HEAT EXCHANGER PIPE COIL WITH SUPPORT MEANS

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[Diagram of heat exchanger pipe coil]
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The invention relates to a heat exchanger having adjacent flat pipe coils which comprise straight portions joined by bends and are held in longitudinal bearer members running perpendicularly to the straight portions near the bends, the longitudinal members combining to form a wall, which heat exchanger is characterized in that the longitudinal members and pipe coils are arranged vertically and have lateral arms directed towards the heat exchanger wall for mounting them in holders on this wall.

It is known that horizontally arranged pipe coils can be attached by means of flat longitudinal bearer members which have semicircular cuts for the pipes, form a continuous wall and are supported on the foundation of a vapor generator. However, this design can only be used where the pipe coils are not very large. In particular, it cannot be employed for heat exchanger installations, where the special temperature conditions entail large heat exchange surfaces and therefore large-size pipe coils.

The invention will now be described with reference to an embodiment shown diagrammatically in the drawings. In these:

FIG. 1 shows a section through a heat exchanger according to the invention parallel to the planes of the pipe coils;

FIG. 2 shows a section taken along a line II—II in FIG. 1 and

FIG. 3 shows a view corresponding to FIG. 1 of a heat exchanger with staggered pipe coils.

In FIG. 1 a preferably rectangular duct formed by side walls 1 contains two pipe coils 2, 3. These coils consist in a known manner of straight portions of pipe a connected by bends b. The coils 2, 3 shown in FIG. 1 are arranged in one plane, and each has a straight distance piece c with bends d after every few windings. This distance piece forms a space within which a few windings of the other pipe coil are arranged. At the ends of the straight parts a, near the bends b, d, the coils are mounted in longitudinal bearer members 4. These members 4 are made of rolled stock with a T-profile, in the flange of which semicircular recesses corresponding to the diameter of the pipes are cut. The width of the flange with the recesses and the distance between the individual pipe coils are so selected that the flanges of adjacent longitudinal members touch and form a wall. The members 4 have arms 5, 6 directed towards the walls 1 and serving to attach the members 4 to the walls 1. The arms 5 have welded struts 7 and are therefore relatively rigid. The arms 6, which like the arms 5 are made of sheet metal or another flat material, have two-part struts 8, 10 joined by bolts 11. When the bolts 11 are pulled out the arms 6 are relatively soft compared with the arms 5, and they can be slightly bent during assembly. The holes for the bolts 11 in the parts 8, 10 are preferably staggered so that the arms 6 are bent slightly upwards in the drawing by the insertion of the bolts 11. For this purpose the bolts 11 may, for example, be conical or have conical ends. The arms are fixed by driving in the bolts and support themselves accordingly against their mounts in the wall 1. These mounts are formed in this embodiment by angle pieces 12, 13 running along the wall 1 transversely relatively to the planes of the pipe coils, which they support. Some of the angle pieces, e.g. the pieces 13 on one side, preferably have a recess 14 engaged by a projection 15 on the arm 5 or 6. By this means the longitudinal members and also the coils are fixed on one side. With this arrangement it is also an advantage to join the pipe coils to the longitudinal members by welds 16 in some places.

FIG. 2 shows a plan of a heat exchanger according to the invention, taken along a line II—II in FIG. 1. At the top of this figure there are two pipe component assembly with a recess 14 engaged by a projection 15 on the arm 5 or 6. By this means the longitudinal members and also the coils are fixed on one side. With this arrangement it is also an advantage to join the pipe coils to the longitudinal members by welds 16 in some places.

These features—the formation of a continuous wall by the flanges of the members 4, the arms 5, 6 and the arrangement of the baffles 17—serve to throttle the flow along the pipe bends of the medium surrounding the coils during operation of the heat exchanger. The reason for this is that the straight portions a of the pipes are normally provided with fins, which not only improves heat transmission but also increases the heat exchange surface of the medium flowing round the pipes so that a short circuit may form along the pipe bends. If this short circuit is prevented, better use is made of the heat exchange surface. The gas which gives off heat reaches the outlet from the heat exchanger with an even temperature distribution over its cross-section, because there is no connection or part of the heat exchanger, which would not be the case if the seal were perfect.

FIG. 3 shows an arrangement corresponding generally to FIG. 1 but with the pipe coils in adjacent planes staggered relative to each other. For this reason the semicircular recesses in the longitudinal members are staggered relative to each other on each side of the flange. The arrangement is substantially the same as in FIG. 1. The straight portions a of the pipe coils may be provided in a known manner with flat and helical fins 20, 21, as shown in the lower portion of FIG. 3.

The heat exchanger constructed according to the invention has the advantage over known heat exchangers that the heat exchange pipes are easier to assemble and to produce, while the heat exchange properties are in turn even better. The pipe coils between the straight portions c can easily be produced in short sections in the workshop. The individual coils are then provided with the longitudinal members 4 and can be welded together at least in part before or after assembly, depending on the size of the heat exchanger. Thus the pipe coils are easily made. Assembly is carried out by pulling the pipe coils with the longitudinal members sideways into the mounts 12, the bolts 11 being drawn out. The coils and longitudinal members are fixed by driving in the bolts. The seams in the straight parts c are easy to weld as the pipes are straight and are accessible even after assembly, if necessary, e.g. through windows in the wall 1.

There is no reason why the longitudinal members should not be in one piece on each side of the pipe coils. However, this division of each longitudinal member into a number of bearer portions, as in the preferred embodiments, increases the resilience and flexibility of the arrangement, properties which encourage compensation of inaccuracies occurring during assembly and also allow heat.
expansion to take place. This flexibility is further increased by the staggered arrangement of the bearer portions.

What is claimed is:

1. A heat exchanger comprising at least a pair of opposite side walls having spaced mounts thereon; at least one pipe coil disposed transversely between said side walls, said pipe coils having a plurality of spaced straight portions and a plurality of bends interconnecting said straight portions; and bearer members spaced from each of said side walls, said bearer members mounting said pipe coil therein and having means to form a wall spaced from each of said side walls, each of said bearer members including a pair of arms fixed thereto and directed toward an adjacent side wall adjacent respective one of said mounts, and means mounting said pair of arms on adjacent mounts to fix said bearer members and pipe coil in place on said mounts.

2. A heat exchanger as set forth in claim 1 wherein said means mounting said pair of arms includes a first strut secured at one end to one of said pair of arms and a second strut secured at one end to said bearer member including said one of said pair of arms, each of said struts having an aperture misaligned with the aperture of the other strut, and a bolt passing through the apertures of said struts bending said one of said pair of arms against an adjacent mount to fix said arms on said adjacent mount.

3. A heat exchanger as set forth in claim 2 wherein a strut is secured between said other of said pair of arms and said bearer member including said other of said pair of arms.

4. A heat exchanger as set forth in claim 2 wherein one of said pair of arms is positioned above one of said adjacent mounts and the other of said pair of arms is positioned below the other of said adjacent mounts.

5. A heat exchanger as set forth in claim 1 wherein each bearer member includes at least a pair of spaced bearer portions.

6. A heat exchanger as set forth in claim 5 wherein said bearer portions of each bearer member are in staggered longitudinal relation to the bearer portions of the other bearer members.

7. A heat exchanger as set forth in claim 1 wherein each bearer member has a T-shaped profile, the aligned arms of said profiled member containing semicircular recesses holding respective straight portions of said pipe coils therein and the remaining arm of said profiled member being secured to said pair of arms.

8. A heat exchanger as set forth in claim 1 further comprising a pair of pipe coils arranged in a single plane, each pipe coil having at least one pipe portion parallel to said bearer members between a pair of bends whereby said pair of pipe coils are arranged relative to each other with a portion of one pipe coil having windings disposed between spaced parts of the other pipe coil adjacent said pipe portion parallel to said bearer members.

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