April 28, 1931. H. J. KERR 1,802,766

PIPE OR TUBE JOINT

Filed Dec. 8, 1927

Fig- 4

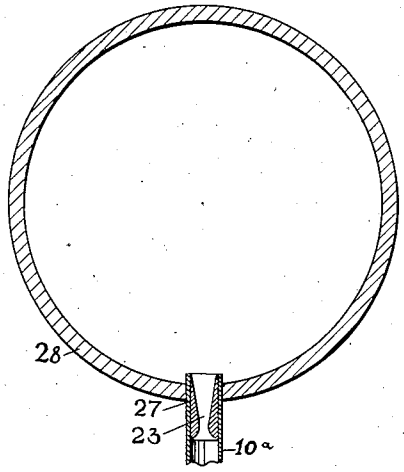


Fig- 3

Fig- 1

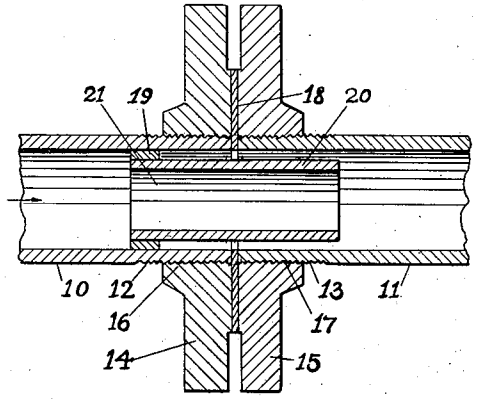
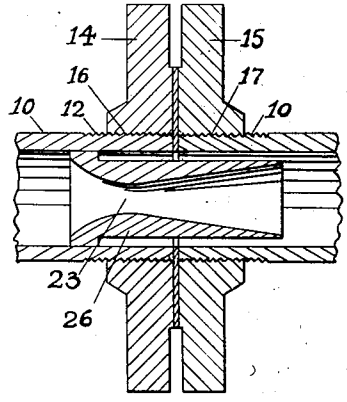
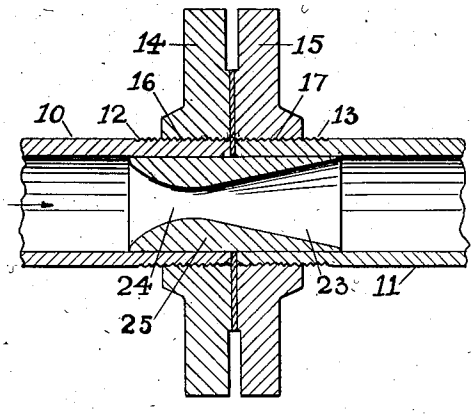


Fig- 2





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UNITED STATES PATENT OFFICE

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PIPE OR TUBE JOINT

Application filed December 8, 1927. Serial No. 238,502.

My present invention relates to devices in which a fluid is conducted from a supply pipe to a receiver and in which fluid sudden changes in temperature may occur producing corresponding sudden changes in temperature in the metal parts of the joint so as to cause leakage at the joint.

One of the objects of my invention is the provision of a jointed pipe for conveying a liquid, a gas or a superheated vapor, with a passage from the one pipe to the other, the walls surrounding the said passage overlapping the joint between the two pipe sections and adapted to reduce the rate of heat exchange between the fluid in said passage and the material of the joint.

Another object of my invention is the provision of a liquid supply pipe and a receiver to which it is connected, a Venturi tube being provided between the supply pipe and the receiver, the walls surrounding the passage in the Venturi tube overlapping the joint between the supply pipe and the receiver and adapted to reduce the rate of heat exchange between the fluid in said passage and the material of the joint.

My invention will best be understood from the following description and the annexed drawings, in which Fig. 1 is a sectional view through a pipe joint and illustrating one embodiment of my invention; Fig. 2 is a view generally similar to Fig. 1, but illustrating a Venturi tube connecting the supply pipe to the receiver; Fig. 3 is a section generally similar to Fig. 2, but illustrating the walls around the Venturi tube surrounded by a water jacket, and Fig. 4 is a sectional view illustrating a fluid supply pipe connected to a drum or header.

Like reference characters indicate like parts in the several views.

In the form of my invention illustrated in Fig. 1, a fluid supply pipe 10 is connected to a receiver 11, which in this case is a pipe section, the supply pipe preferably being threaded as at 12, and the receiving pipe as at 13. In the embodiment illustrated, discs or flanges 14 and 15 are provided with central openings, the walls surrounding which are provided with screw threads 16 and 17 which are received on the screw threads 12 and 13 of the supply pipe 10 and the pipe section 11. Suitable packing material 18 is preferably interposed between the flanges 14 and 15, and it will, of course, be understood that the flanges may be secured together in any desired manner, usually by bolts.

With ordinary constructions of joints, when there is a sudden drop in temperature in the liquid, gas or superheated vapor passing through the supply pipe, the metal at the joint and nearest to the fluid cools faster than the bolts and the relative contraction of the flange metal relieves the compression on the packing, with the result that the packing material is likely to be blown out by the internal fluid pressure, or, in case there is a metal to metal joint without packing between the two, the seat pressure is relieved and in either case, a leaky joint may result.

In accordance with my invention, means are provided forming a passage from the supply pipe to the receiver, the passage being surrounded by walls which are adapted to reduce the rate of heat exchange from the liquid in said passage to the adjacent walls of the supply pipe and the receiver at the joint, and thereby overcome the difficulties above referred to.

In the arrangement illustrated in Fig. 1, a plug 19 is rolled or otherwise permanently attached to the interior of the supply pipe 10 at a distance from the joint, and through an axial opening in this plug, there extends an auxiliary tube 20, this tube being spaced from the interiors of the two pipe sections and overlapping the joint between the two pipe sections. The tube 20 forms a passage 21 from the supply pipe 10 to the receiving pipe 11, the pipe 20 being surrounded by a

more or less quiescent layer or jacket of fluid, one end of which is open to the fluid flowing in the pipe preferably at the receiver or down-stream end. This more or less dead jacket of liquid, gas or superheated vapor protects the ends of the pipes 10 and 11 from sudden changes in temperature and thereby avoids the difficulties due to leakage above referred to, because the thermal conductivity of such fluids is low.

In the modification of my invention illustrated in Fig. 2, the adjacent ends of the supply pipe and the receiving pipe, and the means for fastening the two together, are the same as those illustrated in Fig. 1 and the same reference characters have been applied thereto. In the form here illustrated, a Venturi tube indicated generally at 23, connects the liquid supply pipe 10 to the receiving pipe 11. In the embodiment here shown, the passage 24 in the Venturi tube is surrounded by walls 25 cylindrical in form on their exterior and adapted to fit snugly in the adjacent ends of the pipe sections 10 and 11 and formed of a material which is a fairly good heat insulating material, such, for example, as porcelain, wood fibre, or the material known to the trade as bakelite. The Venturi tube thus serves to protect the joint between the supply pipe and the receiving pipe from sudden changes in temperature; at the same time, the Venturi passage reduces the resistance to the flow of the liquid as compared with an arrangement which causes sharp changes in the directions of the flow.

In the modification of my invention illustrated in Fig. 3, a Venturi tube 23, generally similar to that shown in Fig. 2, is provided, but is surrounded by a jacket or layer of fluid 26 which has little or no motion, communicating with the receiving pipe as in the arrangement illustrated in Fig. 1. The material of which the walls surrounding the Venturi passage are formed in this case need not be as good a heat insulator as in the arrangement illustrated in Fig. 2; in fact, the venturi could, if desired, in this case be formed of metal because the high thermal resistance of the layer of fluid acts to prevent sudden changes in temperature of the joint material.

In the arrangement illustrated in Fig. 4, a liquid supply pipe 10^a is secured by expansion or otherwise in an opening 27 in a drum 28, the tube preferably extending beyond the inner wall of the drum as illustrated. A Venturi tube 23 of the character illustrated in Fig. 2 is received in the end of the supply pipe 10^a and prevents sudden changes in temperature which may occur in the fluid entering or leaving the drum or header from being communicated to the walls of the joint immediately surrounding the opening 27, thereby preventing leakage between the end of the tube and the drum itself. While I have illustrated a single fluid supply tube in Fig. 4, it will, of course, be understood that in practice when the tubes are used as economizer or superheater tubes for a steam boiler, that a plurality thereof will preferably be provided entering the drum or header 28, and the drum will usually be the steam and water drum of the steam boiler or the headers of the superheater.

The joint embodying my invention is particularly valuable in connection with high pressures, and, as already noted, is also particularly valuable for conducting liquids, gases or superheated vapor. It may also be used where saturated vapors pass through the pipes and which may be turned on and off and are not continuously flowing. In fact, my invention is useful wherever fluids are utilized and where changes in temperature of the fluid occur.

I claim:

1. In a jointed pipe, a fluid supply pipe, a fluid receiving pipe into which the fluid from said supply pipe is delivered, a joint being formed between the two said pipes, and a tubular member seated and supported at one end in one of said pipes beyond said joint and having a free end extending into the other pipe, a continuous space being formed between said tubular member and said supply pipe and receiving pipe and extending from the free end of said tubular member to the portion thereof which is seated and supported in one of said pipes.

2. In combination, a fluid supply pipe, a fluid receiving pipe into which the fluid from said supply pipe is delivered and to which said supply pipe is connected, a Venturi tube seated and supported at one end in one of said pipes beyond said joint and having a free end extending into the other pipe, a continuous space being formed between the outer portion of said Venturi tube and said supply pipe and receiving pipe and extending from the free end of said Venturi tube to the portion thereof which is seated and supported in one of said pipes.

3. In a jointed pipe, a fluid supply pipe, a fluid receiving pipe into which the fluid from said supply pipe is delivered, a joint being formed between the two said pipes, and a tubular member of heat insulating material seated and supported at one end in one of said pipes beyond said joint and having a free end extending into the other pipe, a continuous space being formed between said tubular member and said supply pipe and receiving pipe and extending from the free end of said tubular member to the portion thereof which is seated and supported in one of said pipes.

4. In combination, a fluid supply pipe, a fluid receiving pipe into which the fluid from said supply pipe is delivered and to which said supply pipe is connected, a Venturi tube

of heat insulating material seated and supported at one end in one of said pipes beyond said joint and having a free end extending into the other pipe, a continuous space being formed between the outer portion of said Venturi tube and said supply pipe and receiving pipe and extending from the free end of said Venturi tube to the portion thereof which is seated and supported in one of said pipes.

HOWARD J. KERR.