Nov. 20, 1928. 1,692,391

C. W. STANCLIFFE

HEAT TRANSFER APPARATUS

Filed March 8, 1928

Fig. 1.

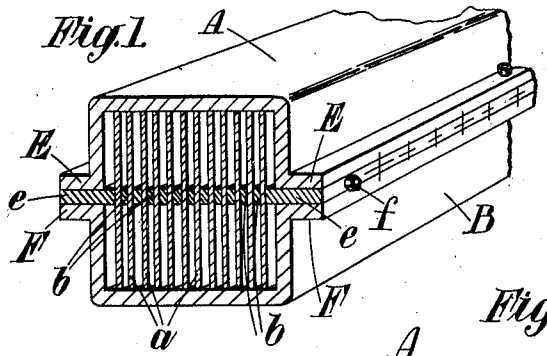


Fig. 2.

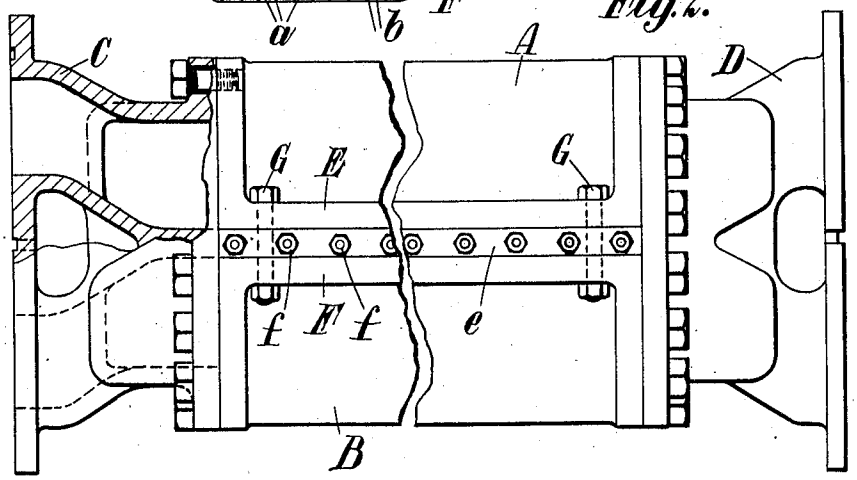


Fig. 3.

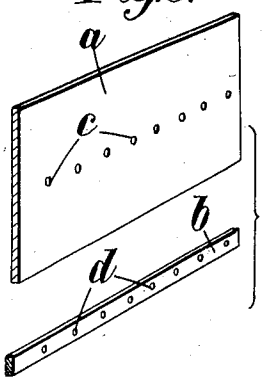
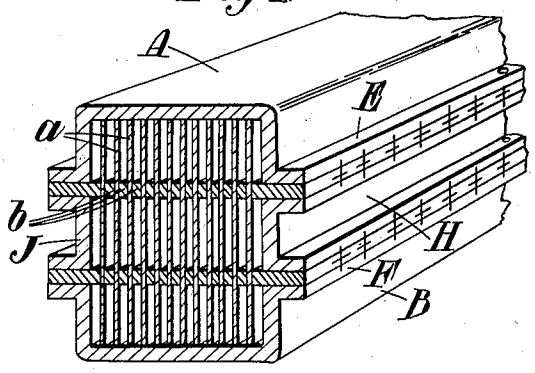


Fig. 4.



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UNITED STATES PATENT OFFICE.

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HEAT-TRANSFER APPARATUS.

Application filed March 8, 1928, Serial No. 260,124, and in Great Britain January 6, 1927.

This invention relates to apparatus for the heating and cooling of fluids. In the transfer of heat to and from fluids it is known that in order to effect rapid transfer of heat to or from metal surfaces the fluid must flow comparatively quickly over the surfaces, and that the area of contact between fluid and metal must be great.

It has previously been proposed to construct heat transfer apparatus for fluids by assembling units so that they provide a large area of contact and at the same time provide for direct conduction of heat through solid metal from one fluid to the other.

The object of the present invention is to provide an apparatus of this kind in which the parts are assembled in an improved manner which provides a large area of contact of the conducting metal with fluids with a small division wall, the fluids passing in parallel streams on each side of the division wall.

In the apparatus constructed in accordance with the present invention the division wall with projecting plates or fins is built up by assembling a series of deep and shallow plates.

The present apparatus is to be distinguished from constructions previously proposed in which slotted plates and rings or washers have been assembled to provide a tortuous path for fluid between the plates.

Referring to the accompanying drawings which illustrate the invention in a diagrammatic manner,

Fig. 1 represents a cross-section through a preferred embodiment of heat-transfer apparatus built up of assembled plates and spacing bars in accordance with the invention,

Fig. 2 represents, to enlarged scale, the elevation of a completed heat transfer apparatus corresponding to Fig. 1 with inlet and outlet headers attached,

Fig. 3 shows separately one of the plates and one of the spacing bars shown in Fig. 1,

Fig. 4 shows an alternative construction providing three fluid passages.

Referring first to Figs. 1–3 the improved heat transfer apparatus comprises external jacket or casing members A, B and inlet and outlet headers C, D, within the casing are arranged alternatively plates *a* and spacing bars *b* which run practically throughout the length of the casing. The plates *a* and bars *b* extend for the full depth of the casing and when assembled as shown in Fig. 1 the bars *b* divide the heat transfer apparatus into upper and lower passages for the fluids between which the heat is to be transferred. The plates form partition walls which divide the fluids into narrow streams having large contact area and the heat is conducted by these plates by direct conduction through solid metal. The plates *a* are provided with a number of holes *c* and the bars *b* are provided with registering holes *d*.

At the sides flat filler plates *e* are provided, these plates the thickness of which is substantially equal to the width of the spacing bars, are similarly provided with transverse holes which register with the holes in the plates and bars and through which bolts *f* may be passed to clamp the parts together. The plates and bars when clamped together form a partition with fins or ribs on both sides. The plates *e* are clamped between flanges E, F on the casing members A, B by a series of bolts G.

For use with some fluids which transfer their heat more readily than others the plates *e* may be so shaped that they project for different distances beyond the bars *b* on top or bottom or in some cases they may project on one side only.

In the modified construction shown in Fig. 4 there are two series of bars *b* provided for each series of plates *a*, thus providing three passages for fluids; the casing members in this case comprise four members A, B, H, J.

The plates *a* have been shown on the drawings as of ordinary sheet metal but they may be of gauze or other reticulated form.

The plates *a*, *b* after assembly are preferably soldered or joined together by other suitable process.

It is to be understood that the invention is not restricted to the exact details shown and described but embraces such modifications as come within the ambit of the accompanying claims.

I claim:—

1. Heat transfer apparatus comprising an upper casing, a lower casing, a division wall comprising alternately assembled plates and spacing bars, means for clamping said upper

casing, division wall, and lower casing together, and headers for inlet and outlet clamped at each end of said casings.

2. A heat transfer apparatus comprising an upper and lower casing, a division wall arranged interiorly of the casings and comprising comparatively thin plates and alternate spacing bars, filler plates arranged between the meeting edges of the upper and lower casings, and corresponding in vertical dimension to the similar dimension of the spacing bars, and means passing through the filler plates, spacing bars and plates to secure said parts together.

In testimony whereof I affix my signature.

CECIL WHEATLEY STANCLIFFE.