May 9, 1939. W. PEUTHERT 2,157,564

EXPANSION BEND

Filed Aug. 12, 1936

Fig.1.

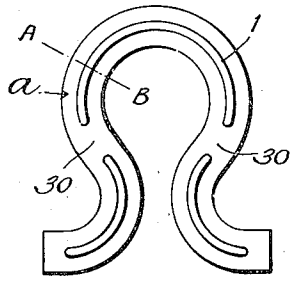


Fig.2.

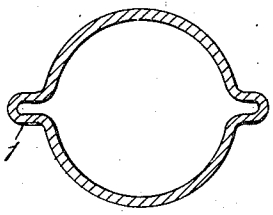


Fig.3.

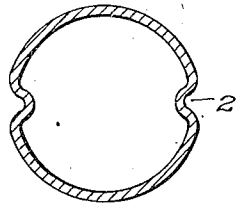


Fig.4.

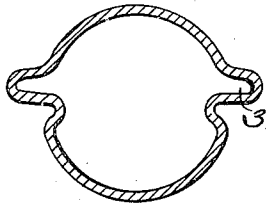


Fig.5.

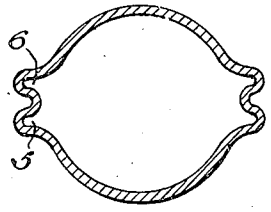


Fig.6.

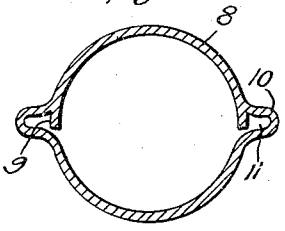


Fig.7.

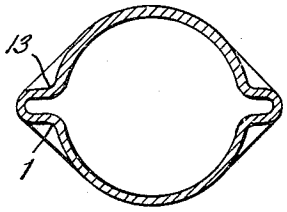


Fig.8.

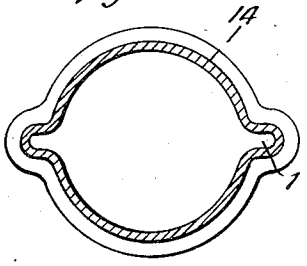


Fig.9.

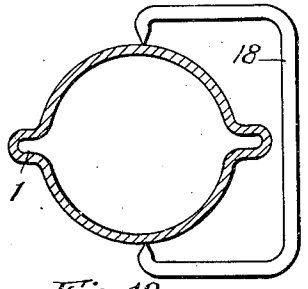


Fig.10.

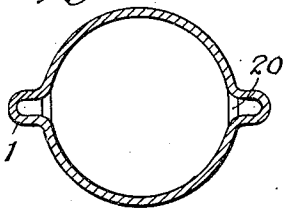


Fig.11.

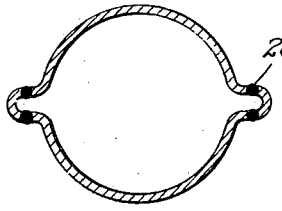


Fig.12.

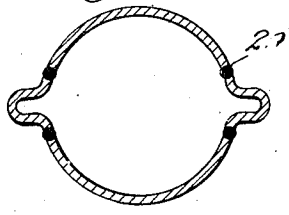


Fig.13.

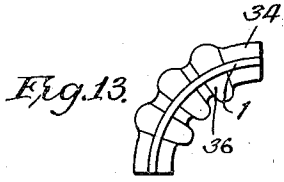
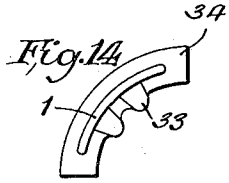


Fig.14.



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Patented May 9, 1939

2,157,564

UNITED STATES PATENT OFFICE

2,157,564

EXPANSION BEND

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Application August 12, 1936, Serial No. 95,512
In Germany August 16, 1935

7 Claims. (Cl. 138—50)

This invention relates to curved flexible compensator tubes such as are inserted in pipe lines for taking up expansion and relative displacements of the individual sections of the line.

By providing such tubes in the usual manner with transversal i. e. peripheral annular folds the flexibility of the tubes is increased in a very desirable manner. This expedient, however, is not satisfactory since the flow through the tube is considerably obstructed and disturbed by the crosswalls of the folds.

While known elbow tubes could be freed of obstructions by providing, in known manner, throughout their surface longitudinal folds instead of transversal folds, the benefit derived is offset by the increased stiffness, since the longitudinal fold stiffens the tube in a proportion increasing with the distance of such fold from the neutral zone of the elbow.

The object of the invention is to avoid all these disadvantages. It is a curved compensator tube provided with longitudinal folds only in or near the neutral zone where they have no detrimental stiffening effect on the tube but, to the contrary, considerably increase the flexibility of the tube.

In the accompanying drawing some modifications of the object of the invention are illustrated diagrammatically.

Fig. 1 is a side view of a compensator, in accordance with the invention, having the form of a lyre.

Fig. 2 is a cross section at the line A—B of Fig. 1.

Figs. 3 to 12 inclusive are cross sections of modifications.

Fig. 13 is a view of an elbow having a longitudinal fold in combination with the known transversal folds extending all around the periphery.

Fig. 14 is a view of a similar elbow with the transversal folds arranged at the inner curvature only.

The lyre *a* shown in Fig. 1 has a substantially cylindrical cross section. Projecting outwardly from the neutral zone are the longitudinal folds 1 which have a curved apex and flat walls separated by an ample space. These folds increase remarkably the flexibility of the tube. They do not, however, create any substantial resistance to flow. This is accomplished by extending the folds in the direction of flow and so that they do not project into the free cross section of the tube proper.

To prevent flattening of the folds by the fluid pressure in the tube, they may be interrupted at one or more places by sections or parts 30 of the tube proper which have an uninterrupted circular cross section without folds.

In the modification shown in Fig. 3 inwardly directed folds 2 are used; in the modification shown in Fig. 4 S-shaped folds 3 are used; and in the modification shown in Fig. 5 double folds 5, 6 are used. This latter construction is particularly adapted for tubes of great diameter.

In the modification shown in Fig. 6 the tube 8 has again folds 1 as in Fig. 2. The inner space 11 of these folds, however, is covered by lips 9 connected or integral with the wall of the tube, thereby improving the flow through the tube.

In the modification shown in Fig. 7 flattening out of the folds 1 is prevented by ribs 13 bracing the folds against the wall of the tube.

Annular ribs 14 are provided for the same purpose according to Fig. 8; according to Fig. 9 a yoke or yokes 18, and according to Fig. 10 anchors 20 traversing the folds. These anchors 20 can be arranged in a plane at right angles to the axis of the tube or, to increase their yielding capacity, they can be arranged obliquely or can have a curved or undulated form. This will be obvious to an expert.

In the modifications shown in Figs. 11 and 12 the folds are welded to the tube proper. In both cases, for greater strength of the tubes, the welding seams are remote from the roots or feet of the folds. According to Fig. 11 the welding seams 26 are located at intermediate points of the walls of the folds while according to Fig. 12 the welding seams 29 are located laterally in the walls of the tube proper. These welded constructions make it conveniently possible to make the folds of a thinner but higher-grade material than the body of the tube.

The elbow 34, shown in Fig. 13, has longitudinal folds 1 as in Fig. 2. Moreover it has the usual transversal annular folds all around its periphery.

The elbow 34, shown in Fig. 14, has, besides the longitudinal folds 1, transversal folds 33 arranged at the inner curvature only.

I claim:—

1. An expansion bend for pipe lines, said bend consisting of a curved pipe having a continuous wall, formed by a single piece of sheet metal, forming as well the inner as the outer part of the bend, said parts being of smooth circular cross section each except in the region of the neutral zone of the bend where the latter has

longitudinal folds the opposite walls of which are separated by a free space.

2. A bend as in claim 1, said folds being arranged substantially outside said circular cross section.

3. A bend as in claim 1, said folds being narrow and having, in cross section, a curved apex with a very small radius and substantially straight nearly parallel sidewalls.

4. An expansion bend for pipe lines, said bend consisting of a curved pipe having a continuous wall, formed by a single piece of sheet metal, forming as well the inner as the outer part of the bend, said parts being of smooth circular cross section each except in the region of the neutral zone of the bend where the latter has longitudinal folds, the opposite walls of which are separated by a free space, in which bend said folds extend uninterruptedly throughout the length of the bend, and in which means for counteracting flattening of said folds are provided.

5. A bend as in claim 1 in which means for counteracting flattening of said folds are provided in a zone substantially uninfluenced by bending movements changing the curvature of the tube.

6. A bend as in claim 4, having a yoke member counteracting flattening of the folds.

7. A bend as in claim 4, having ribs bracing said folds.

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