May 29, 1951 J. E. CARTER 2,554,522

PROCESS FOR MAKING VERTICAL JOINT SEALING STRIPS

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Fig. 1

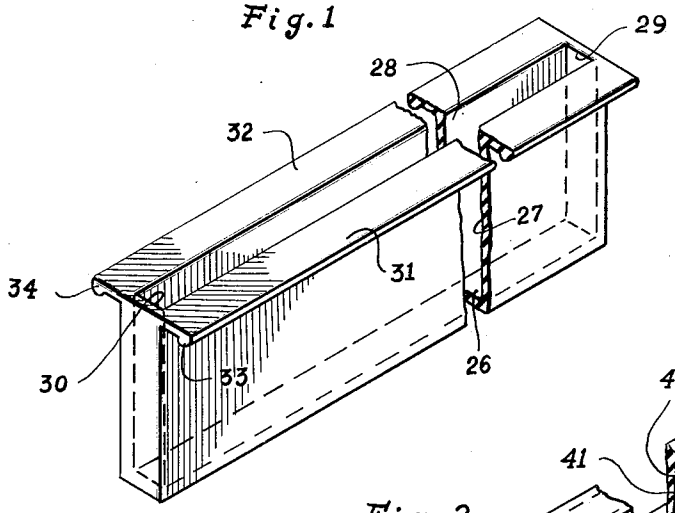

Fig. 2

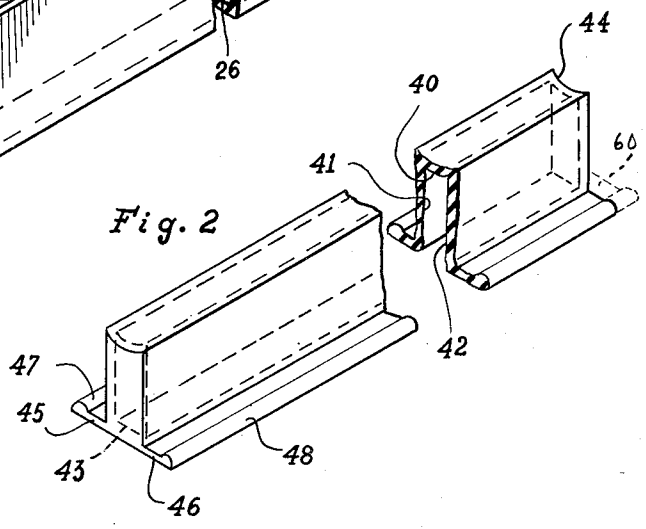

Fig. 3

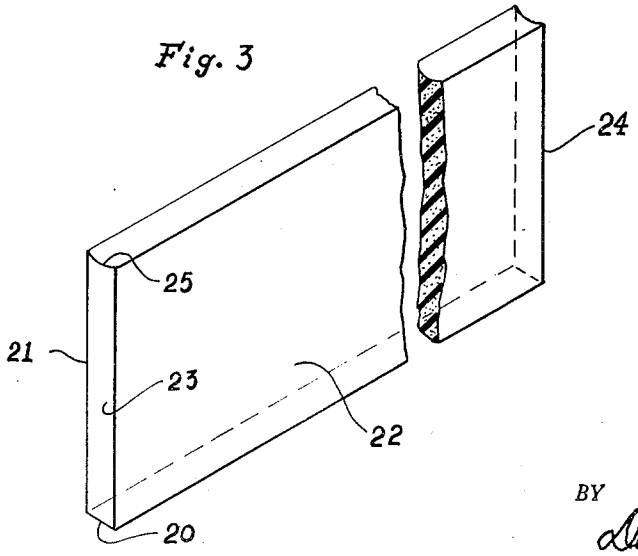

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Fig. 4

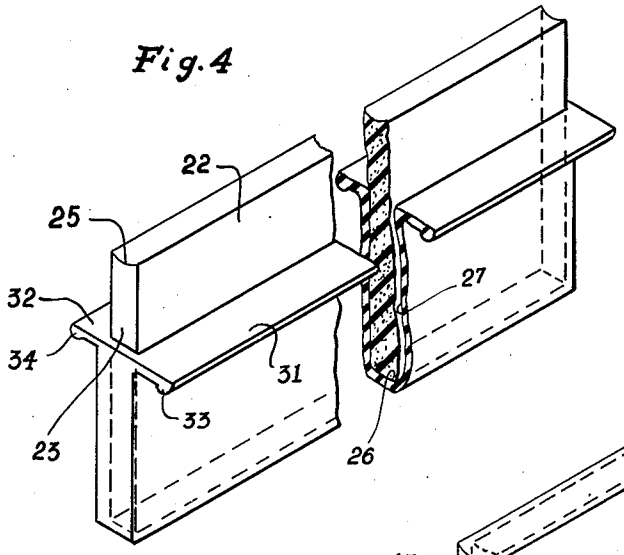


Fig. 5

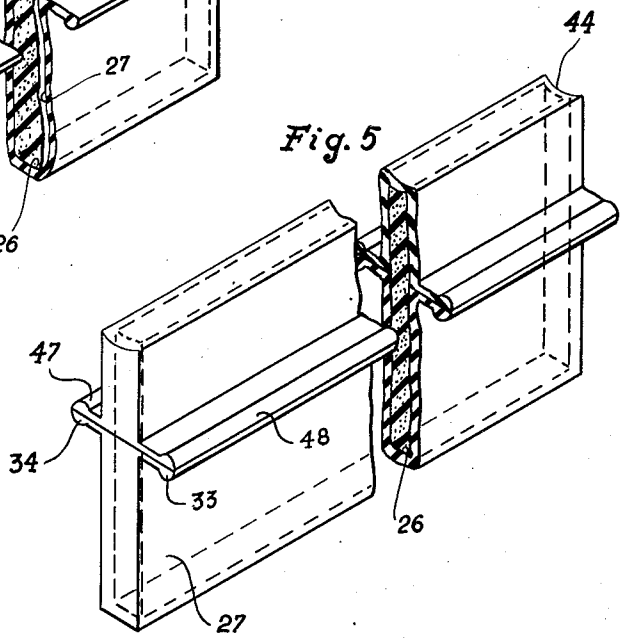


Fig. 6

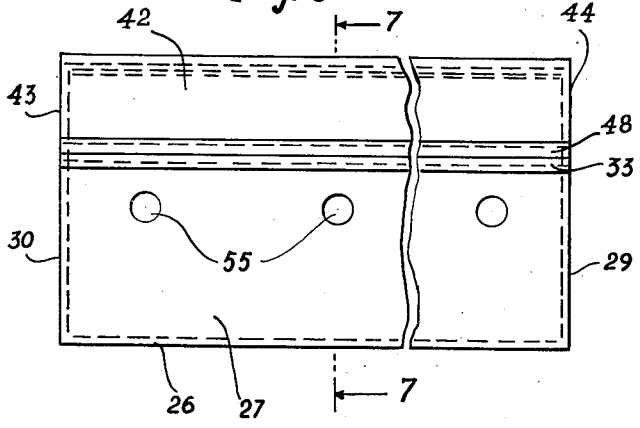
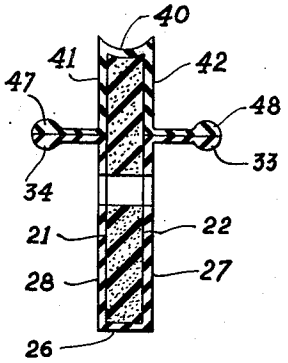


Fig. 7



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UNITED STATES PATENT OFFICE

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PROCESS FOR MAKING VERTICAL JOINT SEALING STRIPS

John E. Carter, Columbus, Ohio

Application October 1, 1946, Serial No. 700,531

5 Claims. (Cl. 154—139)

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This invention relates to a novel process for making vertical joint sealing strips used in concrete slab road pavement construction, and particularly pertains to the process for making a resilient strip of cellular elastomeric material encased in a sheath of solid elastomeric material provided with extension fins having beads which may be embedded in the concrete to maintain the position of said strip.

This application is a companion to my co-pending application for United States Letters Patent, Serial No. 700,532, filed October 1, 1946, claiming the product made by this novel process.

Vertical joint sealing means are provided for filling vertical joints between concrete slabs, to prevent the entry of water and dirt in such joints. Commonly, in the past, such joints have been made of bituminous material. More recently such joints have been plugged with strips of elastomeric material which have the advantage over the bituminous material of quickly regaining normal shape after being distorted by forces due to the expansion and contraction of the slabs. I have, heretofore, provided an elastomeric strip having internal air passages, which strip is adapted to be set on edge on a roadbed before concrete is cast thereabout, and this type of strip is described in my co-pending application for United States Letters Patent, Serial No. 670,793, filed May 18, 1946. The companion application for United States Letters Patent, Serial No. 700,532, filed October 1, 1946, is an improvement, in that the air in the interior of the strip is contained in non-intercommunicating cells comprising a core of cellular elastomeric material, which core is covered by a relatively thin elastomeric sheath.

It will be understood that, in manufacturing a strip of elastomeric material having a cellular core and a waterproof sheath, certain problems of manufacture arise, particularly with relation to the provision of the waterproof casing over the core. The novel strip which I intend to make has side beads running longitudinally below the intended concrete level, which beads act to retain the strip by their being imbedded in the concrete as it is cast and hardened thereabout.

I have provided, by my novel process, unique means for making the strip by molding upper and lower outer boots which are welded by vulcanization, or bonded otherwise as by cementing, along the mid-lines of the beads to encase the inner core in a waterproof manner to make the complete product. In this process the beads which extend laterally from the sides of the sheath form a natural means by which the two boots can be grasped together for vulcanizing or cementing purposes.

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Therefore, it is the principal object of my invention to provide a novel process for making an elastomeric vertical joint sealing strip of the type having an inner cellular core and an outer waterproof sheath.

Another object of the invention is to provide a method for making such a joint sealing strip wherein the outer sheath has lateral extensions in the form of beads extending longitudinally along the slab engaging sides of the strip.

Further objects, and objects relating to details and steps of the process, will definitely appear from the detailed discussion to follow. In one instance, I have accomplished the objects of my invention by the steps set forth in the following specification. My invention is clearly defined and pointed out in the appended claims. Views illustrating the preferred steps in the embodiment of my invention are provided in the accompanying drawings forming a part of the specification, in which:

Fig. 1 is a perspective view of the lower half of the casing, or boot, used to sheath the core. The view is broken to show the cross section of the casing.

Fig. 2 is a perspective view of the top casing member, or boot. The view has been broken to show the section.

Fig. 3 shows the core which is encased by the members of Fig. 1 and Fig. 2, this core being made of cellular elastomeric material;

Fig. 4 shows the core of Fig. 3 with the bottom boot member of the casing pulled thereover;

Fig. 5 shows the top and the bottom boot members of the casing in place on the core;

Fig. 6 is a side elevation of the completed strip of Fig. 5, with dowel bar apertures made therein;

Fig. 7 is a sectional view through Fig. 6 on the line 7—7 looking in the direction of the arrows.

In the specification, the same reference numerals refer to the same parts throughout the several views.

Of the elastomeric materials which I intend to be used in the making of my novel strip, I prefer the oil resistant type of rubber or rubber like material, such as a butadiene-acrylonitrile copolymer, although other oil resistant natural rubbers or synthetic rubbers may be used. I contemplate the use of natural rubber or synthetic rubber compounded with toughening and vulcanizing ingredients and vulcanized to a tough resilience, such as that associated with modern automobile

tires. I am not in any way limiting the invention to the use of natural rubber or synthetic rubber, as I also contemplate the use of other materials having the same or similar characteristics of resilience, toughness, water resistance and atmospheric aging resistance.

By the use of the term "cellular" I mean materials in which are included air cells or other gas enclosing cells, which are not inter-communicating and which are discreet within the material. Such cellular material may have holes therein of microscopic size or of a size visible to the unaided eye, but the holes should not be so gross as to make the material porous and liable to such unevenness of structure as to allow water to pass thereinto or therethrough. I do not intend, nevertheless, to restrict the invention to core material having an absolutely uniform cellular condition, or to one in which some surface porosity is not present, as an approximation of that condition is all that is necessary to render the material suitable for the use it is to be put in the finished strip, inasmuch as the finished strip will have an impervious sheathing.

Referring to the drawings, I show in Fig. 3 a core structure molded into a strip having cells therein. As the completed joint sealing strip is to be placed on a roadbed prior to the pouring of concrete thereabout, I mold the core slightly smaller than the intended width, height and length of the pavement joint, as when the sheath is put thereover it adds to the dimensions in all three directions so that the finished product will be the exact wanted size. It will be noted that whereas the base **20** of the core is square with the side faces **21** and **22** and the ends **23** and **24**, the top edge, which will be the only edge free for movement in the joint, is made of a concave cross-section as indicated by the curve **25**, in order that when the core is squeezed laterally on faces **21** and **22**, upon expansion of the concrete, the excess material which will not be accommodated within the joint will tend to cause the curved surface **25** to become flush with the road surface but without any protrusion thereof. Inasmuch as roads may be any one of several standard widths, or the slabs of any one of a variety of standard widths and lengths, the cores such as shown in Fig. 3 can be made in a number of standard sizes according to the need, or the cores may be cut from oversize lengths or heights of stock material.

Having provided the core, the next step in the process is to mold a lower part sheath, or boot, of impervious elastomeric material, which may be of the same material as the core although it need not be, the said lower sheath or boot, being shown in Fig. 1. This lower boot sheath has a bottom edge portion **26**, side-wall portions **27** and **28**, and end-wall portions **29** and **30**, the thickness of those walls being relatively small compared to the thickness of the core piece shown in Fig. 3. The interior cavity formed by the side-walls and bottom should be such as to snugly receive approximately two-thirds the vertical height of the core with the face surface **20** of the core resting on the bottom inside surface **26** of the said lower boot. The relative thickness of the core and the boot walls may be adjusted within reasonable limits as long as the resilient action and light weight characteristics of the core are not interfered with. Extending laterally from each of the side walls **27** and **28**, are fins **31** and **32** having underneath half round portions **33** and **34** respectively. The whole lower boot is made of one integral piece of elastomeric material and may be molded in the primary condition preceding vulcanization so that this lower boot and the upper boot of Fig. 2, made similarly, which boot will be described, may be welded together in the vulcanization process. Although the preferred form of sealing the upper and lower boot together is vulcanization, it is apparent that the lower boot may be vulcanized and the upper boot vulcanized and then the two sealed together by rubber cement or other bonding means. The height of the side-walls of the lower boot preferably should be about two-thirds of the vertical height of the strip as completed.

The placing of the core into the lower boot constitutes the next step of the process. The relationship of the core with the lower boot therein is shown in Fig. 4.

The top boot shown in Fig. 2 has an internal cavity formed by top wall **40**, side walls **41** and **42**, and end walls **43** and **44**, which cavity matches the cavity opening of the lower boot, and said upper boot has fins **45** and **46** ending in upwardly half round beads **47** and **48**. The dimensions of the top and bottom boot as far as the contacting surfaces of the fins go as shown in Fig. 5, are the same so that when the upper boot is placed over the core contained in the lower boot the two match together forming the unit as shown in Fig. 5.

The placing of the top boot on the core constitutes the next step of the process.

The top boot shown in Fig. 2 has the top wall **40** curved to match the top edge **25** of the core, in the preferred embodiment, although the top edge of the core and the top wall of the top boot may be flat, or any other shape, if desired.

In the next step of the process, after the parts are assembled as shown in Fig. 5, the facing surfaces are bonded together so that the two boots become an integral enclosing structure, sealing the core within, against the entry of water or dirt. As has been before remarked, the boots may be prevulcanized and the fins and edges of the boots at their meeting point may be bonded together by ordinary rubber cement, or the boots may be in the unvulcanized state and be welded together in the process of vulcanizing the boots. A lip may be provided on each boot at each end of the seam for holding the ends tightly together during bonding, if desired. Such is illustrated by the broken line **60** (Fig. 2), showing the form of such a lip as made on one end of the top boot. The two half round portions of the meeting fins on either side of the strip form a round bead, as shown at **34** and **47** in Fig. 5, and the fin-like pieces joined together form a neck of double thickness. As concrete is cast about the strip, as it rests on the roadbed, the bead portions and the fins are gripped in the concrete which sets about them and prevents the removal of the strip through extraneous forces acting thereon.

If dowel bars are going to be used to join concrete blocks together, by burying them in the concrete before it has set, then the joint sealing strip, constructed by my novel process, should have dowel bar apertures cut therein as indicated by aperture **55** in Fig. 6.

In use, such strip is placed upon the intended roadbed, the dowel bars are passed through the holes if desired, the sturcture is held in place by suitable wire chairs, and then the concrete is poured thereabout. In the event that other than standard pieces of the strip have to be used, it is contemplated that stock lengths of the strip as

completed may be cut to the desired length and the cut ends sealed over by placing a sheath of impervious elastomeric material thereagainst and bonding it into place, by vulcanization or by cement, as is desired.

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

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

1. The process of making an elongated board-like joint sealing strip for concrete slab road pavements, including the steps of molding an elongate core strip rectangular in cross-section of cellular rubber material; molding a boot of vulcanizable rubber material containing toughening compounds, said boot being shaped to cover a portion of the core; molding another boot of the same material shaped to cover the remaining portion of the core; assembling the boots and the core with the core enclosed within the boots without being adhered thereto; and bonding the boots together by approximating the edges of the boots and vulcanizing the boots when so approximated.

2. The process of making an elongated board-like joint sealing strip for concrete slab road pavements, including the steps of molding a core strip of cellular rubber material vulcanized to a tough resilience; molding a boot of vulcanizable rubber material which is shaped to cover a portion of the core snugly, molding another boot of material like the first boot, shaped to cover the remaining portion of the core snugly; assembling the boots over the core, and not adhered thereto, so the facing edges of the boots approximate each other; and while holding said edges in approximation vulcanizing the boots which results also in bonding the edges together to form a waterproof sheath for the core which is movable with respect to the core.

3. The process of claim 1 in which the the approximating edges of the boot are formed with laterally extending fins ending in half round beads so that when the boots are bonded together the beads form a full round bead which joins to the sheaths by fins extending longitudinally of the core.

4. The process of making a vertical joint sealing strip for concrete slab road pavements, including the steps of molding a core strip of cellular elastomeric material of a butadiene-acrylonitrile copolymer compounded with vulcanizing ingredients and vulcanized; molding a boot of a compound of vulcanizable butadiene-acrylonitrile copolymer material, said boot covering approximately two-thirds of the height of the strip; molding another boot of like material shaped to cover the other third of the core; assembling the boots and the core, with the core enclosed within the boots without being adhered thereto, so that the meeting edges are closely approximated; and bonding the boots together along the approximated edges by vulcanizing them.

5. The process of making an elongated board-like joint sealing strip for concrete slab road pavements, including the steps of molding a core strip of cellular elastomeric material having a tough resilience; molding a boot of waterproof material, shaped to snugly cover two-thirds of the core strip measured across the board surfaces thereof in the direction of its width; molding another boot of the same material shaped to cover the remaining portion of the core, said boots on the approximating edges thereof having laterally extending fins ending in half round beads; assembling the boots and the core, with the core enclosed within the boots without being adhered thereto, whereby to cause the lateral extensions to be approximated; and bonding the boots together along the meeting edges to form a waterproof sheath for the core and to form laterally extending fins ending in full round beads which may be held by concrete cast thereabout.

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REFERENCES CITED

The following references are of record in the file of this patent:

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