Jan. 30, 1951 W. J. VAN LONDON 2,539,875

EXPANSION JOINT FILLER FOR EXISTING CONCRETE PAVEMENTS

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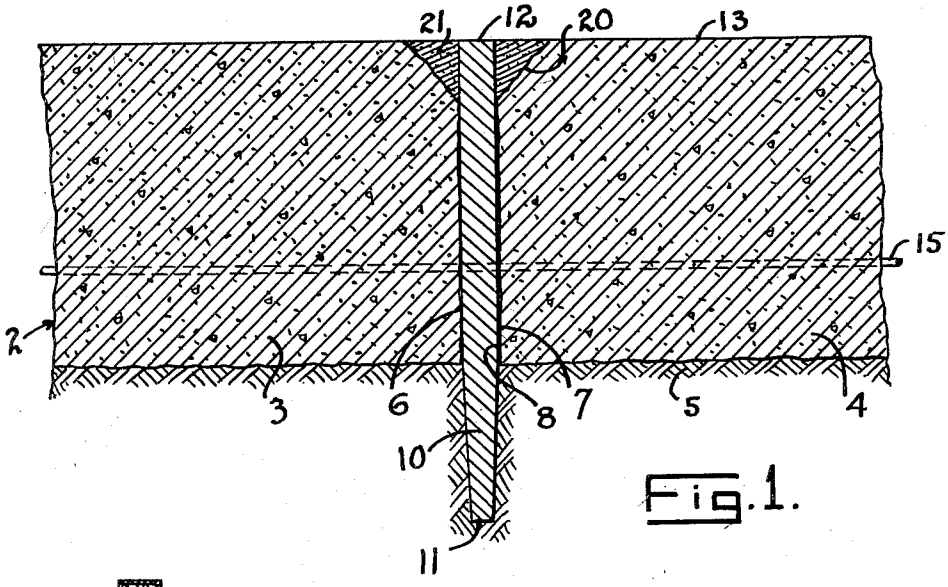


Fig. 1.

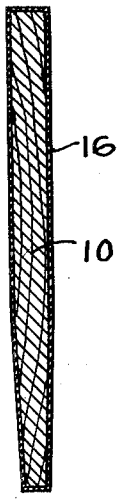


Fig. 3.

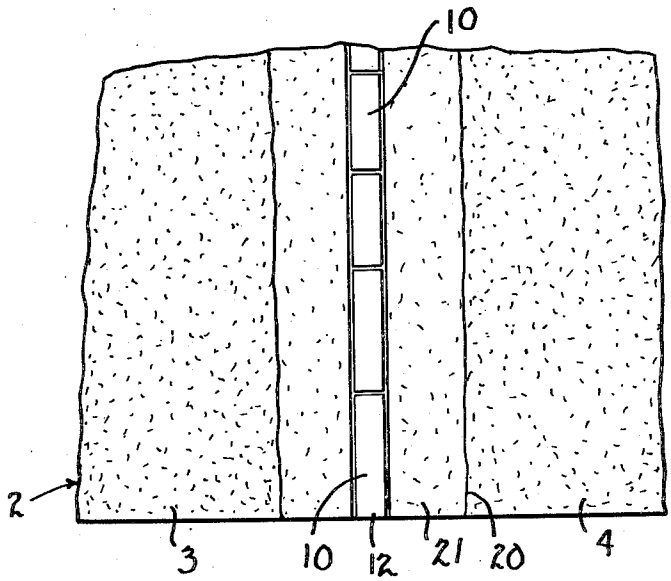


Fig. 2.

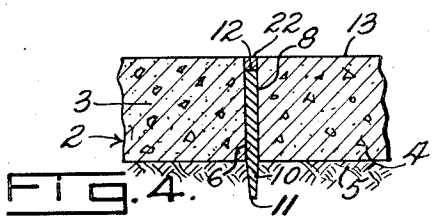


Fig. 4.

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EXPANSION JOINT FILLER FOR EXISTING CONCRETE PAVEMENTS

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2 Claims. (Cl. 94—22)

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The invention relates to an expansion joint or crack filler for existing pavements so that the joint or crack will remain filled at all times, the filler will not be extruded and will exclude soil, oil, sand, pebbles, water and the like from the pavement opening and sub-grade.

Considerable difficulty has been encountered with the many joints and cracks between adjacent slabs of concrete pavement and the like due to the expansion and contraction thereof.

The usual practice of filling the joint or crack with a semi-plastic asphaltic material is not satisfactory because the expansion of the slabs extrudes the filling and when the slabs contract the material is not sufficiently plastic nor is there any tendency for it to return to the joint or crack and the result is an opening in which sand, dirt and water can enter.

In the case of sand and dirt, it may fill the opening thus formed and when the slabs next expand an additional amount of the semi-plastic filler is thus extruded and eventually when considerable foreign matter has entered the joint or crack, subsequent expansion of the slabs against such material packed in position results in crush- of the slabs. Water passing through the openings softens the sub-grade which causes a flexing of the slabs under traffic which results in a pumping action to pump mud and water from the joint so that eventually a cavity is formed under the ends of the slabs which results in cracking or breaking of the pavement. The present invention contemplates a joint filler which can be inserted in a pre-compressed condition so that it will expand and fill the crack or joint so as to exclude foreign matter. It also contemplates a joint filler composed of sheets of uncompressed material which can be inserted in edge to edge relation in such a manner as to exclude foreign material.

It is one of the objects of the present invention to provide a pre-compressed piece of material which can be inserted in a joint or crack in concrete pavements so that it will expand upon the absorption of moisture to completely fill the joint or crack and which is compressible and expansible to maintain a tight joint.

Another object of the invention is to provide a plurality of wooden pieces which can be driven vertically into an existing joint or crack in pre-compressed condition so that they will automatically swell upon the absorption of moisture to thereafter fill the joint or crack.

Another object of the invention is to repair an existing joint or crack in concrete pavement by

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inserting therein a plurality of pre-dried, pre-compressed strips of wood whose normal thicknesses are greater than the width of the joint or crack.

Another object of the invention is to repair an existing joint or crack in concrete pavements by inserting therein a plurality of strips of pre-compressed wood and then filling the remaining area at the surface adjacent the wood so as to provide a smooth surface.

Another object of the invention is to drive pre-compressed wooden shingles into an expansion joint construction in pavements so that the shingle extends into the sub-grade and will swell by the absorption of moisture to fill the joint.

Another object of the invention is to repair an expansion joint by inserting therein a compressible and expansible member in combination with an additional filler material.

Another object of the invention is to fill a joint or crack in concrete pavements by driving a plurality of pieces of pre-compressed wood or the like therein edge to edge so as to fill the joint upon the swelling of the wood due to the absorption of moisture.

Another object of the invention is to insert in a joint or crack in a pavement structure in vertical position and in edge to edge relation a plurality of members such as wood or the like which have been precompressed while dry and which are entirely or partially waterproofed with temporary waterproofing so that the members will remain in precompressed condition until spalled and broken slab ends and irregularly shaped joint openings can be repaired and the slab ends brought tightly against the precompressed members and flush with the top of the members and the surface of the pavement, so that after the material used to repair slab ends has taken a set, the precompressed member may be wetted at the top to provide expansion, cause it to swell and tightly fill and seal the joint or crack.

Another object is to provide a temporary waterproofing for joint sealing members, so that the subsequent deterioration of the temporary waterproofing will admit moisture from the sub-grade to effect swelling and expansion.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawings wherein:

Fig. 1 is a vertical sectional view of an expansion joint which has been repaired in accordance with the invention.

Fig. 2 is a top plan view looking down on the pavement of Fig. 1.

Fig. 3 is a vertical section through one of the filler strips which has been enclosed with waterproofing material.

Fig. 4 is a vertical section through a joint having the filler therein.

In Fig. 1 a pavement 2 made up of the slabs 3 and 4 is disposed upon the sub-grade 5 with the ends 6 and 7 of the slabs 3 and 4 respectively spaced apart a distance to form an expansion joint 8.

This pavement has been in use for some time and as a result thereof the initial filler material in the joint has been extruded. The joint is then cleaned out by removing any foreign matter and a filler piece 10 is shown as having been driven in from the surface in a vertical direction so that the lower end 11 thereof penetrates into the sub-grade 5 and the upper edge 12 is approximately flush with the surface 13 of the pavement.

This filler piece 10 may be of any desired width, but as seen in Fig. 2 a plurality of such strips 10 have been placed edge to edge across the pavement so that the joint will be completely filled. Such a manner of inserting the filler pieces 10 is of substantial advantage because very often it is difficult to insert a strip of material extending across the pavement due to the fact that the joint or crack may be irregular, of varying width and also due to the fact that dowel rods 15 may extend across the joint 8 from slab to slab and two of the pieces 10 can be driven down adjacent each side of such rod or one of the pieces may be slotted to straddle such rod. The pieces can be inserted one after the other and each piece driven in a desired distance so as to completely fill the crack or joint after the material has expanded.

It is contemplated that any suitable material may be used, but it has been found that various types of woods or fibers may be suitable, for instance redwood, cedar, cypress, and other decay-proof wood and materials may be utilized. This material may be pre-dried if desired and then compressed to the desired amount, preferably to about 65% of its normal thickness. The strips are then driven into the joint and upon the absorption of moisture tend to swell so as to fill the joint. Such strips will yield with expansion of the concrete slabs and will expand by the absorption of moisture when the slabs contract. In other words, the sides of the strip abut the ends 6 and 7 of the slabs and completely fill the joint at all times and to also act as a support for the slab ends due to this expansive force.

Fig. 3 shows a strip 10 which has been enclosed in a sheath or covering of waterproofing material 16. Such procedure may be followed when the pieces are to be stored or shipped prior to actual use or this waterproofing material may be applied for the purpose of retarding the absorption of moisture by the piece. For instance, if the piece of Fig. 3 were inserted in the joint, then the waterproofing material would be removed from the upper surface and water applied or moisture from the atmosphere permitted to permeate the piece. Such an arrangement would prevent absorption of moisture from the sub-grade 5.

It has been found in actual practice that the above described joint filler will permit expansion and contraction of as much as one-half inch in the joint without being extruded on the one hand while excluding the entrance of soil, sand, pebbles, and water on the other hand, and in addition thereto it prevents any accumulation of water in the sub-grade through the joint and eliminates pumping of mud at the joint.

It has been found that pine, California redwood, cedar, cypress, and similar types of wood, either creosote treated, or untreated, can be used and that a room dried board compressed to 65% of its thickness will expand to approximately 75% of its original thickness in about 24 hours in the atmosphere, but that it will expand to its original thickness in a few hours when water is available for absorption. That after it has absorbed water it can be recompressed to as little as 50% of its original thickness and when released, will recover its original thickness in a few hours. A pressure of 1500 pounds per square inch will compress a wet specimen of such wood to 50% of its original thickness. Little or no extrusion or spreading of the wood was found to occur. The wood should be free from knots and as flat a grain as possible so as to permit the maximum expansion. The thickness of the strip or piece should be such that when it has expanded to approximately 75% of its original thickness after having been compressed that it will fit snugly in the joint. When practical to do so the filler should be placed in the pavement when the slabs are contracted and the joint is open its maximum amount. If the sub-grade is dry it may be advisable to pour water into the joint opening to accelerate expansion of the board. If desired the top of the piece can be positioned one-half to one inch below the pavement surface and an asphalt seal 22 poured into the joint to establish the pavement level after the board has been expanded.

Fig. 1 shows another arrangement for repairing the joint where the upper corners or end portions of the concrete slab as have broken away or spalled off, as at 20, due to the fact that the joint was open or that the concrete was crushed upon expansion. In this arrangement the upper surface 12 of the filler piece has been arranged at the level of the surface 13 of the pavement either by driving the piece in a sufficient amount or driving it in sufficiently and then cutting or grinding off the upper portion extending above the pavement. After the piece has been thus positioned a suitable material 21 can be used to fill the spaces remaining at each side of the strip so that a smooth traffic surface is provided. The slabs can of course be rebuilt to provide square corners in any manner desired. In such an arrangement, the filler pieces may be coated with a suitable waterproofing material which will prevent any substantial swelling of the pieces until such time as the rebuilt material at 21 has had an opportunity to set or harden so that subsequent swelling of the pieces will not displace the material and a smooth repaired joint provided. Water can be added to the top edges of the pieces and the waterproofing can deteriorate so as to permit absorption of moisture and the consequent swelling of the pieces.

The invention as to the pre-drying and pre-compressing of the strips relates generally to the subject matter of my co-pending applications, Serial No. 506,995, filed October 20, 1943, for an Expansion Joint Filler, and since abandoned, and Serial No. 513,956, filed December 11, 1943, for a Means and Method of Constructing Center Parting and Contraction Joints and Sealing Expansion Joints in Pavements, and which has since

matured into Patent No. 2,479,434, issued August 16, 1949.

Broadly the invention contemplates a joint filler for existing expansion joints and cracks between concrete slabs which will accommodate itself to the expansion and contraction of the slabs so as to fill the joint or crack at all times.

What is claimed is:

1. A method of filling an existing joint in concrete pavement comprising driving wooden shingles edge to edge into the joint or crack, filling in at the sides of the shingles with a filler material to rebuild the broken or spalled ends of the concrete, whereby as the shingles absorb moisture they will swell to fill and seal the joint.

2. A method of filling an existing joint in concrete pavement comprising water proofing wooden shingles, driving such wooden shingles edge to edge into the joint or crack, filling in at the sides of the shingles with a filler material to rebuild the broken or spalled ends of the concrete whereby upon destruction of the waterproofing the shingles will absorb moisture and swell to fill and seal the joint.

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