

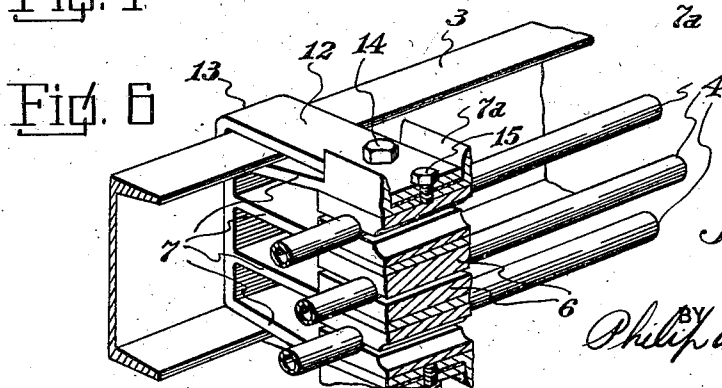
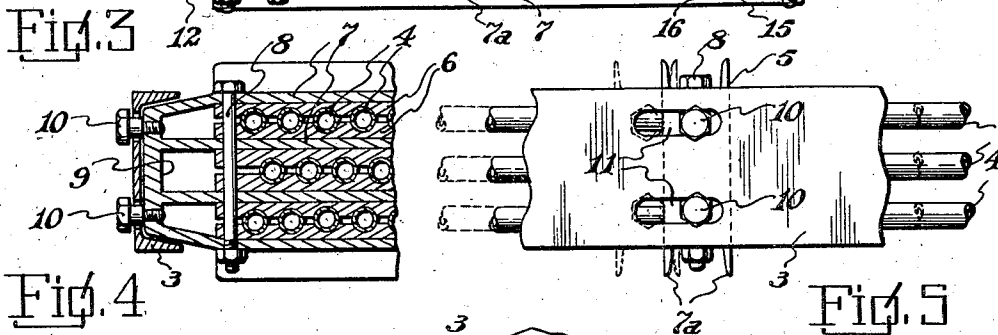
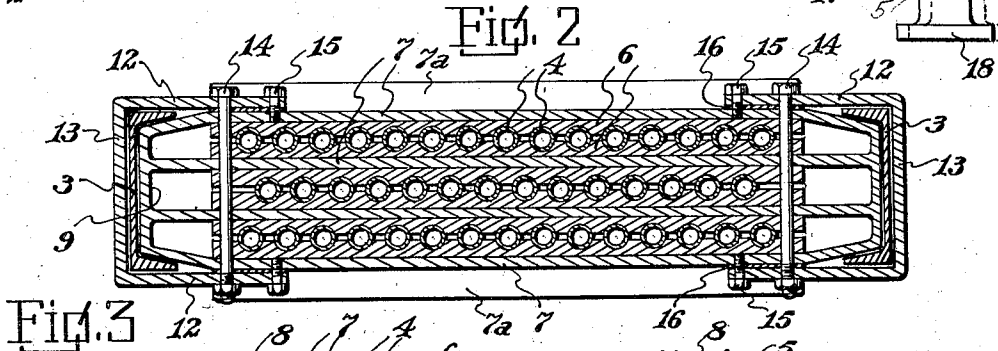
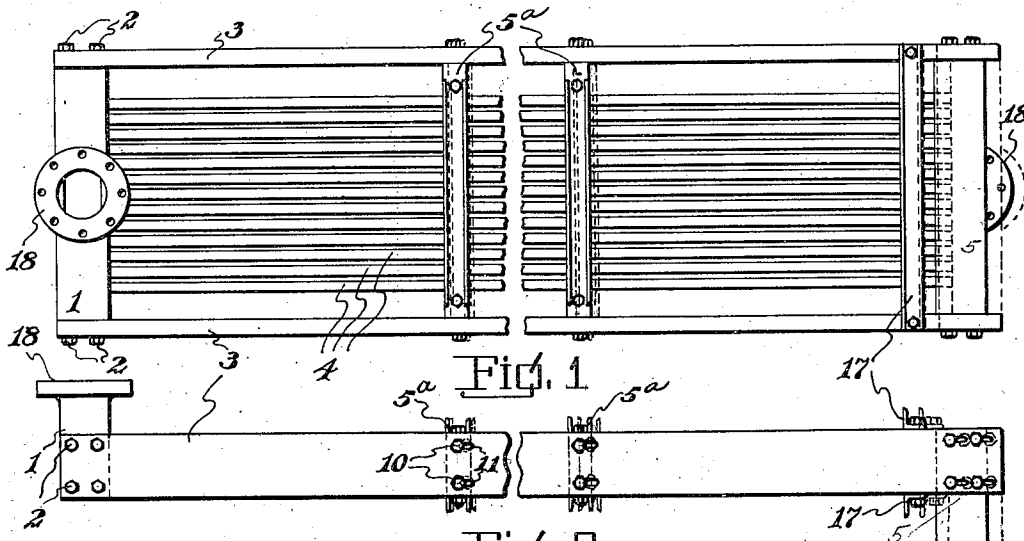
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HEAT EXCHANGER

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HEAT EXCHANGER

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7 Claims. (Cl. 257—248)

The invention relates to heat exchanges, particularly of the type which is moved from place to place, and wherein the units are relatively long, and has for its object to provide the heat exchanger with a floating head and floating support means for the tubes slidably connected to the side channels of the frame in a manner whereby when the heat exchange unit is hoisted, during handling and suspended from one of the channels, the channels particularly centrally thereof will be braced and held by the tube supporting means for distributing the strain to both channels and throughout the unit.

A further object is to provide a heat exchange unit with a tube support, through which the tubes extend and the ends of the support with slidable connections with the unit channels, said connections being constructed in a manner whereby the support can move longitudinally upon expansion and contraction, incident to temperature, but preventing outward spreading of the channels.

A further object is to form the support from spaced bars between which the tubes are disposed and to connect the bars at their ends so that they will slidably move within the frame channels, and to provide U-shaped brackets, arching the channels and connected to the support bars. Also to provide fibrous clamping members between the bars and through recesses of which opposite sides of the tubes extend.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawing, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing:

Figure 1 is a top plan view of the heat exchange unit.

Figure 2 is a side elevation of the unit.

Figure 3 is a vertical transverse sectional view through the unit, and through a modified support.

Figure 4 is a vertical transverse sectional view through one side of the unit showing the form of slidable connection between the tube support and the channel shown in Figures 1 and 2.

Figure 5 is an enlarged side elevation of the central portion of the unit showing the support connection shown in Figure 4.

Figure 6 is a detail perspective view of one end of the modified form of tube support shown in

Figure 3 showing its connection to one of the channels.

Referring to the drawing, the numeral 1 designates the stationary head of the heat exchanger, to the ends of which are connected in the usual manner, by means of bolts 2, the side channel bars 3 of the unit. Connected to the stationary head 1 is a plurality of tubes 4, which are relatively long, and which are parallel. The tubes 4 extend longitudinally of the device and are connected to a floating head 5 which allows the tubes 4 to expand and contract under heat and cold as shown in dotted lines in Figure 1. Devices of this character are usually extremely long, particularly where used in the oil industry and are subject to a great deal of handling. It has been found that in hoisting devices of this character, which weigh several tons per unit, if hoisted by one of the channels 3, they become bent or distorted, and to obviate this difficulty the tubes 4 are provided with tube supporting members 5a, through which the tubes extend, and which have their ends slidably connected to the side channels 3, so that they may slide during expansion and contraction, but at the same time prevent spreading of the channels during a hoisting operation and distribute the hoisting strain throughout the unit during the edge hoisting thereof. The number of tube supports 5a may vary, however two are shown for purposes of illustration, and one will be described in detail.

Referring to the form of device shown in Figures 1, 2, 4 and 5, in this form the tubes 4 are clamped between fibrous members 6, preferably formed of wood and the fibrous members 6 are disposed between spaced bars 7, which are drawn together against the fibrous bars 6 by bolts 8 for clamping the support as a whole on the tubes so the support will move with the tubes upon expansion and contraction, thereby obviating the wear on the tubes incident to scale formed thereon and the tubes dragging through the support.

The ends of the clamping bars 7 terminate in guide portions 9, connecting the bars at their ends, and which guide portions are disposed within the channels 3. The guide portions 9 are slidably connected to the channels 3 by cap bolts 10, which extend loosely through elongated apertures 11 in the channels 3, therefore it will be seen that as the tubes 4 contract and expand, the supports 5a bodily move with the tubes and that the sliding engagement of the ends of the supports within the channels, will allow freedom of movement of the supports, however the cap bolts 10 will positively prevent spreading of the

channels during a hoisting operation when the device is suspended from one of the channels and will distribute the strain throughout the unit.

Referring to the form of device shown in 5 Figures 3 and 6; in this form the upper and lower bars 7 have connected thereto the arms 12 of U-shaped brackets 13 which arch the outer sides of the channels 3 and allow freedom of longitudinal movement of the tube support during 10 expansion and contraction and prevent spreading of the channels 3 during a hoisting operation. The U-shaped brackets 13 are connected to the bars 7 by means of bolts 14 which extend through the arms 12, bars 7 and clamping strips 6. When 15 the bolts 14 are tightened the tubes are clamped within the support. The arms 12 are additionally anchored to the upper and lower bars 7 by means of bolts 15, which prevent side pivoting and displacement of the brackets 13. Spacers 20 16 are preferably used to space the arms 12 upwardly out of engagement with the side channels 3. It will be noted that in both forms play is provided between the slidably engaged parts, which prevents sticking, incident to expansion, 25 and allows easy movement of the parts.

The upper and lower bars 7 are preferably provided with flanges 7a, which brace and stiffen the same, and the channels 3 may be braced by transversely extending angle bars 17 bolted there- 30 to. The heads 1 and 5 are provided with the usual flanged connections 18 whereby the heat exchanger may be built up of any number of sections according to the size of plant desired.

In devices of this character, the tubes are 35 extremely long and there is a wide range of movement of the floating head 5, therefore it will be seen that if the tubes should be loosely and slidably mounted in supports, which are fixed to the channel bars 3, the tubes would become worn 40 incident to their constant movement, especially after the development of scale on the tubes. This has been found to be true even where the tubes are slidably mounted in oversize apertures of wooden blocks, hence it will be seen by clamp- 45 ing the support to the tubes and allowing the support to bodily move with the tubes, the above difficulty is overcome.

From the above it will be seen that a heat exchange unit is provided wherein the tubes are 50 supported so they will not wear during expansion and contraction and that the supporting means for the tubes will also brace the unit frame so that it may be hoisted by its side without bending the side bars and in a manner whereby the 55 strain will be distributed throughout the unit. This is of decided advantage in the oil industry where these units are transported from place to place and assembled, and this necessarily involves the hoisting of the units for the assembling 60 operation.

The invention having been set forth what is claimed as new and useful is:

1. A heat exchange unit comprising a frame, a 65 stationary head carried by said frame, a floating head carried by said frame, tubes connecting said heads and adapted to move the floating head upon expansion and contraction and a slidable connection between the floating head and the frame,

said sliding connection comprising headed members extending through elongated apertures in the frame.

2. The combination with a heat exchange unit comprising a frame having side bars, a stationary head connecting the side bars at one end thereof, and a floating head connecting the side bars at the opposite end thereof, tubes connecting said heads of a tube support slidably connected to the side bars, said tube support being 10 clamped on the tubes to move with the expansion and contraction of the tube whereby the slidable engagement of the support will be with the side bars.

3. The combination with a heat exchange unit 15 comprising side channel bars having their channels inwardly disposed, a stationary head connecting said bars adjacent one end thereof, and a floating head connecting said bars adjacent the other end thereof, of a stationary tube support intermediate the heads, and tubes connecting 20 the heads and extending through the support, said support being clamped on the tubes and movable therewith, the ends of said support having slidable engagement within the channels of the channel bars.

4. The combination with a heat exchange unit comprising side channel bars having inwardly 30 disposed channels, heads carried by said channel bars and connecting the same, slidable connections between one of said heads and the channel bars whereby the said head and bars may move relative to each other, and tubes connecting said heads, of a support for said tubes, said support comprising spaced bars between 35 which the tubes extend, gripping members between the bars adapted to grip the tubes, means for forcing said bars towards each other and slidable connections between the ends of the bars and the channels.

5. A device as set forth in claim 4 in which the slidable connections include headed members 40 carried by the ends of the support bars and extending through elongated apertures in the channel bars, and forming a sliding anchored connection between the support and the channel bars.

6. A device as set forth in claim 4 in which the slidable connections include straps carried by the ends of the support and arching the outer 45 side of the channel bars and forming means for preventing spreading of the channel bars.

7. The combination with a heat exchange unit having a floating head and a stationary head connecting side channel bars, of tubes connecting the heads, supports for said tubes comprising 55 flexible bars and gripping members between the bars and between which the tubes extend, and means for forcing said bars towards each other for a tube gripping operation, whereby the support as a whole will bodily move with the 60 tubes, the ends of said bars having slidable connections to the channels bars whereby the support may slidably move on the channel bars, said support bars and slidable connections co-operating with the channel bars for preventing 65 spreading of the channel bars.

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