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STEAM HEAT EXCHANGER

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FIG. 1

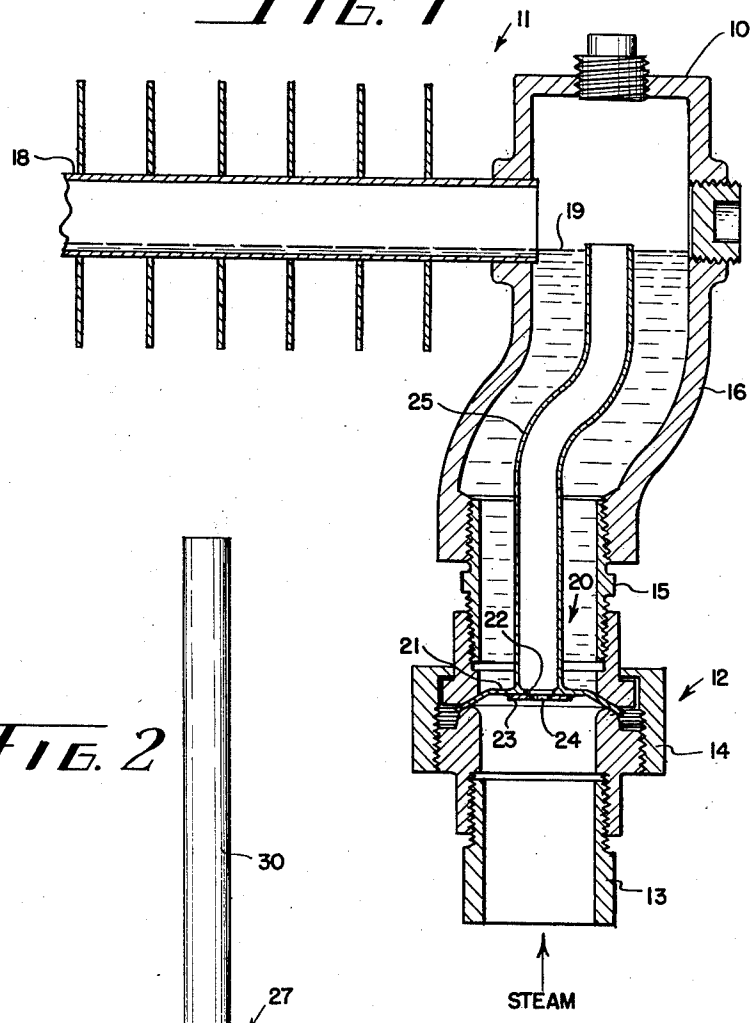


FIG. 2

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STEAM HEAT EXCHANGER

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3 Claims. (Cl. 257—46)

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The present invention relates to an improved orifice construction for steam heat exchangers. In many types of heat exchangers, especially those used in convectors, it is either necessary or most convenient to connect the steam supply to bottom of the heat exchanger. This arrangement, especially when orifices are used, tends to cause noise due to steam gurgling through the condensate that tends to collect in the supply end of the heat exchanger and the presence of condensate tends to interfere with the flow through the orifice. To overcome this difficulty, it has been the practice to attach the orifice member to the upper end of a tube which is attached to this steam supply conduit, the tube extending far enough into the heat exchanger to hold the orifice above the condensate level in said heat exchanger. This solution has not been fully satisfactory for several reasons including the relatively unpredictable behavior of such orifice devices.

However, all of the good features of this prior art practice may be retained and other substantial advantages may be had by locating the orifice at the entrance to the extension tube rather than at its upper end. With this latter arrangement, the conduit diameter at the entrance of the orifice is generally larger than the diameter of said tube, thus giving a more favorable ratio of entrance diameter to orifice diameter, hence better orifice characteristics result. Further, the tube may be cut to a desired length in the field by use of simple tools and without appreciably affecting the flow characteristics of the assembly. In addition, because the orifice plate is attached to a union cup or the like rather than the end of the tube, it is better protected from injury due to handling, installation and the like. Also, due to the relatively less effect of the tube on the flow characteristics of the orifice assembly, a smaller inventory of such assemblies is adequate to meet all the installation requirements. It is therefore an object of the present invention to provide an improved orifice assembly such as briefly described above.

For a better understanding of the objects and features of this invention, reference is made to the specification and drawings wherein:

Figure 1 is a fragmentary view, with parts in section, of a heat exchanger fitted with the present orifice assembly.

Figure 2 is an elevation view, with parts in section, of an orifice assembly.

In Figure 1, header member 10 of heat exchanger 11 is supplied with steam through a conduit 12 from a source not shown, conduit 12 including pipe 13, union 14 and nipple 15, nipple 15 being screwed into a lower offset inlet portion 16 of said header. From header 10, the steam flows through the passages of the heat exchanger, such as finned tube 18, and condenses therein, with the condensate being removed at the other end of the heat exchanger, not shown. However, condensate tends to accumulate in all low portions of the heat exchanger including the inlet header, especially when an orifice is used to limit the steam flow, for the orifice, in restricting flow, makes it difficult for the condensate in the inlet header to drain back down the supply pipe or conduit. To prevent the noise that would result if the steam were to blow through the condensate, it is necessary to introduce the steam into the header above the level 19 of the condensate, orifice assembly 20 being provided for this purpose.

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Orifice assembly 20 comprises a cup-like member 21 clamped between the halves of union 14, said member having a central opening 22, and a circular orifice plate 23 is soldered on the upstream face of said member 21 with the orifice 24 of plate 23 substantially concentric with opening 22. Copper tube 25, formed to fit within offset inlet 16, is soldered to the downstream side of member 21 and extends slightly above the condensate level 19 in header 10, thereby introducing the steam supplied through orifice 24 above the condensate level, thus insuring full steam flow and minimizing noise.

Orifice device 27 is essentially the same as 20 but its cup-like member 28 is inverted for use with union connections having a reversed seat arrangement. This device includes an orifice plate 29, identical with 23, and a straight and relatively long tube 30. By making tube 30 long enough to fit installations needing such a long tube, any installation requiring a shorter tube can be accommodated by merely cutting the tube to proper length on the job. This same consideration holds true for tubes having an offset, such as 25, hence it is preferred that such tubes be made relatively long and cut to proper length in the field. It is also feasible to bend the above tubes in the field to fit the particular installation but it is preferred that the bends be factory made and standardized as much as possible so that the effect of the bends on performance may be considered in calibrating the orifices for, although the downstream tube has far less effect on orifice performance than a tube extending up-

stream from the orifice, it still has some effect, especially if bent.

To define the scope of the present invention, the following claims are appended:

I claim:

1. In a steam heat exchanger having an inlet header portion below the normal level of condensate in said heat exchanger; in combination; a steam conduit connected to said inlet header, said conduit including a pair of members clamped together; and an elongated orifice member, said elongated orifice member comprising a cup-like member having a central opening and arranged between said member, a substantially rigid tube attached to one side of said cup-like member, the attached portion of said tube being in at least approximate axial alignment with said opening, said tube extending upwardly into said header portion to a point above said normal level of condensate, and an orifice plate attached to the other side of said cup-like member with its orifice in substantial registry with said opening.

2. In an orifice device, a cup-like member having a central opening, an orifice member fixedly attached to one side of said cup-like member with the orifice of said orifice member in approximate axial alignment with said opening, and an elongated tube rigidly joined to the other side of said cup-like member and extending therefrom, said tube having at least its joined portion in at least approximate axial alignment with said opening.

3. In an orifice device, a cup-like member having a central opening, an orifice member fixedly attached to one side of said cup-like member with the orifice of said orifice member in approximate axial alignment with said opening, and an elongated tube rigidly joined to the other side of said cup-like member and extending therefrom, said tube having at least its joined portion in at least approximate axial alignment with said opening, said tube having a diameter appreciably larger than the orifice in said orifice member and having an outer diameter appreciably smaller than the diameter of said cup-like member, said tube being of a length at least several times its diameter.

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