

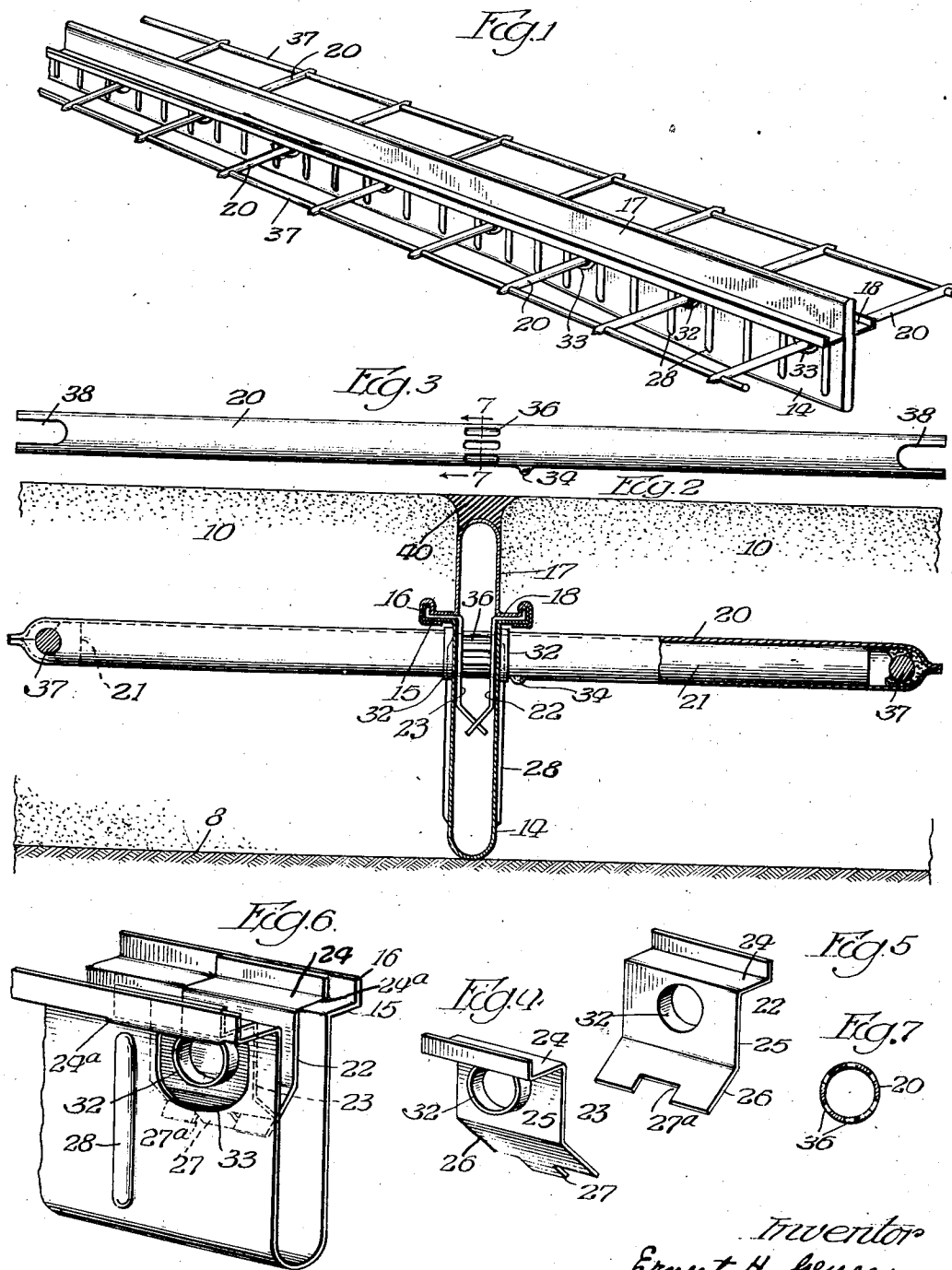
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JOINT FOR CONCRETE SLABS

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JOINT FOR CONCRETE SLABS

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The present invention relates generally to joints for concrete. More particularly the invention relates to that type of joint which is adapted for use between a pair of adjoining or contiguous slabs in a roadway or like concrete construction, operates as a load transfer unit and at the same time permits of expansion and contraction of the slabs and comprises (1) a pair of laterally spaced load distributing bars which are adapted for association respectively with the adjoining portions of the slabs and to extend transversely through the slabs; (2) a plurality of dowel rods which extend between and at right angles to the load distributing bars and are adapted to cross the meeting faces of the slabs; and (3) a set of sleeves which encase and are slidable relatively to the rods and are adapted to become bonded to the concrete.

One object of the invention is to provide a joint of this type which is more efficient than, and is an improvement on, previously designed joints for the same purpose and of the same general character by reason of the fact that the sleeves encase completely the dowel rods and are connected at their ends to the load distributing bars and have weakened central portions which permit the end portions in response to expansion or contraction of the slabs to move relatively to each other and slidably with respect to the dowel rods.

Another object of the invention is to provide a joint of the type under consideration which is of the expansion variety and includes a novel form or type of hollow structure for encasing the slot weakened central portions of the sleeves.

A further object of the invention is to provide a joint of the type and character under consideration in which the sleeves have notches at the ends thereof for the load distributing bars and are collapsed around the bars.

Other objects of the invention and the various advantages and characteristics of the present joint will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Fig. 1 is a perspective of a joint embodying the invention; Fig. 2 is a transverse section; Fig. 3 is a side view of one of the sleeves before inser-

tion thereof through the hollow structure; Figs. 4 and 5 are perspectives of a pair of the spreader-plates for the lower member of the hollow structure, and in which the sleeves for the dowels are held; Fig. 6 is a perspective of a portion of the lower member of the hollow structure; and Fig. 7 is a section on the line 7-7 of Fig. 3.

The joint which is shown in the drawing constitutes the preferred embodiment of the invention. It is shown in connection with a pair of roadway forming concrete, slabs 10 on a bed or subbase 8 and comprises as one of the main parts thereof a hollow structure. The latter is adapted to fit between the contiguous faces of the slabs and consists of a lower U-shaped member 14 and an upper inverted U-shaped cap member. The member 14 is formed of sheet metal and embodies integral horizontal flanges 15 at the top thereof and upstanding flanges 16 at the outer ends of the horizontal flanges. The upper U-shaped cap-member 17 is formed of sheet metal and is provided with horizontal flanges 18 which are lapped around the flanges 15 and 16 of the lower member. The upstanding flanges form troughs to catch or deflect any water seeping between the sides of the upper member 17 and the concrete slabs 10. Vertical corrugations 28 are formed in the side walls of the lower member 14 of the hollow structure. Coacting pairs of spreader-plates 22, 23 are longitudinally spaced along the hollow expansible structure. These plates each comprise an angular top-flange 24 which is confined between the flanges 15 and 18 of the upper and lower members of the hollow structure, a side wall 25 which extends downwardly from the joint between the members of the hollow structure, and an inclined lower end or leg 26. The inclined ends 26 of each pair are provided with interfitting and abutting tongues 27 and notches 27^a. They are resilient and abut against each other to spread the side walls 25 of the hollow structure after contraction of said structure by the expansion of the slabs 10. The spreader plates cause the side walls of the hollow structure to follow the concrete slabs when the latter contract. In fabricating the joint, the contiguous flanges at the joint between the upper and lower members and on the spreader-plates are firmly secured together. The flanges 15 of the lower member are recessed as at 24^a to receive the flanges 24 of the spreader-plates and hold them against endwise movement in the hollow structure.

One-piece sheet metal sleeves 20 extend transversely through the side walls of the member 14

and the pairs of spreader-plates 22, 23. The side walls 25 of the plates are formed with outwardly extending cylindrical bearing-flanges 32 to carry these sleeves: The side walls of the member 14 are cut away, as at 33, to permit the sleeves 20 and the flanges 32 to pass freely therethrough. A dowel rod 21 is placed in each sleeve 20 and terminates inwardly from the outer ends of the sleeve. The rods are greased with graphite and enclosed by the sleeves. An outwardly extending dent 34 is formed in each sleeve 20 to form a stop for centering the sleeve longitudinally in the spreader-plates and member 14. The portions of the sleeves which extend outwardly beyond the hollow structure are embedded in and become bonded to the concrete and, in consequence, move axially with the concrete slabs when expansion and contraction occur. In order to make it possible to use one-piece sleeves through the hollow structure and permit relative movement between the end portions of the sleeves, the central portion of each sleeve is formed with a series of longitudinal slots 36 so that the portion within the hollow structure can collapse or bulge outwardly during expansion of the concrete slabs and rupture or distend during contraction of the slabs.

The outer ends of the sleeves 20 are adapted to carry load-distributing bars 37. In practice, it is desirable to assemble the sleeves, dowels and load-distributing bars at the places where the joint is installed. For this purpose, the sleeves 20 are insertable endwise through the hollow structure and the spreader-plates 22, 23 and provision is made for securing the load-distributing bars in the sleeves after the latter have been inserted into the hollow structure and the dowel rods have been placed in the sleeves. To facilitate the assembling of the load-distributing bars and the sleeves, the outer ends of the sleeves are formed with open-ended slots or notches 38 into which the bars 37 are adapted to be inserted transversely. After the bars have been inserted in the slots, a suitable sealing material, such, for example, as cork, is placed in the ends of the sleeves, and around the bars, and the portions of the sleeves above and below the slots are collapsed and pressed together to secure the load distributing bars in the sleeves and to form, with the sealing material, a closure against the entry of concrete or moisture into the sleeves.

In practice, the hollow structure with the spreader-plates therein is fabricated and assembled in suitable lengths before being shipped to the place of installation. At the place of installation, the sleeves 20 are inserted endwise through the lower member 14 of the hollow structure and the bearing-flanges 32 in the spreader-plates, and then shifted axially until stopped by the stops or dents 34. The dowel rods are placed in the sleeves, either before or after insertion of the sleeves. The load-distributing bars 37 are then inserted in the slots 38 which are then sealed and closed by collapsing the forked ends of the sleeves together.

In use, when the concrete slabs have been laid around the joint, the side walls of the hollow structure will permit the slabs to expand and contract. The upstanding flanges on the upper and lower members 14, 17 serve to bond the side walls of the hollow structure to the slabs, so the walls will follow the concrete sleeves during contraction and prevent water from passing directly to the openings in the structure below the flange. A bituminous joint-filler 40 is usually placed above the top of member 17. During the expansion of

the concrete slabs, the portions of the sleeves 20 at the sides of the hollow structure will move with the slabs, and the central portions of said sleeves due to the slots 36 therein bulge outwards.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. In a joint for contiguous concrete slabs, the combination of a hollow structure adapted to be positioned between the contiguous faces of the slabs and having a pair of laterally spaced side walls adapted to fit against said faces, a plurality of metallic one-piece sleeves of substantially uniform width from one end thereof to the other extending through the side walls of the supporting structure and having the end portions thereof projecting beyond both sides of the structure and adapted for embedment in and to be bonded to the slabs respectively, and their central portions weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

2. In a joint for contiguous concrete slabs, the combination of a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and having a pair of laterally spaced side walls adapted to fit against said faces, a plurality of metallic one-piece sleeves of substantially uniform width from one end thereof to the other extending through the side walls of the supporting structure and having the end portions thereof projecting beyond both sides of the structure and adapted for embedment in and to be bonded to the slabs respectively, and the parts of the central portions thereof within the supporting structure slotted so that they are weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

3. In a joint for contiguous concrete slabs, the combination of a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and having a pair of laterally spaced side walls adapted to fit against said faces and provided with a longitudinal series of substantially equidistantly spaced oppositely facing pairs of openings, pairs of oppositely facing centrally apertured, coacting spreader plates positioned in the structure and aligned respectively with the openings in the side walls of said structure, a plurality of sleeves extending through the apertures in the pairs of spreader plates respectively and having the end portions thereof projecting beyond both sides of the supporting structure and adapted for embedment in and to be bonded to the slabs respectively and their central portions constructed so as to permit said end portions to move to and from one another in response

to expansion and contraction of the slabs, and dowels of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

4. In a joint for contiguous concrete slabs, the combination of a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively; a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and having a pair of laterally spaced side walls adapted to fit against said faces, a plurality of spaced, one-piece sleeves between the bars extending through the side walls of the supporting structure and having the end portions thereof projecting beyond both sides of said structure and connected at the extremities thereof to the bars and adapted for embedment in and to be bonded to the slabs respectively and their central portions constructed so as to permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

5. In a joint for contiguous concrete slabs, the combination of a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and having a pair of laterally spaced side walls adapted to fit against said faces, a plurality of spaced one-piece sleeves between the bars extending through the side walls of the supporting structure and having the end portions thereof projecting beyond both sides of said structure, provided with notches at the extremities thereof for receiving the bars and adapted for embedment in and to be bonded to the slabs respectively, and their central portions constructed so as to permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

6. In a joint for contiguous concrete slabs, the combination of a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and comprising a lower U-shaped member and an upper inverted U-shaped member with out-turned abutting flanges therebetween whereby they are secured together, a plurality of substantially equi-distantly spaced one-piece metallic sleeves of substantially uniform width from one end thereof to the other extending through the lower member and having the end portions thereof projecting through beyond both sides of the lower member of the structure and adapted for embedment in and to be bonded to the slabs respectively, and the parts of the central portions thereof that are disposed in said lower member weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the

sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

7. In a joint for contiguous concrete slabs, the combination of a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and comprising a lower U-shaped member and an upper inverted U-shaped member with out-turned interlocking flanges therebetween whereby they are secured together, pairs of equidistantly spaced, oppositely facing, coating spreader-plates disposed in the structure and having out-turned flanges held between the flanges of the upper and lower members of the structure and depending side walls, a plurality of one-piece metallic sleeves of substantially uniform width from one end thereof to the other extending through the depending side walls of the spreader plates and the side walls of the lower member of the structure and having the end portions thereof projecting beyond both of said side walls of the lower member and adapted for embedment in and to be bonded to the slabs respectively, and their central portions weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

8. In a joint for contiguous concrete slabs, the combination of a hollow supporting structure adapted to be positioned between the contiguous faces of the slabs and comprising a lower U-shaped member and an upper inverted U-shaped member with out-turned interlocking flanges therebetween whereby they are secured together, a plurality of equidistantly spaced, oppositely facing, pairs of spreader plates disposed within the structure and having out-turned flanges between the flanges of the upper and lower members of the structure and also having depending side walls with annular outwardly extending bearing flanges and also with the lower ends thereof extending inwardly in abutting relation and arranged to urge the side walls of the structure outwardly, a plurality of sleeves extending through the annular bearing flanges of the spreader plates and the side walls of the lower member of the structure and having the end portions thereof projecting beyond both sides of the structure and adapted for embedment in and to be bonded to the slabs respectively, and their central portions constructed so as to permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

9. In a joint for contiguous concrete slabs, the combination of a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of metallic one-piece sleeves of substantially uniform width from one end thereof to the other extending between the bars and adapted to have the end portions thereof bonded respectively to the slabs and having their extreme outer ends connected to the bars and the central portions thereof weakened to such

an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods mounted slidably in the sleeves and extending across the central portions thereof.

10. In a joint for contiguous concrete slabs, the combination of a pair of laterally spaced, load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of metallic one-piece sleeves between the bars adapted to have the end portions thereof bonded respectively to the slabs and having their outer extremities connected to the bars and annular series of slots in the central portions thereof whereby said central portions are weakened to such an extent that they will readily expand or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods mounted slidably in the sleeves and extending across the central portions thereof.

11. In a joint for contiguous concrete slabs, the combination of a pair of laterally spaced bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of metallic one-piece cylindrical sleeves of substantially uniform diameter throughout their length extending between the bars and adapted to have the end portions thereof bonded respectively to the slabs and having their outer extremities connected to the bars and annular series of longitudinally extending slots in the central portions thereof whereby said central portions are weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods fitting snugly and slidably in the sleeves and extending across the central portions thereof.

12. In combination, a pair of adjoining concrete slabs, a series of laterally spaced substantially parallel one-piece metallic sleeves extending between and through the slabs and having the end portions thereof bonded to the slabs

respectively and having annular series of slots in portions thereof between the slabs whereby said last mentioned portions are weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods mounted slidably in the sleeves and extending across the central portions thereof.

13. In combination a pair of adjoining concrete slabs, a series of laterally spaced substantially parallel one-piece sheet metal sleeves of substantially uniform width from one end thereof to the other, disposed between the slabs and having the end portions thereof extending substantially like distances into, and bonded to, the slabs respectively and having the portions thereof between the slabs weakened to such an extent that they will readily expand or distend or rupture and hence permit said end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves mounted slidably in said sleeves and extending across the central portions thereof.

14. A joint for contiguous concrete slabs, comprising in combination an elongated compressible structure adapted to be positioned between the contiguous faces of the slabs, a plurality of sheet metal one-piece sleeves of substantially uniform width from one end thereof to the other extending through said structure and having the end portions thereof projecting beyond the sides of the structure and adapted to extend substantially like distances into, and to be bonded to, the slabs respectively, and having their central portions weakened to such an extent that they will readily expand or distend or rupture and thus permit the end portions to move to and from one another in response to expansion and contraction of the slabs, and dowel rods of slightly less length than the sleeves extending longitudinally through and engaging slidably the sleeves and adapted to transmit by way of the end portions of the sleeves load from one slab to the other.

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