fitting and would gradually become smaller as the distance increases away from the inlet fitting. In

some instances the inturned flange may be omitted completely and again in some instances the nipple may be formed as a closed cup in the event it is desired for any reason to cut off some of the core tubes from the heat exchanging circuit. Through this control of the flow capacity, proper distribution of pressure fluid throughout the whole of the core will be obtained.

We claim:

1. In a heat exchanger, a pair of complementary header plates, one having spaced openings for communication with the core and the other having opening aligned embossments therein, a manifold, and interfitting tapered tube formations on the manifold and embossments, the innermost formation in certain instances having its end flanged inwardly a predetermined distance for regulating tube capacity.

2. In a heat exchanger, a sheet metal header plate having a series of spaced tubular formations adapted to fit core tubes, a complementary sheet metal plate having embossments aligned with said tubular formations and each embossment having an upstanding tubular formation and a manifold having a series of nipples projecting therefrom and seating within the upstanding tubular formations.

3. In a heat exchanger, a pair of complementary pressed metal plates joined at their marginal edges, a series of tube formations on

one plate for nested engagement with core tube ends, a series of raised ribs formed in the other plate in alignment with said tube formations, a tapered tube formation in each rib and a manifold having spaced tapered tube formations in nested engagement with the tapered tube formations of said ribs.

4. In a heat exchanger, a core header plate having a series of spaced embossments for alignment with core tubes, a flanged opening in each embossment and a manifold having dependent nipples fitted to said flanged openings.

5. A header structure, including a series of superposed plates, a series of tube sections formed in one plate, a series of embossments formed in another plate and aligned with said tube sections and perforations in an intermediate plate aligned with said embossments and tube sections.

6. A heat exchanger header, comprising a pair of complementary pressed metal plates, tube sections pressed in one of said plates for nested engagement with core tubes, distributor embossments pressed in the other plate for cooperation with said tube sections and a reinforcing plate interposed between said plates and having openings therein for communicating said embossments with the tube sections.

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