United States Patent [19]

Honegger

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[54] **ROADWAY EXPANSION JOINT**

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[52] **U.S. Cl.** **404/69**

[51] **Int. Cl.** **E01c 11/02**

[58] **Field of Search** 404/69, 56, 68, 57, 48, 404/47, 64, 49; 49/488, 489, 490

[56] **References Cited**

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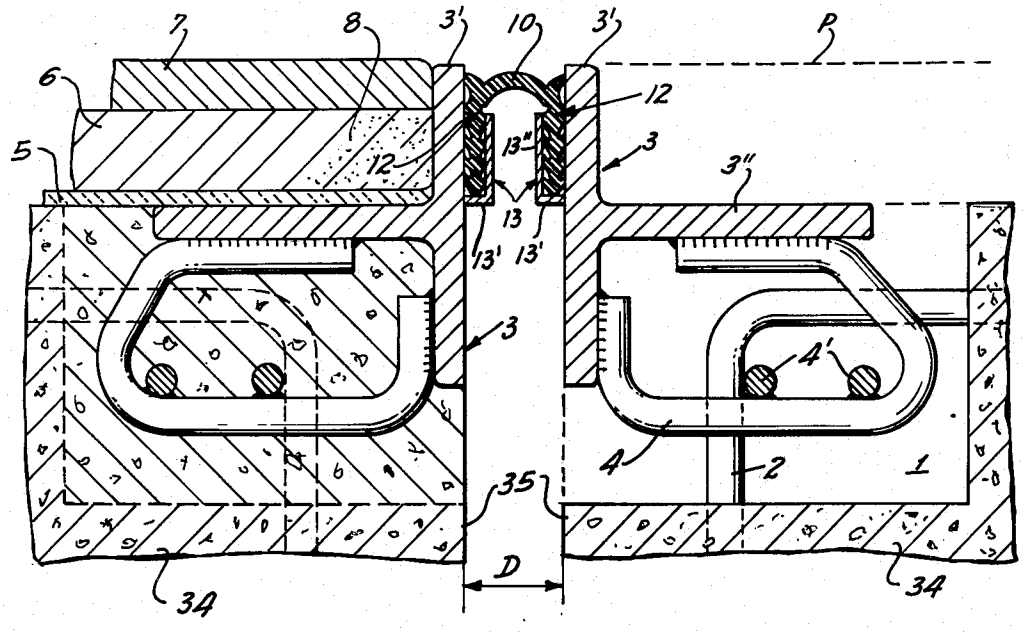
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[57] **ABSTRACT**

A pair of spacedly adjoining concrete slabs are provided at their facing edges with metal profiles having upwardly opening pockets, channels or grooves. A flexible seal has a pair of legs formed with barbs and receivable in the pockets with the barbs directed upwardly to resist pullingout of the seal from the pockets. These two legs are interconnected by a U-shaped web which deforms as the slabs move toward and away from each other. The seal is formed at both sides with a upwardly and outwardly projecting lip which engages the respective profile and can be lodged under an overhanging ledge. A second profile can be provided between the two slab edges and two seals can be used to bridge the gap in order to seal large gaps.

7 Claims, 5 Drawing Figures



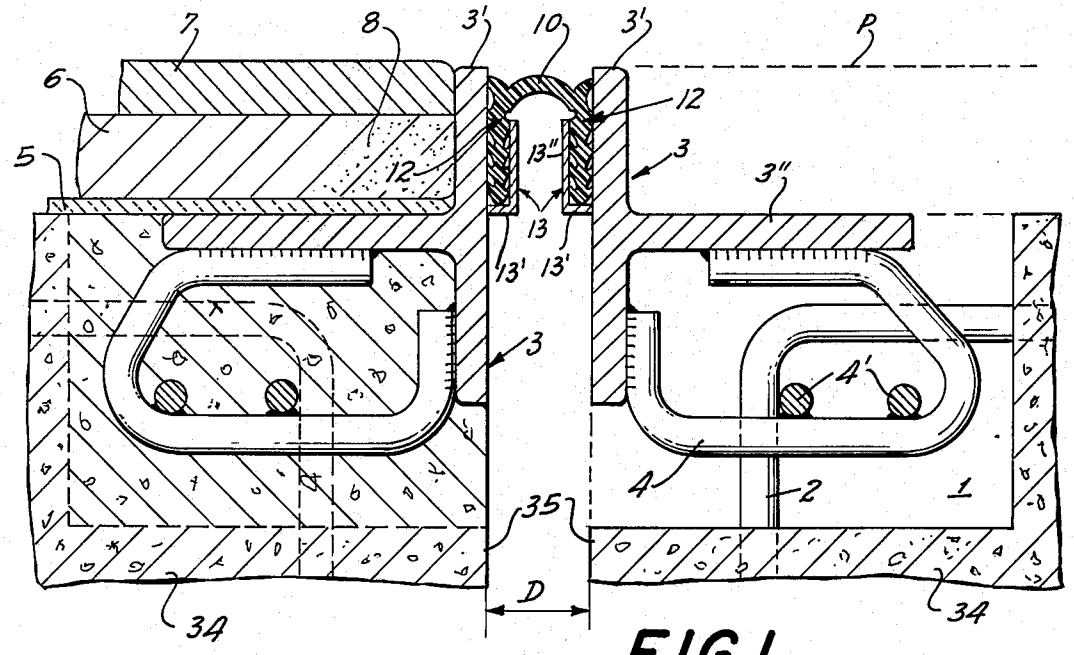


FIG. 1

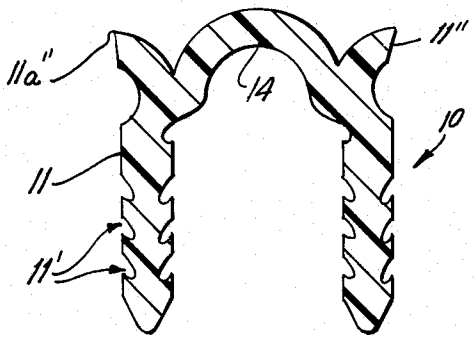


FIG. 3

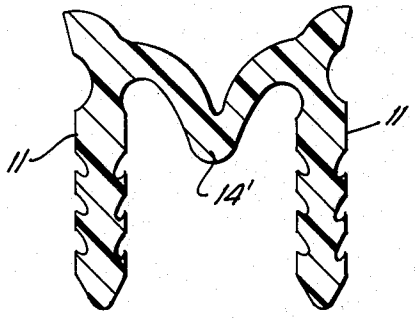


FIG. 4

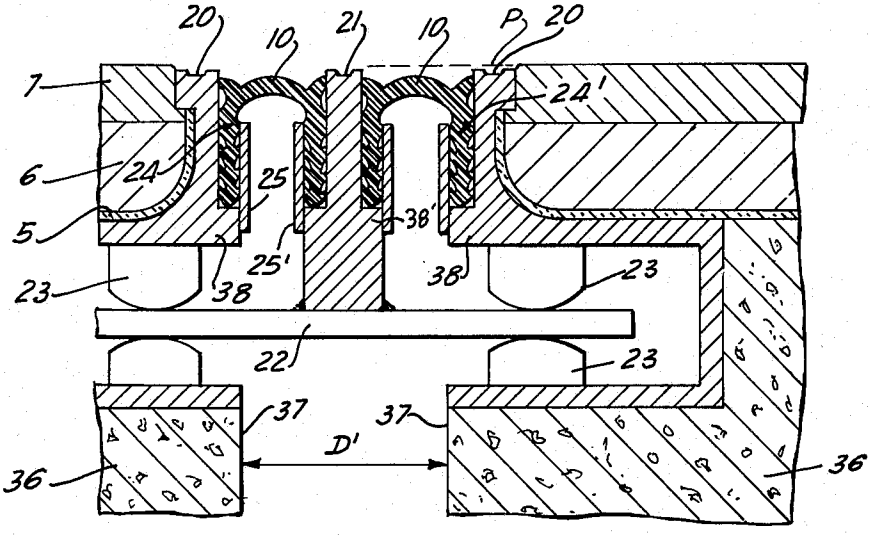
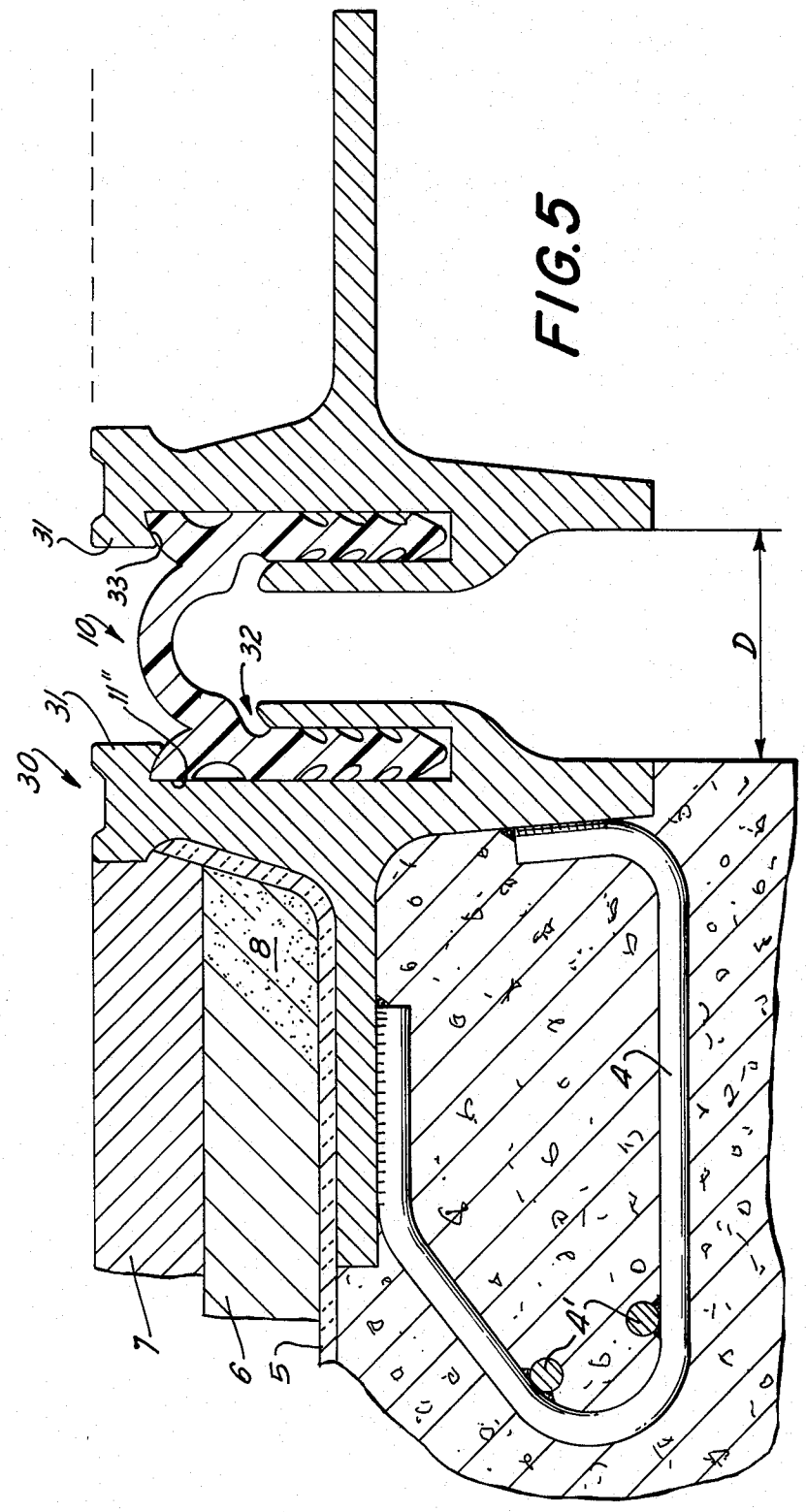


FIG. 2

FIG.5



ROADWAY EXPANSION JOINT

FIELD OF THE INVENTION

The present invention relates to an expansion joint for use in a roadway. More particularly this invention concerns an elastic expansion joint for connecting together two spacedly adjoining concrete slabs as, for instance, in a bridge.

BACKGROUND OF THE INVENTION

In the construction of bridges, overpasses, and the like it is necessary to provide expansion joints between the concrete slabs forming the roadways to compensate for changes in size due to temperature variations. Such joints must be durable, must be able to deform to take up expansion and contraction, and must prevent water and solid particles from collecting between the slabs. The hitherto known arrangements are often complicated and expensive or else they do not live up to these requirements.

When such a joint finally wears out, which is inevitable with virtually any kind of known expansion joint, its replacement is invariably a difficult and time-consuming process. As a matter of fact it is often necessary to detour traffic for days at a time while the slab joints are rebuilt along their spacedly adjoining edges for the provision of a new expansion joint.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide an improved expansion joint for use in a roadway between spacedly adjoining slabs.

Another object is the provision of such a joint which is easy to install and which has a long service life.

Yet another object is to provide an expansion joint which can be quickly and easily replaced, but which at the same time seals the two slabs together tightly without working free.

SUMMARY OF THE INVENTION

These objects are attained according to the present invention in an arrangement wherein a metal profile is provided along the spacedly adjoining edges of two roadway slabs. Each such profile is formed with an upwardly open groove or channel. A flexible sealing strip has two downwardly extending legs each received in one of the grooves and each formed with upwardly directed barbs that engage the flanks of the groove under compression and prevent the seal from pulling out. Thus each leg is pinecone-shaped in section. These two legs are connected together by a U-shaped web which may be either upwardly or downwardly concave.

According to another feature of this invention a second metal profile is provided in the gap between the two slabs, this second profile being limitedly displaceable to either side toward either of the two slabs. A pair of grooves similar to the above-described grooves are provided on each side of the second profile and two sealing strips as described above each have one leg engaged in one of the grooves or pockets on one of the slabs and the other leg engaged in one of the grooves on the second profile. Two or more such second profiles can be used to take up very large spaces.

In accordance with yet another feature of the invention each of the profiles is formed with an overhanging ledge under which an upwardly and outwardly extending lip on the strip engages. In this manner a very tight seal is obtained between the strip and the slabs.

Such an arrangement is easy to install. The strip need merely be pressed into the two grooves. The barbs on its legs prevent it from working out under normal conditions, and its U-shaped web can take up relatively large displacements of the slabs. Similarly, should the strip become damaged it can be removed without unreasonable effort by simply grasping it with, for example, a heavy pair of pliers and ripping it out of its grooves. The roadway need not be opened up, and a new such strip can be quickly inserted in place.

DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages of the present invention will become more readily apparent from the following description reference being made to the accompanying drawing in which:

FIGS. **1** and **2** are vertical sections through joints according to the present invention;

FIGS. **3** and **4** are cross sections through two types of sealing strips according to this invention; and

FIG. **5** is a vertical section through another joint according to the present invention.

SPECIFIC DESCRIPTION

As shown in FIG. **1** a pair of reinforced-concrete slabs **34** have confronting edges **35** formed with elongated cutouts **1.** The right-hand slab is shown with its reinforcement rods **2** visible, the notch **1** in the left-hand slab is shown filled in with concrete.

A T-section steel profile **3** having its crosspiece **3'** extending vertically parallel to the edge **35** and its leg **3''** extending on a level with the upper surface of the slab **34** is provided with a plurality of welded-on steel anchor loops **4** connected via other welded reinforcement bars **4'** to the bars **2** imbedded in each slab **34,** so that each such profile **3** is securely attached to its slab. The cutout **1** is filled up with concrete once the profile **3** is welded in place.

A metal angle **13** has a short horizontal leg **13'** welded to the face of each profile and a long vertical leg **13''** which defines with the respective profile **3** an upwardly open elongated groove **12** having straight and parallel flanks. A sealing strip **10** made of neoprene has two legs **11** each formed with a plurality of upwardly and outwardly projecting barbs **11'** on both sides. These barbs engage the inside walls of each groove **12** and prevent the seal **10** from working up and out. In addition the seal **10** is formed to each side with an outwardly and upwardly curved lip **11''** having an upper edge **11*a*''** which abuts the face of the respective profile **3** and makes a very tight seal. The two legs **11** are connected together, as shown in FIG. **3,** by a downwardly concave U-shaped web **14.** FIG. **4** shows that the web **14'** can be V-shaped and upwardly concave. Each barb extends along the length of the sealing strip continuously. The distance between the barbs on opposite sides of the leg as measured thereacross is greater than the width of the groove. The bars project outwardly prior to compression by a distance of a most one-third of the overall width of the leg.

The barbs stem from massive trunks of a thickness between the roots of the grooves defining the barbs of at least one-third of the overall thickness.

Each slab **34** is covered with an insulating layer **5** on which is provided a binder layer **6.** The wear-resistant

roadway surface 7 is provided on top of this layer 6. Advantageously an asphalt mass 8 is provided adjacent each crosspiece 3' for best sealing characteristics. Thus a roadway surface or plane P is defined by the layer 7. The seal 10 lies completely below this plane P. The two facing edges 35 of the slabs 34 are spaced apart by a distance D varying with temperature between 25mm and 65mm.

FIG. 2 shows an arrangement wherein two concrete slabs 36 have facing edges 37 separated by a distance D' equal to 80mm on the average and capable of growing to 130mm. Each such slab 36 is provided with a respective steel profile 20 having an inwardly extending ledge 38 to which is welded a steel plate 25 to form a pocket 24 corresponding to the pocket 12. In addition each slab 36 is formed in part as an inwardly open channel 39 provided on its cheeks with elastic bumpers or supports 23. Crosspieces 22 are received between these supports 23 and are horizontally shiftable but vertically fixed. These crosspieces 22 are secured to a central profile 21 having an upper edge parallel with the upper edges of the profiles 20 and substantially on a level with the roadway surface P. In addition the profile 21 is formed with a pair of ledges 38' to which are welded plates 25' forming pockets 24' identical to the pockets 12. Two seals 10 each have one leg 11 in one of the pockets 24 and their other leg in one of the pockets 24'. SUch an expansion joint has twice the capacity for taking up expansion and contraction as the joint description with reference to FIG. 1. The barbed legs each have a pinecone profile, the groove width being dimensioned so that its width is greater than the aforementioned trunk thickness but less than the overall thickness of the leg.

The arrangement of FIG. 5 has a pair of edge profiles 30 each formed unitarily with an upwardly open slot or groove 32 receiving one leg of a seal 10. In addition the profiles 30 are each formed with an overhanging ledge or lip 31 under which is engaged the lip 11'' of the seal 10 so that such a joint is watertight. The seal 10 is inserted by first tamping its legs 11 into the pockets 32, and then forcing its lip 11'' under the ledge 31. The latter projects beyond the inner cheek of the groove to a distance preferably less than the groove or pocket width but at least one-half this width.

I claim:

1. An expansion joint for a roadway, comprising two spacedly adjoining concrete slabs defining a roadway surface, a metal strip embedded in each of said slabs confronting the other slab, each of said metal strips being provided with two spaced-apart parallel walls defining respective horizontally extending but vertically elongated upwardly open grooves, and at least one flexible sealing strip of generally U-section having two downwardly extending shanks each received in one of said grooves, each shank being formed with a relatively thick central portion and with a plurality of upwardly and outwardly directed opposite resiliently deflectable bars engaging the walls of said grooves under compression and resisting upward withdrawal of said shanks from said grooves while sealing same against the entry of contaminants, said sealing strip being formed about each shank with an upwardly and outwardly curved projecting lip sealingly engaging a flank of the respective strip facing the opposite strip.

2. The joint defined in claim 1 wherein said sealing strip is made of neoprene.

3. The joint defined in claim 1 wherein said metal strips are each formed with an overhanging ledge, said lips each being snugly received under the respective ledge.

4. The joint defined in claim 1, further comprising an intermediate metal strip provided on opposite sides with respective upwardly open grooves, means for supporting said intermediate metal strip between the first-mentioned metal strips with limited displaceability to either side toward said first-mentioned metal strips, and a second such strip, each of said sealing strips having shank received under compression in the groove of a respective one of said first-mentioned metal strips and another shank received under compression in a respective one of the grooves of said intermediate metal strip.

5. The joint defined in claim 4 wherein said means comprises at least one crosspiece fixed to said intermediate metal strip and a plurality of supports on said first-mentioned metal strips supporting said crosspiece.

6. The joint defined in claim 1 wherein each of said metal strips is of T-shaped cross section and each of said slabs is provided with steel reinforcement, said metal strips being fixed to said reinforcement.

7. The joint defined in claim 1 wherein the distance to which each barb projects from the respective thick portion is at most equal to the thickness thereof.

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