Dec. 19, 1944. J. N. HELTZEL 2,365,550

EXPANSION JOINT

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Fig. 1.

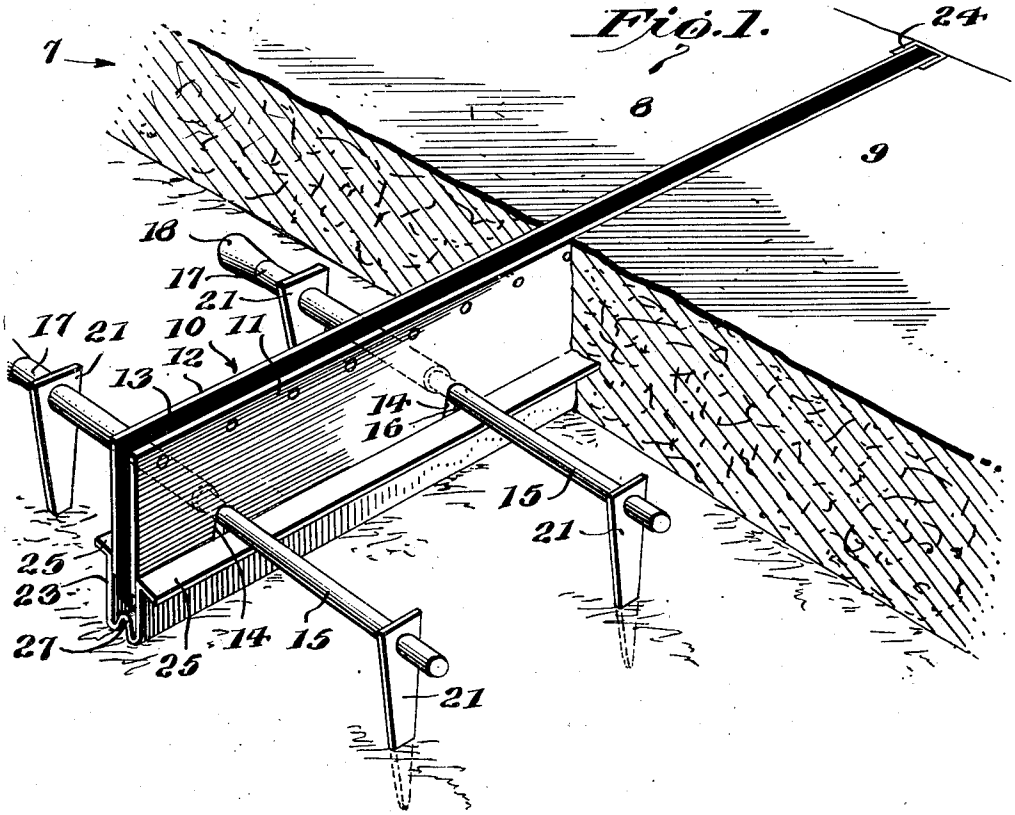


Fig. 2.

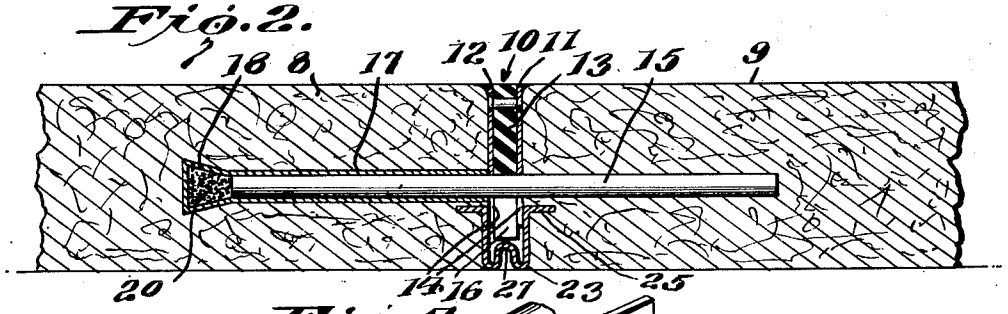


Fig. 4.

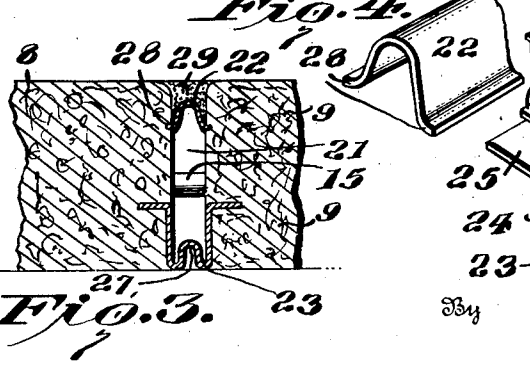
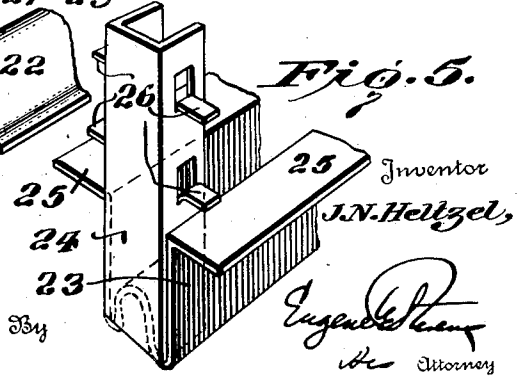


Fig. 3.

Fig. 5.



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EXPANSION JOINT

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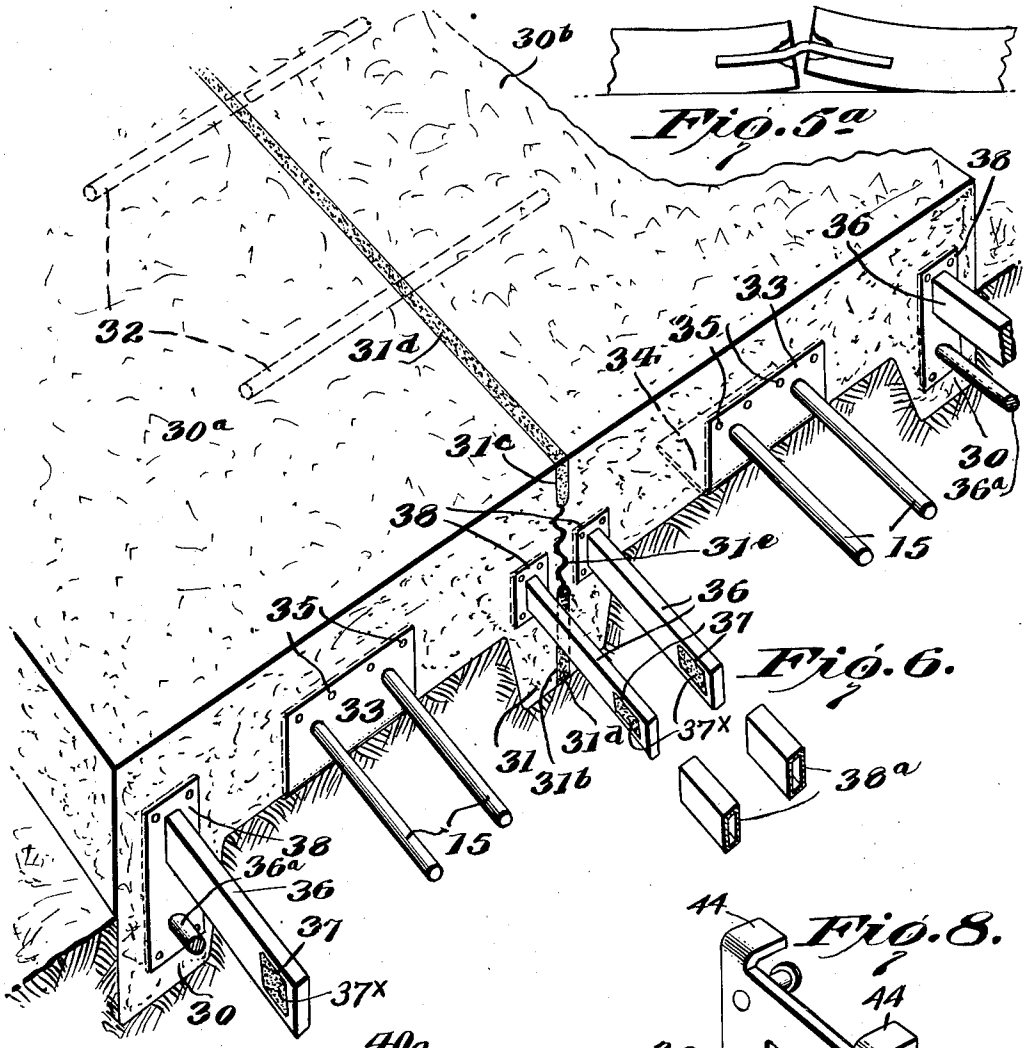


Fig. 5a.

Fig. 6.

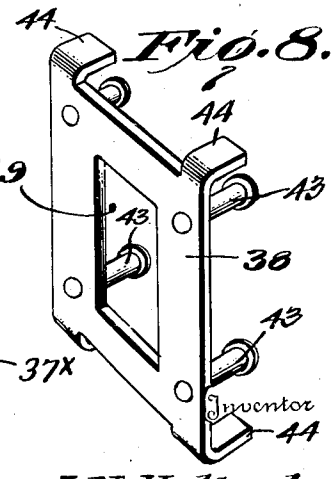


Fig. 8.

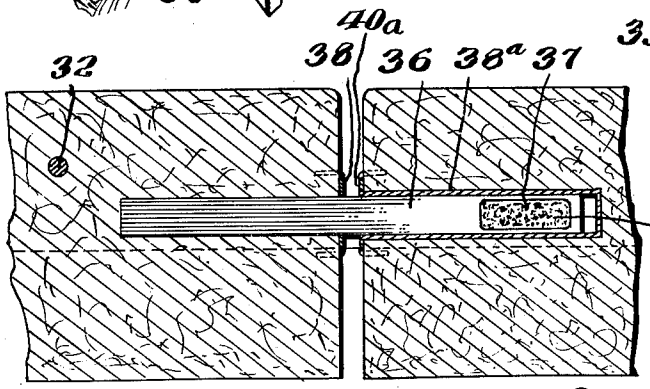


Fig. 7.

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Fig. 9.

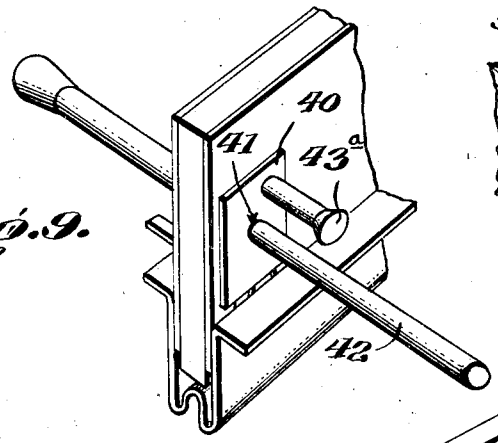


Fig. 12.

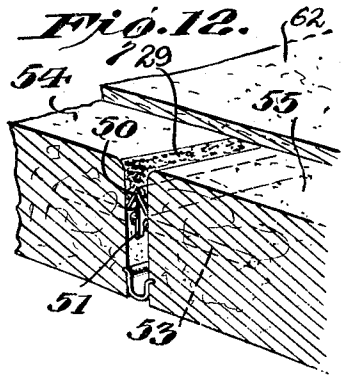


Fig. 10.

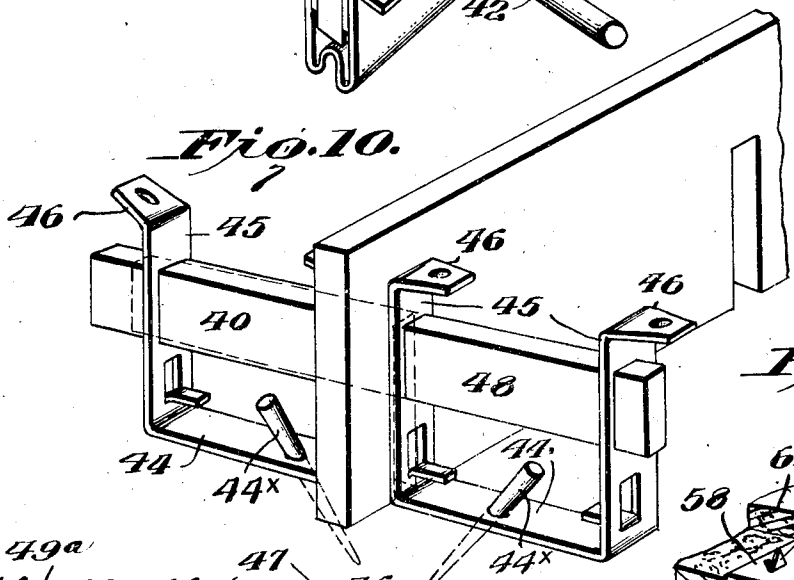


Fig. 13.

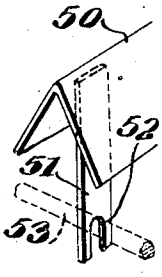


Fig. 11.

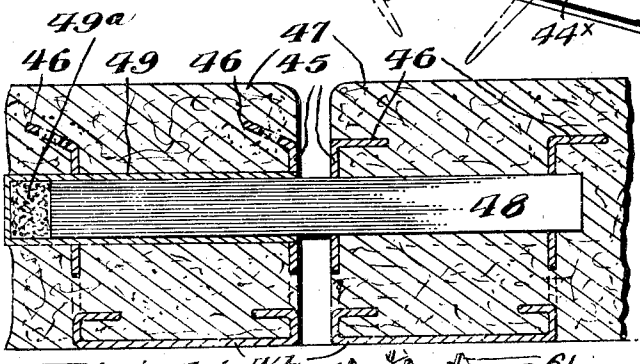


Fig. 14.

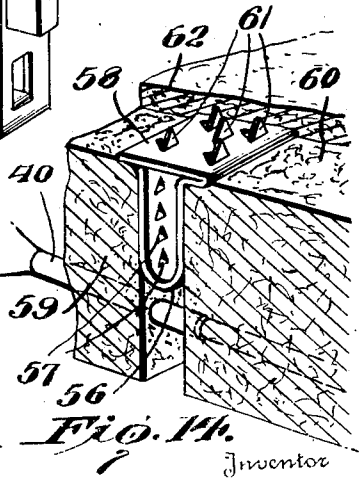
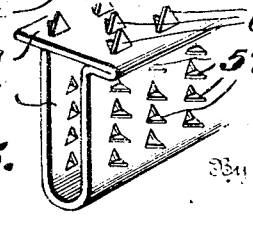


Fig. 15.



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EXPANSION JOINT

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Fig. 16.

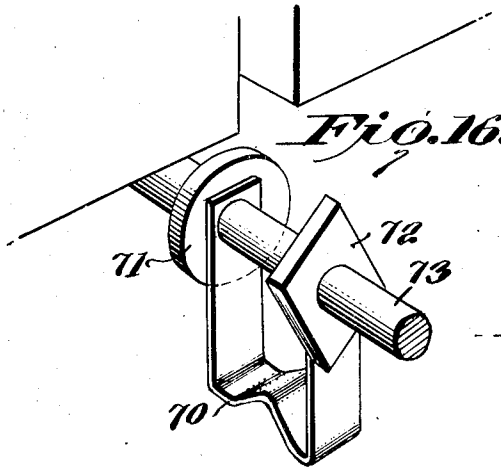


Fig. 17.

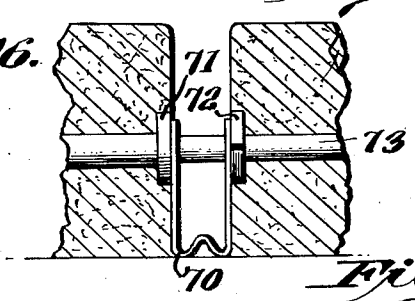


Fig. 18.

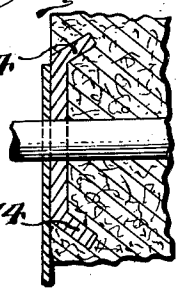


Fig. 19.

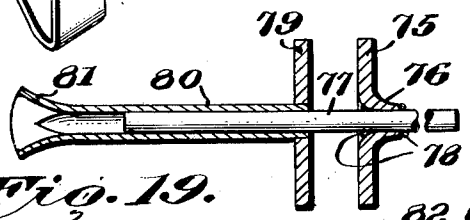


Fig. 20.

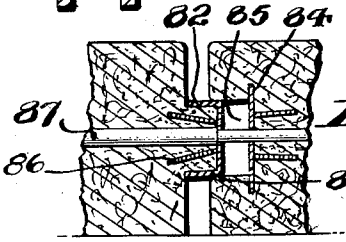


Fig. 24.

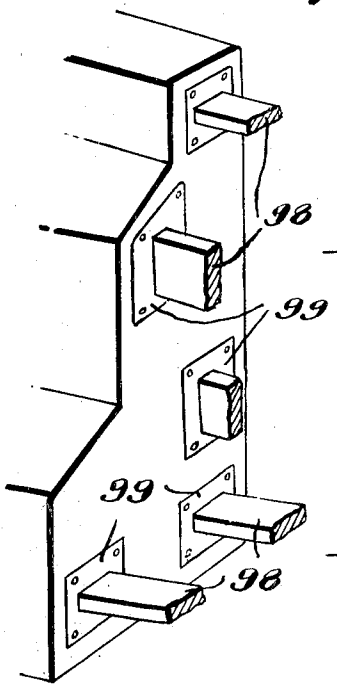


Fig. 21.

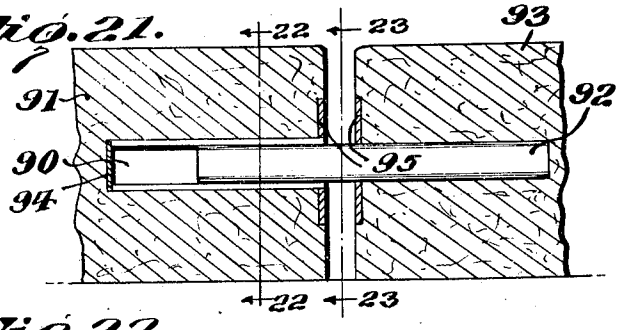


Fig. 22.

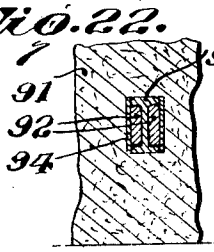
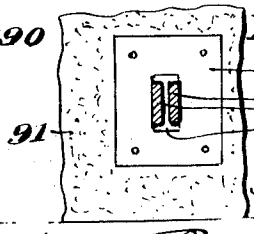


Fig. 23.



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Patented Dec. 19, 1944 2,365,550

UNITED STATES PATENT OFFICE

2,365,550

EXPANSION JOINT

John N. Heltzel, Warren, Ohio

Application January 24, 1934, Serial No. 708,155

32 Claims. (Cl. 94—18)

This invention is a continuation, in part, of my application Serial Number 507,492, filed January 8, 1931, now Patent No. 1,988,900, January 22, 1935, and relates to improvements in removable expansion joint forms and dowel rod installation.

A primary object of this invention is to provide a removable expansion joint plate or form for molding a space between abutting slabs of concrete together with means for forming a combination cushion and sealed joint in concrete roads, floors, roofs, walls and similar plastic structures.

Another object of this invention is to provide means in connection with removable expansion joints wherein the spalling or breaking away of the concrete around the dowel structure on the face of the concrete is prevented.

A further object of this invention is to provide means to prevent the curling of the road slabs.

A still further object of the invention is to provide an air-cushion joint between the concrete slab members.

Other objects and advantages will be apparent from the following specification, appended claims and annexed drawings,

In the drawings, in which like reference characters indicate like or corresponding parts throughout the several views.

Figure 1 is a fragmentary perspective view, with parts broken away and parts shown in section, of a concrete roadway showing the application and method of removal of expansion joint forms and adjacent parts constructed in accordance with my invention.

Figure 2 is a sectional view of a roadway showing my invention in relation thereto and just before the removal of the expansion joint form.

Figure 3 is a similar view taken after the removal of the form and sealing of the joint.

Figure 4 is a detail perspective view of a portion of a flexible sealing member.

Figure 5 is a detail perspective view of a portion of the bottom sealing member, one of the side sealing members being associated therewith.

Figure 5*a* is a sectional view of a pair of typical concrete slabs provided with dowel rods and illustrating the spalling or breaking away of the concrete around the dowel rods on the face of the slabs and which is eliminated by my invention.

Figure 6 is a perspective view of a slab of concrete positioned on a road bed and equipped with my invention, a modified form of dowel rod being illustrated.

Figure 7 is a sectional view of a pair of slabs provided with the dowel bar illustrated in Figure 6.

Figure 8 is a perspective view of one of the dowel bar guides.

Figure 9 is a detail perspective view showing a modified form of dowel rod guide.

Figure 10 is a perspective view of a pair of bar guides equipped with dowel bars and illustrating their relation to the removable joint form.

Figure 11 is a sectional view of the bar and guide illustrated in Figure 10, the same being shown in position in the concrete slabs.

Figure 12 is a detail perspective view in section of a pair of concrete slabs provided with a modified form of sealing member.

Figure 13 is a detail perspective view of the sealing member illustrated in Figure 12.

Figure 14 is a perspective view similar to Figure 12 but illustrating another modification of a sealing member.

Figure 15 is a detail perspective view of a portion of the sealing member shown in Figure 14.

Figure 16 is a perspective view showing a pair of the shear plates.

Figure 17 is a side elevation of the plates shown in Figure 16 illustrating the position of the same when embedded in the concrete slabs.

Figure 18 is a sectional view of a slightly modified form of one of the shear plates shown in Figure 17.

Figure 19 is a sectional view of another modification of a shear plate together with a form of dowel device.

Figure 20 is a sectional view of a tongue and groove construction formed in the slabs together with cooperating shear plates and dowel device.

Figure 21 is a sectional view of a modified form of dowel device.

Figures 22 and 23 are cross sectional views taken on the lines 22—22 and 23—23 of Figure 21 respectively.

Figure 24 is a perspective view showing the arrangement of dowel bars and shear plates when used in connection with wall structures.

Referring more particularly to Figures 1 and 2, 7 indicates a concrete roadway under construction in which is illustrated a section thereof comprising a pair of concrete slabs 8 and 9, between which is applied my improved form 10.

The form is made up generally of steel reinforcing plates 11 and 12 which are placed upon opposite sides of a pliable mat or filler 13, preferably of rubber. The reinforcing plates 11 and 12 are cut away or notched, as indicated at 14, exposing the rubber filler 13 and for admitting the dowel rods or bars 15. At the exposed portions of the rubber filler 13, the same is provided with slots 16 which terminate in upper openings for receiving the dowel rods 15, all of which is clearly illustrated and described in my pending application, Serial Number 507,492, of which this is a continuation-in-part.

The upper openings in the rubber filler 13 are made somewhat smaller than the diameter of

the dowel rods 15 to insure that the rubber filler will hug the dowel rods snugly. The dowel rods 15 (Figures 2 and 3) are secured within the concrete slabs 8 and 9, serving to reinforce and keep the slabs in alignment. Due to changing atmospheric conditions, the slabs expand and contract as the case may be. Should the ends of the dowel rods be firmly secured within the slabs, a buckling of the slabs would result when expansion took place with a consequent bending of the rods and a spalling or breaking away of the concrete around the dowel rods, on the face of the spaced slabs, would result, as shown in Figure 5*a*.

To overcome and eliminate this very undesirable condition, I provide the dowel rods with telescopic casings 17 having enclosed flared end portions 18, fully illustrated in Figure 2. It will be apparent that the concrete forming slab 8 only surrounds and rigidly holds the section 17 while the slab 9 secures within it the dowel rod 15, thus, any relative movement of the slabs permit the rods 15 to slide back or forward within the casing 17 without causing the rods to bend and spall or break away the concrete surrounding them. To facilitate the movement of the rods relative to the casing, a suitable lubricant 20 is placed within the flared portion 18 and is forced out around the enclosed portion of the rods when movement between the rods and casings takes place. Before the pouring of the concrete, the rods may be coated with a low melting point asphalt and are placed in proper position, aligned and held therein by supports as indicated at 21. These supports are adapted to be driven into the roadbed or held thereon in any suitable manner.

Between the concrete slabs 8 and 9, I provide an air space 21 which is formed by the upper, lower and side sealing members 22, 23 and 24, respectively. To comprehend the action and function of these members, it will be noted that the air space 21 is desirable in order to compensate for the expansion of the slabs relative to each other and at the same time provide an air cushion between the slabs. Under ordinary conditions, dirt and other foreign matter would accumulate within this space and serve to retard or prevent the expansion of the slabs in proper alignment, resulting in a buckling of the slabs as shown in Figure 5*a*. To prevent and overcome this condition, the lower sealing member 23 is removably attached to the lower portion of the form 10 before the form is placed in position. The form is then placed in position as indicated in Figure 1. The dowel rods are then passed through the dowel rod openings in the form, and the supports 21 attached thereto to position the same properly. The end or side sealing members 24 are now secured within the lower member 23 as indicated in Figure 5, and embrace the form 10.

The forms and other structure having been properly placed, the concrete is then poured in between a number of the forms and allowed to set a sufficient length of time to permit the removal of the forms. After the removal of the forms, it will be noted, the sealing members are retained by the slabs, the member 23 being provided with flanges 25 and the side member 24 provided with tongue portions 26 for anchoring them to the slabs. These members may consist of very light non-corrosive metal or the like and in the instance of the lower member 23, it is provided with a deformation 27 in its length constructed in a manner to offer the least resistance to the pressure of the slabs when they expand.

After the removal of the form 10 which exposes the space between the slabs for inspection and removal of any foreign matter, the upper sealing member 22, which is preferably constructed of spring material, is placed within the air space 21 near the upper surface of the slabs. The end portions 28, being so constructed that when inserted within the space, will embed themselves into the slabs of concrete, which is still sufficiently soft to seat them. After the concrete has hardened as shown in Figure 3, a suitable asphaltic or bituminous filler 29 is poured into the space above the member 22 to seal the joint against water or other foreign matter.

It will thus be understood from the foregoing, that by my invention, a roadway may be constructed, having joints in the form of enclosed air spaces for cushioning the adjacent slabs relative to each other to compensate for the expansion and contraction of the material, prevent buckling of the slabs and the resultant movement of the dowel rods therein without the usual breaking of the cement around them.

In the instances where it is desirable to construct wide roadways, particular reference being had to Figures 6, 7 and 8, I overcome the curling action of the slabs and the bending of the dowel rods by providing under beam members 30 and 31 in the slabs 30*a* and 30*b*, the sub-grade of the roadbed being excavated to form and receive them. It will be noted that the beam member 31 is provided with a longitudinal groove 31*b* at the bottom.

An opposite groove 31*c* for dividing the slabs 30*a* and 31*a* along their upper surfaces is also provided. These grooves function to induce a crack 31*e* to develop between grooves 31*c* and 31*b*. Suitable material 31*d* of an asphaltic or bituminous nature is used as a filler.

In order to prevent a lateral separation of slabs suitable tie rods 32 are provided. Sheer plates 33 are imbedded into the oppositely disposed faces of the slabs to prevent spalling or breaking away of the concrete around the dowel rods 15. The shear plates 33 project around and under the bottom as at 34 of the slabs and are secured thereto by anchoring means indicated at 35. The plates 33 are of a fairly heavy grade of material so that the shear resistance thereof will substantially equal that of the dowel rods 15.

Dowel bars 36, substantially rectangular in cross section to prevent bending, are provided and formed with openings 37 in one end for the reception of a lubricant 37*x*, the upper and lower walls of the openings being very thin. Sleeves 38*a* are positioned over the ends of the dowel bars so as to prevent the concrete from amalgamating thereto. The bars and sleeves operate in the same manner as described in the form shown in Figure 1. Shear plates 38, having anchoring portions 43 and 44 are embedded in the concrete and are provided with openings 39 formed therein for the reception of the dowel bars 36. Auxiliary dowel rods 36*a* together with sleeves (not shown, but which will be like sleeves 17 of Fig. 1) are provided for the end shear plates. Plates 40*a* having openings for the reception of the sleeves are secured to the adjacent slab as illustrated in Figure 7.

When the slabs expand or move together, the thin walls of the opening 37 in the dowel bars, will collapse in a manner to force the lubricant

around the dowel bars and thus permit free movement of the parts.

Figure 9 illustrates a modified form of shear plate formed of a flat plate or sheet of material 40 provided with an opening 41 for the reception of the dowel bar 42. A suitable anchoring pin 43a is secured thereto for retaining the plate in the concrete after removal of the form 10.

Figures 10 and 11 illustrate a further modification in which a pair of shear members 44 of flat material are bent to provide slotted upright portions 45. The portions 45 being provided with tongues 46 for anchoring the members within the slabs 47. The tongues may be bent at an angle to prevent the forcing out of the shear members. Holes alone may be incorporated to receive concrete therethrough and aid in anchoring the members. The dowel bar 48 and sleeve 49 operate within the slots in the upright portions 45 in substantially the same manner as the rods and sleeves described in reference to the form shown in Figure 1. The lubricant 49a being placed in the end of the sleeve and forced around the bar by the action thereof. Pins 44x passing through openings in the members 44 and into the ground hold them in proper position.

A modified form of upper sealing member is shown in Figures 12 and 13 in which the V-shaped longitudinal member 50 below the bituminous filler 29 is provided with depending legs 51 having slotted portions 52 adapted to fit over the dowel rods 53 and support the structure between the end faces of the slabs 54 and 55, the legs being welded to the member 50.

Another form of upper sealing member is illustrated in Figures 14 and 15 in which a substantially U-shaped section 56 of spring material is provided with projecting prongs 57 for anchoring the section to the walls of the slabs. One of the upper ends of the section 56 is bent at right angles to form a flat surface 58 which is adapted to cover the space between the end walls of the slabs 59 and 60 as shown in Figure 15. The flat surface 58 is also provided with projecting prongs 61 so that the asphaltic or like material 62 will be firmly anchored thereto.

In overcoming the curling action of the slabs, I provided shear plates so constructed (Figures 16 and 17) as to offer the greatest amount of bearing surface relative to the cement. These plates may be connected together by a strip 70 of light collapsible material welded or otherwise secured to the plates. The plates may be either circular, as indicated at 71, or square, as at 72, and arranged on the dowel rod 73 in a manner to present the greatest bearing surface to the concrete in a vertical plane. This arrangement greatly assists in preventing the spalling or breaking away of the concrete. Both upper and lower edges of the plates are sharply defined to prevent the formation of round corners by the concrete.

The bearing surfaces of the shear plates may be further increased, as shown in Figure 18, by bending the ends 74 at an angle. This construction tends to force the plates towards the slabs when under pressure.

In some instances, the plate 75 (see Fig. 19) may be drawn to form an opening in the projecting portion 76 and spot welded to the dowel rod 77 as at 78. The opposite plate 79 being secured on the sleeve 80 which is formed by a tube or pipe section flattened at its outer end to close the same.

The oppositely disposed faces of the slabs may be provided with a tongue and groove arrangement such as is shown in Figure 20. The tongue 82 being provided with a shear plate 83 cooperating with the plate 84 within the groove 85. The plate being anchored as at 86 in the concrete and provided with an opening for the reception of the dowel device 87. A modified form of dowel device is depicted in Figures 21, 22 and 23 in which an I-beam 90 is imbedded in the slab 91. A pair of bars 92 secured in the slab 93 are slidably positioned between the top and bottom flanges of the beam 90.

A strip of thin material 94, which may be wood, fibre or metal encloses the beams on both sides and at the end to prevent the entry of concrete during the pouring operation. Suitable shear plates 95, embedded in the slabs, secured to the I-beam and bars make up the assembly. This construction presents a very rigid assembly to prevent vertical movement of the slabs relative to each other.

In wall structures, the dowel bars 98 with cooperating shear plates 99 (Figure 24) are arranged to offer the greatest resistance to lateral thrust.

It will be apparent from the foregoing that various changes and modifications may be resorted to without departing from the spirit of the invention or scope of the appended claims.

Having thus described and set forth my invention, I claim:

1. In an expansion joint construction, concrete sections having juxtapositioned concrete faces, a plurality of spaced relatively thick shear plates of minor area as compared to said faces and having stress-receiving sides secured to said faces, and relatively slidable telescoping means fixedly carried by the respective sections and supported by said plates for maintaining said sections in alignment, said stress-receiving sides positioned in a manner to present their stress-receiving area for receiving the thrust imparted by the sections during a movement of said sections caused by atmospheric conditions.

2. In an expansion joint construction, concrete sections having juxtaposed faces in spaced relation, a tubular socket extending from the face of one section back into the interior thereof, said socket having anchor means at its inner end and having a laterally enlarged flat bearing portion over the face of said section, a dowel member extending from the face of the opposite section and being slidably engaged in the socket to transfer wheel loads from one section to another and permit free longitudinal movement of the sections due to expansion and contraction.

3. A dowel for expansion joints in concrete roads, consisting of elements imbedded in the spaced walls of concrete road slabs, said elements having anchor means extending into said slab for securing the elements in position, and a dowel member to slide freely into said elements, permitting the free movement of said slabs to and from each other due to expansion and contraction of the concrete, said elements to absorb the thrust of wheel loads and transferring said loads from one slab to the other through said dowel.

4. A joint construction for spaced concrete sections, comprising a series of substantially enlarged bearing members imbedded in the face of one of said sections, a series of substantially enlarged bearing members imbedded in the face of the opposite spaced section, said bearing members having anchor means to secure the members in the concrete dowel bars passing through said members and bearing within the members

to transfer wheel loads from one slab to another and preventing vertical displacement of one section in relation to the other but permitting longitudinal movement of the sections.

5. A joint for concrete slab construction comprising a reenforcing member for extending between adjacent slabs, and reenforcing means for embedding in the slabs on each side of the joint and having a pair of stress carrying arms for extending into the body of the associated slab above and below the member, the arms being adapted to transmit stresses between the member and slabs.

6. A reenforced joint for concrete slab construction comprising a reenforcing bar for extending between adjacent slabs, and reenforcing means operatively associated with the bar on each side of the joint, each means having stress-carrying devices adapted to extend into the body of the associated slab above and below the bar for transmitting stresses between the bar and slabs.

7. A reenforced joint for concrete slab construction comprising a reenforcing bar extending between adjacent slabs, and reenforcing means operatively associated with the bar on each side of the joint, each means having a pair of stress-carrying arms adapted to extend into the body of the associated slab above and below the bar for transmitting stresses between the bar and slabs and the arms of each pair being angularly inclined to the bar.

8. An integral reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a portion for encircling the bar and contacting therewith and arms extending from the portion for embedding in the associated slab and adapted to transmit stresses between the bar and slab.

9. An integral reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a flanged portion for encircling the bar and contacting therewith, and arms bent out of the plane of the flange for embedding in the associated slab and adapted to transmit stresses between the bar and slab.

10. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion adapted to fit the bar on one side of the joint and having arms extending from the portion and adapted for anchorage embedment in the associated slab, the arms being adapted to transmit stresses between the bar and slab.

11. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion for fitting and having a length not less than the length of the bar on one side of the joint, and arms extending from the portion for embedding in the slab and adapted to transmit stresses between the bar and slab.

12. A bridging member for concrete slab joint construction having a load carrying bar between adjoining slabs comprising a sleeve portion for fitting and having a length not less than the length of the bar on one side of the joint, and arms extending from the sleeve portion for embedding in the slab and adapted to transmit load between the bar and slab.

13. A reinforced self-supporting expansion joint structure for concrete roadways, comprising, in combination, an expansion joint having load transferring dowels extending through the same and to opposite sides thereof for embedment in adjacent concrete slabs, reinforcing members having a supporting engagement with the dowels adjacent the sides of the joint, each reinforcing member including reinforcing elements extending into the slabs above and below the dowel, the portions of said elements extending below the dowel including base portions adapted to support and brace the entire unit during the pouring of the concrete.

14. A joint for concrete slab construction comprising a reenforcing member for extending between adjacent slabs, and devices for embedding in the slabs on each side of the joint and having stress-carrying connection with the member, the devices being adapted to transmit stresses between the bar and slabs.

15. A joint for concrete slab construction comprising a reenforcing member for extending between adjacent slabs, and reenforcing means for embedding in the slabs on each side of the joint and having a pair of stress carrying arms for extending into the body of the associated slab above and below the member and the arms of each pair being angularly inclined to the member, the arms of each pair being adapted to transmit stresses between the member and slabs.

16. A joint for concrete slab construction comprising a reenforcing member extending between adjacent slabs, and reenforcing means for embedding in the slabs on each side of the joint and having a pair of stress carrying arms for extending into the body of the associated slab on opposite sides of the member and the arms of each pair flaring outwardly with respect to each other and being angularly inclined to the member, the arms being adapted to transmit stresses between the member and slabs.

17. A joint for concrete slab construction comprising an elongated reenforcing member for extending between adjacent slabs for transmitting the load therebetween, and a pair of arms on each side of the joint for extending into the slabs, the arms of each pair being located on opposite sides of the longitudinal axis of the member and having load transmitting connection with the member for transmitting the load between the member and slabs.

18. A joint for concrete slab construction comprising a reenforcing member for extending between adjacent slabs for transmitting the load therebetween, a flange portion encircling the member on each side of the joint for embedding in the face of the slabs, respectively, and devices adapted to be anchored in the slabs on each side of the joint, the devices having load transmitting connection with the member and adapted to transmit the load between the member and slabs and also being connected to the flange portions whereby the portions provide lateral support for the concrete in the funneling regions around the member.

19. A reenforced joint for concrete slab construction comprising a reenforcing bar for extending between adjacent slabs, and reenforcing means operatively associated with the bar on each side of the joint, each means having a pair of stress-carrying arms adapted to extend into the body of the associated slab above and below the bar for transmitting stresses between the bar and slabs and the arms of each pair flaring outwardly with respect to each other.

20. An integral reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a

flanged portion for encircling the bar and contacting therewith, the flange being adapted for embedding substantially in the joint face of the associated slab, and arms extending from the flange and adapted for anchorage embedment in the associated slab, the flange being adapted to provide lateral support for the concrete in the funneling region around the bar and the arms being adapted to transmit stresses between the bar and the associated slab.

21. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion adapted to fit the bar on one side of the joint, a flange portion encircling the sleeve and adapted to be embedded in a joint face of the associated slab, and stress-carrying arms adapted to be embedded in the slab, the arms being adapted to transmit stresses between the bar and slab and also being connected to the flange portion to provide lateral support for the concrete in the funneling region around the bar.

22. In highway construction wherein adjacent slab sections support the moving wheel load and where the load of the initially loaded slab is progressively applied to the next adjacent slab, a structural member spanning the joint between the slabs and having its ends entered into the opposing faces of the slabs, rigid supporting members standing in aligned relation and embedded within the respective slabs and having their opposed ends exposed through the faces of the slabs on opposite sides of the joint, said supporting members having the ends of the structural member entered thereinto and the assembly permitting slippage of the structural member during the advance and recession of the slabs while maintaining the parts in alignment, anchoring means associated with each of the supporting members and embedded within the slab and serving in conjunction with the associated supporting members to reenforce the face of the slab and the region contiguous thereto, and serving to prevent lateral displacement of the structural member and channeling of the slab in proximity thereto, the anchoring means and the supporting means absorbing the wheel loads applied to the initially loaded slab and imparting the same to the structural member and across the joint to the supporting and anchoring means in the next adjacent slab.

23. In a device of the kind described the combination of a dowel having an element extending respectively into the areas of compression and tension of a slab and thereby providing means for absorbing and distributing load applied to the slab and further transmitting said load to the end of the element adjacent the face of the slab.

24. In a device of the kind described the combination of means for receiving a dowel bar, and an element formed thereon extending from said means and respectively adapted to extend into the regions of compression and tension within a slab and thereby providing means for absorbing and distributing load within the slab.

25. In a device of the kind described the combination of a dowel, an element for receiving said dowel and a support for said combined dowel and element, said element having means respectively extending into the regions of both compression and tension of a slab and providing additional means for absorbing and distributing load applied to the slab at points adjacent to said element.

26. A reenforced joint for concrete slab construction comprising a reenforcing bar for extending between adjacent slabs, and reenforcing means operatively associated with the bar on each side of the joint and having a pair of stress-carrying arms adapted to extend into the body of the associated slab above and below and substantially in the same vertical plane as the bar for transmitting stresses between the bar and slabs.

27. A reenforced joint for concrete slab construction comprising a reenforcing bar for extending between adjacent slabs, and reenforcing means operatively associated with the bar on each side of the joint and having a pair of stress-carrying arms adapted to extend into the body of the associated slab above and below the bar for transmitting stresses between the bar and slabs, the arms being shaped to provide anchorage in the concrete for resisting endwise movement toward the adjacent slab face.

28. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion for fitting and having a length not less than the length of the bar on one side of the joint, and a pair of arms extending from the portion in substantially the same plane for embedding in the slab and adapter to transmit stresses between the bar and slab.

29. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion for fitting and having a length not less than the length of the bar on one side of the joint, and arms extending from the portion for embedding in the slab and adapted to transmit stresses between the bar and slab, the ends of the arms being shaped to provide anchorage therefor in the concrete.

30. A reenforcing member for concrete slab joint construction having a reenforcing bar between adjoining slabs comprising a sleeve portion for fitting and having a length not less than the length of the bar on one side of the joint, and a pair of spaced arms extending from the portion for embedding in the slab to transmit stresses between the bar and slab, the arms being symmetrically disposed on opposite sides of the longitudinal axis of the portion.

31. Means for bridging a joint in concrete slab construction comprising a load carrying bar for extending between adjacent slabs and reenforcing means operatively associated with the bar on each side of the joint and having a pair of load carrying arms adapted to extend into the body of the associated slab above and below and substantially in the same vertical plane as the bar for transmitting loads between the bar and slabs.

32. A reinforced joint for concrete road slabs comprising in combination with an expansion joint structure extending vertically throughout the depth of the adjacent slabs and adapted to rest on the sub-grade, a reinforcing dowel extending between said adjacent slabs and through the said expansion joint structure, and reinforcing members having a supporting connection with the dowel on each side of the joint and including reinforcing elements extending from the sides of the joint into the slabs above and below the dowel and away from the joint and also including base portions adapted also to rest on the subgrade to support the entire unit during the pouring of the concrete or equivalent plastic.

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