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Continuation-in-part of application Ser. No.
862,596, Aug. 27, 1969, now abandoned.
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89,743

[56] **References Cited**

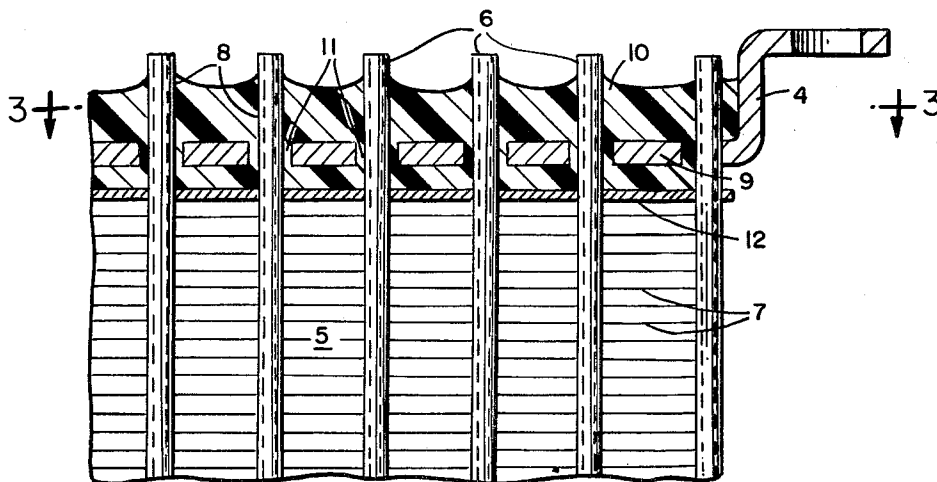
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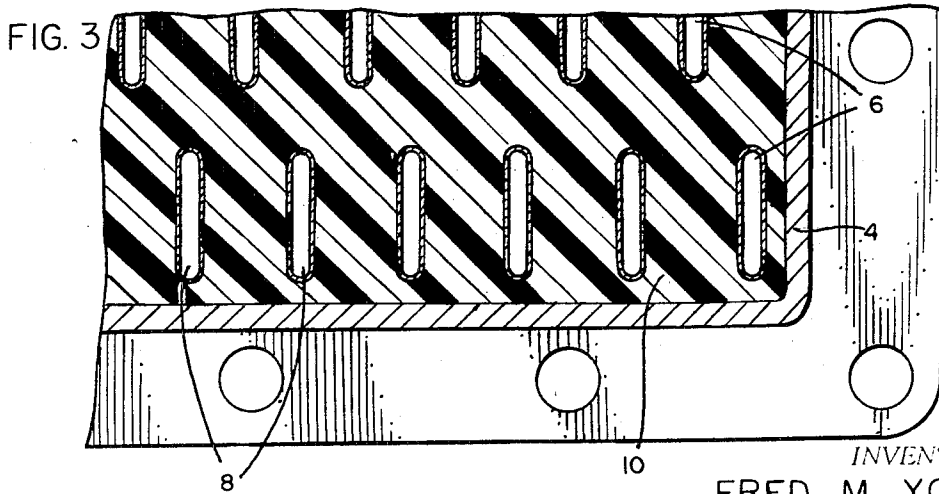
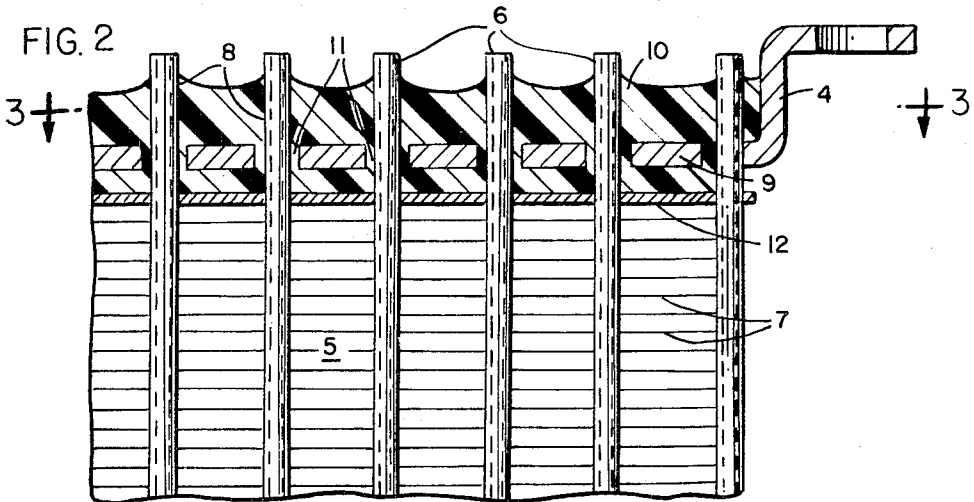
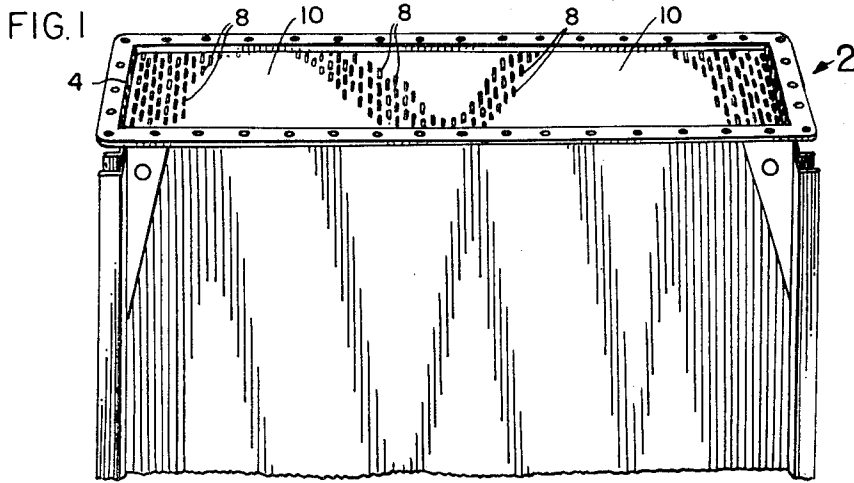
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[54] **PLASTIC BONDING OF HEAT-EXCHANGER
 CORE-UNITS TO HEADER-PLATES**
 3 Claims, 3 Drawing Figs.

[52] U.S. Cl..... **165/69,**
 165/79, 165/173, 165/178, 29/157.4
 [51] Int. Cl..... **F28f 9/04**
 [50] Field of Search..... 165/79,
 173, 178, 69; 29/157.4

ABSTRACT: The essential concept of this invention involves the use of a silicone substance, with "dish-type" headers for heat exchanger core units, for bonding the battery of tubes to the header plates so as to inhere a factor of flexibility when such heat exchangers are used with equipment that would subject the heat exchangers to the possibility of an excessive degree of vibration and some degree of expansion and contraction of the tubes.





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PLASTIC BONDING OF HEAT-EXCHANGER CORE-UNITSTO HEADER-PLATES

This application relates to the plastic bonding of a heat exchanger core unit to header plates, and is a continuation-in-part of prior application Ser. No. 862,596 filed Aug. 27, 1969, now abandoned.

The invention has to do with core units for heat exchangers of the type shown in U.S. Pat. No. 3,165,151 and No. 3,245,465. When heat exchangers having this type of core unit are used with certain types of earth transport equipment the bonds of the tubes to the headers, on occasion, are subject to such excessive strains as may weaken—possibly crack—conventional solder bonding of the tubes to the header plates.

The main objects of this invention, therefore, are; to provide for the bonding of the tubes and header plates with a non-metallic substance with sufficient ductibility as will absorb at least low-degree vibration; to provide a nonmetallic bonding supplement that has a high degree of resistance to strains that normally fracture the long standard type of metallic bonds; to provide for the use of such a bonding substance embracing the tubes above a supplemental plate positioned below the header plate in frictional embracement of the tubes; and to provide a bonding of this kind as will make highly economical, practical and reasonably durable the manufacturing and marketing of such equipment and very gratifying the use thereof by purchasers.

In the adaptation shown in the accompanying drawing;

FIG. 1 is a reduced size, perspective view of the upper portion of a heat exchanger wherein the "dish-type" header plates have the ends of the battery of tubes bonded thereto by the plastic substance disposed above an underpositioned plate and contactively embracing the tubes throughout the portions thereof above the plate;

FIG. 2 is an enlarged, vertical, cross-sectional view of a portion of the core unit shown in the circle of FIG. 1; and

FIG. 3 is a top plan view of what is shown in FIG. 1 as viewed from the plane of the line 3—3.

A heat exchanger embodying the foregoing concept, involves dish-type header plates 4—only one of which is indicated—with a core unit 5 consisting of a battery of tubes transversely spanned by radially disposed fins 7 with the upper portions 8 thereof extending through enlarged openings 11 a considerable distance above the base 9 of the respective

header plates 4 and embedded in a plastic bonding substance. This bonding substance extends a considerable distance above the base 9 of the header plate 4 and is embedded in a plastic bonding substance 10 above the supplemental, planar plate 12.

As best shown in FIG. 2 the flat tubes 6 extend up through enlarged openings 11 in the header plate 4, with their upper ends 6 extending above the base 9, of the respective header plate, almost to the plane of the upper edge of the bordering rim of the header plate 4.

The supplemental plate 12 is positioned a short distance below the base 9 of the dish-type header plate 4. The openings in this plate 12 are so contoured as to have frictional contact with the tubes 6.

The bonding substance fills in the major portion of this dish-type space around all of the tubes 6 and up to a point a bit short of the open ends of the tubes.

In this base part 9, of the FIG. 2, the tube openings are shown larger in area than the cross-sectional form of the tubes 6. The supplemental plate 12 is positioned closely adjacent to the under face of the header plate 4. Such supplemental plate 12 fits snugly over the tubes 6. The bonding substance 10 embraces the exterior of the tubes above the plate 12 to a point somewhat below the plane of the rim of the respective header plate 8.

Variations and modifications in the details of structure and arrangement of the parts may be resorted to within the spirit and coverage of the appended claims.

I claim:

1. A heat exchanger core unit comprising, a dish-type header plate having a base with a plurality of openings therethrough a plurality of finned tubes extending loosely through said openings and having ends located a distance from said base, a supplemental plate having a plurality of openings through which said tubes extend and in embracing frictional contact with said plate, said plate located on that side of said base which is opposite to said tube ends, and a solidified plastic substance in said dish-shaped header plate and bonded to said tubes therein and to said supplemental plate.
2. A heat exchanger core unit as set forth in claim 1 wherein the plastic substance is in the nature of silicone rubber.
3. A heat exchanger core unit as set forth in claim 2 wherein the tubes are of elongated contour transversely thereof.

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