United States Patent [19]

Pare

[11] **3,826,583**

[45] **July 30, 1974**

[54] **LEAF SPRING PAVEMENT JOINT SEAL**

[76] Inventor: **Robert Lee Pare,** 27 Chiswick Rd., Edgewood, R.I. 02903

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[52] **U.S. Cl.** **404/67**

[51] **Int. Cl.** **E01c 11/08**

[58] **Field of Search** 404/67, 66, 49, 47, 68; 292/320, 87, 19; 52/718, 716

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Primary Examiner—Nile C. Byers, Jr.

Attorney, Agent, or Firm—Thomas J. Greer, Jr.

[57] **ABSTRACT**

An expansion joint for roadbed slabs. Two parallel and elongated plates are each provided with resilient struck-out tongues. The tongues of one plate engage opposite portions of the other plate, and vice versa. In an embodiment, the tongues press against one another. Another embodiment has a central plate from which the tongues are struck out or to which the tongues are attached. An elastomer sheath partially or completely surrounds the springs and plates to make sealing contact with edges of adjacent modular slabs.

23 Claims, 9 Drawing Figures

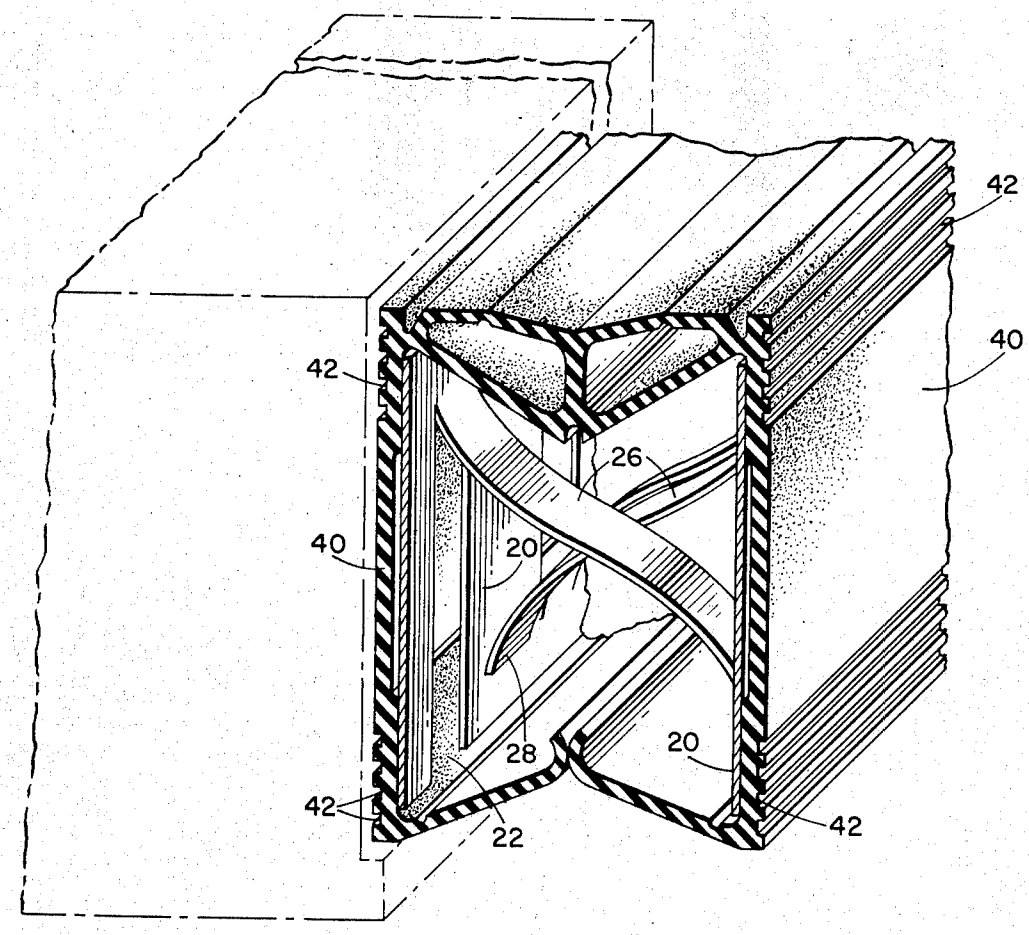


FIG. 1

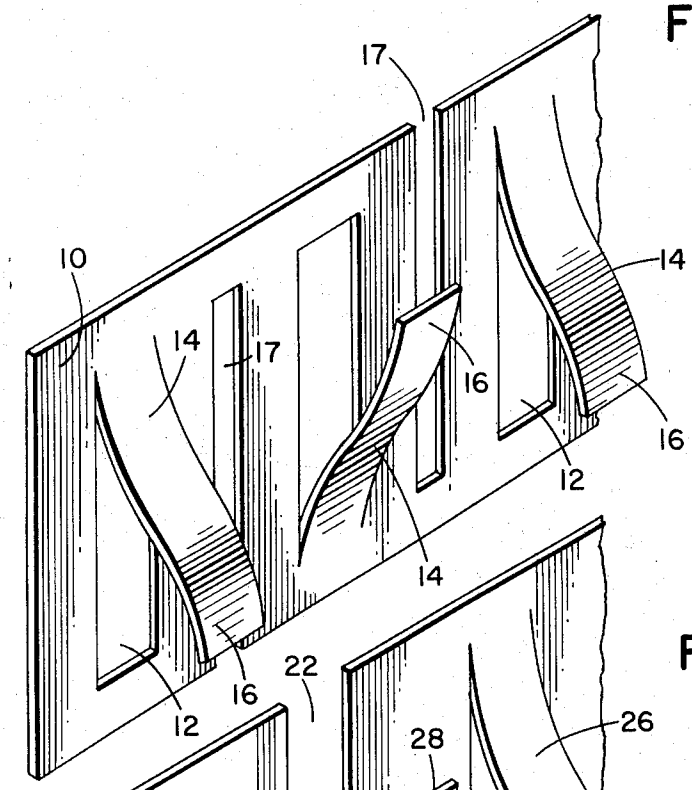


FIG. 2

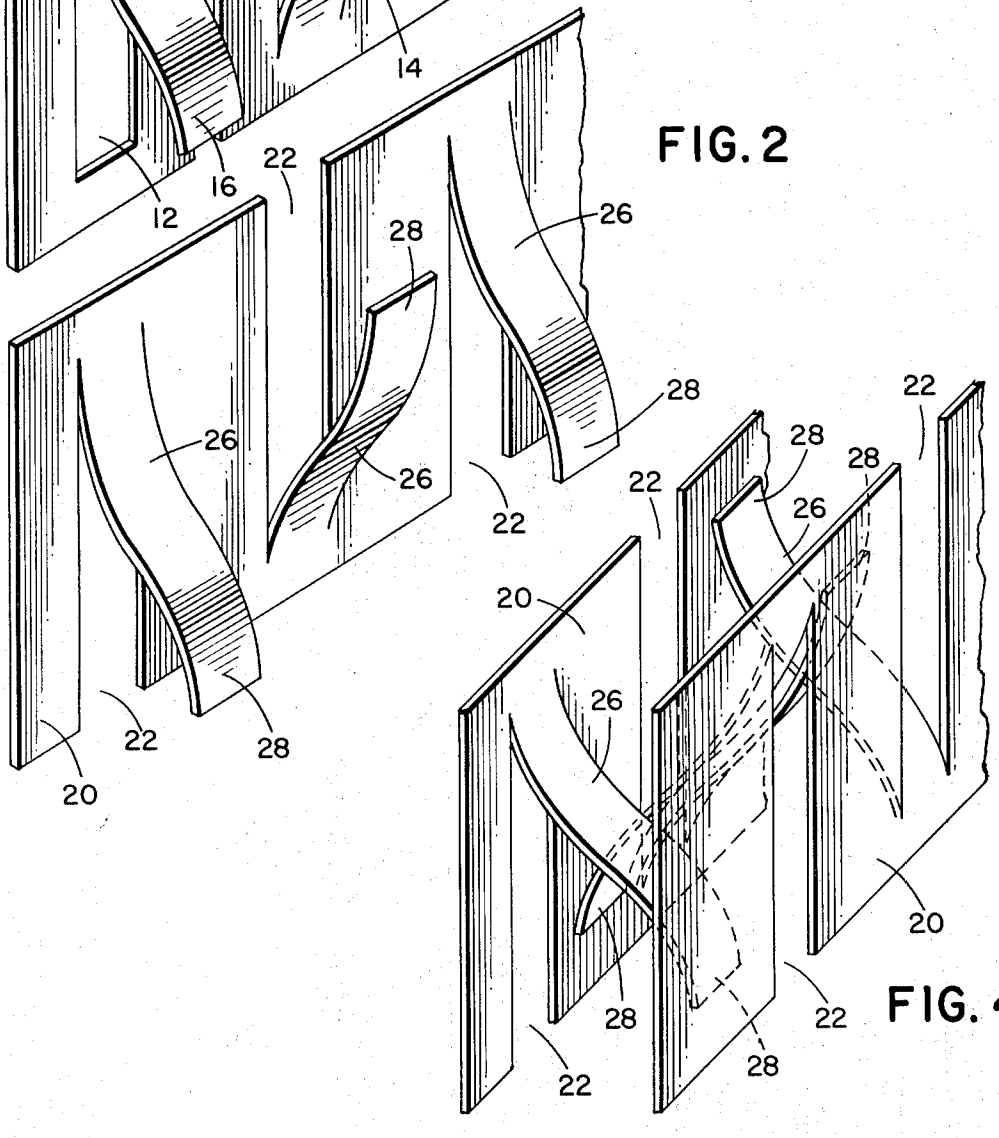


FIG. 4

FIG. 3

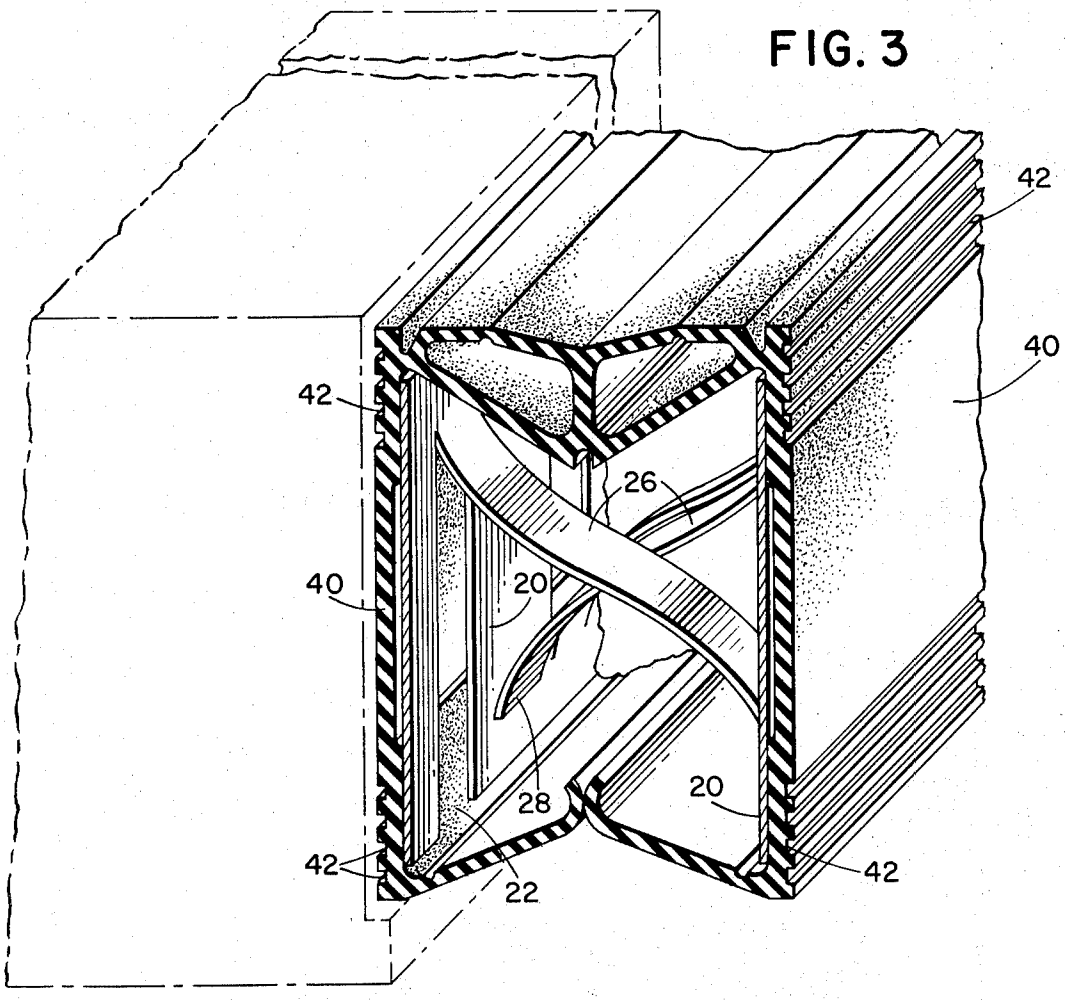

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FIG. 6

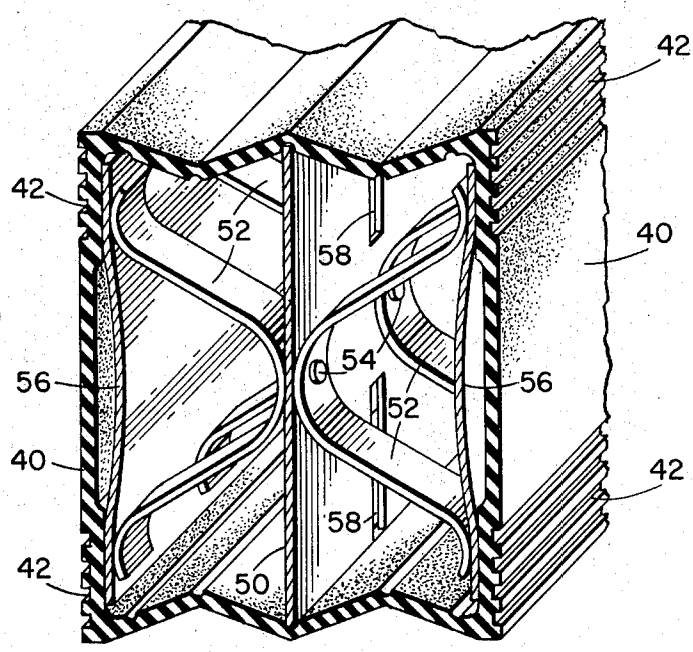
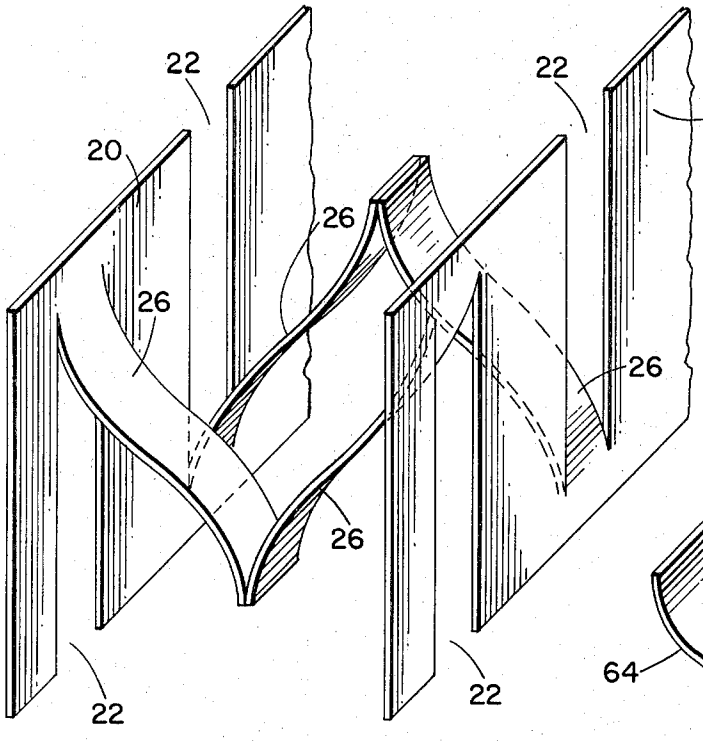

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FIG. 5



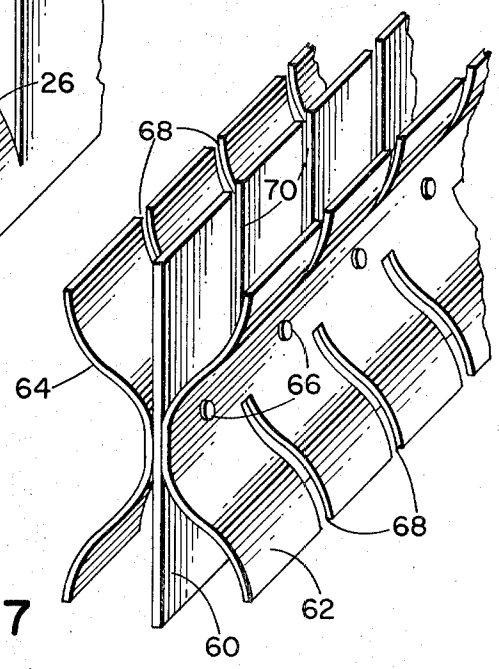


FIG. 7

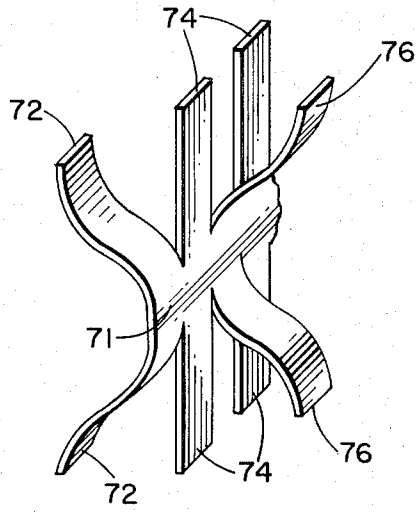


FIG. 8

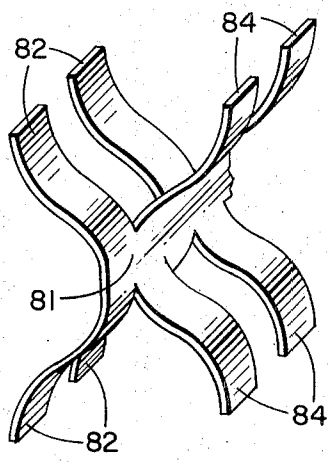


FIG. 9

LEAF SPRING PAVEMENT JOINT SEAL

This invention relates to an expansion joint displaying particular utility for roadbeds and is of the general type illustrated in my prior U.S. Pat. No. 3,504,597. The invention also displays utility wherever it is desired to form a seal between the edges of spaced panel or modular sections, where the sections are subject to relative motion to thereby vary the spacing between the edges of adjacent panels or sections.

The prior art is aware of an appreciable number of expansion joint constructions for roadbeds. In many, a hollow elastomer element is inserted between two relatively movable panel members or modular elements, such as spaced slabs of concrete in a roadbed. Upon expansion and contraction of the slabs, as occasioned by variations in ambient temperature, the spacing between them varies and the expansion joint follows this variation for the purpose of maintaining a seal between the two members.

While many prior expansion joints have enjoyed acceptance, nearly all exhibit drawbacks. Thus, with an expansion joint formed completely of elastomer, the problem of plastic set is encountered. This inhibits or precludes complete following of the changes in the gap between the slabs after fairly long time intervals. In other constructions wherein metal springs have been employed problems of spring insertion and rusting over long time periods have been encountered, as well as problems of spring manufacture and insertion.

According to the practice of this invention, an expansion joint is constructed of two generally parallel and elongated plate elements whose outer faces are parallel to the facing edges of adjacent modular sections. In an embodiment each plate element is provided with integral, struck-out tongues which resiliently contact the opposite facing plate on its flat portions. In a second embodiment, the struck-out tongues press against one another. In this manner, spring force is applied directly against the edge of the gap between the concrete slabs or other modular sections to thereby provide a smooth, stiff face. When receiving the force from the spring tongue elements, the plates transmit forces uniformly to the edges of the gap against which the plates are placed. The plates may be formed of metal such as steel or other fairly stiff, strong, elastic material such as fiberglass. The plates are easily fabricated, as by punching or, if fiberglass is used, the springs may also be molded or extruded. The composite spring element thus defined by the two parallel and facing plates is either partially or completely encased in an elastomer element or elements which make sealing contact with the facing edges of the modular concrete slabs. The economies resulting from the practice of this invention are derived from the use of an essentially single strip to provide stiff and abutting plates for uniform distribution of spring forces to the sides of the gap. Further, the resilient tongue elements may be integral with the plate and require no separate fastening operation. The expansion joint of this invention also admits of ease of insertion of the springs into an encasing, tubular elastomer member. Only two main components are required for the practice of the invention, these being a sealing material such as elastomer and spring plates either of metal or of fiberglass or the like.

IN THE DRAWINGS

FIG. **1** is a partial perspective view of a plate provided with integral tongues according to the practice of this invention.

FIG. **2** is a view similar to FIG. **1** and illustrates an embodiment.

FIG. **3** is a perspective cross-section of a seal, showing the spring elements encased in a tubular, elastomeric sleeve.

FIG. **4** is a view similar to FIG. **3** and illustrates the spring element of that Figure prior to placement inside the elastomeric sleeve.

FIG. **5** is a view similar to FIG. **4** and illustrates an embodiment.

FIG. **6** is a view similar to FIG. **3** and illustrates an embodiment.

FIG. **7** is a view similar to FIG. **4** and illustrates an embodiment.

FIG. **8** is a view similar to FIG. **7** and illustrates an embodiment.

FIG. **9** is a view similar to FIG. **7** and illustrates an embodiment.

Referring now to FIG. **1** of the drawings, the numeral **10** denotes a plate formed of metal or fiberglass and having apertures **12** defined by the striking or punching out of tongue portions **14,** the latter preferably provided at their ends **16** with a slight inward curve to thereby provide a smooth abutment surface. The numeral **17** denotes a flexing slot running from one edge to near an opposite edge. The slots permit limited coplanar flexing of the plate **10.** In the embodiment of FIG. **2,** a like plate **20** is provided with slots **22** resulting from the striking out of integral tongues **26.** The tongues **26** are struck out in such a manner that the remote ends of tongues **28** are curved. It will be noted that slots **22** are of such length to permit limited coplanar flexing of the plate **20.** Alternate slots **22** point in opposite directions. In use, two plates such as **10, 10** or **20, 20** are positioned parallel to each other with their tongue ends engaging an opposite plate, as will now be described.

FIGS. **3** and **4** illustrate an expansion joint employing the plate spring construction of FIG. **2.** Two such plates face each other, with tongues **26** and curved bearing surfaces **28** in the indicated position. An elastomer sleeve member **40** surrounds the two spring plates. The elastomer sleeve is similar to the elastomer sleeve **20** shown in my above-noted United States patent. The upper and lower parallel sides may be provided with longitudinal channel elements **42** adapted to seat against the facing edges of the gap between two modular concrete roadbed sections or the like. FIG. **4** illustrates the plates **20** without the elastomer sleeve **40.**

The mode of operation will be apparent from a consideration of FIGS. **3** and **4.** The springs are slightly compressed when inserted into the gap between the roadbed slabs (one edge of which is shown in phantom lines in FIG. **3**) such that when expansion occurs the plates **20** will follow the movement. In the case of contraction of the gap, corresponding to elongation of the modular roadbed sections, the plates **20** will move towards each other, such motion being resisted by the resilient force of integral tongues **26** having their end curved portions **28** bearing and sliding against flat portions of the opposite plate.

In FIG. 5 a modification is shown, without illustrating the elastomer sleeve, wherein the curved ends of tongues 26 abut each other instead of the opposite plate. This embodiment permits a wider elastomer joint seal.

In FIG. 6 a central divider plate 50 runs longitudinally of the elastomer sleeve 40, positioned midway thereof, and is provided with separate tongues 52 secured to the plate as by fasteners, i.e., rivets, 54. Separate bearing plates 56 may be employed against which bear curved ends of the tongues. Longitudinally spaced flexing slots 58 permit limiting flexing in a vertical plane.

FIG. 7 illustrates an embodiment similar to FIG. 6, without showing the elastomeric sleeve. A rigid plate 60 has secured to opposite sides thereof two curved fiberglass extrusions 62 and 64 whose longitudinal edges are curved, as well as their central portions. Longitudinally spaced slots 70 in plate 60 extend from top and bottom edges towards the central longitudinal region. Fasteners 66 join the three elements at longitudinally spaced locations. Similar slots 68 in the curved, resilient extrusions 62 and 64 permit limited vertical flexing to permit the seal to conform to the roadway contour. Plate 60, as well as plate 50 of FIG. 6, may be fashioned of fiberglass, metal, or rigid plastic. In some applications, the central plate 60 may be omitted and the two curved extrusions 62 and 64 fastened together, as may readily be visualized.

FIG. 8 shows an embodiment, similar to FIG. 7, wherein alternate tongues 72, 76 are spaced along a plate 71 by straight, upstanding fingers 74. The latter correspond to plate 60 of FIG. 7 and plate 50 of FIG. 6. In FIG. 9, resilient tongues 82, 84 are struck from plate 81 in opposite directions.

The mode of operation of the embodiments of FIGS. 5 through 9 is the same as previously described with reference to FIGS. 3 and 4.

I claim:

1. An expansion joint and seal for roadbed slabs and other modular members having a variable width gap between adjacent members, said joint including,
   a. a pair of parallel, elongated plates,
   b. at least one of said plates provided with a plurality of resilient tongues extending therefrom, said tongues having portions which abut the opposite plate,
   c. an elastomer sheath in contact with and at least partially surrounding said plates and spanning the gap between them, said sheath having portions adapted to abut facing edges of a variable width gap, said sheath portions being urged apart by the action of said resilient tongues.

2. The seal of claim 1 wherein said plate which is provided with said resilient tongues is formed of a stiff, resilient material, and wherein said tongues are integral with said plate.

3. The seal of claim 2 wherein each of said plates is provided with integral tongues, the tongues of one plate abutting the opposite plate.

4. The seal of claim 2 wherein adjacent tongues extend on the same side but in opposite directions from their plate.

5. The seal of claim 2 wherein said tongues of one plate abut corresponding tongues of the other plate.

6. An expansion joint and seal for roadbed slabs and other modular members having a variable width gap between adjacent members, said joint including,
   a. a plurality of generally arcuate, resilient tongues,
   b. said tongues defining two rows, the tongues of the two rows being spaced from each other, the tongues of the two rows facing in opposite directions, said two tongue rows being fixedly positioned relative to each other, the tongues of the two rows being generally X-shaped in cross section,
   c. a pair of parallel bearing plates between which said tongues are positioned and against which the ends of said tongues resiliently bear to thereby urge the bearing plates away from each other,
   d. an elastomer sheath at least partially circumferentially surrounding said bearing plates and spanning the gap between them, said sheath having portions adapted to abut facing edges of a variable width gap.

7. The seal of claim 6 wherein said tongues are integral with a plate, with adjacent tongues facing in opposite directions.

8. The seal of claim 7 wherein adjacent tongues are spaced from each other by an upstanding portion of said plate.

9. The seal of claim 6 wherein said tongues are secured to a longitudinally extending divider plate, one of said tongue rows being on one side of said divider plate and the other tongue row being on the other side of said divider plate.

10. The seal of claim 9 wherein said divider plate is provided with transversely extending slots running inwardly from the plate edges toward the center of said plate, to thereby permit limited flexing in the plane of the divider plate.

11. An expansion joint and seal for roadbed slabs and other modular members having a variable width gap between adjacent members, said joint including,
   a. an elongated divider plate,
   b. a pair of elongated, resilient strip elements, arcuate in cross-section, positioned on opposite sides of said divider plate so that the strips thereby define an X-shaped outline in cross-section,
   c. a pair of parallel, elongated bearing plates between which said arcuate, resilient strip elements are positioned and resiliently bear to thereby urge the bearing plates away from each other.
   d. an elastomer sheath at least partially circumferentially, surrounding said bearing plates and spanning the gap between them, said sheath having portions adapted to abut facing edges of a variable width gap.

12. The joint of claim 11 wherein said resilient strip elements are provided with transverse slots running inwardly from the edges towards the center.

13. An expansion joint and seal for roadbed slabs and other modular members having a variable width gap between adjacent members, said joint including,
   a. a plurality of generally arcuate, resilient tongues,
   b. said tongues defining two rows, the tongues of the two rows being spaces from each other, the tongues of the two rows facing in opposite directions, said two tongue rows being fixedly positioned relative to each other, the tongues of the two rows being generally X-shaped in cross section

c. an elastomer sheath at least partially circumferentially surround said tongues, with the ends of said tongues abutting said sheath, said sheath having portions adapted to abut facing edges of a variable width gap.

14. The seal of claim **13** wherein said tongues are integral with a plate, with adjacent tongues facing in opposite directions.

15. The seal of claim **14** wherein adjacent tongues are spaced from each other by an upstanding portion of said plate.

16. The seal of claim **13** wherein said tongues are secured to a longitudinally extending divider plate, one of said tongue rows being on one side of said divider plate and the other tongue row being on the other side of said divider plate.

17. The seal of claim **16** wherein said divider plate is provided with transversely extending slots running inwardly from the plate edges toward the center of said plate, to thereby permit limited flexing in the plane of the divider plate.

18. An expansion joint and seal for roadbed slabs and other modular members having a variable width gap between adjacent members, and said joint including,

a. an elongated divider plate,

b. a pair of elongated, resilient strip elements, arcuate in cross-section, positioned on opposite sides of said divider plate so that the strips thereby define an X-shaped outline in cross-section,

c. an elastomer sheath at least partially circumferentially surrounding said resilient strip elements, with the longitudinal edges of said strip elements abutting said sheath, said sheat having portions adapted to abut facing edges of a variable width gap.

19. The seal of claim **18** wherein said divider plate is provided with transversely extending slots running inwardly from the plate edges toward the center of said plate, to thereby permit limited flexing in the plane of the divider plate.

20. The seal of claim **19** wherein said resilient strip elements are provided with transversely extending slots running inwardly from the edges toward the center.

21. A spring adapted for use in a roadbed joint and seal, including,

a. an elongated, rectangular sheet member of resilient material,

b. a plurality of integral tongues extending out from the plane of said sheet member, adjacent tongues being on one side of said sheet, adjacent tongues having their roots from opposite longitudinal edges of said sheet member, so that adjacent tongues point in opposite directions,

c. said tongues extending generally transversely of said elongated sheet member,

d. flexing slots extending transversely of said sheet member, each flexing slot running from one edge of said sheet member towards the other edge.

22. A spring adapted for use in a roadbed joint and seal, including,

a. an elongated, rectangular sheet of resilient material,

b. a plurality of integral tongues extending out from the plane of said sheet member, adjacent tongues being on one side of said sheet, adjacent tongues having their roots from opposite longitudinal edges of said sheet member, so that adjacent tongues point in opposite directions,

c. said tongues extending generally transversely of said elongated sheet member,

d. said tongues being struck out of said sheet to thereby define a closed slot corresponding to each tongue.

23. The spring of claim **22** including,

a. flexing slots extending transversely of said sheet member, each flexing slot running from one edge of said sheet member towards the other edge, said flexing slots being laterally spaced from said slots defined by striking out said tongues.

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