June 12, 1945. C. GOTTWALD 2,378,214

EXPANSION MEANS

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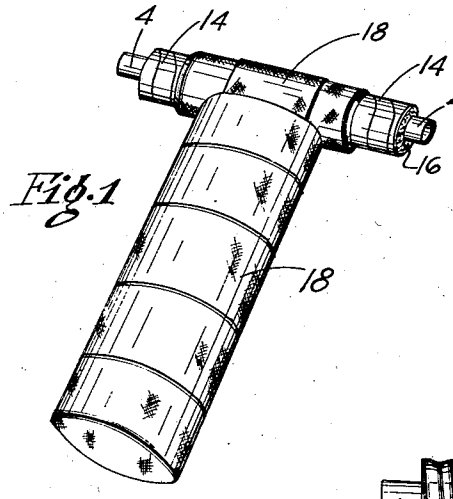


Fig. 1

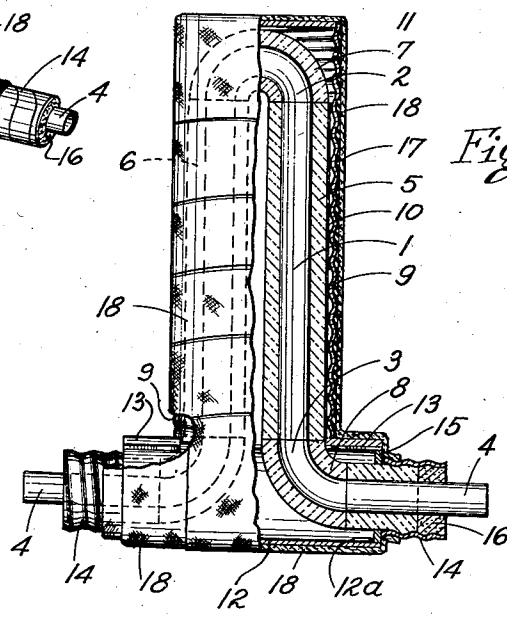


Fig. 3

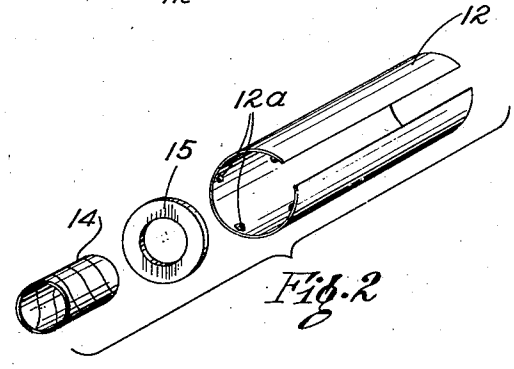


Fig. 2

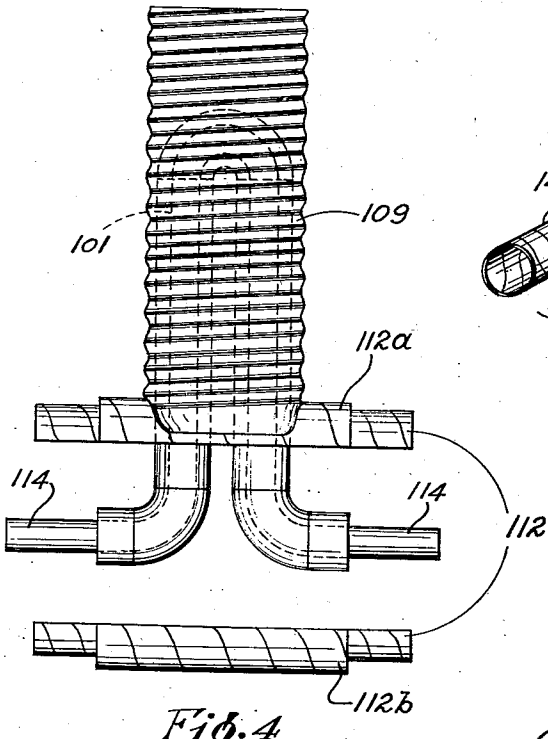


Fig. 4

Christian Gottwald INVENTOR.

BY Haugood and Van Horn ATTORNEYS

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EXPANSION MEANS

Christian Gottwald, Cleveland Heights, Ohio, assignor to The Ric-wil Company, Cleveland, Ohio, a corporation of Ohio

Application June 10, 1942, Serial No. 446,449

6 Claims. (Cl. 138—48)

This invention relates to expansion means, particularly adapted to conduit systems which are subjected to variations in temperature.

An object of the invention is to provide an improved expansion means which will effectively compensate for expansions and contractions in conduits or the like.

Another object is to provide an improved expansion means which may readily be applied to insulated conduits and may itself be effectively insulated.

Another object is to provide an improved expansion means which may be easily prefabricated as a unitary structure.

Another object is to provide an improved expansion means which will be compact and easily handled.

Another object is to provide an improved expansion means which may be readily and economically manufactured.

Another object is to provide an improved expansion means which may be simply installed.

Another object is to provide an improved expansion means which will occupy relatively little space.

Another object is to provide an improved expansion means which will be effectively sealed at all times.

Another object is to provide an improved expansion means which will require no movable joints, packings or similar relatively movable parts.

Other objects will hereinafter appear.

The invention will be better understood from the description of two practical embodiments thereof, illustrated in the accompanying drawing, in which:

Figure 1 is a perspective view of a finished expansion device embodying the invention, ready for installation;

Figure 2 is a perspective view of some of the component parts of one form of the device such as is shown in Figure 1;

Figure 3 is a plan view showing the assembled arrangement of a device using the parts of Figure 2; and

Figure 4 is a plan view of a modified form of the device, showing the parts partially assembled.

The expansion means of this application is illustrated in conjunction with a heat insulated conduit, consisting essentially of an inner fluid conducting tube surrounded with heat insulated material, which, in turn, is encased within a metallic or like protective shell, such, for instance, as the conduit illustrated in the patent to Gottwald, No. 1,991,445, patented February 19, 1935, or that of the copending application of Gottwald and McLeish, Serial No. 295,390, filed September 18, 1939 which has matured into Patent No. 2,330,966, granted October 5, 1943.

Conduits of this type are usually erected in trenches in the ground, and after erection, buried, although at times the structures are used above ground, and even for elevated steam lines and the like.

Inasmuch as steam at relatively high temperatures is frequently transmitted, or, in some instances, a conduit of this type is used for refrigerant materials, and, inasmuch as the exterior is exposed to the temperature changes taking place in the ground or atmosphere, generally outside of any building, it will be apparent that considerable variations in temperature exists, and that expansions and contractions of the conduit often are substantial and frequent.

Movable connections, such as by slip joints and the like, requiring frequent care and packing, seriously increase the maintainance cost and impair the effectiveness of these conduit systems.

To eliminate these disadvantages, the expansion means of this application has been devised.

This expansion means is shown in the drawing as a very narrow U shaped or "hair-pin" bend, consisting of two straight parallel closely adjacent arms of fluid conducting tube, one end of each of these sections being connected by a 90° elbow to the main conduit, and the remote ends of the arms being connected together by an elbow or a bend of substantially 180°, these parts all conveniently being joined by welding.

Any expansion or contraction taking place in the main conduit moves the ends of the hair-pin like loop toward or away from each other, bending the normally straight sides thereof slightly. Due to the fact that these sides may have substantial length, the unit stresses produced are slight and well within permissible limits.

In Figures 1 to 3, the arms of the loop appear at 1, the 180° elbow or return bend at 2, the outwardly turned elbows at 3, and short pieces of pipe or conduit for connection into the main line at 4.

The parts of the loop are shown as covered with insulation which is preferably separated into two parts 5 and 6, one surrounding each of the straight arm sections and carried by it so that it will not impede their relative movement,

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while similar insulation 7 and 8 surrounds the bend 2 and elbows 3, respectively.

Both of these arms are enclosed in a flattened generally elliptical casing 9 of corrugated sheet metal, or the like, which will be hereinafter described.

In making the loop of the first figures, the loop arms 1, elbows 2 and 3, and two short sections 4 of tubing are assembled and united by welding.

Then this assembly is enclosed in its coverings of heat insulating material 5, 6, 7 and 8. This may be shredded asbestos, molded pipe covering, or the like, and may be encased in a covering of asphalt treated felt 10, roofing paper, or similar material.

The outer shell 9 is preferably constructed of corrugated metallic tubing of a flattened or generally elliptical shape. It may originally be formed into such shape, or a cylindrical section of corrugated tubing may be somewhat flattened by means of a press. If helically corrugated tubing is used, the seams must be prevented from slipping during this flattening operation, one effective way being to weld them adjacent the ends of the section before this operation.

The outer end of the shell is closed as by a plate 11 welded to it.

After the shell is formed, it is slid over the arms of the loop and a split cylindrical sleeve 12 is slid over the elbows 3 and short tubular sections 4, the straight arms 1 of the loop extending through the slit.

The slit in the sleeve may be only large enough to embrace the arms of the loop and its edges may act as guides to properly locate them. Of course, this will necessitate slight spaces through the insulation at the two sides of the arms. Or the slit may be wide enough to span the entire insulating covering, and, if this be of rigid material, will still assist in supporting the loop arms.

With the parts in the position of Figure 3, the end of the casing is welded to the sleeve, after which the slit at the projecting ends of the sleeve is covered with covers or patches 13 which are welded both to the sleeve and to the casing.

Short corrugated tubular sections 14 are supported centrally of the sleeve by centrally apertured plates 15 which may be welded within the sleeve, these sections corresponding to the casing of the main conduit line to which they may be joined on installation of the system. Welded buttons 12a may be formed in the sleeve to assist in locating the rings 15.

The casing, sleeve, and ends 14 form a hollow, generally T shaped shell in which the U shaped bend is free to move in the plane of the axes of the main conduit and of its arms.

Ring shaped guides 16 preferably of heat insulating material are inserted in the ends of tubes 14, as by being threaded into the corrugations thereof, if these be helical.

The exterior of the casing and sleeve are preferably coated with a thick coating of waterproof material 17 such as asphalt and wound with an outer covering of fibrous material 18 such as felt.

This coating is preferably applied after the parts of the expansion joint have been assembled. While it is possible to coat the piece of corrugated tubing for the shell 9 with asphalt and to wind it with felt before subjecting it to the flattening operation, the distortions which take place during flattening may dislocate some of the material, and hence it is believed that a better protective coating is produced after the assembly of the parts rather than before.

This completes the fabrication of the expansion bend, which need only be welded to the ends of the actual conduit sections on installation.

In Figure 4, a slightly modified form of protective covering is illustrated in which, instead of the slit sleeve, a sleeve is shown made from a circular section of corrugated metallic pipe.

In this instance, after the casing 109 has been formed, its open end is brought to the corrugated sleeve 112, the sleeve then being cut away to correspond to the end of the casing, and the two welded together. After this operation, the sleeve is split lengthwise into halves 112a and 112b as by the use of a cutting torch, the bend 101 of heat insulated tubing inserted within the casing, and the removed portion of the sleeve returned to its initial position and welded back into place.

It will be understood that the bend 101 is formed like that above described, consisting of two straight parallel arms 1, a return bend 2, elbows 3 and short tubular pieces 4, and that these parts are incased within heat insulating material such as that indicated at 5, 6, 7 and 8 in the embodiment previously described.

It will also be understood that corrugated sleeve 112, if this be of a different size from the outer casing of the conduit, will be provided with rings 115 and tubular ends 114 similar to those applied to the sleeve above described, and that these parts may most conveniently be secured to the sleeve before it is split into halves 112a and 112b and will necessarily be reunited at the same time that the halves of the sleeve are welded together.

After these parts have been assembled, they, like those previously described, are coated with water proof material such as molten asphalt and with an outer covering such as felt, paper, or the like.

Upon installation in a conduit which is to be buried in the ground, it is only necessary to dig a relatively short straight branch trench at the point where the expansion bend is to be installed, this trench being substantially at right angles to the one provided for the reception of the main line.

After the bend has been placed in this trench, the later may be filled in and the earth tightly compacted, as the casing prevents any earth from getting between the arms of the bend or otherwise obstructing the relative motion of these arms as may be required to compensate for expansions and contractions.

In a conduit installed above ground, it can conveniently be laid extending horizontally to one side upon whatever supporting structure may be provided for the main line of the conduit.

While I have described the illustrated embodiments of my invention in some particularity, obviously many others will readily occur to those skilled in this art, and I do not, therefore, limit myself to the precise details shown and described, but claim as my invention all embodiments, variations, and modifications thereof coming within the scope of the appended claims.

I claim:

1. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms and out-turned ends, the arms

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being joined by a bend, heat insulating material secured to the arms and bend, guide means associated with said ends, and a T-shaped casing, the out-turned ends extending through the cross of the T and the arms being enclosed within the staff thereof.

2. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms and out-turned ends, the arms being joined by a bend, heat insulating material secured to the arms and bend, guide means associated with said ends, and a T-shaped casing, the out-turned ends extending through the cross of the T and the arms being enclosed within the staff thereof, the staff of the T consisting of a tubular corrugated member of elliptical cross section.

3. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms and out-turned ends, the arms being joined by a bend, heat insulating material secured to the arms and bend, guide means associated with said ends, a T-shaped casing, the out-turned ends extending through the cross of the T and the arms being enclosed within the staff thereof, the staff of the T consisting of a tubular corrugated member of elliptical cross section, the cross of said T consisting of a slotted cylindrical tubular member, the slot being passed over the arms of the bend, and coverings overlying said slot exteriorly of said elliptical casing member.

4. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms and out-turned ends, the arms being joined by a bend, heat insulating material secured to the arms and bend, guide means associated with said ends, and a T-shaped casing, the out-turned ends extending through the cross of the T and the arms being enclosed within the staff thereof, the staff of the T consisting of a tubular corrugated member of elliptical cross section, the cross member of said T consisting of two semi-cylindrical halves sealed together, one of said halves being sealed to the end of said elliptical member.

5. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms joined by a return elbow, the arms having out-turned ends, a T-shaped casing, the ends of the bend extending through the cross of the T and the arms being enclosed within the staff thereof, guide means positioning said ends with respect to said casing, and heat insulating material within the casing surrounding the arms and bend.

6. An expansion device comprising a U-shaped conduit having elongated substantially straight and parallel arms joined by a return elbow, the arms having out-turned ends, a T-shaped casing, the ends of the bend extending through the cross of the T and the arms being enclosed within the staff thereof, guide means associated with the out-turned ends and fixed in relation to the ends of the cross of the T whereby the arms may move laterally with respect to the casing, while the out-turned ends are maintained axially in alignment relative the casing.

CHRISTIAN GOTTWALD.

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