Jan. 25, 1955 J. E. CARTER 2,700,329

ELASTOMERIC STRIP FOR VERTICAL PAVEMENT JOINTS

Filed May 18, 1946 3 Sheets-Sheet 1

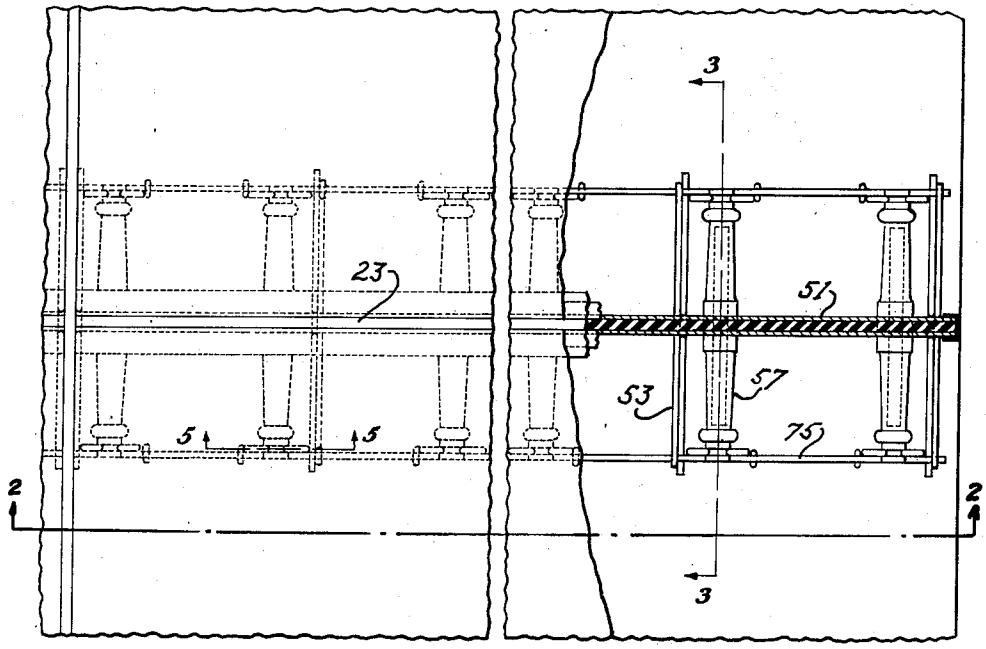

Fig. 1

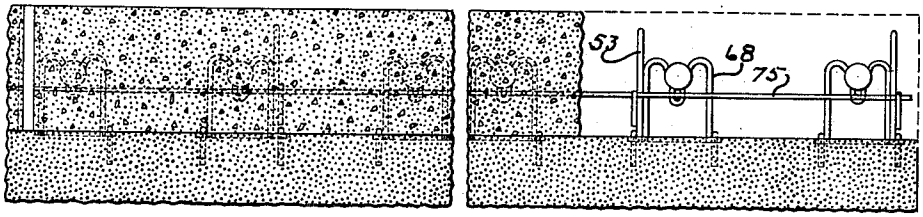

Fig. 2

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ELASTOMERIC STRIP FOR VERTICAL PAVEMENT JOINTS

Filed May 18, 1946 3 Sheets-Sheet 2

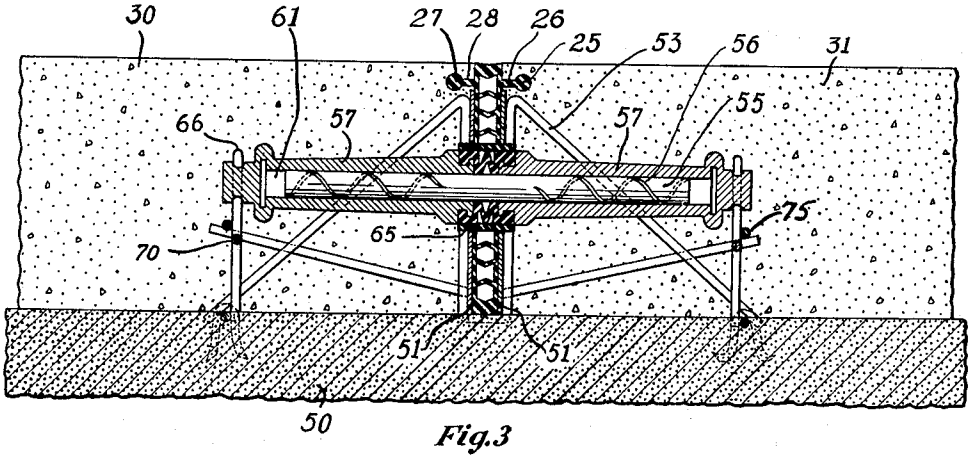

Fig.3

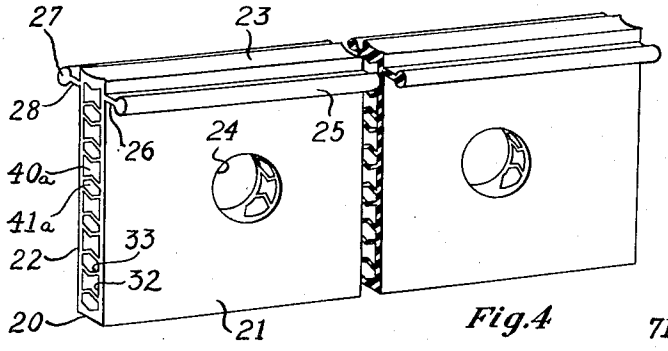

Fig.4

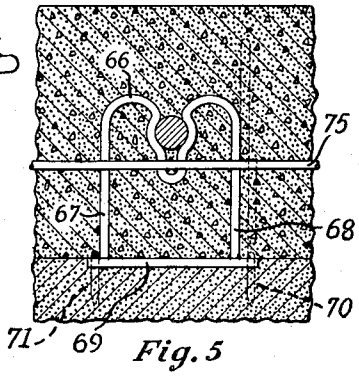

Fig. 5

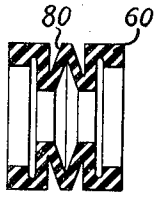

Fig. 6

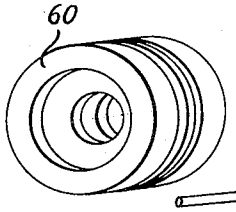

Fig. 7

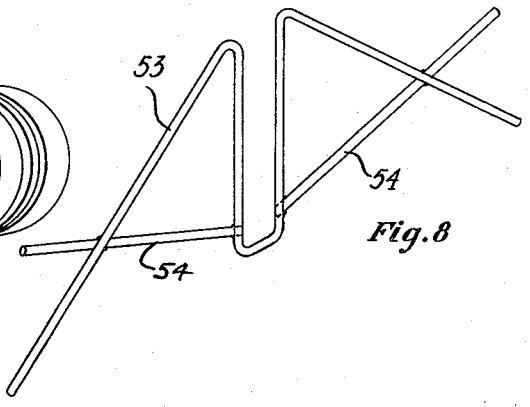

Fig. 8

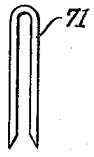

Fig. 9

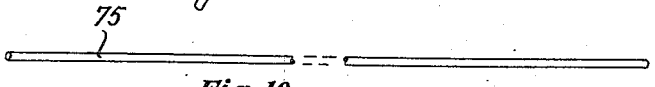

Fig. 10

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ELASTOMERIC STRIP FOR VERTICAL PAVEMENT JOINTS

Filed May 18, 1946 3 Sheets-Sheet 3

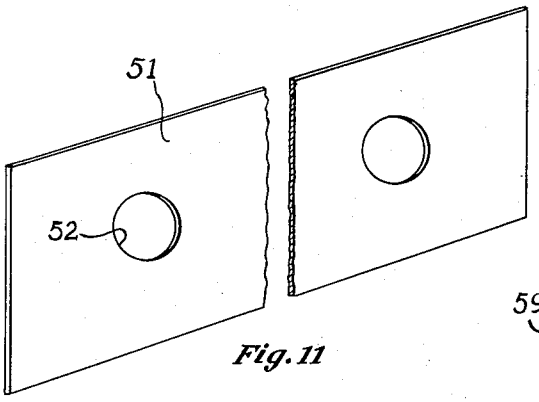

Fig. 11

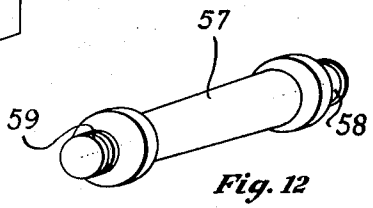

Fig. 12

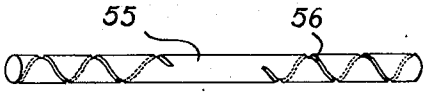

Fig. 13

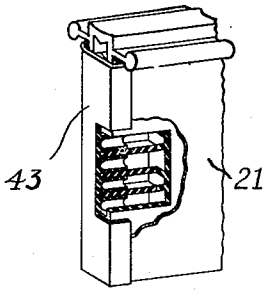

Fig. 14

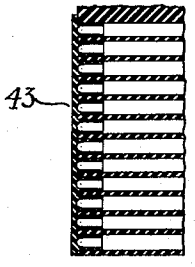

Fig. 15

Fig. 16

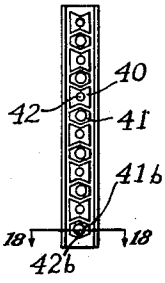

Fig. 17

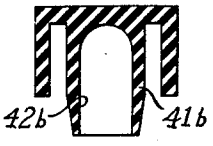

Fig. 18

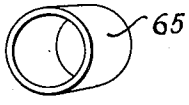

Fig. 19

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United States Patent Office

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ELASTOMERIC STRIP FOR VERTICAL PAVEMENT JOINTS

John E. Carter, Columbus, Ohio

Application May 18, 1946, Serial No. 670,793

12 Claims. (Cl. 94—18)

This invention relates to an elastomeric strip for vertical pavement joints, and more particularly pertains to such a strip having sealed air pockets therein, having means for tying-in said strip to concrete pavement cast thereabout, and having means for cooperating with dowel bars for forming a water-proof, compressible, dowel bar vertical joint between adjacent concrete slabs.

In the heretofore known art of concrete slab pavement construction, a particular point of trouble has been in regard to water seepage in the vertical joints between adjacent concrete slabs, which water tends to erode the roadbed, and in cold weather, to freeze causing fragmentation of the concrete. Such water seepage also affects the efficiency of dowel bar action. Dowel bars are universally used to connect adjacent slabs of concrete pavement to prevent relative tilting thereof. Of the various means heretofore known, for filling vertical joints between adjacent concrete slabs, all have been deficient in one form or another under various conditions. For instance, the most commonly used vertical joint filler is bituminous material which is melted and poured into the joints after the concrete has set. Bituminous material, being relatively plastic over the range of temperatures met with in ordinary climates, will permit the concrete slabs to expand during hot periods, but under pressure, exerted by the expanding slabs, it is forced out at the top of the joints to form ridges on the road, where it is subjected to contamination and deterioration by the passing of traffic thereover. Such protrusion of the bituminous material is due to the fact that it is imcompressible. The formation of these of bituminous material ridges on the surface of the pavement, during hot weather, causes the jolting of vehicles passing thereover, until the ridge has been mangled and flattened by the weight of such traffic. During this process, dust, dirt and other debris is ground into the bituminous material causing it to lose its plastic characteristics, and it is gradually ground away and separated from the joints. Upon subsequent contraction of the concrete, which widens the joints, cracks are formed between the concrete and the reduced amount of filler therein, because said bituminous material is not elastic and does not of itself resume the shape in which it was first cast into the joints. The consequence is, that water seeps into the cracks and erodes the roadbed, or, if the weather is below freezing, said water freezes and causes ice-rupturing of the concrete at such joints. Such deterioration of the pavement becomes progressively worse and causes constant maintenance and refilling of the joints to prevent complete destruction of the road. This item of maintenance is the chief one in the total cost of keeping concrete roads in repair and, until my invention, no completely satisfactory substitute for bituminous material has been found. An attempt has been made in recent years to fill these vertical joints between concrete slabs with resiliently vulcanized rubber strips anchored in one way or another in the joints. It is a well known fact that rubber even though it be resilient is incompressible. Because of the incompressibility, even though the sealing strips made thereof be resilient and distortable, when the concrete slabs between which such a strip is placed expand, and thus reduce the size of the joints, the rubber is distorted vertically and causes ridges to protrude from the top of the joints where passing traffic can scuff and cause a wearing away of such protruded part of the rubber. Moreover, such protruding part of the rubber is subject to horizontal forces, as traffic passes over it, tending to rip it from the joints, leaving the joints unprotected against the entry of water.

I have provided an elastomeric strip, made of rubber, or rubber-like material which is water-proof, and compressible. The compressibility of my strips is gained by providing therein a number of air pockets which, though the elastomeric material itself is not compressible, are compressible because of the natural compressible characteristics of the enclosed air. The air pockets or channels within the strip are totally enclosed therein so that they do not interfere with the normal outlines of the strip in producing the water-tight seal against the concrete or metal sides of the joint with which they are in abutment. By "elastomeric material" I mean such material as natural rubber which may be distorted, by applied forces, to as much as 100% of its ordinary dimensions and which, when such distorting forces are removed, will return substantially to its original form. I have, therefore, combined the characteristics of a water-proof elastomeric material with the advantages of a compressible gas contained therein, into a single strip, so that, when said strip is squeezed by the compressive forces caused by expansion of the slabs, the strip will not be caused to distort in a vertical direction and protrude upon the surface of the road. By such means which I provide, the joint is kept permanently water-proof, no ridges are formed on the road during hot weather, and the joint sealing means is not subject to traffic wear. I have also provided means whereby dowel bar units may pass through my elastomeric strip and be water-proofedly connected thereto, the dowel bars of such units each being encased in water-proof casings. I have further provided in the means for sealing the dowel bar units through said elastomeric strip, means whereby said encased dowel bars in addition to being sealed against the entry of water, have a floating action in the casings in which they are held. Moreover, as a further safeguard against the protrusion of my novel elastomeric strips from the roadbed, I have provided a concavity along the length of their upper edges so that any slight tendency of the rubber to protrude above the road surface, during extraordinary expansion of the slabs, will be taken up by such concavity. I have further provided means, near the top of said strips, in the form of laterally projected beads, attached to said strips by narrow necks, whereby when concrete is cast about the strips the beads will be encased thereby and water-proofedly connect and tie-in the strips to the concrete, forming a mechanical bond therewith. I have further provided for the sealing of such strips by cementing a sealing strip of elastomeric material over any cut in a strip which is necessary for the fitting of a strip to the road width or length.

Of the elastomeric materials, which I desire to use in connection with my invention, those having the characteristics of being impervious to water, tough resilience, resistance to atmospheric deterioration, resistance to oil, resistance to aging and oxidation, and of relatively high tensile strength. Of such materials, I prefer natural rubber vulcanized to that degree of resiliency and toughness associated with modern automobile tires, and, to, that end, toughening, aging and vulcanizing ingredients are to be included with the raw elastomeric material in its compounding. Of the synthetic rubber-like materials paralleling natural rubber in characteristics, I prefer the oil resistant types of which the butadiene-acrylonitrile copolymers are representative, because such materials resist better the swelling and disintegration to which the elastomeric strips may be subjected in situ from oil dripping from passing motor traffic and from lubricants used for the dowel bars. I realize that there are a number of so called synthetic elastomers, which have equivalent characteristics to natural rubber, in addition to the butadiene-acrylonitrile copolymers, and I include such in the classes of suitable materials for my novel joint sealing strips.

Therefore, the principal object of my invention is to provide an elastomeric and compressible joint sealing strip for use in vertical joints between adjacent concrete slabs of a road pavement.

Another object of my invention is to provide such a strip made of rubber or rubber-like materials having the characteristics of resilient toughness and water resistance, which are comparable to the present day automobile tire rubber.

Another object of my invention is to provide an elastomeric strip for use in vertical road joints, between concrete slabs, which strip has sealed therein a number of air pockets so that horizontal compression upon such strip will not cause it to distort in a vertical direction to any extent.

Another object of my invention is to provide such an elastomeric strip which has means for mechanically tying itself into concrete cast thereabout, in a water sealing manner.

Another object of the invention is to provide such a strip with means for sealing the same to encased floating dowel bars which are embedded in the concrete slabs across said vertical joints.

Further objects, and objects relating to details and economies of operation, will definitely appear from the detailed description to follow. In one instance, I have accomplished the objects of my invention by the devices and means set forth in the following specifications. My invention is clearly defined and pointed out in the appended claims. Structure constituting preferred embodiments of my invention are illustrated in the accompanying drawings forming a part of the specification, in which:

Fig. 1 is a plan view of a concrete slab road pavement showing my novel joint sealing strip and dowel bar construction cooperating therewith.

Fig. 2 is a vertical sectional view of the concrete slab road of Fig. 1, on the line **2—2**, showing the dowel bar supporting means.

Fig. 3 is a vertical sectional view through the concrete slab road of Fig. 1 across the joint on the line **3—3**, and through the dowel bar unit cooperating therewith.

Fig. 4 is a perspective view of my novel joint sealing strip, indicating both an end and a section portion thereof.

Fifg. 5 is a detail of a dowel bar chair on the vertical section **5—5** of Fig. 1.

Fig. 6 is a sectional view through an elastomeric union for joining the casings of a dowel bar unit which cooperates with the elastomeric strip for water-proofing the connection.

Fig. 7 is a perspective view of the union shown in Fig. 6.

Fig. 8 is a perspective showing of a U-shaped chair for holding my vertical strip upright on the roadbed before the pouring of concrete thereover.

Fig. 9 shows a sample of a staple used for fastening the chair unit of Fig. 5 to the roadbed.

Fig. 10 is a representation of a brace wire used in the frame work supporting my dowel bars and vertical joint sealing strips.

Fig. 11 shows sideplates for supporting the elastomeric strip, between the chairs, in a vertical manner, prior to the pouring of the concrete, said plates having dowel bar apertures therein.

Fig. 12 shows a water-proof dowel bar casing for one end of a dowel bar.

Fig. 13 shows a dowel bar.

Fig. 14 shows the seal for sealing a cut end of my vertical joint sealing strip.

Fig. 15 is a vertical section through my novel strip with the sealing piece comented thereto.

Fig. 16 is a side elevation view of the end seal for a cut sealing strip.

Fig. 17 is another vertical view of the end seal for the sealing strip.

Fig. 18 is a sectional view on the line **18—18** of Fig. 17.

Fig. 19 is a view of an elastomeric sleeve for covering the union, shown in Fig. 6 and in Fig. 7, to form between it and the elastomeric strip a snug watertight fit.

In the drawings, the same reference numerals refer to the same parts throughout the several views, and the sectional views are taken looking in the direction of the arrows at the ends of the section lines.

Referring to Fig. 4, my novel joint sealing strip, made of the specified elastomeric, resilient, and tough material has a bottom edge **20** which rests on the roadbed, side faces **21** and **22** against which the compression forces of the expanding concrete slabs are directed, and a top edge **23** which shows from the surface of the concrete road as the top edge of said vertical strip. At intervals, a distance apart, as is necessary for the strength of the construction wanted, are dowel bar apertures **24**, piercing the thickness of the strip. Running parallel with the length of the strip near its top edge, and associated with face **21**, is a bead **25** connected to the body of the strip by neck **26**.

Associated with the face **22**, is a similar bead **27** connected to the body of the strip by a neck **28**. The beads **25** and **27** are located near the top of the strip, and are two or more times in diameter the thickness of the neck which joins the associated bead to the strip. Referring to Fig. 3 the strip is shown in position after the concrete slabs **30** and **31** are poured to a height of the top edge **23**, encasing the beads **25** and **27**, thus mechanically bonding the strip to the concrete.

Referring again to Fig. 4, running parallel through the length of the strip are air channels, such as channels **32** and **33**, which form continuous air passages from one end of the strip to the other. The channels in said strips, preferably, are parallel and fit close together so as to provide a maximum volume of air within the strip. It will also be observed that channels **32** and **33** are shaped in cross sections in such a manner that side pressure exerted on sides **21** and **22** will tend to collapse said channels so that the inter-channel webs between them will fold without horizontal resistance. That is, the webs between the channels are formed so that the compression forces of the expanding concrete, directed against the side faces of the strip, will not meet with any resistance of consequence because of said inter-channel webs.

By examination of Figs. 3 and 4, it will be seen that the top edge of the strip is slightly concave in cross section so that, when compression forces operate against the sides of the strip, any slight distortion upwardly of the strip will spend itself by forcing out the concavity of the top edge so that the rubber will not protrude above the concrete surface level.

As will be described, the end of the air channels are sealed, and the air channels exposed by the dowel bar apertures such as aperture **24** are sealed, against the entry of water and against the expulsion of air so that there will be no pumping action during the compression and decompression of the strips which tends to draw water into the assembly. In other words, the strip after being assembled in the road is sealed air-tight and water-tight, so that the compressibility of the air in the air channels creates sufficient force outwardly to cause the elastomeric strip to form a perfect water-tight seal with the concrete and the side plates, as will be explained.

Referring to Figs. 14, 15, 16, 17 and 18, there is shown a means for sealing the cut ends of a strip. Ordinarily, in producing such a strip as shown in Fig. 4, extrusion molding is used, and the strip comes in undefined lengths. In order to fit such a strip to a roadbed under construction, it is obvious that the strips must be cut to size, and this necessitates cutting through the air channels at right angles as shown in Fig. 4. In Fig. 16, there is shown a seal which is formed with shaped plugs to fit the channel apertures. For instance, in Fig. 17 looking at such a seal strip into the face of the plugs, plug **40** is shaped to fit aperture **40***a*, Fig. 4, and plug **41** is adapted to fit aperture **41***a*, Fig. 4. It will be observed that each of the plugs has, in the center thereof, a hole to render the plugs collapsible to fit within its corresponding aperture, such a hole being shown at **42**, Fig. 17. Cement, or other fastening means, is used to fasten such seals on the cut end of the joint sealing strip in a water-proof manner to form a water-tight and air-tight end to the strip. Thus, referring to Fig. 14 the seal strip **43** is shown fastened to the end of the elastomeric vertical joint sealing strip. For convenience, the seal need extend no higher than the beads as the top air channel need not be protected from entry of water inasmuch as it ordinarily extends above the berm of the road and will drain. Fig. 15 is a vertical section through a strip with the end seal in place, showing how the plugged channels are physically strengthened by their cooperation. Fig. 18 is a section through Fig. 17 on the line **18—18** showing the hole **42***b* and the plug **41***b*, in an enlarged manner.

Coming now to describe the installation of the strip upon the roadbed prior to pouring the concrete, reference is made to Fig. 3 in which a roadbed **50** is shown with the vertical elastomeric sealing strip placed thereon. Bordering each vertical face of the sealing strip is a metal face plate **51** (see Fig. 11) having therein, at intervals, apertures, like aperture **52**, which are aligned with the apertures, like aperture **24** (see Fig. 4) of the strip, so that dowel bars may be passed therethrough. At intervals corresponding to the intervals at which the dowel bars pass through, are U-shaped chairs **53** (see also Fig. 8) braced by braces **54** welded thereto, and fastened, as will

be described, to the roadbed, in a vertical position, so as to receive, as shown in Fig. 3, the sealing strip, and the side plates, in the U-shaped portion of said chairs. The side plates are held against the sides of the sealing strip in a water-tight manner by the chairs.

A dowel bar unit is associated with each dowel bar aperture. Each dowel bar unit includes a dowel bar **55** (Fig. 13) having a helical lubricating groove **56**, a casing **57** (Fig. 12) for each end of the dowel bar, each casing being water-proof except for a dowel bar receiving aperture opening at one end (see Fig. 3), and an elastomeric water-proof union **60** (Figs. 6 and 7) joining the casings associated with a dowel bar by engaging grooves **58** on the inner ends thereof. The union **60** is formed with compression pleats **80** (Fig. 6) so that the casings may move together over the encased dowel bar. The casings **57** (Fig. 12) are formed with a groove **59** on the outer end to receive chairs as will be described. A lubricating reservoir **61** (Fig. 3) is provided in the interior dowel aperture to hold lubricant which works along the groove **56** of the dowel bar as the casings move with respect to the dowel bar. The dowel bar unit assembly to the strip is best shown in Fig. 3. An elastomeric water-proof sleeve **65** (Fig. 19) is fitted over the union (see Fig. 3) to act as a water seal between the dowel bar unit aperture in the strip and the rubber union. It will be apparent that in assembling the joint structure on the road, that with a dowel bar unit assembled together by the union and sealed by the sleeve **65**, it is only necessary to pass the same through a dowel bar unit aperture **52** of the side plates and the corresponding aperture **24** of the vertical sealing strips to a point where the sleeve is snugly in the aperture.

To support the dowel bar units, such as shown in Fig. 3, before the concrete is cast, chairs like chair **66** (Fig. 5), having downwardly extending legs **67** and **68**, joined by a bottom piece **69**, stapled to the roadbed by staples **70** and **71** (see also Fig. 9), are provided for each end of the dowel bar unit. A downwardly extending loop in the upper portion of the chair engages the circumferential groove **59** of the outer end of the dowel bar casing so as to support it at a definite distance above the road-bed level. As shown in Fig. 3, the strip supporting chair **53** is welded to the associated dowel bar unit chairs **66** at points like point **70**. The strip supporting chair and the dowel bar supporting chairs of a dowel bar unit thereby are welded together into a solid supporting structure. The dowel bar units along a strip are further supported by a rod like rod **75** (Fig. 10 and Fig. 5), welded to all the dowel bar chairs on an associated side of the strip.

The novel beading by which the top of the strip is mechanically tied into the concrete, after it is cast thereover, is far superior to any such mechanical bond previously known. The elastomeric quality of the sealing strip permits contraction of the concrete for a considerable extent beyond normal without stretching of the necks **26** and **28** sufficiently to cause the beads **25** and **27** to be withdrawn through the narrow aperture occupied by the stretched necks.

By referring to the construction shown in Fig. 3, by which the dowel bar unit is connected to the vertical sealing strip unit, it will be understood that upon compression movement of the concrete slabs **30** and **31** toward one another, during periods of their expansion, the rubber strip will be compressed as also will be the air in the channels contained therein. At the same time, the casings **57** held embedded in the concrete will push toward one another, and the formation **80**, (Fig. 6), in the rubber union joining the casings, will permit of such movement of the casings together, leaving the dowel bar floating freely within the casings and rubber union, without effect as to its load transferring and tilt preventing characteristics.

My Patent 2,508,443, issued May 23, 1950, is directed to a novel dowel assembly having a sectional sleeve interposed between the two casings, each of which is interlocked with a section of the sleeve.

I am aware that the device disclosed herein may be varied considerably without departing from the spirit of my invention and therefore, I claim my invention broadly as indicated by appended claims.

Having thus described my invention, what I desire to claim as new and useful is:

1. A joint sealing strip for use in concrete slab road construction, comprising a strip of water-proof elastomeric material having side faces along its length, said strip being provided with a plurality of sealed air channels parallel one another and separated by webs therebetween, the webs between said channels being angularly positioned with reference to the side faces of the strip, so that said strips may be compressed by lateral pressure upon the sides of the strip with a minimum of resistance offered by said webs, a dowel bar aperture cut at intervals through the thickness of the strip and through some of said channels, and a resilient sleeve inserted in the apertures for sealing the channels.

2. A joint sealing strip for use in concrete slab road construction, comprising a long strip of water-proof tough and resilient elastomeric material having wide side faces along its length, said strip having sealed air channels provided along its length between the long edges of the strip and separated by thin V-shaped webs so that when the strip is compressed by forces pressing inwardly on the faces thereof on either side, said strip will be compressed, compressing the air contained in said channels, without any great resistance from said webs which fold into pleats, a dowel bar aperture cut at intervals through the thickness of the strip and through some of the channels, and a resilient elastomeric sleeve inserted in the apertures for sealing the channels.

3. A joint sealing strip for use in sealing vertical joints in concrete slab road construction comprising a strip of water-proof resilient elastometric material, having a plurality of sealed internal air channels provided between the top and bottom edges, substantially throughout the body of the strip, separated by webs, the webs between said air channels being formed in V-shapes, with the point of the V pointed either upwardly or downwardly, so that side forces tending to compress the strip will not be greatly resisted by said webs, a dowel bar aperture cut at intervals through the thickness of the strip and some of said channels, and a resilient seal lining the apertures.

4. A joint sealing strip for use in making a cast concrete slab pavement on a roadbed, comprising a flat strip of elastomeric material, said strip having a plurality of internal channels separated by narrow webs and said strip having integral therewith a round bead running the length of the strip on each side thereof, each bead being connected to the strip by a neck-like portion, said bead being in cross section at least two times the thickness of the associated neck, said bead being adapted to be embedded in the concrete of the slabs on the associated side of the joint, a dowel bar aperture cut at intervals through the thickness of the strip and through some of the channels, and a resilient sleeve inserted in the apertures for sealing the channels.

5. A joint sealing strip unit for use in making a cast concrete slab pavement on a roadbed, comprising a joint filling portion shaped to fill an intended joint and a bead portion on each side integral with the joint filling portion, said beads being extended laterally from the side of the joint filling portion toward the concrete on the sides of the joint, said beads being approximately circular in cross section except for a neck-like portion with which the bead is joined to the joint filling portion, said beads being at least two times the thickness of the associated neck portions, said joint sealing strip units being made of elastomeric material, and said joint sealing portion of the unit having air channels internally thereof, which channels are sealed against the entry of water, and a dowel bar aperture cut through the strip and some of the air channels and having its surrounding walls sealed to close said channels.

6. A joint sealing strip for use in making a cast concrete slab pavement on a roadbed, said strip being adapted to be place on the roadbed prior to the casting of concrete thereabout, and said strip being adapted to cooperate with dowel bars passing therethrough, comprising a length of elastomeric material having at intervals along its length between its top and bottom edges, dowel bar apertures with their walls sealed to enclose the internal structure of said strip, and having internally thereof, along its length, air channels, and having projecting laterally, on each side the length thereof, near the top of the strip but below the intended top surface of the concrete to be cast thereabout, a bead joined to the strip by a narrow neck, whereby when said concrete is cast thereabout it forms a mechanical bond therewith.

7. A joint sealing strip for use in making a cast con-

crete slab pavement on a roadbed, said strip being adapted to be placed on said roadbed before concrete is cast thereabout, and said strip being adapted to have dowel bars passed therethrough, comprising a length of elastomeric material pierced at intervals, between its top and bottom edges, to receive dowel bars therethrough, said strip having, internally thereof and lengthwise of the strip, a plurality of enclosed air channels, including those pierced by the dowel apertures, whereby when said strip is placed on the edge on the intended roadbed and the concrete is cast thereabout it forms a water-proof resilient and compressible joint filler.

8. A joint sealing unit for use in placement on a roadbed, before concrete is cast thereabout to form a slab concrete road pavement, including in combination, a length of elastomeric joint filler material having a plurality of parallel air channels, running internally thereof the length of the strip and separated from each other by thin webs of material set at angles which give low resistance to compression forces acting laterally against the sides of said strip and having dowel bar apertures through its thickness and some of the channels with the surrounding walls of said apertures sealed to close the channels, and said strip having running lengthwise thereof, on either side near one lengthwise edge, laterally extending portions consisting of a bead joined to the main body of the strip by relatively narrow neck, said beads and necks being adapted to be embedded in concrete cast thereabout and to form a mechanical bond therewith when said concrete is set; a metal plate running the length of said strip on either side thereof below the bead, said plates being relatively thin compared to the thickness of the strip; a dowel bar extending through the metal plate and the dowel apertures of the strip, a metal chair supporting said strip, dowel bar and plates on said roadbed at the intended joint, whereby, when concrete is cast thereabout, said strip forms a resilient compressible joint filler which is water-proof, and which joint filler strip is, by means of the beads and necks thereof, mechanically bonded into the concrete, to render said joint water-proof on contraction of said concrete.

9. A joint filler strip and dowel bar unit construction for use on a roadbed prior to the casting of concrete thereabout to form a concrete slab road pavement, including in combination, an elastomeric and compressible vertical joint sealing strip having along its median line, the length thereof, dowel bar apertures, at intervals, for receiving dowel bar units; and a dowel bar unit piercing each of said apertures, each of said dowel bar units including a dowel bar, a casing for either end of the dowel bar, said casings being waterproof except for the meeting edges of said casings, and said meeting edges of the casings being joined in a water-proof connection by an elastomeric water-proof union, and said elastomeric union being fitted with a water-proof fitted elastomeric sleeve which snugly fits into said dowel bar apertures to seal them.

10. A joint filler strip, adapted to be placed on a roadbed prior to the casting of concrete thereabout to form a concrete slab road pavement, said strip being made of resilient elastomeric material and having, along the median line of its length, a dowel bar aperture at intervals, said strip having internally thereof along its length a plurality of parallel air channels, said air channels being cut by said apertures, and an elastomeric sleeve fitting into said apertures to seal said air channels against the entry of water, and said strip having integral therewith formed portions for mechanically bonding it to concrete cast thereabout.

11. A joint sealing unit for use in cast concrete slab road pavement, which unit is adapted to form a framework around which concrete may be poured to form concrete slabs connected by dowel bars which pass through the joint, including in combination, a strip of toughly resilient elastomeric material having top and bottom edges and side faces, having along its median line, in the lengthwise direction thereof, dowel bar apertures piercing said strip from face to face, and having extending from each face near the top edge and running the length of the strip a rounded bead made integral with the strip by a relatively narrow neck portion, the axis of the said beads running parallel with the length of the strip; and a dowel bar unit piercing each hole, said dowel bar units each consisting of a dowel bar, a half casing fitting over each end of the dowel bar, said casings meeting towards the middle of said dowel bar, an elastomeric water-proof union tying said casings together so that said dowel bar is encased entirely against the entry of water; and a rubber sleeve covering said union in a water-tight manner and being of a dimension to fit water-proofedly in the associated aperture of the strip, each of said dowel bar units being fitted by means of said seal into the strip.

12. A paving joint construction comprising concrete slabs spaced apart to provide a space therebetween, a strip of waterproof elastomeric material interposed to fill the space between the slab, said strip having a plurality of narrowly spaced air channels extending substantially throughout its body to provide air channels throughout the height of the joint space and having dowel bar apertures through its thickness and some of the channels, and means for sealing the end of the channels, including that through which the dowel apertures extend, to prevent a fluid being pumped through the paving construction during the compression of the strip and the contraction and expansion of the pavement.

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