

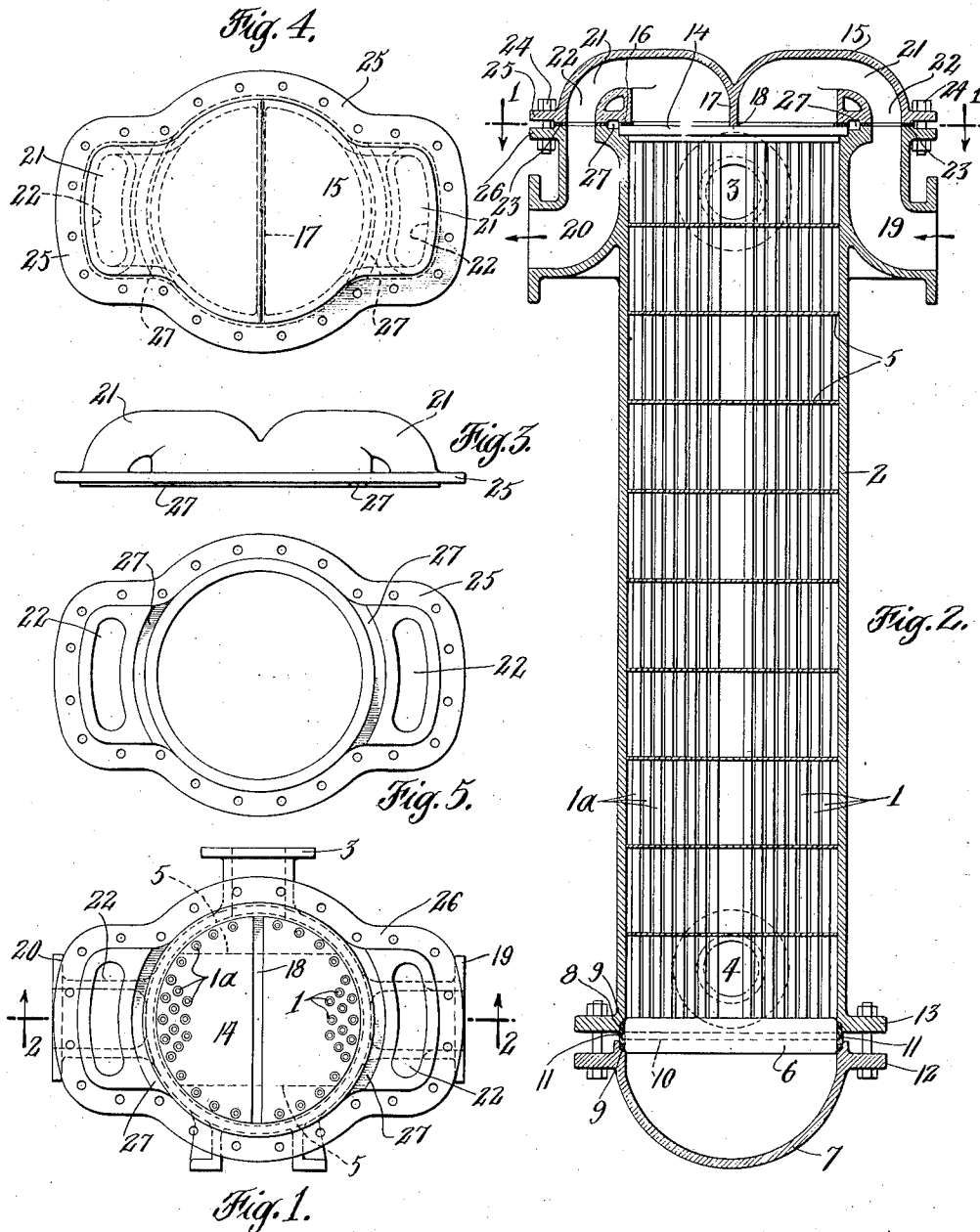
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HEATER OR COOLER

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HEATER OR COOLER.

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This invention relates to heaters or coolers and is particularly useful when applied to liquid types, that is to say, types in which liquid is to be heated or cooled through the medium of another hot or cold liquid. A familiar example of this is the ordinary oil cooler and I have illustrated my invention as applied to this type of apparatus although it might just as well be applied to other apparatus of a similar nature in which the same problem arises.

The primary object of the invention is to provide a heater or cooler of the character described in which it is unnecessary to break any pipe joints when removing the tubes for cleaning, inspection, repair or replacement. A further object resides in the provision of means for preventing all possibility of leakage of one fluid into the other.

With the foregoing in mind any further objects and the advantages incident to my invention will appear hereinafter in connection with the description of the accompanying drawings which illustrate the invention in an oil cooler.

In the drawings, Fig. 1 is an end elevation of the cooler with the detachable cover removed taken as indicated by the line 1—1 in Fig. 2;

Fig. 2 is a longitudinal section of the cooler taken as indicated by the line 2—2 in Fig. 1;

Fig. 3 is a side elevation of the detachable cover;

Fig. 4 is a face view of the detachable cover;

Fig. 5 is a face view of the under or inner side of the detachable cover.

Referring to the drawings it will be seen that the tubes 1 and 1^a are disposed within the casing or shell 2 in the usual and very well known manner, the cooler illustrated being of what is known as the two-pass type. The group of tubes 1 may be considered the inlet group and the group 1^a may be considered the outlet group inasmuch as the fluid which flows through them passes through the tubes 1 first and then back through the tubes 1^a.

Oil is admitted to the casing through the inlet 3 and passes out therefrom through the outlet 4. Between the inlet and the outlet is arranged a plurality of baffle plates 5 which are adapted to cause the oil to flow

backward and forward across the exterior of the tubes, the plate 5 adjacent to the inlet 3 terminating short of the opposite side of the casing in order to provide a passage below it and the succeeding plates alternating with respect thereto to provide successive passages at opposite sides of the casing. This represents old and extremely well known practice and it is thought unnecessary to go into it in further detail.

At the outlet end of the casing the tubes extend into a tube plate 6 located between the end of the casing and a detachable cover 7. A packing, composed of the annular ring of metal 8 in between the soft packings 9, seals the joints, the metal ring 8 being provided with an inner annular groove 10 which communicates with the exterior thru a plurality of radially disposed outlet openings 11. Bolts and nuts hold the cover 7 in place through the medium of the flanges 12 and 13.

At the opposite end the tubes enter a tube sheet 14 by means of which the tube nest is withdrawn, the tube sheet 6 being of a size such as will make it fit snugly but not tightly within the interior of the casing 2 so that it can slide therethrough.

This open end of the heater is closed by a cover member 15 between which and the header 14 I place a suitable packing 16. The cover member 15 is provided with a projecting web 17 which is adapted to fit down into the groove 18 in the tube sheet 14 and thereby to divide the tubes into the aforementioned groups 1 and 1^a.

In so far as I am aware all constructions heretofore have placed the water inlet for the tubes 1 and the water outlet for the tubes 1^a somewhere in the cover member 15 such design, of course, necessitating breaking of the pipe connections which supply and carry away the water every time that it is necessary to remove the cover 15 in order to obtain access to the tubes. This is a constant source of trouble and annoyance as well as an additional expense since it takes time to make and break the several connections involved.

I overcome these difficulties by casting the water inlet 19 and the water outlet 20 directly on the main casing 2 and by establishing communication between them and the tubes 1 and 1^a respectively by means of U-shaped conduits 21 in the member 15. Although the

openings 19 and 20 are preferably circular I find it advisable to elongate and slightly curve the connecting passages 22 in the neighborhood of the junction between the cover 15 and the casing 2. The total area of an elongated opening 22 is designed to be substantially equal to the area of an opening 19 or 20.

I provide suitable packing gaskets 23 at the juncture between the openings 19 and 20 and the cover 15. A nut and bolt connection 24 holds the cover 15 in place thru the medium of the flanges 25 and 26.

Inasmuch as either of the fluids may be under a fair amount of pressure, say for example 30 to 40 pounds, and inasmuch as either or both of them may be re-used and a mixture of the two would be highly undesirable and detrimental, I have provided the vent 27 leading to the outside so that any leakage which might possibly occur either past the packing 16 or past the packing 23 or past the tube sheet 14 from the interior of the casing 2 may escape there through. This vent may be formed as shown partly in the cap 15 and partly in the casing 2 or entirely in one or the other as desired.

It will therefore be seen that I have provided a construction in which it is unnecessary to brake any pipe joints at the time of cleaning the tubes and at the same time have

prevented all possibility of interchange of fluids due to leakage of either of the fluids.

I claim:

1. A heater or cooler comprising in combination, a casing having an open end, a plurality of tubes, a tube sheet for the tubes seated in the open end of the casing, a duct on the casing wall having an opening adjacent to and facing in the same direction as said open casing end, a detachable cover, a U-shaped conduit in the cover establishing communication between the duct opening and the tubes, packing between the tube sheet and said cover at one end of said cover conduit, packing around the duct opening at the other end of said cover conduit, and a vent between said packings.

2. A heater or cooler comprising in combination, a casing having an open end, a plurality of tubes therein, a duct on the casing wall having an opening adjacent to and facing in the same direction as said open casing end, a detachable cover, a U-shaped conduit in the cover establishing communication between the duct opening and said tubes, and a vent between the joint made between the casing and the cover at one end of said conduit and that made around the duct opening at the other end of said cover conduit.

In testimony whereof, I have hereunto signed my name.

D. RAYMOND McNEAL.