Dec. 7, 1937. C. OLDER 2,101,154

EXPANSION JOINT FOR PAVEMENTS AND THE LIKE

Original Filed Aug. 8, 1931 2 Sheets-Sheet 1

Fig. 1.

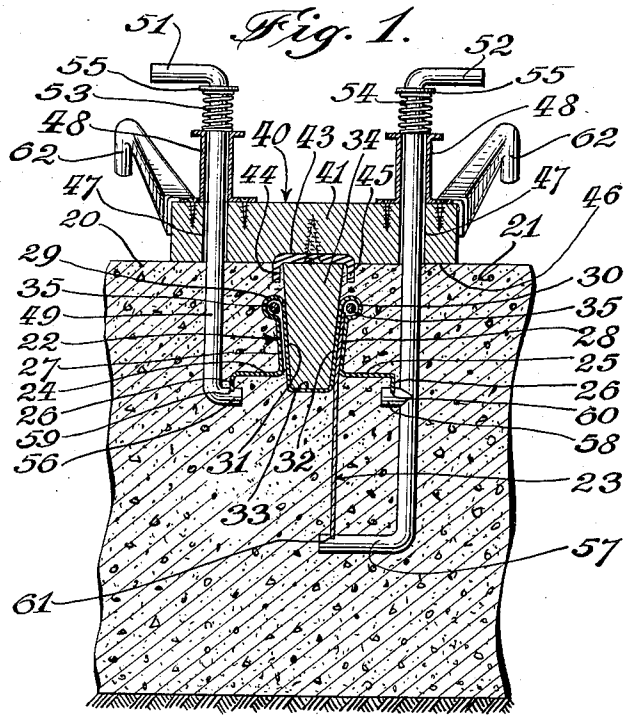


Fig. 2.

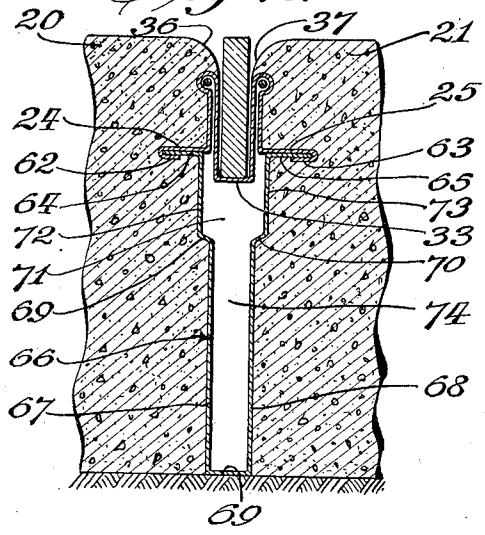
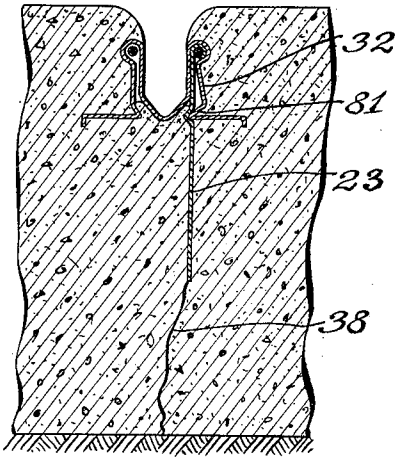


Fig. 3.



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Fig. 4.

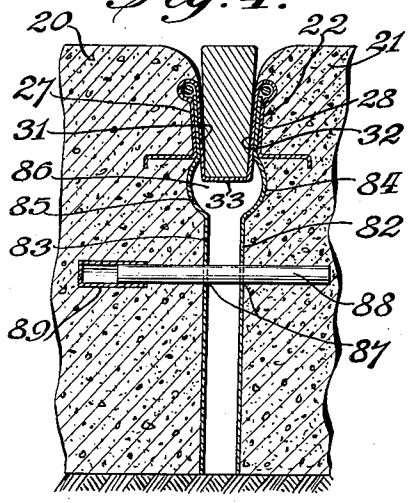


Fig. 5.

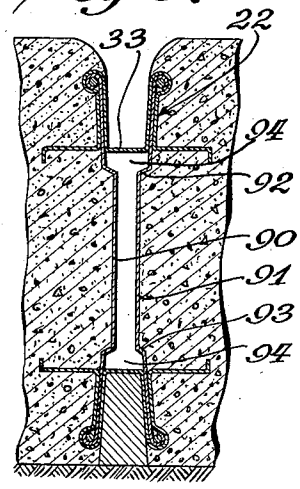


Fig. 6.

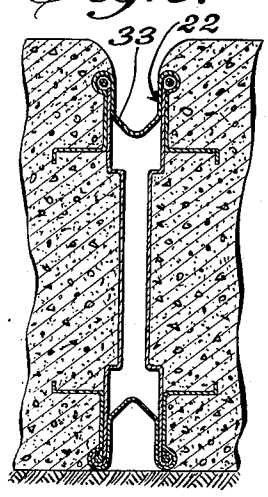


Fig. 7.

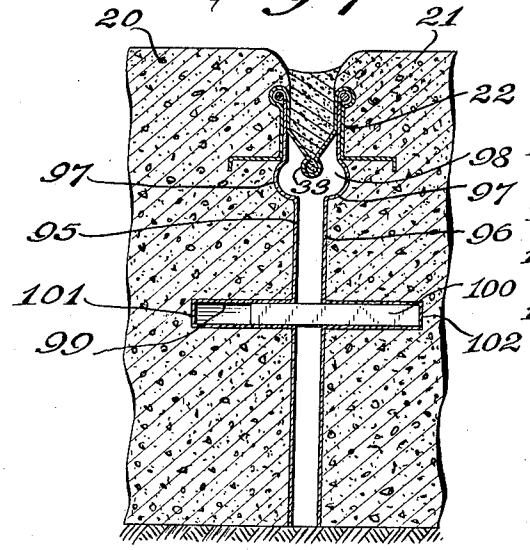
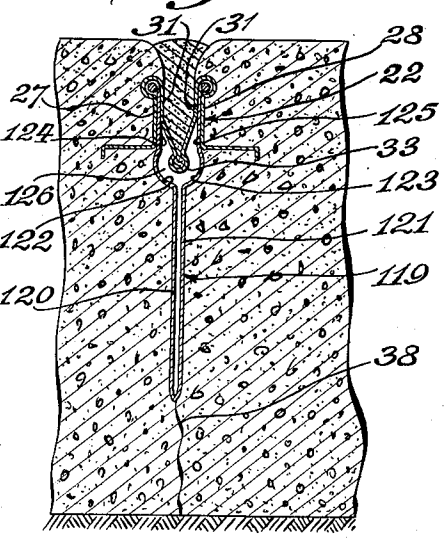


Fig. 8.



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UNITED STATES PATENT OFFICE

2,101,154

EXPANSION JOINT FOR PAVEMENTS AND THE LIKE

Clifford Older, Wilmette, Ill.

Original application August 8, 1931, Serial No. 555,949. Divided and this application May 6, 1933, Serial No. 669,632

12 Claims. (Cl. 94—18)

The present invention relates to expansion joints for pavement and the like and is particularly concerned with expansion joints for concrete roads and the like.

The present application is a division of my prior application, Serial No. 555,949, filed August 8, 1931, for Expansion joints for pavement and the like, and the present application relates to modifications not covered by said parent application.

The concrete pavements of the prior art are ordinarily constructed in a plurality of sections with cracks between the sections and with substantially larger expansion cracks located at regular intervals for the purpose of permitting the longitudinal expansion of the pavement under changes of temperature of the pavement. Expansion joints of this type may be installed to permit initial expansion or contraction depending upon the result desired.

When the separate sections of the pavement expand, there is a gradual sliding of the sections toward the expansion crack or joint, but when the sections subsequently contract, they do not tend to return to their former position. This results in the disappearance of the relatively wide expansion crack, and the space utilized by the wide expansion crack is soon divided into a plurality of cracks formed between adjacent sections of the pavement and it is practically impossible to prevent this action of the pavement sections in closing up the expansion joints.

The open expansion joints and cracks between adjacent sections soon become filled with dust, soil and sand particles and as this material is generally incompressible it follows that when expansion again takes place, the joints cannot close between the adjacent sections and the whole series of sections is pushed still further toward the expansion joint, until eventually all of the joints, including the expansion joint, have become filled with hard packed unyielding material. The purpose of the expansion joint is then defeated and further expansion of the concrete sets up compression stresses as great as there would be in case no expansion joint had been provided in the first place.

Another difficulty encountered in providing expansion joints lies in the fact that the continuous expansion and contraction of the concrete permits the sand, soil and other material to get in between the sections of concrete and the folds of the expansible metal joint. As the space between the concrete sections around the expansible metal becomes filled with hard packed material, the expansible fold itself becomes compressed between the sections of concrete and hard packed material in the crack with the result that the easy curve, preferably provided between the folds of the expansible joint, becomes pressed to a sharp edge, thereby causing the expansible metal strip to crack along the sharp edge between the sections of concrete. Unless provision is made for taking care of this tendency the fold in the expansible metal strip ultimately takes the form of a sharp bend, the metal then becomes pinched or creased and cracked and the purpose of the expansible joint is defeated.

One of the objects of the present invention is the elimination of the foregoing difficulties by the provision of an improved expansion joint of relatively simple and economical construction which is adapted to permit relative movement between adjacent sections of the pavement and to prevent the filling of the cracks between the sections with dirt or other foreign material.

Another object of the invention is the provision of a plurality of improved and simplified forms of expansion joints adapted to positively prevent the formation of a sharp bend, fold or crease, and to prevent the pinching of the sheet metal of the joint by the foreign material filling the crack, so that the expansible metal joint will not be cracked or broken after a long period of service.

Another object of the invention is the provision of a plurality of forms of metal expansion joints for pavement, or the like, which are not only adapted to secure the adjacent movable sections of concrete together, but are also adapted to act as a division plate for producing a crack at a predetermined point in the pavement.

Another object of the invention is the provision of a plurality of improved forms of expansion strips, the folds of which are provided with cylindrical portions having a filling which positively precludes the folds from being forced into a sharp bend or crease, thereby preventing the cracking of the strips at this point.

Another object of the invention is the provision of an expansion strip adapted to be used with my improved division plates or with any of the modern parting plates.

Another object of the invention is the provision of an expansion strip and parting plate assembly peculiarly adapted to take care of initial expansion without any possibility of the main fold of the expansion strip being squeezed into a crack by the adjacent sections of concrete.

Other objects and advantages of the invention will be apparent from the following description

and from the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are two sheets;

Fig. 1 is a fragmentary sectional view of a pavement showing one form of expansion joint with a template for installing the parting strip and expansion joint, and showing the strip after its installation but before the removal of the template.

Fig. 2 is a similar view of a modification with a different type of expansion member and a different type of parting strip.

Fig. 3 is a similar view of another modification having another form of parting strip.

Fig. 4 is a similar view of another modification.

Fig. 5 is a similar view of another modification.

Fig. 6 is a similar view of another modification.

Fig. 7 is a similar view of another modification.

Fig. 8 is a similar view of another modification.

Referring to Fig. 1, the concrete sections 20, 21 are shown in connection with an expansion strip indicated in its entirety by the numeral 22 and a parting strip 23. The expansion strip 22 may be used with or without parting strips and it is adapted to be used with any of a multiplicity of different types of parting strips, some of the most important of which are illustrated.

The expansion strip 22 is preferably formed with a pair of inwardly extending flanges 24, 25, having downwardly or upwardly bent ends 26 forming anchoring formations secured in the concrete sections 20, 21. The flanges 24 and 25 are joined to upwardly extending flanges 27, 28 which terminate in substantially cylindrical beads 29, 30.

The beads 29 and 30 constitute auxiliary folds in the expansion strip 22 but the main fold of the expansion strip is provided by the downwardly extending flanges 31, 32 which are joined by the central portion 33 of the strip and the central portion 33 extends preferably below the wings 24, 25 to prevent the pinching of this fold by the adjacent parts of the sections of concrete 20 and 21. The flanges 31 and 32 of Fig. 1 diverge slightly to form a wedge shaped opening capable of receiving a removable steel bar 34, or a semi plastic bitumen filler which may be left in place, if desired.

The circular folds 29 and 30 are preferably filled with metal wires 35 so as to positively preclude these folds from being compressed into a sharp crease which would result in the cracking of the fold and these folds are preferably anchored in the concrete as shown in Fig. 1. It will be noted that the concrete has been rounded off at 36 on each section 20, 21 and the flanges 31 and 32 may serve as guides in the edging operation or the metal bar 34 may be used as a guide. It will be noted, however, that the concrete extends downward at the point 37 inside of each of the beads 29, 30 and, under ordinary conditions, the beads 29, 30 should remain anchored in the concrete and the principal bending should take place at the lower portion 33 of the strip 22.

Under some conditions, however, the beads 29 and 30 may be pulled out of the adjacent sections of concrete but, in any event, it will be practically impossible for the dirt, sand and other compressible material which gathers about the joint, to compress these beads into a sharp crease. One of the principal defects of the expansion strips of the prior art was the inability of such strips to prevent this creasing or cracking action.

The parting strip 23 may consist of a plane metal strip which is resiliently clamped between the flanges 28 and 32 or flanges 27 and 31, and adapted to insure the location of the crack 38 at the expansion joint. The expansion strip and parting strip are shown in Fig. 1 during the course of their installation in the green concrete.

The expansion strip is supported upon a template which may be indicated in its entirety by the numeral 40 and which consists preferably of a flexible body 41 of metal or lumber which may be provided with a metal bar 42 fixedly secured to its lower side for telescopically engaging the flanges 31, 32 or with a channeled metal member 43 having flanges 44, 45 for engaging the sides of the tapered bar 42 when a loose bar or filler is used.

The body 41 of the template 40 is sufficiently flexible to conform to the actual crown of the concrete rather than the theoretical curve desired and the lower flat surface 46 of the template acts as a gauge surface for locating the expansion strip 22 at a predetermined depth below the surface of the concrete when the surface 46 engages the top of the concrete. The template body 41 is provided with bores 47 and with metal guides 48 for slidably receiving the rods 49 and 50.

Each rod is preferably provided with a laterally bent upper end 51, 52 forming a handle and the rods are urged upward by helical compression springs 53, 54 which are compressed between the upper ends of the guides 48 and the washers 55. The lower ends of the rods or plungers 49, 50 are provided with a plurality of laterally extending portions 56, 57, 58 adapted to engage parts of the expansion strip 22 to hold it against the template. The groove 59 in the end 56 engages the anchoring formation 46 on flange 24. Groove 60 in laterally extending portion 48 engages the other anchoring portion 56 of flange 25. Groove 61 on the laterally bent end 57 engages the lower edge of the parting plate 23. The expansion strip assembly is secured to the template by locating it in a position shown in Fig. 2 with respect to template 40 and then pushing the plungers 49 and 50 downward beyond the flanges and parting plate 23 and rotating the plungers 49 and 50 until the grooves engage the extending edges of the expansion strip and parting plate. The template preferably has a pair of handles 62 at each end or it may be supported from a stirrup by cables leading to its half and quarter points.

The expansion joints described herein which merely consist of an upper unit and a parting strip may be installed by the use of such a template by forcing the parting strip and the expansion strip down into the wet and green concrete just after the surface of the concrete has been finished. The engagement between the lower flat surface 46 on the template and the upper flat surface of the concrete determines the final position of the parting plate and expansion strip. The plungers 49 and 50 are thus pushed downward and rotated to release the parting plate and expansion strip and the template is removed.

In some cases, the bar 42 is removed with the template but in other cases, it may be left and used as a guide in finishing the adjacent edges 36. The holes left by the plungers are, of course, filled up by smoothing the adjacent surface with a trowel or other tool.

Referring to Fig. 2, this is a modified form of construction in which the flanges 24 and 25 are

provided with backwardly bent portions 62 and 63 spaced sufficiently from the flanges 24 and 25 to receive the flanges 64 and 65. The expansion joint of Fig. 2 is adapted to permit initial expansion of the concrete sections and is, therefore, provided with a special parting plate which may be indicated in its entirety by the numeral 66. The parting plate 66 comprises two parallel flanges 67 and 68 joined by a yoke 69 which may be located at the lower surface of the concrete.

The parallel flanges 67, 68 are provided with outwardly extending offset portions 69, 70 forming an enlarged space 71 between the flanges 72, 73. The flanges 72, 73 support the laterally extending flanges 64 and 65 which are adapted to be received in between flanges 24, 62 and 25, 63. The parting plate unit 66 may thus be sprung together until its feet 64, 65 are engaged in the grooves formed by flanges 24, 62 and 25, 63. This expansion joint assembly provides a space 74 between the adjacent sections 20, 21 of concrete so that the concrete does not fill the space 74. The enlarged space 71 is adapted to prevent the adjacent flanges 72, 73, engaging the main fold 33 of the expansion strip when such initial expansion takes place. The adjacent ends of the concrete sections cannot, therefore, force the fold 33 into a sharp crease and the cracking of this fold is thus prevented.

Referring to Fig. 3, this is another modification in which the flange 32 is provided with a rib 81 for the purpose of more firmly engaging the parting plate 23. If desired, the parting plate 23 may be formed with a complementary grooved or stamped formation for receiving the rib 81.

Referring to Fig. 4, this modification of the same type of expansion strip 22 may be used with a pair of separate division plates 82, 83. Division plates 82, 83 are preferably formed with grooves or depressions 84, 85 adjacent the main fold 33 and the division plates 82, 83 are supported in spaced relation and parallel to each other by the respective flanges 28, 32 and 27, 31. The enlarged space 86 adjacent the main fold 33 positively prevents the division plates 82, 83 from engaging and pinching the main fold 33. The division plates 82, 83 are provided with apertures 87 for receiving dowel pins 88 which may be provided with metal caps 89 located in one of the concrete sections 20, 21 so as to make provision for the telescopic engagement of the dowel pins 88 in one of the sections of concrete.

This expansion joint provides for the initial expansion of the sections of concrete and permits expansion and contraction of the joint for long periods of time without any possibility of the folds being bent into sharp creases or cracks.

Referring to Fig. 5, this is another modification in which expansion strips 22 are used at the top and bottom of the concrete. The parting plates 90, 91 are provided with offsets at 92, 93 forming enlarged spaces at 94 adjacent the main folds 33. The extent of expansion permitted is equal to the space between the main portions of the division plates 90, 91 which may cause the fold 33 to bulge downward but the fold 33 can never be pinched between adjacent sections of concrete.

Fig. 6 is another modification in which the same type of division plates may be utilized but the shape of the main fold 33 of the expansion strip 22 has been made of substantially V-shape instead of U-shape as previously described.

Referring to Fig. 7, this is another modification in which the main fold 33 of the expansion strip 22 takes the form of a substantially cylindrical bead. The division plates 95, 96 are provided with curved grooves 97 forming an enlarged space 98 adjacent the main fold 33. The division plates 95, 96 are formed with longitudinally extending grooves 99 for receiving a dowel plate 100. The dowel plate 100 is of less width than the space between the ends 101, 102 of the grooves 99 so as to leave space for the initial expansion of the concrete sections 20, 21 and the dowel plate 100 is adapted to maintain the sections 20, 21 in substantial alignment.

Referring to Fig. 8, this is an expansion joint having a similar expansion strip 22 but the parting plate 119 comprises a pair of parallel flanges 120, 121 bent back against each other and having the outwardly bent portions 122, 123 to bring the upper flanges 124, 125 into position to be engaged between flanges 27, 31 and flanges 28, 32. The offset portions 122, 123 form an enlarged space 126 around the main fold 33. The main body of the parting strip 119 need not be as wide as the depth of the concrete since the crack 38 will result from the weakening of the concrete at this point.

Each of the various modifications of my expansion joint have particular advantages resulting from the specific arrangement and construction of the parts, and the different modifications may be used for different type of installations for meeting various conditions.

It will thus be observed that I have invented a plurality of improved forms of expansion strips, parting strips and expansion joint assemblies, in which provision has been made for initial expansion, initial contraction, or both. The present expansion strips are peculiarly adapted to eliminate the tendency of the strips of the prior art to cause sharp folds or creases between the flanges of the expansion strips after the adjacent spaces have been filled with dirt, sand or other sharp, solid and incompressible material.

While I have illustrated and described a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a concrete road joint forming member, the combination of an expansion strip having a main fold with a pair of substantially parallel flanges, an auxiliary flange engaging each of said parallel flanges, anchoring flanges carried by said auxiliary flanges, a parting strip clamped between one of said parallel flanges and said auxiliary flanges, substantially cylindrical formations joining each of said auxiliary flanges to one of said parallel flanges, a template for supporting said strips, means carried by the template for engaging between said parallel flanges and means for holding said parting strip against said template.

2. A template for installing expansion joints and parting strips comprising a flexible member adapted to conform to the surface of the concrete, said flexible member having handles at each end, an elongated strip complementary in shape to the expansion strip for engaging the expansion strip, detachable fastening devices carried by said template for engaging the anchoring wings of an expansion strip, one of said de-

tachable fastening devices supporting a parting strip while the expansion strip and parting strip are forced into the green concrete.

3. In a concrete road joint forming member the combination of an expansion strip having an intermediate expansible portion terminating in beads at the top, said beads having downwardly extending flanges with anchoring wings and said expansible portion extending below said anchoring wings to prevent pinching of the fold, and a pair of parting plates, said parting plates being secured between said expansible portion and said downwardly extending flanges and said parting plates having oppositely extending ridges forming an enlarged chamber about the lower part of said expansible portion, and a similar expansible member carried by the lower end of said parting strips and having anchoring flanges anchored in the adjacent section of concrete.

4. In a concrete road joint forming member the combination of an expansion strip having an intermediate expansible portion terminating in beads at the top, said beads having downwardly extending flanges with anchoring wings and said expansible portion extending below said anchoring wings to prevent pinching of the fold, and a pair of parting plates, said parting plates being secured between said expansible portion and said downwardly extending flanges and said parting plates having oppositely extending ridges forming an enlarged chamber about the lower part of said expansible portion, said expansible portion having a bead formed at its lowermost point to prevent cracking of the metal, and said parting strips having oppositely located slots and a dowel plate slidably mounted in one of said slots and located in the other of said slots to maintain the concrete sections in alignment.

5. In a concrete road joint forming member the combination of an expansion strip having an intermediate expansible portion terminating in beads at the top, said beads having downwardly extending flanges with anchoring wings and said expansible portion extending below said anchoring wings to prevent pinching of the fold, and a pair of parting plates, said parting plates being secured between said expansible portion and said downwardly extending flanges and said parting plates having oppositely extending ridges forming an enlarged chamber about the lower part of said expansible portion, said expansible portion having a bead formed at its lowermost point to prevent cracking of the metal, said parting strips being integrally joined together at their lower edge and terminating at a point spaced from the lower surface of the concrete.

6. In a load transmitting mechanism for a concrete road joint, the combination of a pair of sections of concrete arranged with adjacent edges and a crack formed between said edges, a dowel plate comprising a metal member adapted to be slidably mounted in one of said concrete sections, said dowel plate extending longitudinally of the crack and having its surfaces substantially parallel to the plane of the road, the plate being located between the upper and lower surfaces of the concrete sections, said dowel plate having a shield on each edge thereof, each shield comprising a pair of parallel flanges of sheet metal slidably engaging said dowel plate, and each of said parallel flanges having at its edge a vertically extending flange to permit sliding movement between concrete sections and said dowel plate.

7. In a load transmitting mechanism for a concrete road joint, the combination of a pair of sections of concrete arranged with adjacent edges and a crack formed between said edges, a dowel plate comprising a metal member adapted to be slidably mounted in one of said concrete sections, said dowel plate extending longitudinally of the crack and having its surfaces substantially parallel to the plane of the road, the plate being located between the upper and lower surfaces of the concrete sections, said dowel plate having a shield on each edge thereof, each shield comprising a pair of parallel flanges of sheet metal slidably engaging said dowel plate, and each of said parallel flanges having at its edge a vertically extending flange to permit sliding movement between concrete sections and said dowel plate, there being a space at one of the edges of the dowel plate between said dowel plate and a shield whereby expansion is permitted as well as contraction.

8. In a concrete joint forming member, the combination of an air core comprising a base, a pair of upwardly projecting spaced walls carried by said base, said upwardly projecting walls having laterally projecting supporting flanges at their upper edges, and a flexible seal, said flexible seal having anchoring flanges and extending parallel to said supporting flanges and having securing flanges extending over and under said supporting flanges, and said seal having a pair of upwardly projecting walls formed with beads at the top and a pair of downwardly projecting walls forming a medial expansible portion.

9. In a concrete joint forming mechanism, the combination of a parting plate made of a sheet metal strip which is bent back upon itself and provided with a pair of substantially parallel flanges located at the juncture between two concrete sections, said parallel flanges being outwardly bowed at the top and spaced from each other, and a flexible seal comprising an intermediate flexible portion, a pair of anchoring flanges, and arranged with adjacent walls for receiving the spaced flanges of said parting plate whereby the parting plate and seal are joined together.

10. In a concrete road joint forming member, an expansible member comprising a pair of anchoring flanges adapted to be imbedded in adjacent sections of concrete, each of said flanges having an upwardly extending flange carried thereby, a substantially cylindrical bead at the upper edges of each of said upwardly extending flanges and a main expansible portion joining said beads, and means for supporting said expansible member comprising a pair of upwardly extending spaced walls having their upper edges secured to said anchoring flanges.

11. In a concrete road joint forming member, an expansible member comprising a pair of anchoring flanges adapted to be imbedded in adjacent sections of concrete, each of said flanges having an upwardly extending flange carried thereby, a substantially cylindrical bead at the upper edges of each of said upwardly extending flanges and a main expansible portion joining said beads, and means for supporting said expansible member comprising a pair of upwardly extending spaced walls having their upper edges secured to said anchoring flanges, said anchoring flanges being clamped over the edges of parts of said walls.

12. In a concrete road joint forming member, an expansible member comprising a pair of anchoring flanges adapted to be embedded in ad-

jacent sections of concrete, each of said flanges having an upwardly extending flange carried thereby, a substantially cylindrical bead at the upper edges of each of said upwardly extending flanges and a main expansible portion joining said beads, and means for supporting said expansible members comprising a pair of upwardly extending spaced walls having their upper edges secured to said anchoring flanges, said anchoring flanges being clamped over the edges of parts of said walls, said main expansible portion extending below said anchoring flanges, and said spaced walls being formed with offset portions spacing the walls from said main expansible portion.

CLIFFORD OLDER.