

Jan. 7, 1941.

L. B. GARDNER

2,228,052

EXPANSION JOINT

Filed Oct. 26, 1937

Fig. 1.

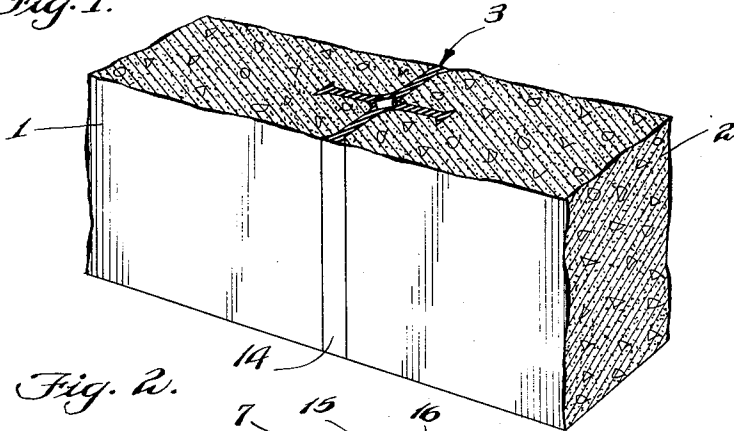


Fig. 2.

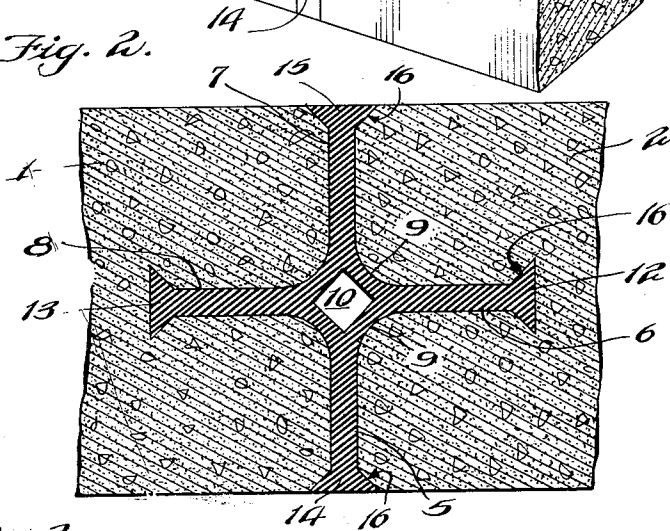


Fig. 3.

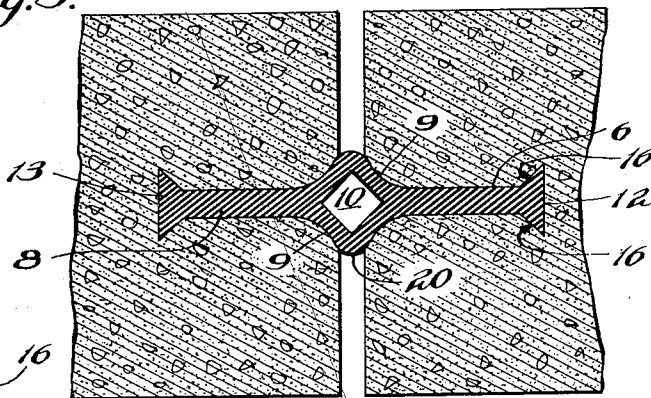
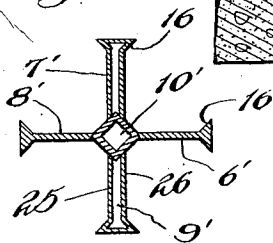


Fig. 4.



Inventor
Lyle B. Gardner
By Morris Spector,
Att'y.

UNITED STATES PATENT OFFICE

2,228,052

EXPANSION JOINT

Lyle B. Gardner, Riverside, Ill.

Application October 26, 1937, Serial No. 171,114

9 Claims. (Cl. 94—18)

This invention relates to expansion joints.

It is one of the objects of the present invention to produce a water-tight and dirt free expansion joint which is particularly applicable for use in places such as vertical walls which may be of great length and which may hold water or other liquid on one side. While the expansion joint of the present invention is particularly applicable to vertical structures it is not limited thereto, as the same may be used also on horizontal structures, such as highways.

It is a further object of the present invention to provide a joint of the above character wherein there is no danger of injurious foreign material puncturing the joint between the adjacent walls as the walls expand and contract.

It is a still further object of this invention to provide an expansion joint with improved means for anchoring the same so that it will not be torn loose from the joined structures as the same expand or contract.

It is another object of the present invention to provide an expansion joint which is so arranged that it maintains the space between adjacent walls closed even as they separate from one another on contraction. To attain this result the joint is made in the form of a cross, two sides of which extend in the direction of expansion and contraction of adjacent wall parts and the other two sides extend transversely of the wall, the arrangement being such that separation of the walls produces an extension of the sides of the joint that extend lengthwise of the walls, which extension in and of itself produces a contraction of the sides that extend transversely of the walls, which transverse sides of the joint are provided with tapered edges that are thus drawn into firm engagement with the walls.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a fragmentary perspective view of a portion of a wall, two adjacent sections of which are connected by an expansion joint of the present invention;

Figure 2 is a horizontal sectional view through the expansion joint of Figure 1;

Figure 3 is a view corresponding to Figure 1 and illustrating a modified construction; and

Figure 4 is a reduced sectional view of another joint.

Reference may now be had more particularly to Figure 1. In this figure there are shown two adjacent concrete wall sections 1 and 2 slightly spaced apart to permit relative movement of the sections due to thermal expansion. The sections 1 and 2 may be part of a huge wall of great length, or may be the wall of a tank, and may have water on one side thereof and air on the other. The water-tight expansion joint between the wall sections 1 and 2 is indicated in general by the reference numeral 3. The expansion joint may be made of any elastic material such as rubber, by way of example. The joint extends the full height of the wall and has four imperforate arms or plates 5, 6, 7 and 8. The arms or plates project radially from a hollow tubular body 10 to which they are joined by smooth curved surfaces 9 to form one integral structure. The plates 6 and 8 are anchor plates for anchoring the joint in place, and the plates 5 and 7 are filler plates. The ends of the plates are enlarged, as indicated at 12—13 on the plates 6 and 8 and 14—15 on the plates 5 and 7.

The enlargements 12 and 13 serve to anchor the joint to the wall sections 1 and 2, and for that purpose any shaped enlargement is satisfactory. However, the enlargements serve an additional purpose, that of maintaining a water-tight seal, to prevent the seepage of water through the joint, and for that reason the inner sides of the enlargements are tapered, or wedge shaped, as indicated at 16, as are also the inner sides of the enlargements 14 and 15.

As the wall contracts, causing the separation of the wall sections 1 and 2, the arms or plates 6 and 8 are drawn with the wall sections 1 and 2, thus tending to flatten the tubular body at the curves 9 and pull the filler plate arms 5 and 7 inwardly toward the center of the joint. This causes the tapered sides 16 of the extensions 14—15 to slide on the correspondingly tapered surfaces of the wall sections 1 and 2 and thus maintain the space between the wall sections 1 and 2 closed. At the same time the tapered surfaces 16 of the anchor arms 6 and 8 are drawn into tighter engagement with the adjacent concrete surfaces, thus aiding to seal against the creepage of liquid from one side of the wall to the other through the joint, since the plates 6 and 8 extend the full length of the tubular body 10 and are in fluid-tight relation thereto to prevent leakage of liquid around the tube 10. Later, as the wall expands and the joint is reduced in size, the reverse action takes place.

The arms 6 and 8 are pushed towards one another and through the curved surfaces 9 force the filler plates 5 and 7 outwardly so that the tapered surfaces 16 of the extensions 14-15 are pushed outwardly, thus permitting the surfaces 16 to maintain engagement with the concrete walls.

If desired the opening 10 may be filled with a readily compressible material, such as sponge rubber. If the opening 10 remains unfilled then the top of the joint is, preferably, covered to prevent foreign matter from dropping into the opening 10.

Reference may now be had more particularly to Figure 3. In Figure 3 is shown a joint corresponding to that of Figure 2 except that the plates 5 and 7 have been entirely omitted. In other respects this joint is the same as that of Figure 2 and similar reference numerals have been used to indicate similar parts. When these plates are omitted adjacent curves 9-9 are joined by a smooth curve 20. The tube 10 allows for expansion of the joint, and the surfaces 16 seal against the creepage of liquid through the joint. Any type of compressible filler may be placed in the space between the sections 1 and 2.

Instead of omitting both of the arms 5 and 7, as in Figure 3, only one may be omitted. When this is done the filler arm retained is preferably the one on the side of the wall that receives the water pressure.

If this joint is used on highway work it may be used in the form illustrated in Figures 2 or 3 or, if only one instead of both of the filler arms is to be omitted, then it is the downwardly projecting arm which is omitted, and the upwardly projecting arm is retained.

It is apparent from the above description that it is primarily the tube 10 that is distorted during expansion or contraction of the joint. Therefore any elastic tube may be used for this purpose, for instance a brass tube. The plates may be made of any desired metal and secured to the tube by a liquid-tight joint extending the full length of the tube. The plates 5 and 7 must be compressible to allow contraction of the joint. If metal is used, those arms may be made hollow, the opposite sides being of thin sheet brass.

In Figure 4 I have illustrated a joint made of metal. The tubular body is indicated at 10', being preferably a thin-walled brass tube. The anchor plates, preferably of steel, are indicated at 6' and 8', and the filler plates at 5' and 7'. The filler plates are hollow, the walls 25 and 26 thereof being thin brass sheets. The plates 5, 6, 7 and 8 are secured to the tube in fluid-tight relation throughout the length of the tube 10'. For the sake of simplicity I have shown the tube 10' as square, although any other section may be used, and it may have its walls curved as at 9 in Figures 2 and 3.

From the above description it is apparent that I have provided an expansion joint which is simple in construction and reliable in its action and which is not likely to be injured by foreign material working its way into the joint as the adjacent wall sections expand or contract.

In compliance with the requirements of the patent statutes I have herein shown and described a few preferred forms of my invention. It is, however, to be understood that the invention is not limited to the precise constructions here shown, the same being merely illus-

trative of the principles of the invention. What I consider new and desire to secure by Letters Patent is:

1. A water-proof expansion joint for joining adjacent sections of a structure, said joint comprising a resilient tubular body having anchoring plates projecting from opposite sides thereof and each forming a water-tight sealing fit with the tubular body for the full effective length of the body, and at least one compressible filler plate projecting from the side of the tubular body at substantially right angles to the anchoring plates and extending the full length of the tubular body, and having an enlargement at the end thereof remote from the tubular body, said enlargement extending for the full length of the filler plate and terminating substantially flush with the outer surfaces of the sections being joined.

2. A water-proof expansion joint comprising a resilient tubular body having anchoring plates projecting from opposite sides thereof and each forming a water-tight sealing fit with the tubular body for the full effective length of the body, and at least one compressible filler plate projecting from the side of the tubular body at substantially right angles to the anchoring plates and extending the full length of the tubular body, said filler plate having an enlargement along the edge thereof opposite the tubular body, which enlargement is joined with the filler plate by a wedge-shaped taper.

3. A water-proof expansion joint comprising a resilient tubular body having anchoring plates projecting from opposite sides thereof and each forming a water-tight sealing fit with the tubular body for the full effective length of the body, each of said plates having an enlargement for substantially the full length thereof at its end opposite the tubular body, and at least one compressible filler plate projecting from the side of the tubular body at substantially right angles to the anchoring plates and extending the full length of the tubular body, said filler plate having an enlargement along the edge thereof opposite the tubular body, which enlargement is joined with the filler plate by a wedge-shaped taper.

4. A water-proof expansion joint comprising a resilient tubular body having anchoring plates projecting from opposite sides thereof and filler plates projecting from opposite sides thereof and at right angles to the anchor plates, each plate extending for the full effective length of and forming a water-tight sealing fit with the tubular body, said plates and tube constituting one unitary structure so that relative movement of the anchoring plates towards and away from one another results in distortion of the tubular body which produces opposite movement of the filler plates, each of said plates being outwardly flared along both sides at its edge remote from the tubular body and for the full length of that edge.

5. An expansion joint for joining two sections of a structure and closing the space therebetween while allowing relative movement of the sections due to thermal expansion and contraction, said joint comprising a wedge-shaped strip with the inclined sides thereof resting on the two sections being joined and the top of the wedge substantially flush with the outer surfaces of the sections being joined, and means responsive to the separating movement of the joined sections for pulling the strip inwardly

in the space between the joined sections, said last means comprising a looped member in the space between the sections being joined, means anchored in the two sections for distorting the looped member as the sections move with respect to one another, and connecting means between the looped member and the strip for moving the strip responsive to distortion of the looped member.

6. An expansion joint for joining adjacent sections of a structure, said joint comprising an elastic tubular body having anchoring plates and filler plates extending therefrom, the filler plates being at right angles to the anchoring plates, and wedge-shaped means at the end of each filler plate and terminating substantially flush with the outer surfaces of the sections being joined for sealing the entrance to the joint.

7. An expansion joint for joining adjacent sections of a structure, said joint comprising an elastic tubular body having anchoring plates and filler plates extending therefrom, the filler plates being at right angles to the anchoring plates, and each filler plate being outwardly flared at its end remote from the tubular body and terminating substantially flush with the outer surfaces of the sections being joined for preventing the entrance of foreign solid matter between the sections.

8. A structure comprising adjacent sections spaced apart to permit relative expansion and contraction of the structure, an expansion joint joining said sections and sealing said space between the sections, said expansion joint including a filler closing the space between the sections and having a wedge shaped enlargement at an

end thereof and extending the full length of the filler, said enlargement terminating substantially flush with the outer surfaces of the sections and sealing the space between the sections, and means for drawing the enlargement inwardly responsive to separation movement of the sections whereby the wedge shape of the enlargement maintains the space between the sections closed at the outer surfaces of said sections as said sections recede from one another.

9. A structure comprising adjacent sections spaced apart to permit relative expansion and contraction of the structure, an expansion joint joining said sections and sealing said space between the sections, said expansion joint including a filler closing the space between the sections and having a wedge shaped enlargement at an end thereof and extending the full length of the filler, said enlargement terminating substantially flush with the outer surfaces of the sections and sealing the space between the sections, and means for drawing the enlargement inwardly responsive to separation movement of the sections whereby the wedge shape of the enlargement maintains the space between the sections closed at the outer surfaces of said sections as said sections recede from one another, said last named means comprising a pair of arms anchored in said sections and joined between said sections by a portion looped toward said wedge shaped enlargement so that the loop is drawn away from said enlargement upon recession of the sections from one another, and said filler being joined to said loop portion.

LYLE B. GARDNER.