

June 4, 1968

M. BERMAN

3,386,352

EXPANSION-CONTRACTION JOINT

Filed Sept. 29, 1965

FIG. 1a

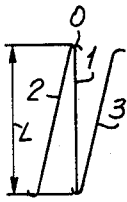


FIG. 1c

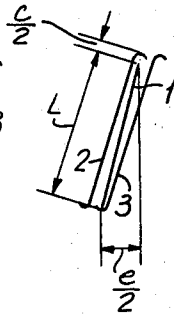


FIG. 1e

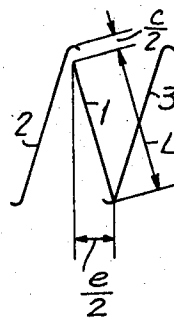


FIG. 1d

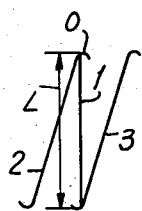


FIG. 1f

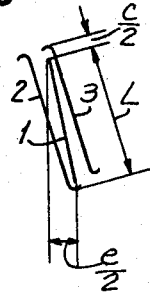


FIG. 1b

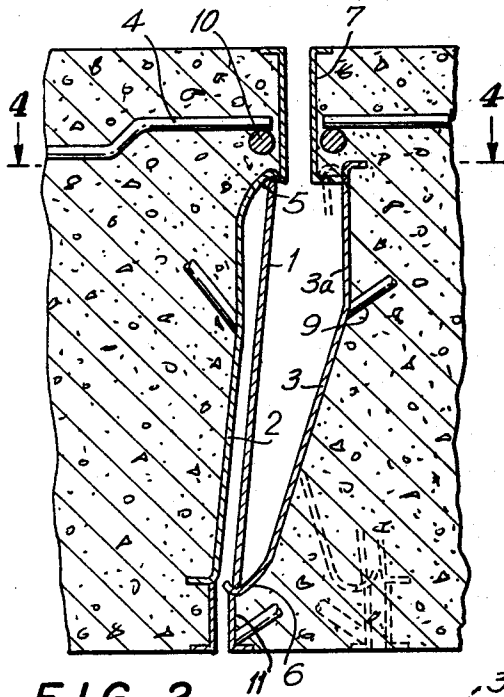
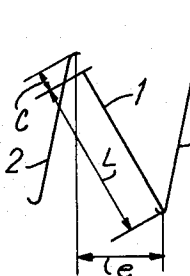


FIG. 2

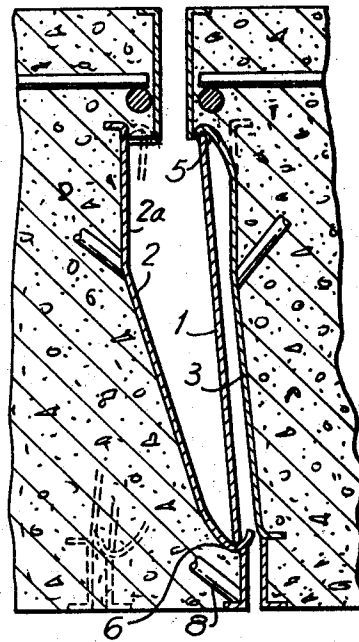


FIG. 3

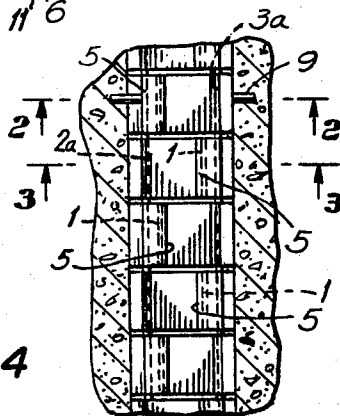


FIG. 4

INVENTOR.
MORRIS BERMAN

1

3,386,352
EXPANSION-CONTRACTION JOINT
Morris Berman, P.O. Box 115,
New York, N.Y. 10001
Filed Sept. 29, 1965, Ser. No. 491,099
1 Claim. (Cl. 94-18)

ABSTRACT OF THE DISCLOSURE

A load transfer mechanism of an expansion-contraction joint between adjacent slab ends of a roadway having struts seated in the two slab ends for transmitting the load between said slab ends wherein the struts are sloped in one direction initially and on further opening of the joint, first assume a vertical position followed by a slope in the opposite direction.

In my Patent 3,094,908 I disclose the construction of a roadway expansion-contraction joint wherein said joint includes two sets of struts along the joint length, one set for transferring load from one end of the adjacent slab to the other and the second set for transferring load from the other of the slab ends to the first slab end, the struts of the two sets and seating means therefor alternating along the joint length, said seating means transferring loads to the struts, each set of the struts sloping to one side of the vertical only through the full expansion or contraction range. If initially the tops of the struts are in a vertical position and in contact with the top seat the opening or closing of the joint will result in a clearance between the struts and top seats, said clearance being the difference between the strut length and the hypotenuse of a right triangle having the strut length and horizontal joint motion as sides. The top seat cannot transmit load until it is in contact with the strut after the slab has deflected vertically under the load. When this deflection exceeds the order of 0.02-inch the slab may crack due to excessive deflection. It is the object of this invention to reduce said clearance and deflection by half, through positioning the struts so as to slope in an angular direction initially, struts becoming vertical on partial joint opening, then sloping in the opposite direction on further joint opening, whereby the maximum clearance will be half the clearance described for the issued patent.

To permit such changes in strut slope the construction of the load transfer elements is modified from that of the patent issued as further described.

In the drawings,

FIGURES 1a and 1b show the clearance between the strut and top seat initially and upon joint opening respectively for the issued patent.

FIGURES 1c, 1d and 1e show the initial, midway and final clearances respectively between a strut and top seat for this invention. FIGURE 1f shows the initial slope and clearance corresponding to FIGURE 1c for this invention, but where the top seat is anchored to the right slab end of the joint as shown in FIGURE 3.

FIGURE 2 is a section of the joint wherein the seat or shoulder for the strut at the left side of the joint is at the top and the right shoulder is at the bottom.

FIGURE 3 is a section of the joint wherein the left shoulder is at the bottom and the right shoulder is at the top. FIGURE 4 is a sectional plan 4-4 taken on FIGURE 2 showing several adjoining joint length segments as shown in FIGURE 2 alternating with such segments as shown in FIGURE 3. Section 2-2 on said FIGURE 4 represents the construction of FIGURE 2, and section 3-3 represents the construction of FIGURE 3 for the adjoining length segment.

In FIGURE 1a, representing the construction of my

2

issued patent diagrammatically but not in detail, there is no clearance between the strut and top shoulder initially, said clearance c being shown in FIGURE 1b after joint separation e .

In FIGURES 1c, 1d and 1e the clearances $c/2$, zero and $c/2$ are shown for the initial position, midway and final joint openings respectively, and it will be noted that at no time is the clearance greater than $c/2$ instead of c as for the issued patent for the same total joint separation e . Thus the clearance is cut in half by this invention.

For the case of an adjoining length segment shown in FIGURE 1f, which corresponds to the construction of FIGURE 3, the strut slopes initially to the left, with a horizontal distance of $e/2$ between the top and bottom of the strut. The length of the strut is shown as L in FIGURES 1.

In FIGURE 2 strut plate 1 is shown between top seat shoulders 5 and bottom shoulders 6, the strut resting upon shoulder 6 by the force of gravity when the slab is unloaded, leaving a clearance $c/2$ between the top of the strut and top shoulder. The side plates 2 and 3 are anchored to the concrete by recessing into the concrete, by bond between the plates and the concrete and by anchors 9 into the concrete if desired, as well as by bending tops of plates for anchoring.

The preferred construction of side plates 2 and 3 is shown in FIGURES 2 and 3, wherein a substantially vertical portion at 2a and 3a are provided near the top to provide plate continuity for the length of the joint. The slopes of plates 2 and 3 shown are adapted to permit the strut slopes required by the diagrams of FIGURES 1c to 1f inclusive.

As shown in the drawings the side plate construction is adaptable for stamping, though the plates may be formed by other desired methods. The shoulders stresses due to the strut thrusts for the top shoulders are resisted by the force of slab loads, while deflections of the bottom shoulders due to the strut thrusts are resisted by plates 11 and bottom anchors 8 as well as by the concrete into which said shoulders are recessed, or by other staying means desired. Plates 2 and 3 are preferably deformed on the concrete sides for greater value in bond with the concrete. The dotted lines of FIGURES 2 and 3 indicate the strut, shoulder and plate construction of the length segment adjoining that shown in full lines. Plates 7 are for containing the joint filler material, bars 4 are the slab reinforcement, where used, and bars 10 carry the load across the space between alternating shoulders 5 on the same side of the joint.

It is understood that any suitable material may be substituted for the concrete slabs referred to herein, and for the side plates and struts in lieu of that indicated, and that the term "plates" refers to any structural form which may be used to transmit stress. The term "slab" also includes floor and roof construction of any material.

It is understood that the specific embodiments disclosed herein are merely illustrative of the several of the many forms which the invention may take in practice without departing from the scope thereof as delineated in the appended claim, which claim is to be construed as broadly as permitted by the prior art.

I claim:

1. A pair of slabs spaced apart to form a joint, a contoured strip adjoining and bonded to each of the opposite faces of said joint space and recessed therein, the contoured strip in one of said slabs having upper spaced arcuate seats facing downwardly alternating with lower spaced seats facing upwardly, alternating similarly spaced seats in the other slab, and a series of struts extending between said spaced seats to transfer load from one slab to the other, the upper seats for each of said struts normally

3

overlapping the lower seats, the struts alternating in opposite directions and initially sloping from its lower seat toward the slab of said lower seat and into the overlapping seat of the next slab, whereby upon slab contraction each of said struts will rotate in its lower seat to a vertical position then to a final oppositely inclined position to thereby reduce the clearance between struts and top

4

seats and the corresponding slab deflection due to load at the joint by half.

References Cited**UNITED STATES PATENTS**

5 3,094,908 6/1963 Berman ----- 94—18

JACOB L. NACKENOFF, *Primary Examiner*.