F. P. SMITH.

EXPANSION JOINT.

APPLICATION FILED SEPT. 1, 1921.

1,427,557 Patented Aug. 29, 1922.

Fig. 1.

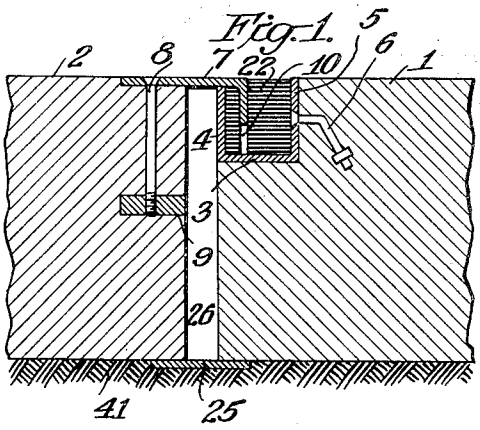


Fig. 2.

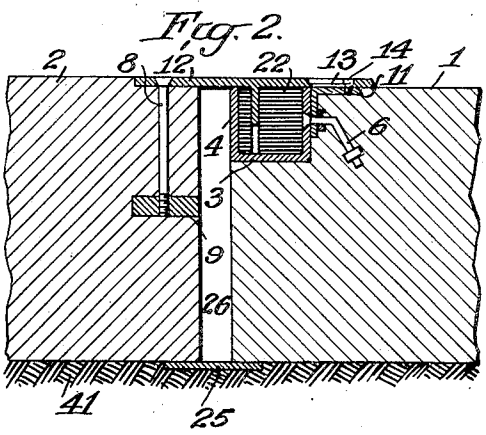


Fig. 3.

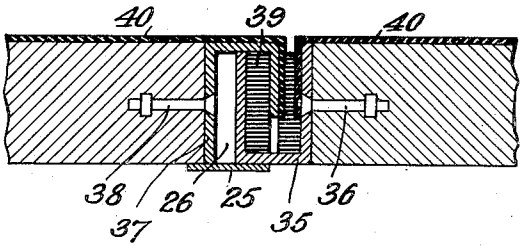


Fig. 4.

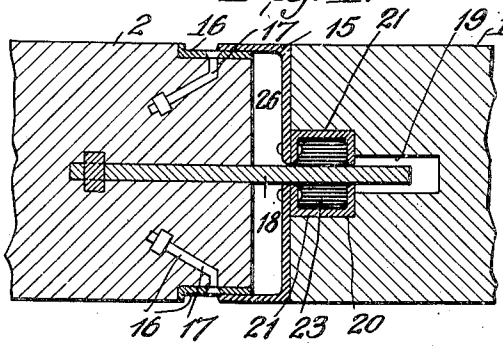


Fig. 5.

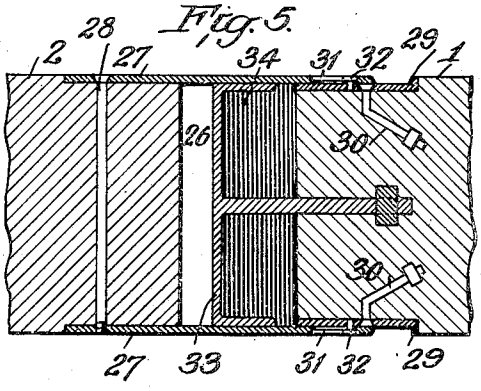
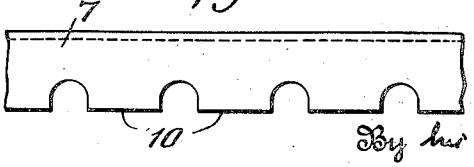


Fig. 6.



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UNITED STATES PATENT OFFICE.

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EXPANSION JOINT.

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To all whom it may concern:

Be it known that I, FRANCIS P. SMITH, a citizen of the United States of America, residing at Rye, Westchester County, State of New York, have invented certain new and useful Improvements in Expansion Joints, of which the following is a specification.

My invention is particularly designed for use in connection with pavements, reservoir linings and similar structures made up of sections or slabs of concrete or similar material, which materials contract and expand slightly under the influence of variations of temperature at different seasons of the year. Heretofore it has been customary to fill the space between the abutting ends of such sections of concrete pavement with a mass of waterproof, semifluid material such as asphalt, but when a crevice so filled is reduced in volumetric capacity by the expansion of the concrete sections forcing the adjacent ends together, part or all of the intervening asphalt is expelled and soon washed, or otherwise carried away by the elements or the traffic. When the crevice is afterwards enlarged by the contraction of the concrete slabs on either side of it, cracks are opened through which water can pass, or sand and gravel enter and fill the crevice, with the result that when the slabs expand next summer their edges are driven against this incompressible foreign matter with such force that they crack or crush, thus destroying the joint.

My present invention is based largely on the discovery that if the waterproof, viscous material, such as asphalt or asphalt and sand mastic used for waterproofing an expansion joint, be placed in a constant volume receptacle carried by one slab or section of concrete or other material composing the main structure, and a projection from the other slab or section be allowed to extend over or through the said waterproofing mass, the overlapping faces so formed extending in the plane of relative movement of the two sections, a constant contact and water-tight joint may be secured. Several of the best forms of apparatus at present known to me, embodying my invention, are illustrated in the accompanying sheet of drawings, in which—

Fig. 1 is a vertical section through a joint in a concrete pavement, parts being broken away.

Fig. 2 is a similar view of a modified construction.

Fig. 3 is a vertical section through a joint in the floor lining of a reservoir.

Figs. 4 and 5 are horizontal sections through different forms of joint construction for use in the wall lining of reservoirs; and

Fig. 6 is a detail of one form of one joint-member.

Throughout the drawings like reference characters indicate like parts.

1 and 2 represent (in Figs. 1 and 2) adjacent ends of two slabs or sections of concrete used in paving a modern highway. A space 26 is left between these ends sufficient to allow for the maximum predetermined expansion of slabs 1 and 2 in the hottest weather, without producing contact and a crushing force of compression between the said adjacent ends. The upper edge of one slab, as 1, is cut away to form a space in which may be set a trough-like member of iron having the bottom 3, forward lip 4 and rear lip 5. A deep channel iron will usually serve. This may be anchored in section 1 by anchor bolts 6. A cooperating member 7 (see Fig. 1) having a downwardly extending lip 10, is anchored by bolts 8 and anchor piece 9, on the upper edge of the section or slab 2. A standard form of angle iron may be used for this purpose. The lip 10 extends downwardly into the interior of the opposite channel iron and preferably rests on the bottom, 3, thereof. This lip should be cut away partly, as indicated in Fig. 6. A mass, 22, of asphalt, or similar waterproof, viscous material is placed in the trough-like member and fills the same to the level of the upper surface of sections 1 and 2. These sections rest on any suitable foundation 41, of gravel or other material, over which they can move slightly as they expand and contract. 25 is a plate placed under the ends of the pavement sections and bridging the space between them to prevent the foundation material from working up into crevice 26. The various recesses for attachments may be molded in slabs 1 and 2.

It is evident that as slabs 1 and 2 expand and contract, the lip 10, immersed in the

viscous material 22, will move back and forth through the same, always retaining close contact therewith on one side or the other or both and so preventing percolation of water through the joint. The upper surface of the joint will remain substantially always at the same level, as the surface of the mass 22 will not materially rise or fall in its container of constant volume. As the lip 10 rests on the surface of the bottom 3 of the cutaway space in one slab, it supports the outer edge of member 7 and enables it to withstand the blows of wheels running over the joint.

In the modification shown in Fig. 2, a ribbed plate 12 is substituted for the angle plate 7 shown in Fig. 1. This plate may have slots 13 through which may project screws 14 carried in angle iron 11. The general mode of operation of the parts is as before, the rib on plate 12 being immersed in the asphalt 22 and making a water-tight joint therewith. In this form the asphalt is entirely protected by plate 11 from wear by the traffic, and any admixture of foreign matter with the asphalt is thus entirely prevented. The rib on plate 11 need not necessarily extend to and bear on the bottom of plate 3 of the cutaway space in slab 1, as the plate is supported at both edges. Screws 14 and slots 13 form tying means, holding the metal members and also the sections 1 and 2 together.

The modification shown in Fig. 3 is designed for use on the floors of water reservoirs and the like. The grooved asphalt-holding member 35 is anchored to one section of the cement floor lining by anchor bolts 36, and the lip member 37 is anchored to the other section by anchor bolts 38. The layers of waterproof fabric 40, 40, cemented to the floor sections, are continued down into the asphalt mass 39. This seals the joints between the concrete floor sections and their attached joint members 35 and 37.

In all the forms of my invention previously described it has been permissible to leave one surface of the plastic mass of packing material exposed, because in all these constructions the trough-like container member of the joint has extended in a horizontal direction. This leaving the plastic mass exposed would not be permissible in a joint in the side walls of a reservoir, because then the asphalt or other viscous material would flow downward and slowly ooze away through the openings so left. For such side walls I use a joint construction such as shown in Figs. 4 or 5, the distinguishing feature of which is a closed constant volume container for the packing material.

In Fig. 4 the asphalt 23 is confined in channel irons 21, 21, set facing one another in an enlargement 20 of space 19 formed in the end of slab or section 1, and the tongue member 18, anchored in section 2, moves back and forth, through the asphalt, into and out of space 19. The wall sections 1 and 2 may be kept in line by angle irons 15 anchored to one section (as 1) and overlapping the face plates 16 held on the other section 2 by bolts 17, 17. As the tongue member 18 moves back and forth through the asphalt mass 23, the drag of said mass on the surface of said tongue member insures continual watertight contact and therefore a watertight joint at all times. This construction also prevents gravel and sand from entering space 26.

In the form shown in Fig. 5, the last described construction is reversed. The asphalt mass 34 confined by cap member 33 anchored in section 1, slides like a tongue in and out of the groove formed by plates 27, 27, anchored to section 2 by bolts 28. Here again the alignment of the wall sections 1 and 2 may be further assured by having the outer edges of plates 27 bear on guide plates 29, 29, anchored to section 1 by bolts 30, 30. The latter plates may also carry screws 32, 32, which engage slots 31, 31, in plates 27, 27. In this construction the drag of plates 27, 27, on the adjacent surfaces of the asphalt mass 34, as they move one over the other, will cause a constant crowding of the asphalt in one direction or the other, and consequent watertight contact at all times between these moving elements.

The common principle underlying all these modified constructions is the provision of a constant volume recess in one member in which a body of viscous material may be retained in such position that a projection extending from the other member, in the common line of relative motion, may be held in constant contact with said viscous mass. Thus the supply of the viscous material is conserved and at the same time no opportunity is afforded for the admission of foreign matter between the joint members.

Having described my invention, I claim:

1. An expansion joint for concrete structures and the like which comprises, in combination, two members having overlapping faces extending in the plane of movement of said members and which members are shaped to form a recess of constant volumetric capacity between said overlapping faces which said capacity is unvaried by the relative movement of the overlapping faces, and a mass of viscous waterproof material packed in and substantially filling said recess.

2. An expansion joint for concrete structures and the like which comprises, in combination, two members having overlapping faces extending in the plane of movement of said member and which members are

shaped to form a recess of constant volumetric capacity between said overlapping faces which said capacity is unvaried by the relative movement of the overlapping faces, extending into both members, and a mass of viscous waterproof material packed in and substantially filling said recess.

3. An expansion joint for concrete structures and the like which comprises, in combination, two members having overlapping faces extending in the plane of movement of said member and which members are shaped to form a recess of constant volumetric capacity between said overlapping faces which said capacity is unvaried by the relative movement of the overlapping faces, and a mass of viscous waterproof material packed in and substantially filling said recess, and tying means for holding said overlapping faces together.

4. An expansion joint for concrete pavements which comprises, in combination, two abutting sections of concrete spaced apart sufficiently to allow for the maximum expected expansion, one of said sections being cut away along its upper abutting edge and provided with an upwardly extending lip along said edge, and the other section being provided with an overhanging plate set in it flush with the common plane of the upper surfaces of the two sections, and projecting over and beyond the lip on the first section, together with a mass of viscous water-proof material filling the cutaway portion of the first section behind said lip and under said overhanging plate and extending up substantially to the plane of the upper surfaces of the sections along the space not covered by the said overhanging plate.

5. A structure such as set forth in claim 4, combined with a second plate placed under the two concrete sections and bridging the space between their abutting ends.

6. A structure such as set forth in claim 4, in which the overhanging plate is provided along its outer edge with a downwardly extending lip.

7. A structure such as set forth in claim 4, in which the overhanging plate is provided along its outer edge with a downwardly extending lip and projections on said lip bearing on the bottom of the cutaway portion of the adjacent pavement section.

8. An expansion joint for concrete structures and the like which comprises, in combination, two members having overlapping faces extending in the plane of movement of said members and which members are shaped to form a recess between said overlapping faces, and a mass of viscous waterproof material packing in and substantially filling said recess, together with layers of waterproof fabric cemented to the surfaces of the two first mentioned members, said layers of fabric having portions adjacent the edges of the said members immersed in the viscous material.

9. A structure such as set forth in claim 4 combined with layers of waterproof fabric cemented to the surfaces of the concrete sections and extending into the mass of viscous material.

FRANCIS P. SMITH.