Oct. 29, 1946. R. C. OLMSTED ET AL 2,410,099

EXPANSION JOINT FOR CONCRETE ROADWAYS

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FIG. 1.

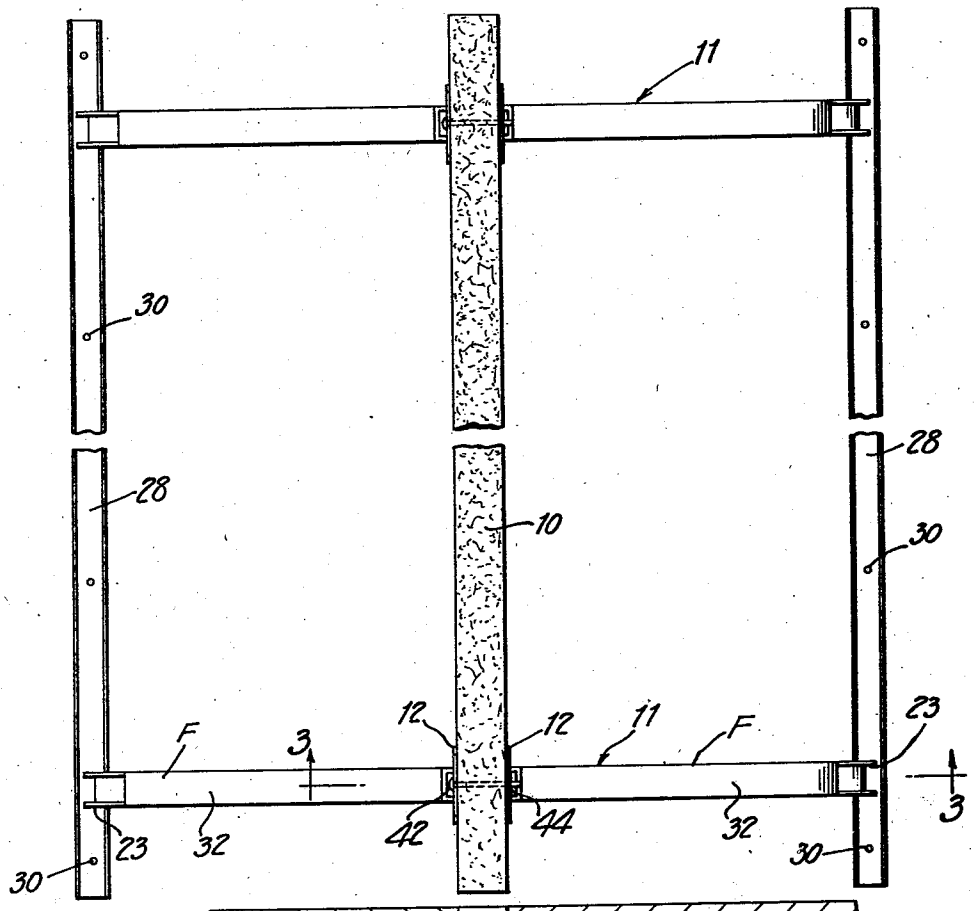
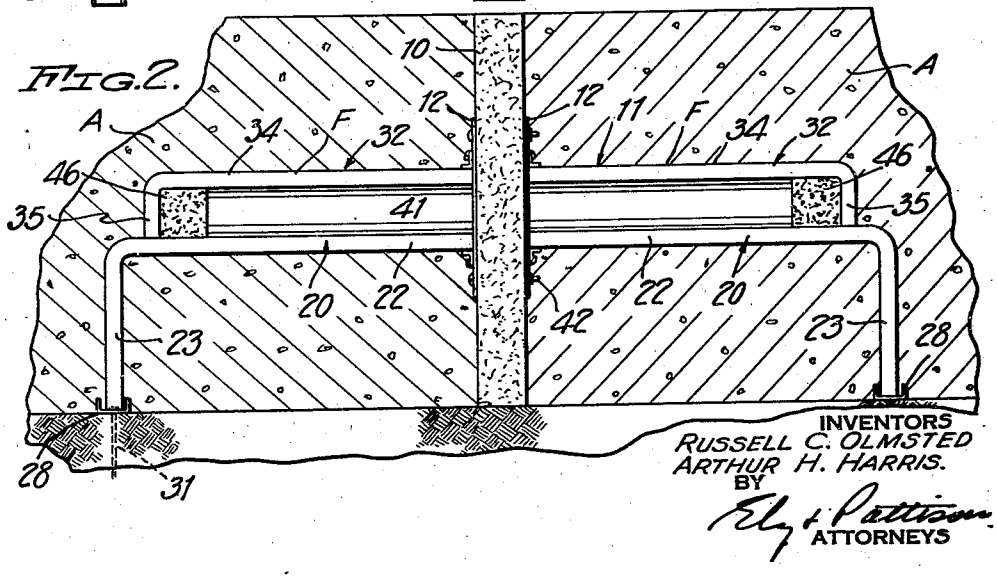


FIG. 2.



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FIG. 4.

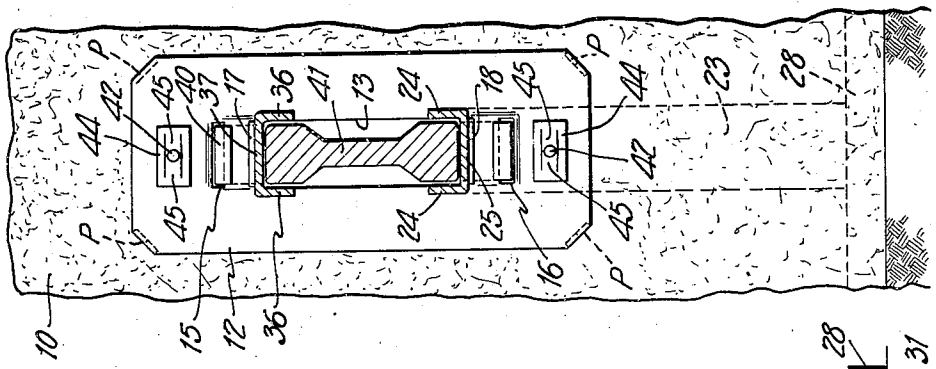
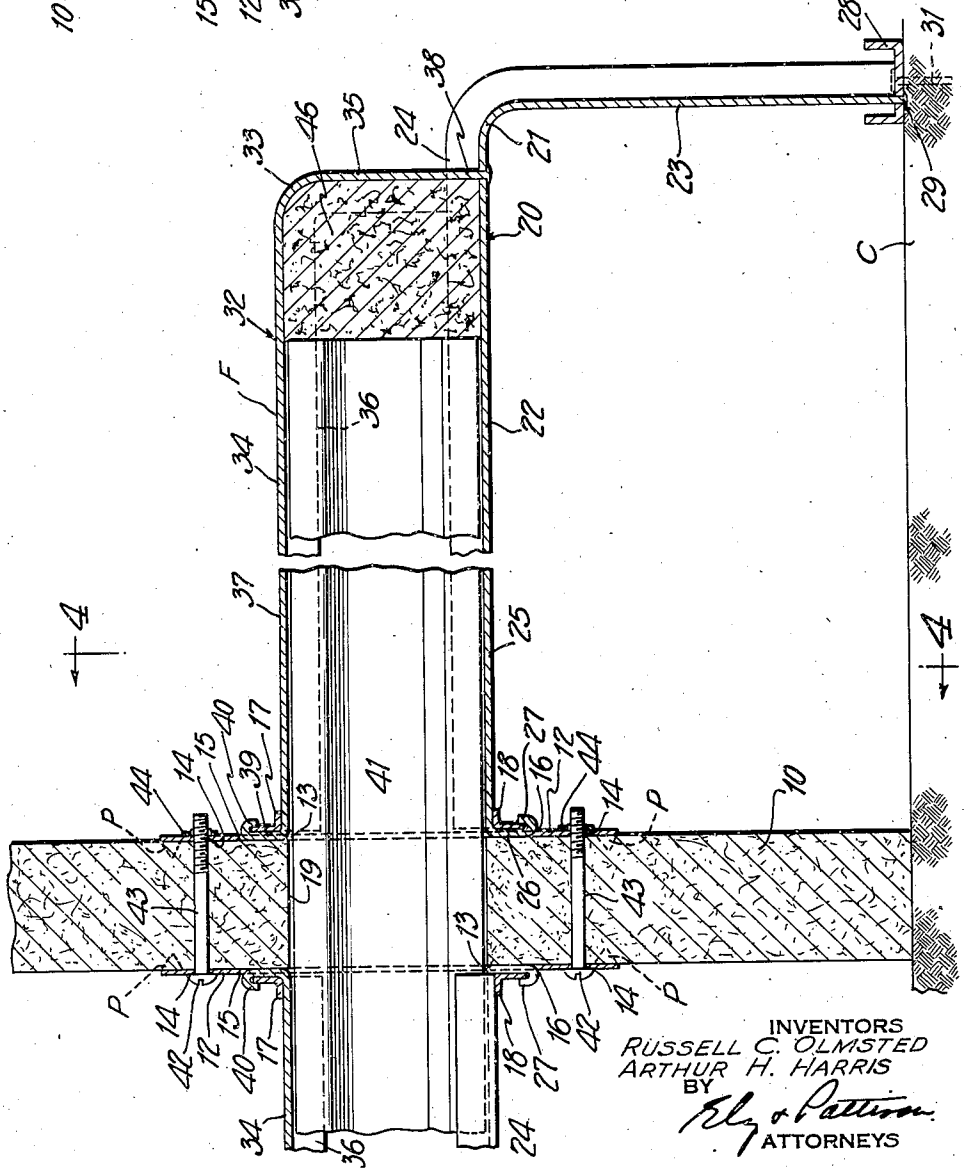


FIG. 3.



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FIG. 6.

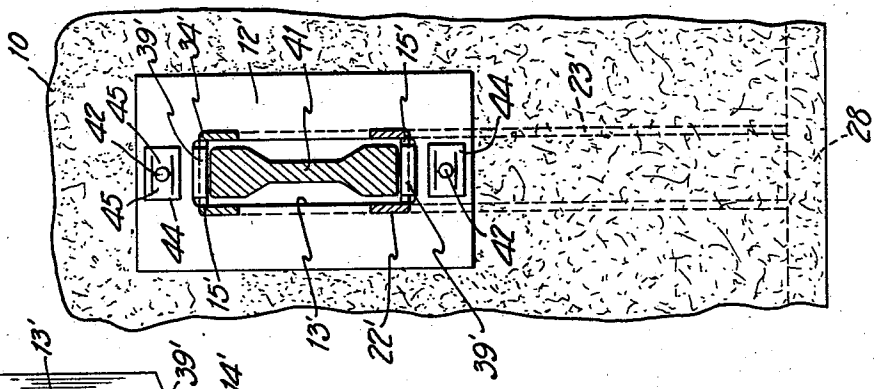


FIG. 7.

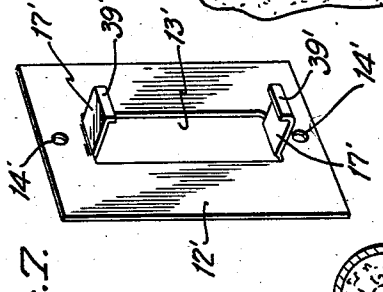
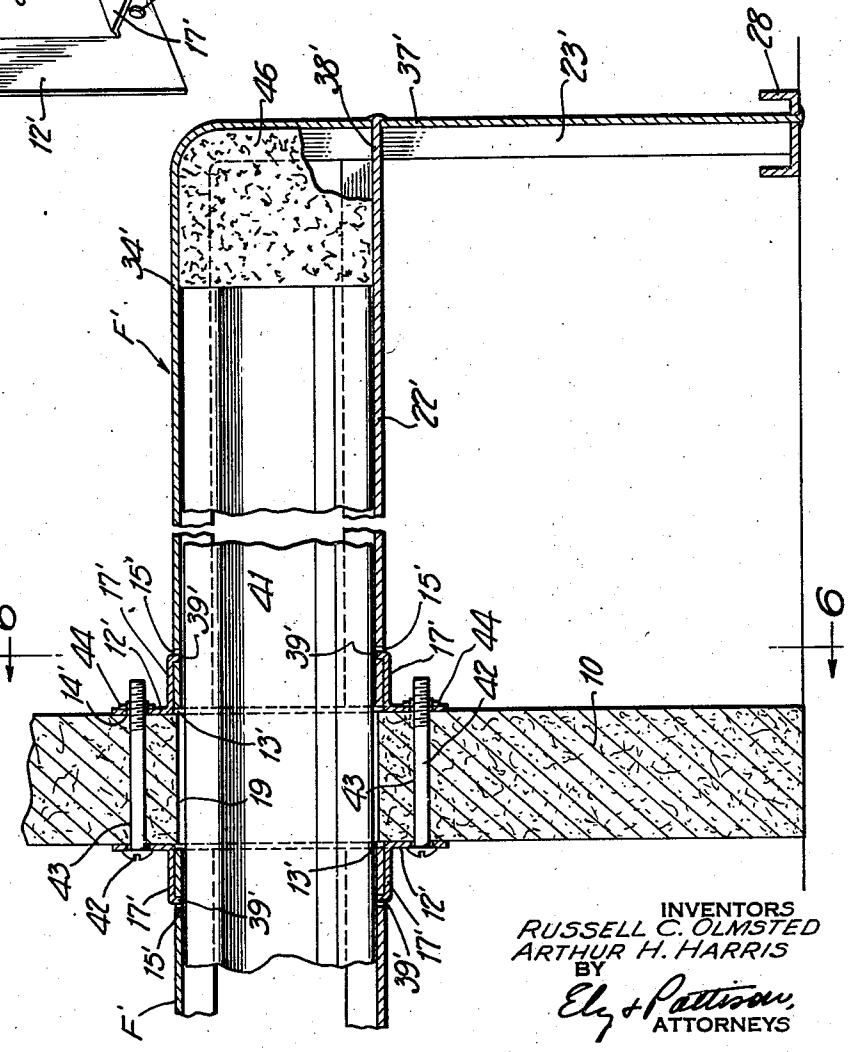


FIG. 5.



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UNITED STATES PATENT OFFICE

2,410,099

EXPANSION JOINT FOR CONCRETE ROADWAYS

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Application December 18, 1943, Serial No. 514,754

3 Claims. (Cl. 94—18)

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This invention relates to expansion joints for concrete roadways, and other like concrete construction wherein the adjacent ends of two concrete slabs are to be joined together.

In the building of concrete roads, it is the practice to lay the same in slabs with a compressible filler strip interposed between the adjacent edges of the slabs to accommodate expansion of the slabs. Also, it is the practice to connect adjacent slabs by dowels which bridge the joints therebetween to prevent rising movement of the adjacent slabs relative to each other. Therefore, the main feature of this invention is to provide an expansion joint which permits the slabs to expand and contract while securely bonding the same together to prevent vertical movement of adjacent slabs relative to each other.

Another feature of the invention resides in a metal dowel structure which is manually fabricated in a manner to avoid the necessity of welding which is costly and laborious.

Another feature of the invention resides in a dowel construction which is normally rigid when placed in position upon a sub-grade preparatory to the pouring of the concrete slabs, and which embodies rupturable means which functions when the concrete becomes set due to normal contraction of the slabs, the dowel when said means is ruptured being of such strength as to arrest any tendency of the slabs to rise relative to each other.

A further feature of the invention is the provision of a dowel type expansion joint which is simple and inexpensive of construction, easy to assemble on a job, and strong and durable for the purposes intended.

Other novel features of the invention will become apparent as the following specification is read in conjunction with the accompanying drawings, in which,

Figure 1 is a top plan view of an expansion dowel joint constructed in accordance with our invention.

Figure 2 is an end elevational view of the dowel joint embedded in adjacent concrete slabs, the latter being shown in section.

Figure 3 is an enlarged fragmentary vertical transverse sectional view on the line 3—3 of Figure 1.

Figure 4 is a vertical transverse sectional view on the line 4—4 of Figure 3.

Figure 5 is a fragmentary vertical sectional view illustrating a modified form of expansion dowel joint constructed in accordance with our invention.

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Figure 6 is a vertical transverse sectional view on the line 6—6 of Figure 5.

Figure 7 is a perspective view of one of the coupling plates.

Referring to the drawings by reference characters, the numeral 10 designates a filler strip of any conventional resilient composition material which is disposed on edge and of a height approximating the thickness of the concrete slabs A—A to be joined and between which it is interposed. The length of the filler strip 10 depends upon the length of the fabricated structure which is composed of a plurality of suitably spaced transversely disposed expansion dowel units 11.

Each expansion dowel unit 11 includes a pair of metal plates 12—12 of rectangular shape having their four corners bent rearwardly to provide pointed prongs P. The plate 12 has a centrally located rectangular opening 13, upper and lower bolt openings 14—14, and horizontal upper and lower slots 15 and 16 respectively, said slots being disposed adjacent the respective top and bottom edges of the central slot 13. The metal material between the slots 15 and 16 and the adjacent ends of the slot 13 is outwardly offset for reasons hereinafter explained. The plates 12—12 at the top and bottom ends of the slot 13 are provided with horizontal outwardly extending flanges 17 and 18 respectively. The plates 12—12 are respectively applied against opposite sides of the strip 10 with the openings 14 therein in registration with a similar size passage 19 provided in the strip 10. The plates 12 are applied with the prongs P facing the strip and which embed themselves therein. However, before the plates 12 are applied in position, each plate is connected to a frame structure F, so that a frame structure extends from each side of the strip 10.

Each frame structure F includes a supporting member 20 formed of a length of metal channel stock, preferably strip steel, which is bent at 21 to form a horizontal channel track 22 and a vertical leg 23. The side flanges 24—24 of the track 22 at the inner ends thereof terminate short of the web 25 thereof to provide a tongue extension 26 which is bent downwardly at right angle and which lies behind the offset portion of the plate 12 adjacent the slot 16. The terminal end of the tongue extension passes forwardly through the slot 16 and terminates in an upturned hook portion 27. It will therefore be seen that the inner end of the supporting member 20 is fixedly secured to the plate 12 and its weight rests upon the flange 18. The leg 23 extends vertically and has its lower end connected to a base member 28.

The base member 28 is of metal channel stock and is placed upon the sub-grade C of a roadway with its open side up for a reason to be hereafter explained. The leg 23 may be connected to the base member in various ways but we have shown the web portion of the leg as having portions 29 extending through openings in the base member, which portions are upset or headed as best illustrated in Figure 3. The base members 28 extend parallel to the strip 10 at respective sides thereof and are of a length substantially equal to the length thereof. The web portions of the base members 28 are provided with suitably spaced apertures 30 through which nails or spikes 31 may pass and be driven into the sub-grade C for rigidly holding the multiple dowel joint structure in a set position.

Each frame structure F also includes a guide member 32 which is constructed of a length of metal channel stock, preferably strip steel, which is bent inwardly as at 33 to provide a horizontal guide portion 34 and a downwardly extending end wall portion 35. The guide member 32 comprises side flanges 36—36 and a connecting web 37. The guide member 32 is complementary to the horizontal track 22 and is disposed with its open side facing inwardly. The side flanges 36—36 of the end wall portion 35 are cut short of the web 37 to rest on the flanges 24 adjacent the leg 23, while the extending portion 38 of the web 37 extends through a slot in the web 22 and has its end upset or headed.

The inner end of each guide member 32 has a tongue extension 39 formed on the web 37, which tongue extension is bent upwardly at right angle and lies between the plate 12 and the strip 10, the terminal end of the tongue extension being formed with a down-turned hook 40 which passes outwardly through the slot 15 and hookingly engages the adjacent offset portion of the plate 12. The inner end of the web 37 is disposed beneath and is braced by the flange 17.

Before positioning the frame structure F—F at opposite sides of the strip 10, a dowel beam 41 is inserted through the passage 19 in the strip so as to extend a substantially equal distance beyond opposite sides of the strip. After the dowel beam 41 has been thus positioned, the open ends of the frame structures F—F are inserted onto the ends of the beam, said open ends carrying the plates 12—12. The frame structures are slid inwardly over the ends of the beam until the plates 12—12 flatly engage opposite sides of the strip 10, where the plates are pressed inwardly to cause the prongs P to become embedded in the strip 10. The plates 12 are now in a position to be connected to the strip 10 by a rupturable fastening means now to be described.

The rupturable fastening means comprises headed bolts 42 which pass through the alined holes 14 in the plates 12—12 and through alined holes 43 in the strip 10. The headed ends of the bolts 42 engage one of the plates 12 while the threaded ends of the bolts extend beyond the other plate 12 and receive flat resilient clamping plates 44. Each clamping plate 44 includes a pair of spaced opposed spring tongues 45—45 which releasably interlock with the threads of the bolt. The clamping plates 44 are pushed onto the threaded end of the bolts and flatly engage the adjacent plate 12. Thus the frame structures F—F are connected to opposite sides of the strip in such manner that any expansion movement of the slabs A—A will cause the bolt connections to "break" due to the fact that the resilient clamping plates 44 will be pulled from the threaded ends of the bolts 42. The dowel beam 41 bridges the joint between adjacent slabs and prevents upward movement of one slab relative to the other.

Whereas the dowel beam 41 may be of a length substantially equal to the combined lengths of the frame structures F—F and thickness of the strip 10, we prefer to make the same shorter, and to compensate for this difference in length, resilient filler blocks 46—46 are placed in the frame members between the ends of the dowel bar 41 and the end wall portions 35 as best seen in Figure 2. The resilient filler blocks 46 may be made of cork, rubber, or the like, and when compressed, they place a slight initial tension upon the rupturable fastening means.

By reason of the channel frame structures F—F, the same will freely slide relative to the dowel beam 41 when the slabs A—A expand and the rupturable fastening means has released the frame structures from their original connections with the strip 10.

The channel base members 28 have their open sides face up to receive the concrete fill and prevent the formation of voids in the slabs A—A when set.

In Figures 5 to 7 inclusive we have illustrated a modified form of our invention and like parts heretofore described are designated by corresponding reference characters. In this form of the invention the ends of the dowel beam 41 slidably extend into frame structures F'—F', respectively disposed at opposite sides of the strip 10. Each frame structure F' includes a straight horizontal track 22' of metal channel stock, the outer end of which is formed with a web tongue extension 38' which extends through a slot in the web 37' of a vertical supporting leg 23' and which has its end headed or upset. The leg 23' is formed integral with the horizontal guide member 34' which is disposed parallel to and in spaced superposed relation to the track 22'. The lower end of the leg 23' is fixedly secured to the U-shaped base member 28.

The inner ends of the track 22' and guide member 34' terminate in vertical alinement, and the webs thereof adjacent said ends are provided with vertically alined slots 15'. The inner ends of the track and guide member are fixedly connected to a metal plate 12', which plate has a central rectangular shaped opening 13' which registers with the opening 19' in the strip 10. Flanges 17'—17' extend outwardly from the top and bottom ends of the slot 13' and have inwardly extending tongues 39' which enter the respective slots 15'. The plates 12' are secured to opposite sides of the strip 10 in the same manner as before described, namely by bolts 42 passing through alined openings 14' in the plates and openings 43 in the strip 10. Releasable resilient clamping plates 44 are applied to the threaded ends of the bolts to form the rupturable connection between the dowel frame structures F'—F' and the strip 10. The modified construction of expansion dowel joint functions in the same manner as that shown in Figures 1 to 4 inclusive, therefore a further description is not believed necessary.

While we have shown and described what we consider to be the most practical embodiments of our invention, we wish it to be understood that such changes in design and materials as come within the scope of the appended claims may be resorted to without departing from the spirit of the invention.

Having thus described the invention, what we claim as new is:

1. An expansion joint structure comprising in combination, a filler strip adapted to close the joint between adjacent ends of a pair of concrete slabs, said filler strip having a transverse passage therein, a dowel beam freely passing through said passage and having its ends disposed beyond opposite sides of said filler strip, a pair of metal frame structures having their respective inner ends fitting against opposite sides of the filler strip and slidably receiving the respective ends of the dowel beam, each of said frame structures including parallel top and bottom frame members of channel shape in cross section with the open sides thereof in confronting relation, legs carried by the outer ends of the frame structures for supporting the same in an elevated position above the subgrade of a roadway, and rupturable fastening means for securing the inner ends of the frame structures to opposite sides of the filler strip, said rupturable fastening means being adapted to break under expansion stresses of the connected slabs.

2. An expansion joint structure as set forth in claim 1 in which the rupturable fastening means

comprises vertical metal plates connected with the inner ends of the frame structures which flatly fit against the respective opposed sides of the filler strip, bolts freely passing through said plates and filler strip, and a fastening element resiliently connected to the threaded end of each bolt.

3. An expansion joint structure comprising in combination, a filler strip having a transverse passage therein, a pair of metal frame structures, vertical metal attaching plates fixedly secured to the inner ends respectively of the frame structures, said plates having openings therein conforming in shape and size to that of said passage, said plates being respectively disposed against opposite sides of said filler strip with the openings therein in register with the passage, rupturable fastening means securing said plates to said filler strip, a dowel beam freely passing through the passage with its ends respectively extending into the frame structures and snugly disposed therein, and each attaching plate being secured to the respective frame structure by an offset portion on the plate and a hook on the frame structure engaged with said offset portion.

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Certificate of Correction

Patent No. 2,410,099. October 29, 1946.

RUSSELL C. OLMSTED ET AL.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the grant, lines 14 and 15, after the word "heirs" strike out "or assigns, and Hazel B. Olmsted, as Administratrix, her successors"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of December, A. D. 1946.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.