Feb. 27, 1934. E. S. CORNELL, JR 1,948,564

METHOD OF FORMING A FITTING

Filed April 16, 1932

Fig. 1.

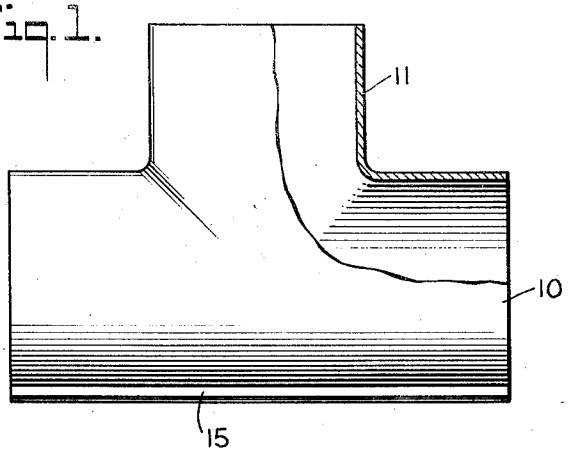


Fig. 2.

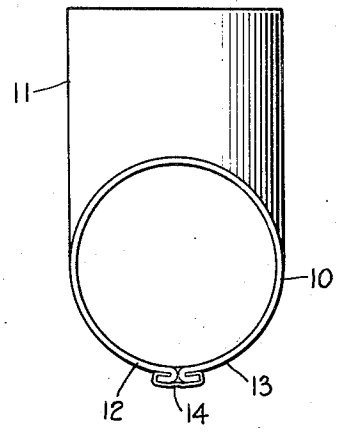
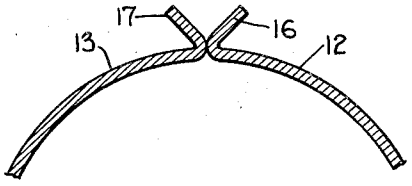


Fig. 3.



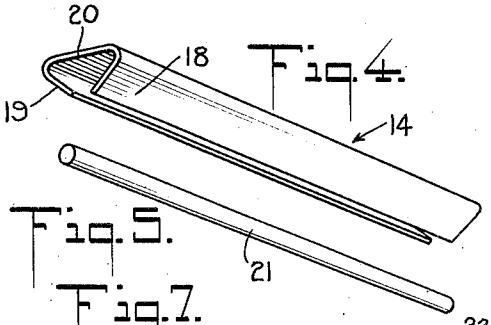


Fig. 4.

Fig. 5.

Fig. 6.

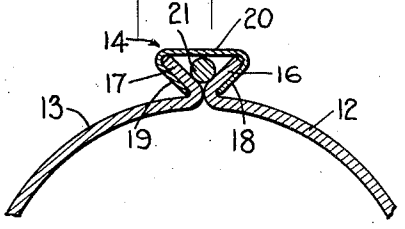
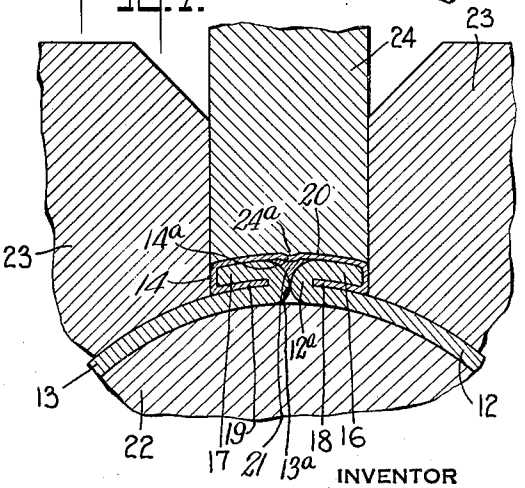


Fig. 7.



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1,948,564

METHOD OF FORMING A FITTING

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Application April 16, 1932. Serial No. 605,576

1 Claim. (Cl. 29—157)

My present invention relates to pipe fittings and more particularly to an improved method of making sheet metal pipe fittings.

In my patent for pipe fittings and method of making the same, granted to me under date of March 15, 1932, and bearing Patent No. 1,850,049, I have described and claimed an improved pipe fitting constructed of sheet metal, preferably copper and the longitudinal passage of such pipe fitting is provided with a seam on the side opposed from the lateral, such seam being formed by folding up the juxtaposed edges of the metal sheet and enclosing such folded juxtaposed edges in a channel shaped member, and afterwards compressing the folded edges and the channel shaped member so as to cause practically a cold flow or weld of the metal and produce thereby a fluid-tight joint. Due to the difficulty of manipulating the fittings during the process of making the fluid-tight joint or seam and because of the inequality in the stresses existing in the various pieces of metal being worked upon, it was often found extremely difficult, though possible, to obtain a satisfactory fluid-tight joint, but the cost of such joint was relatively high in comparison with the total cost of the manufacture of the fitting itself.

With a view of obtaining a satisfactory fluid-tight joint in fittings of this character which will not add materially to the cost of manufacture of the fittings, I have devised the present method of making a seam or joint in fittings made of sheet metal, and in carrying out my invention, I have utilized, as in the fitting formed according to my patent above referred to, the folded parallel edges of the so-called skirting of the material to form the longitudinal passage through the fitting and have enclosed such folded parallel edges in a channel shaped member, but before applying pressure to consolidate the channel member, the folded parallel edges and the adjoining portions of the skirting into a unitary mass, I have associated in the space formed by the parallel folded edges and the outer face of the channel member, a rod or strip of relatively soft material, that is, material that is relatively soft as compared to the material of which the fitting and channel are composed. After such rod or strip is in position, I subject the joint to pressure, to consolidate the channel member, the rod or strip of relatively soft material the adjoining parallel folded edges of the skirting of the material and the adjoining portions of the skirting materials into a unitary mass by subjecting the same to pressure. I have found that the relatively soft material of which the rod or strip is composed, is readily incorporated in the adjoining faces of the channel member and the folded over parallel strips so as to form practically a single unitary piece of metal at the joint and therefore, form a joint that is fluid-tight under the range of pressure to which the fitting may be subjected in use. Such joint is formed by moderate pressure being applied to the various parts and while I have extensively practiced this methed of forming a joint, the number of failures of the joint is extremely low as compared with the heretofore practiced method of forming such joint.

The object of my invention, therefore, is an improved method of forming seams or joints in the manufacture of sheet metal pipe fittings, and the resulting fitting and joint thereof.

In the accompanying drawing illustrating the various steps by my invention,

Fig. 1 is a side elevation, partly in section, of a T pipe fitting to which my invention is applied;

Fig. 2 is an end elevation of Fig. 1;

Fig. 3 is an enlarged end section of a portion of the longitudinal member of a fitting, such as a T, showing the ends of the skirting of such longitudinal member folded over and arranged in position with respect to each other, prior to enclosing the same in a channel member;

Fig. 4 is a perspective view of a channel member utilized for enclosing the folded over ends of the skirting shown in Fig. 3;

Fig. 5 is a perspective view of a section of rod or strip of metal utilized in the process of forming the joint;

Fig. 6 is an end elevation of a portion of the longitudinal member of a pipe fitting such as is shown in Fig. 1, showing the folded ends of the skirting enclosed in the channel member such as shown in Fig. 4 and with a length of rod or strip of relatively soft metal in position and prior to the application of pressure to form a fluid-tight joint, and

Fig. 7 is an end elevation of the parts shown in Fig. 6 in position in a structure for applying pressure thereto, and after pressure has been applied to form a fluid-tight joint.

Referring to the drawing, 10 designates the longitudinal member of a pipe fitting such as a T from one side of which extends a lateral member 11. Both the longitudinal member and the lateral member are formed of a single sheet of material and the lower portion of the longitudinal member, that is, the portion opposite

the lateral extension 11, is formed of two skirts, 12, 13, the edges of which are outwardly folded over to be enclosed by an exterior channel member 14 to form an exterior seam designated generally by the numeral 15 in Fig. 1, such exterior seam extending along the length of the longitudinal member 10.

The skirts 12, 13, during the formation of the joint have their adjacent edges folded over as indicated at 16 and 17, respectively, in Fig. 3, the portions 16, 17, lying at an angle to each other, as shown, extending divergently of one another. The angle formed by the folded portions 16, 17, is substantially similar and equal to the angle formed by the members 18, 19, the exterior of channel member 20, and in Fig. 6, such channel member 20 is shown in position on the folded over exterior portions 16, 17.

In Fig. 5 is shown, in perspective, a rod 21 of relatively soft metal, that is, a metal that is relatively soft as compared with the metal of either of the elements 12, 13, 16, 17, or 20. In Figs. 5 and 6, the member 21 is shown as a rod but obviously I may utilize a strip of metal of any cross-sectional area and the circular rod 21 as shown is merely used for convenience and does not limit the novelty of my improved method.

After the rod 21 is placed in position, as shown in Fig. 6, the longitudinal member having the skirts 12, 13, is placed on a cylindrical mandrel 22 in a press (not shown) having clamping members 23, arranged substantially as shown, such members 23 defining a passage extending longitudinally of the member 10 and providing thereby a guideway for a plunger 24, the under face of the plunger 24 being contoured to form the under face or side of the resulting joint substantially concentric with the outer diameter of the longitudinal member 10. The mandrel 22 is maintained substantially in position while pressure is ordinarily applied to the plunger 24 whereupon the assembly shown in Fig. 6 gradually assumes the form shown in Fig. 7, and as the pressure continues to be applied the material constituting the rod or strip 21 is caused to flow to fill up the substantially triangular space between the folded over portions 16 and 17 and it has been found that the material of the rod or strip 21 is actually cold flowed or welded into the material of the folded over portions 16 and 17 and of the channel member 21, and this to such an extent that the line of demarkation between such various elements is obliterated and there results therefore a fluid-tight joint. In such pressure operation, as appears from a comparison of Fig. 6 with Fig. 7, the angles of the respective exteriorly folded over portions 16, 17, relative to the skirt portions 12, 13, are gradually decreased, until the exterior folded over portion 16, 17, respectively, are brought home to their final positions indicated in Fig. 7, in accompaniment with the compression and cold flow of the relatively softer material of the rod 21 into the materials of the folded over portions 16, 17, and of the channel member 21.

As is illustrated in Fig. 7, the face of the plunger 24 is provided with a projection, see 24*a*, which coincides with and extends substantially centrally and longitudinally of the channel member 14, thereby effecting an indenting 14*a* of the channel member at its central longitudinal portion, thus enhancing the resistance of the channel member against displacement. It will be observed that such indenting 14*a* is formed in juxtaposed relation to the meeting faces of the rounded ends 12*a*, 13*a* of the respective juxtaposed edge portions of the eventually cylindrical body 12, 13.

Additionally, such indenting 14*a*, under pressure exerted by the projection 24*a* of the plunger 24, forces the flow under pressure of the material 21 toward and within the jointure of the meeting faces 12*a*, 13*a* simultaneously as the infolded edges 18, 19 of the channel member 14 and the folded edge portions 16, 17 of the eventually cylindrical body are brought into mutually locking relationship with one another, whereby a highly effective seal is attained at the joint by the combinational effects of the pressure of the meeting faces 12*a*, 13*a*, of the edge portions of the eventually cylindrical body against one another, the pressure of the interposed material 21, sustained in position by the interlocking channel member 14, reinforced by its indenting 14*a*.

My improved fluid-tight joint has been described in connection with a sheet metal pipe fitting only for the reason that such joint was developed in connection with pipe fittings, but it is obvious that my invention is applicable to a variety of uses, such as the joining of separate sheets of metal together by a joint of this character, and therefore I am not to be limited with regard to my claim to a structure suitable only for use in forming a fluid-tight joint in pipe fittings.

Preferably, the element of relatively soft material is formed of a material or materials which do not produce any electrolytic effect with the material of the fitting or parts thereof in use, and also of material or materials which are not corroded chemically or otherwise by the fluid with which the fitting or other joined member is used.

Whereas I have described my invention by specific reference to formations thereof, it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

I claim.

The improved method of forming a fitting having a substantially cylindrical hollow body provided with opposite end openings and a lateral opening communicating with the interior of the hollow body and disposed intermediate the body end openings, which comprises forming from a single sheet of ductile metal the body and the body end portions and the lateral end portion integrally with one another, the edges of the sheet being brought into juxtaposition, bending the juxtaposed edge portions outwardly to form flanges, interconnecting such resulting outward flanges by an inversely bent connecting strip, interposing relatively soft material between the flanges and the body portion of the interconnecting strip and locking and sealing the joint between the outward flanges and the interconnecting strip by applying pressure jointly to the interconnecting strip, the body flanges and the interposed relatively soft material while indenting the body of the interconnecting strip centrally and longitudinally to displace the relatively soft material toward and within the joint between the meeting faces of the body flanges and between the body flanges of the interconnecting strip under sufficient pressure as to effect a cold flow interlocking between the stated parts.

EDWARD S. CORNELL, JR.