Jan. 27, 1948. D. W. CHRISTENSEN 2,434,988

HEAT EXCHANGE CORE AND AIR DUCT

Filed Sept. 25, 1943 2 Sheets-Sheet 1

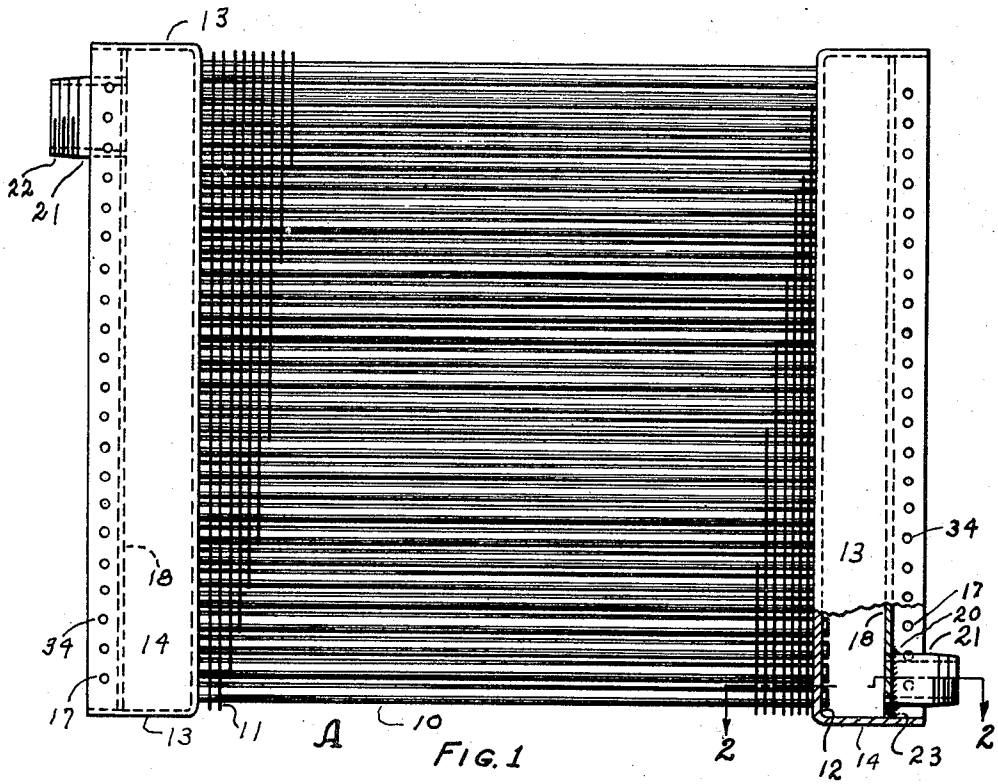


FIG. 1

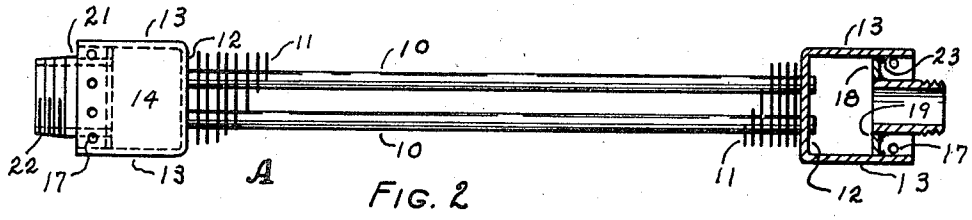


FIG. 2

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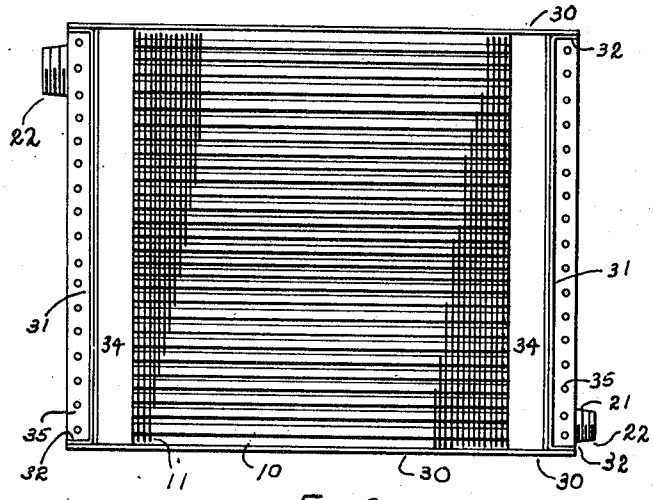


FIG. 3

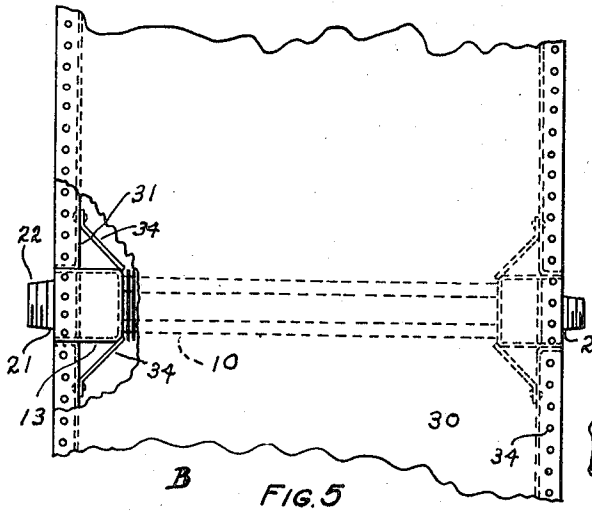


FIG. 5

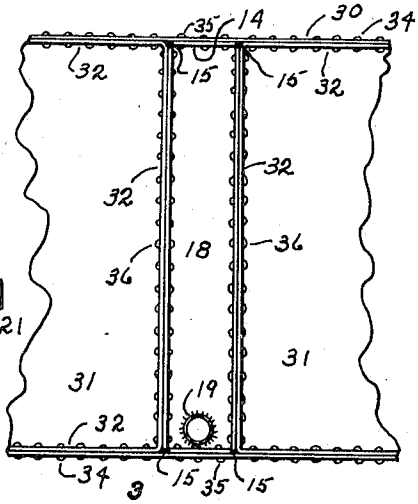


FIG. 4

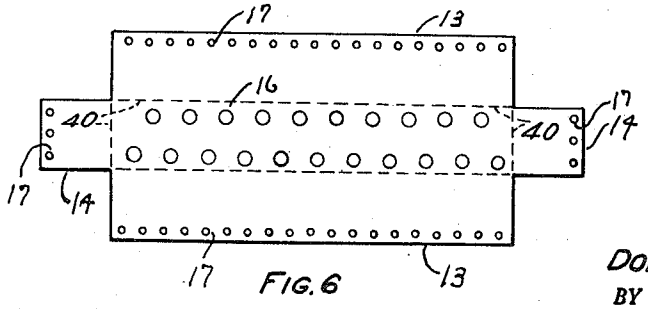


FIG. 6

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UNITED STATES PATENT OFFICE

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HEAT EXCHANGE CORE AND AIR DUCT

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Application September 25, 1943, Serial No. 503,848

3 Claims. (Cl. 257—137)

1

The present invention relates to heat exchange cores or radiators and has for an object forming the headers preferably from prefabricated flat sheet steel and securing the parts together by welding or brazing.

An important object of my invention generally stated is to provide a core which is light, strong, efficient and easily manufactured at low cost.

An object of the present invention is to provide a core having headers which can be conveniently connected to or in an air duct of simple and efficient design either for testing or for permanent equipment and wherein the duct is simple strong and efficient and can be manufactured at low cost, and wherein the duct and assembly has a pleasing appearance.

To these and other useful ends my invention consists of parts and combination of parts or their equivalents, and mode of manufacturing and assembling as hereinafter described and claimed and shown in the accompanying drawings in which:

Fig. 1 is a front side elevational view of my improved core, one header being partially sectioned.

Fig. 2 is an edge view of the core as shown in Figure 1, one of the headers being sectioned on lines 2—2 of Figure 1.

Fig. 3 is a view of my device taken from one end of the complete device.

Fig. 4 is an end view of the core showing a fraction of the air duct attached.

Fig. 5 is a top view partly in section of a short section of the air duct showing the core by dotted lines.

Fig. 6 is a flat view of the main header member before being formed into a trough.

As thus illustrated the core in its entirety is designated by reference character A, and B designates the air duct in its entirety.

Core A comprises a bundle of tubes 10 having closely spaced fins 11 through which the tubes extend. It will be understood that the core proper may be honeycomb type or formed by means of tubes and fins wherein the tubes may be round flat or tear drop in cross section.

The core is made complete by means of novel headers between which the tubes form operating connections. The headers comprise a trough having tube plates 12 through which the tubes extend and are made taut and leak proof in any suitable manner. The header is formed by two flat sheets, preferably steel, the part from which the trough is formed is shown in Figure 6.

Tube plate 12 has side and end projections

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13—13 and 14—14 (see Figure 6) which are, after the part has been fabricated as shown in Figure 6, bent at right angles to member 12 as at 40 to form a deep trough after which the adjacent edges are welded or brazed together as at 15 (see Figure 4). Openings 16 and 17 are preferably drilled or punched in members 12, 13 and 14 while the part is flat as shown in Figure 6.

I provide a plate 18 which is drilled or punched as at 19 preferably near the end and having welded thereto as at 20 a short inlet or outlet pipe 21 being preferably threaded as at 22, after which member 18 is inserted into the trough and welded thereto as at 23, thus a complete header is formed having a header chamber 24.

It will be seen that a complete core is provided having all steel headers, and that tubes 10 may be bonded to members 12 from either side before plates 18 are secured into place.

I provide a special air duct B comprising top and bottom plates 30—30 having spaced apertures for the reception of rivets or bolts and side plates 31—31 having flanges 32 and spaced apertures whereby plates 31 and flanges 32 may be secured together by means of rivets or bolts as at 34 and whereby the headers and members 30 may be riveted or bolted together as at 35 and the headers and flanges 32 may be secured together as at 36.

It will be seen that an air tight duct is provided, the headers forming a part thereof, whereby the ducts may be detachably secured to the headers and the duct plates knocked down for shipment or storage.

Clearly I have provided very light and strong headers which may be made at low cost and that the assembly has a pleasing appearance.

I prefer to manufacture my improved header in the following manner: a flat sheet of steel is prefabricated as shown in Figure 6 after which the side and end members 13 and 14 are bent so as to form a trough. The adjacent edges of members 13 and 14 being then welded together. Tubes 10 may then be secured to tube plates 12 in any suitable manner and after this operation plates 18 are placed into position in the trough and welded to the trough as already described.

It will be noted that the headers project inwardly past the side walls of the duct. In order to reduce air resistance plates 34 are provided and secured to the side plates. The inner ends resting on the corners of the headers as shown in Figure 5.

It will be seen that member A has a convenient shape for stacking or shipping in crates and that

the entire device may be conveniently assembled or installed.

Having thus shown and described my invention I claim:

1. A heat exchanger of the class described, comprising spaced headers, a number of tubes forming operating tube connections between said headers and having a multiplicity of closely spaced fins through which the tubes extend, said headers being substantially rectangular in cross-shape and comprising troughs through the bottoms of which said tubes extend and are bonded thereto, plates positioned in said troughs intermediate the bottoms and tops thereof and being bonded to the four inner walls of the trough and being positioned to thereby form a header closure and a supplemental trough, and inlet and outlet connections secured to said plates.

2. A heat exchanger of the class described, comprising spaced headers, a number of tubes forming operating connections between said headers and having a multiplicity of closely spaced fins through which the tubes extend, said headers comprising troughs through the bottoms of which the ends of said tubes extend and are bonded thereto and, said headers being substantially rectangular in cross section, plates positioned in said troughs intermediate the bottoms and tops thereof and being bonded to the four walls of the troughs, inlet and outlet connections secured to said plates, spaced openings in the side walls of said troughs and being positioned between said plates and outer edges of the troughs, inlet and outlet air ducts secured to said headers comprising top, bottom and side plates, the side plates having flanges with spaced holes adapted to lie over said spaced openings, forming means for removably attaching the air ducts to the headers.

3. A device as recited in claim 2 including, said headers projecting inwardly into the sides of the duct formed by said plates, guide plates secured to said plates a distance from the headers and extending to the inner corners of the headers to thereby cooperate with the headers to form a venturi passageway.

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