May 10, 1938. E. H. GEYER 2,116,697

JOINT FOR CONCRETE SLABS

Filed Dec. 10, 1936 2 Sheets-Sheet 1

Fig. 1

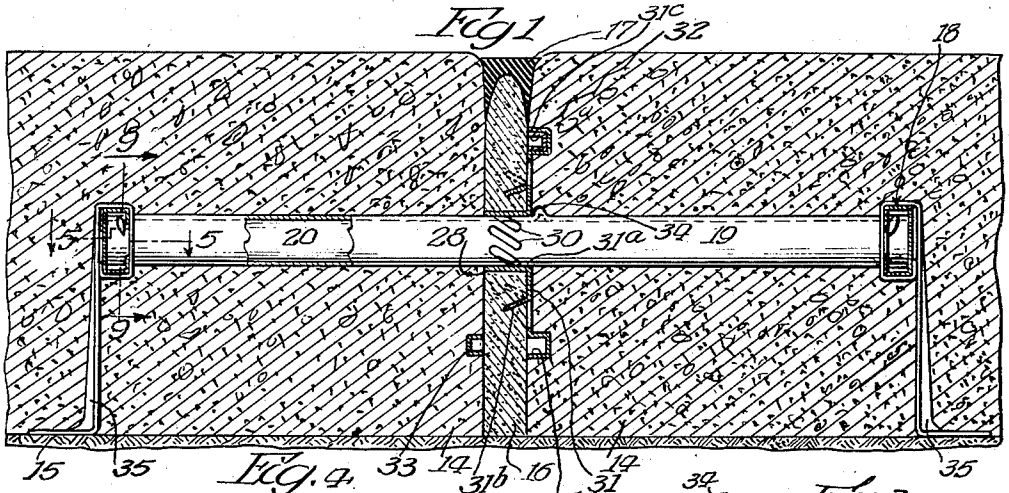


Fig. 4

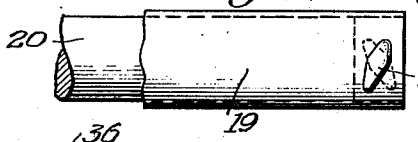


Fig. 3

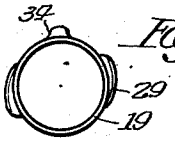


Fig.

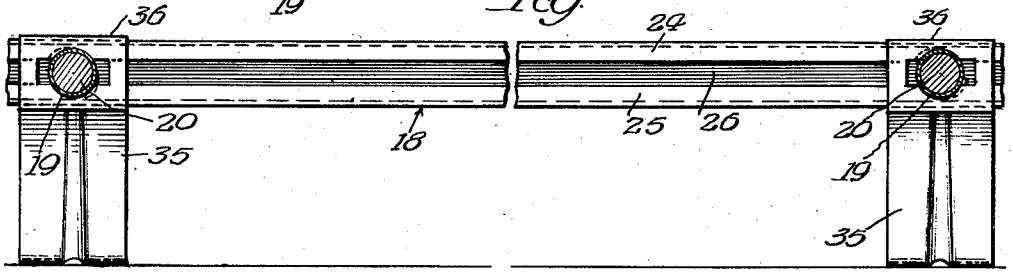


Fig. 6

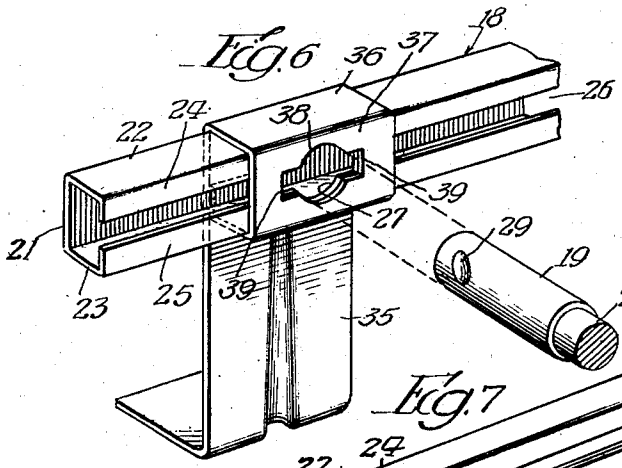


Fig. 5

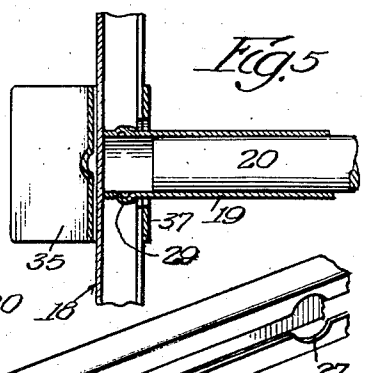
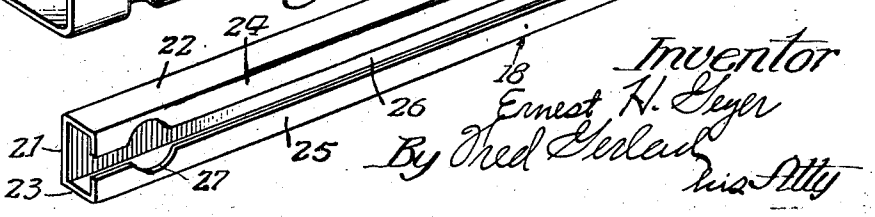


Fig. 7



Inventor
Ernest H. Geyer
By Reed Gerlach
his Atty

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Fig. 8

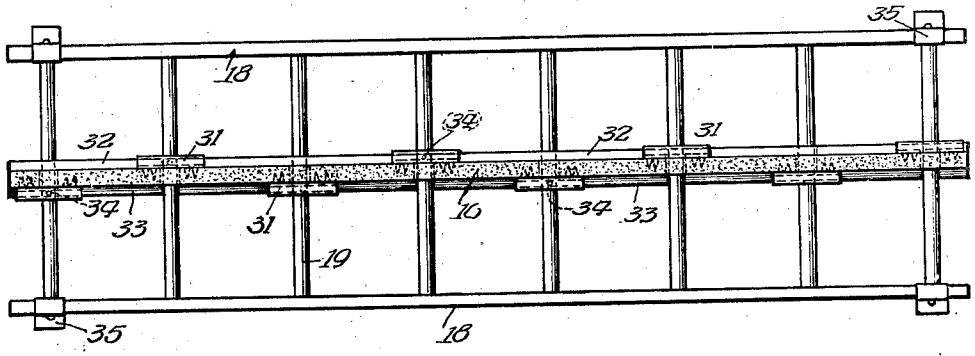


Fig. 10

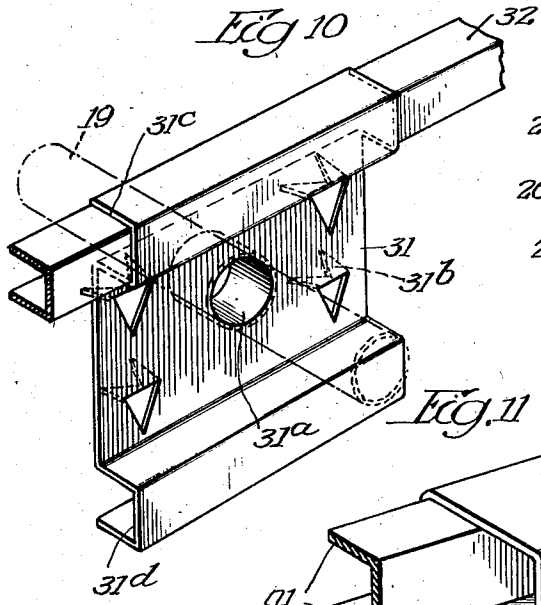


Fig. 9

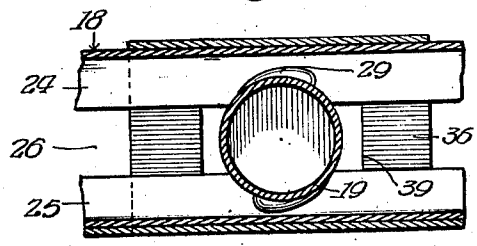


Fig. 11

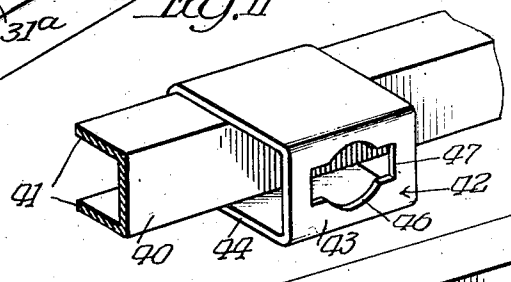


Fig. 13

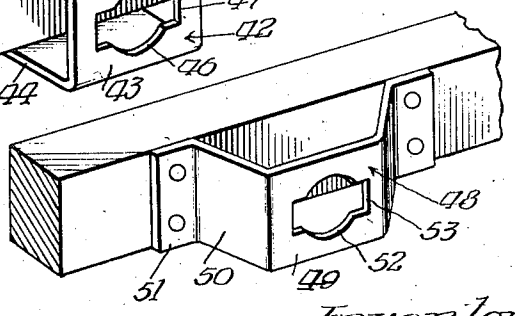
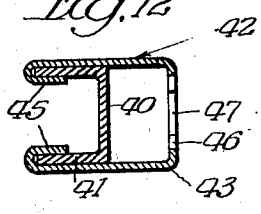


Fig. 12



Inventor
Ernest H. Geyer
By Fred Gerlach Atty.
his

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UNITED STATES PATENT OFFICE

2,116,697

JOINT FOR CONCRETE SLABS

Ernest H. Geyer, Chicago, Ill., assignor of one-half to Henry A. Taubensee, Chicago, Ill.

Application December 10, 1936, Serial No. 115,069

16 Claims. (Cl. 94—18)

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 horizontally extending, 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 one-piece sleeves which extend between and at right angles to the load distributing bars and through the meeting faces of the slabs, are adapted to have the end portions thereof bonded respectively to the slabs, and have their extreme outer ends connected to the bars and the central portions thereof weakened so as to permit the end portions to move to and from one another in response to contraction and expansion of the slabs; and (3) dowel rods which are slidably mounted in the sleeves respectively and constitute the load transfer members of the joint.

One object of the invention is to provide a concrete joint of this type in which the connections between the outer extremities of the sleeves and the load distributing bars are of novel design and permit the joint as a whole to be assembled more quickly and readily than previously designed joints of the same general character.

Another object of the invention is to provide a concrete joint of the type and character under consideration in which the connections between the outer extremities of the sleeves and the load distributing bars are of the interlocking variety and serve to hold the outer ends of the sleeves in abutting relation with the bars so that they are closed or sealed against the inflow of concrete during pouring of the concrete for the slabs.

Another object of the invention is to provide a concrete joint of the aforementioned type in which the sleeves between the load distributing bars have washers on the central portions thereof for centering and holding in a vertical position during pouring of the concrete for the slabs a filler strip of felt or like material.

A further object of the invention is to provide a joint of the last mentioned character in which the washers on the central portion of the sleeves are designed to carry bars which abut against and extend longitudinally of the filler strip and serve to prevent the portions of the strip between the washers from bulging or sagging.

A still further object of the invention is to provide a concrete joint which is generally of new and improved construction and may be manufactured at a low and reasonable cost.

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 drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a vertical transverse sectional view showing a joint embodying the invention in its operative position with respect to a pair of adjoining contiguous concrete slabs;

Figure 2 is a vertical longitudinal sectional view of the joint;

Figure 3 is an end view of one of the sleeves of the joint;

Figure 4 is a side elevational view of one end of one of the sleeves;

Figure 5 is a sectional view taken on the line 5—5 of Figure 1 and showing in detail the manner in which the sleeves are connected at their outer extremities to the load distributing bars;

Figure 6 is a perspective of the parts of the joint which are shown in Figure 5;

Figure 7 is a perspective of one of the load distributing bars;

Figure 8 is a plan view of the joint;

Figure 9 is an enlarged section on the line 9—9 of Figure 1;

Figure 10 is a perspective of one of the washers which constitutes the means on the central portions of the sleeves for holding the felt filler strip in a vertical position during pouring of the concrete for the slabs;

Figure 11 is a perspective of a modified form of connection between the sleeves and the load distributing bars;

Figure 12 is a section on the line 12—12 of Figure 11; and

Figure 13 is a perspective of a third form of connection between the sleeves and the load distributing bars.

The joint which is shown in Figures 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 of the drawings constitutes the preferred embodiment of the invention and is shown with a pair of contiguous roadway forming slabs 14. As shown in Figure 1 the slabs are mounted on a bed 15. They are spaced slightly

apart and have a filler strip 16 therebetween. This strip is formed of felt or like material and extends from the bed 15 to a point a small distance beneath the top faces of the slabs 14. A filling 17 of bituminous material overlies and seals the top portion of the strip 16. The joint operates as a load transfer unit and at the same time permits the slabs 14 of the roadway to expand or contract as the result of changes in temperature or climatic conditions. It is of unitary design or construction and consists of a pair of laterally spaced, horizontally extending, load distributing bars 18, a set of sleeves 19 between the two bars, and a plurality of dowel rods 20 in the sleeves. The load distributing bars 18 are associated respectively with the slabs 14 and extend transversely through the latter, as shown in Figure 1. They are located midway between the top and bottom faces of the slabs and are positioned from the filler strip 16 a distance corresponding substantially to the thickness of the slabs. As shown in Figure 6, the bars 18 are of channel formation or design and comprise side walls 21, top walls 22, and bottom walls 23. The top walls 22 extend horizontally and are formed integrally with the top margins of the side walls 21. They project or extend in the direction of the filler strip 16 and embody integral downwardly extending flanges 24 along the free or outer margins thereof. The bottom walls 23 are formed integrally with the bottom margins of the side walls 21 and underlie the top walls 22. They are coextensive with the top and side walls of the bars and embody integral up-turned flanges 25 along their free margins. The flanges 24 and 25 are separated by spaces 26 and embody pairs of oppositely facing arcuate cut-outs 27. The latter are of the same radius as the sleeves and permit the outer ends or extremities of the sleeves to be inserted into the load distributing bars into a position wherein the end faces abut against the inner faces of the side walls 21. The pairs of cut-outs 27 in each load distributing bar are spaced equidistantly apart and correspond in number to the sleeves.

The sleeves 19 extend between and at right angles to the load distributing bars 18 and project through holes 28 in the filler strip 16. They are formed of any suitable metal and are of uniform diameter throughout. The outer faces of the sleeves are coated with zinc or any like material which when brought into contact with concrete bonds itself to the concrete as a result of the chemical action which takes place. Because of these coatings the end portions of the sleeves become bonded to the slabs 14. The outer extremities of the sleeves are connected to the load distributing bars by means of locking lugs 29. The latter are located near the end edges of the sleeves and extend angularly with respect to such edges. They are formed by striking outwardly the ends of the sleeves and are adapted when the outer extremities of the sleeves are inserted into the load distributing bars 18 through the cut-outs 27 to pass through the spaces 26. When the sleeves are rotated or turned a quarter-turn or less after insertion of the outer extremities thereof into the load distributing bars the locking lugs 29 swing into engagement and interlocked relation with the inner faces of the cut-out defining portions of the flanges of the bars. The angularity and location of the locking lugs are such that when the sleeves are turned for purposes of connection to the bars the lugs draw the side walls of the bars into contact and clamped relation with the end edges of the sleeves with the result that the side walls of the bars serve as closures for the outer extremities of the sleeves and prevent the inflow of concrete into the sleeves during pouring of the concrete for the slabs 14. Preferably each sleeve has on each end thereof two locking lugs 29 and such lugs are positioned one diametrically opposite to the other.

The dowel rods 20 fit snugly and slidably in the sleeves 19 and the ends thereof, as shown in Figure 4, terminate slightly inwards of the load distributing bars 18. They constitute the load transfer members of the joint and are coated with graphite or any other suitable lubricant prior to insertion in the sleeves so that they are slidable relatively to the latter and thus permit the end portions of the sleeves to move to and from one another in response to expansion and contraction of the slabs. In order to permit the end portions of the sleeves at one side of the filler strip 16 to move to and from the end portions of the sleeves at the other side of the strip the central portions of the sleeves are weakened by way of annular series of slots 30. By employing the slots in the central portions of the sleeves the sleeves are sufficiently weakened so that they either bend or buckle in response to movement of the end portions of the sleeves toward one another or rupture in the event that the end portions of the sleeves move away from one another as the result of marked contraction on the part of the slabs. Because the sleeves are of one-piece design prior to installation, and are connected at the ends thereof to the load distributing bars 18, the dowel rods are all retained in parallel relation and as a result there is no misalignment which would tend to cause either the formation of funnel shaped sockets in the slabs or breakage of the concrete. As shown in Figure 1, the slots 30 are disposed midway between the ends of the sleeves and are confined within the holes 28 in the filler strip 16. By having the slots confined in these holes they are protected by the strip against inflow of concrete during pouring of the slabs 14.

The filler strip 16 is mounted on the central portions of the sleeves 19 before the slab forming concrete is poured. In order to center the strip and hold it in a vertical position during the pouring operation washers 31 are mounted on the sleeves respectively. These washers are preferably rectangular in conformation and are in the form of metal stampings. The central portions of the washers embody cylindrical hubs 31a which fit slidably on the central portions of the sleeves 19 and prevent the washers from tilting relatively to the sleeves. As shown in Figure 1, the hubs 31a of the washers surround the slots 30 and are adapted to fit within holes in the filler strip 16. The portions of the washers which are located outwardly of the hubs 31a are struck inwardly to form pairs of teeth 31b. These teeth are adapted to embed themselves into the filler strip 16 when the washers are brought into contact with the latter and serve to hold the filler and washers in abutting relation. One tooth of each pair extends upwardly and the other downwardly with the result that the teeth tend to interlock with the felt and prevent separation of the washers from the strip after they are once assembled. The upper marginal portions of the washers are bent outwardly, upwardly, and then inwardly to form inwardly facing grooves 31c. The lower marginal portions are bent outwardly, downwardly, and then inwardly to form inwardly

facing grooves 31d. The washers on every other one of the sleeves are positioned at one side of the filler strip 16 and the washers on the alternate sleeves are located on the other side of the strip. By so arranging the washers in alternate relation the filler strip is supported at both sides and hence is truly centered and maintained in vertical position during the concrete pouring operation. In order to prevent sagging of the portions of the filler strip between the sleeves 19, channel bars 32 and 33 are provided. These bars are coextensive with and extend longitudinally of the filler strip 16. The bar 32 abuts against one side of the filler strip and is secured in the grooves 31c of the washers adjacent said one side of the strip and the bar 33 is located beneath the bar 32 and is positioned in abutting relation with the other side of the filler strip and in the grooves 31d of the washers adjacent to said other side of the strip. As shown in Figure 1, the bars 32 and 33 are arranged so that the open sides thereof face the filler strip. By so arranging the channel bars 32 and 33 portions of the filler strip are free to work into the bars when the concrete slabs expand and tend to compress the strip. Outward displacement of the washers 31 is prevented by means of stop lugs 34 on the central portions of the sleeves. These lugs are formed integrally with the sleeves and are located outwardly of the slots 30. They are adapted to bear against the central portions of the washers and serve not only to prevent outward displacement of the washers in one direction but also as a centering medium for the filler strip in the event that it should be desired to use the joint without the washers. When the washers are used they are mounted on the sleeves before formation of the locking lugs 29 at the outer extremities of the sleeves. When the locking lugs are formed in the sleeves they together with the stop lugs 24 prevent the washers from sliding off the sleeves.

The load distributing bars, sleeves and dowel rods are supported in elevated relation with respect to the bed 15 before pouring of the concrete for the slabs by means of a set of leg-like supports 35. These supports are in the form of metal stampings and embody sleeve-like parts 36 at the upper ends thereof. There are preferably four supports 35 for the joint and these are located adjacent to the ends of the load distributing bars 14. The sleeve-like parts 36 surround and fit slidably on the load distributing bars and embody vertically extending walls 37 which are disposed adjacent to and fit against the outer faces of the flanges of the bars (see Figure 6). The supports are preferably arranged so that the sleeve-like parts encircle the portions of the bars to which the outermost sleeves 19 are connected. The vertically extending walls 37 of the parts 36 have circular holes 38 therein and notches 39 at the sides of the holes. The holes, as shown in Figure 6, are adapted to register with the outermost pairs of cut-outs 27 so as to permit of insertion of the end extremities of the outermost sleeves into the end portions of the load distributing bars 18. The notches 39 are aligned with the spaces 26 when the sleeve-like parts 36 of the supports are in their operative position and permit the locking lugs 29 on the sleeves to pass through the vertical walls 37 during assembly or connection of the outermost sleeves with respect to the load distributing bars. When the outermost bars are in place the supports 35, as the result of passage of the end extremities of the sleeves through the holes 28 in the vertical walls 37 are held against longitudinal displacement with respect to the load distributing bars.

It is contemplated that the joint be sent by the manufacturer to the place of installation in dismantled condition. In assembling the joint the sleeves 19 are first inserted through the holes 28 in the filler strip 16 in such order or manner that every other sleeve has its washer 31 in engagement with one side of the strip and the alternate sleeves have their washers in engagement with the other or opposite side of the filler strip. In inserting the sleeves into place the sleeves are pushed or slid forwards until the stop lugs 34 are brought into engagement with the cylindrical hubs 31a of the washers and the washers are shifted into a position wherein the teeth 31b thereof are embedded in the filler strip. After insertion of the sleeves through the holes 28 the dowel rods 20 are inserted into the sleeves. Thereafter the sleeve-like parts 36 at the upper ends of the supports 35 are slid onto the ends of the load distributing bars 18 until the holes 38 in the vertical walls 37 thereof are in registry with the outermost pairs of cut-outs 27. After properly positioning the supports the load distributing bars are moved adjacent to the outer ends of the sleeves. Thereafter the outer ends of the sleeves are inserted into the load distributing bars through the cut-outs 27 and the sleeves are then turned in order to bring the locking lugs 29 into interlocked relation with the cut-out defining portions of the flanges of the bars and thus lock the ends of the sleeves to the bars and in clamped relation against the inner faces of the side walls 21 of the bars. Upon connection of the sleeves to the bars the joint is fully assembled and operates to support the filler strip 16 in a vertical or upright position. After pouring of the concrete for the slabs 14 the joint is fully embedded in the concrete. Upon setting of the concrete the end portions of the sleeves become bonded to the slabs and move to and from one another in response to expansion and contraction of the slabs. By reason of the fact that the ends of the sleeves are held in sealed or clamping relation with the side walls 21 of the bars no concrete can flow into the sleeves during the concrete pouring operation.

Figures 11 and 12 illustrate a different type of load distributing bar and different means for securing the bar in assembled relation with the other parts of the joint. The load distributing bar of these two figures is of channel formation and comprises a vertically extending web 40 and a pair of horizontally extending flanges 41. The latter are formed integrally with the margins of the web and project away from the sleeves. A U-shaped clip 42 serves to connect the bar to one of the sleeves of the joint. This clip is in the form of a stamping and comprises an intermediate piece 43 and a pair of superposed horizontally extending leg pieces 44. The latter, as shown in Figure 12, extend transversely across the flanges 41 of the bar and have inturned tongues 45 which extend around the outer margins of the flanges and serve to connect the clip in place. The intermediate piece 43 is held in spaced relation with respect to the web 40 by the leg pieces 44 and has a circular sleeve receiving hole 46 and a pair of notches 47 at the sides of the hole. The notches are positioned diametrically opposite one another and permit the locking dogs on the sleeve to pass through the intermediate piece 43 of the clip. It is contem-

plated that the bar be positioned directly opposite a like load distributing bar and that it shall have a series of laterally spaced clips like the clip 42. In assembling the bar with respect to the sleeves of the joint the contiguous ends of the sleeves are inserted through the holes in the intermediate pieces of the clips and then the sleeves are rotated in order to bring the locking lugs into interlocked relation with the hole defining intermediate portions of the pieces of the clips and thus jam or clamp the contiguous end edges of the sleeves against the web 40 of the load distributing bar.

Figure 13 illustrates another form or type of load distributing bar and different means for securing the bar in assembled relation with the other parts of the joint. The load distributing bar of Figure 13 is solid and of rectangular cross-section from end to end. A U-shaped plate 48 serves to connect the bar to one of the sleeves of the joint. This plate is preferably in the form of a metal stamping and comprises an intermediate piece 49 and a pair of legs 50. The latter serve to space the intermediate piece 49 from the inner face of the load distributing bar and have out-turned feet 51 which fit against and are suitably secured to the bar. The intermediate piece 49 has a circular sleeve receiving hole 52 and a pair of locking lug receiving notches 53 at the sides of the hole. It is contemplated that the bar be positioned directly opposite a like load distributing bar and that it shall have a series of laterally spaced plates like the plate 48. In assembling the bar with respect to the sleeves of the joint the contiguous ends of the sleeves are inserted through the holes in the intermediate pieces of the plates and then the sleeves are rotated or turned in order to bring the locking lugs into interlocked relation with the hole defining portions of the intermediate pieces of the plates and thus jam or clamp the contiguous end edges of the piece against the inner face of the load distributing bar.

The herein described types or forms of joint due to the interlocking connections between the ends of the sleeves and the load distributing bars may be assembled with facility, and due to the comparatively small number of parts may be manufactured at a low and reasonable cost.

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. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of sleeves extending at right angles to and between the load distributing bars and adapted to have the end portions thereof embedded respectively in the slabs, interlocking connections between said end portions of the sleeves and the bars whereby the end faces of the sleeves are clamped in abutting relation with the bars, and dowel rods fitting slidably within the sleeves.

2. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of open-ended cross-sleeves between the load distributing bars, adapted to have the end portions thereof embedded in the slabs respectively and having flat end faces positioned in abutting relation with the bars, interlocking connections between said end portions of the sleeves and the bars whereby said end faces and bars are clamped together in abutting relation in order to seal the open ends of the sleeves, and dowel rods slidably mounted in the sleeves and extending across the central portions thereof.

3. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of open ended one-piece cross-sleeves between the load distributing bars, adapted to have the end portions thereof bonded respectively to the slabs and having their end faces abutting against the bars and the central portions thereof weakened so as to permit the end portions to move to and from one another in response to expansion and contraction of the slabs, interlocking connections between said end portions of the sleeves and the bars whereby said end faces and bars are clamped together in abutting relation in order to seal the open ends of the sleeves, and dowel rods slidably mounted in the sleeves and extending across the central portions thereof.

4. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively and having flat faces along the opposed sides thereof and parts spaced outwardly of said faces and provided with openings therein, a plurality of cross-sleeves between the load distributing bars adapted to have the end portions thereof embedded in the slabs respectively and having the outer extremities thereof extending through the openings in said parts and abutting against said flat faces, means for locking said outer extremities of the sleeves in abutting relation with respect to said flat faces of the bars, and dowel rods fitting slidably within the sleeves.

5. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively and having flat opposed side faces and parts spaced outwardly of said faces and provided with openings therethrough in alignment with said faces, a plurality of open ended cross-sleeves between the load distributing bars adapted to have the end portions thereof embedded in the slabs respectively and having the outer extremities thereof extending through the openings in said parts and abutting against said flat faces, interlocking means between said outer extremities of the cross-sleeves and said parts for clamping said extremities of the sleeves in abutting relation with said flat faces of the bar in order to seal the open ends of the sleeves, and dowel rods fitting slidably within the sleeves.

6. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively and having flat opposed side faces and parts spaced outwardly of said faces and provided with openings therethrough in alignment with said faces, a plurality of open ended cross-sleeves between the load distributing bars adapted to have the end portions thereof embedded in the

slabs respectively and having the outer extremities thereof extending through the openings in said parts and abutting against said flat faces, locking lugs fixed on the outer extremities of the sleeves and arranged to interlock with the opening defining portions of said parts and clamp said outer extremities of the sleeves in abutting relation with said flat faces so as to seal the open ends of the sleeves, and dowel rods fitting slidably within the sleeves.

7. A joint for contiguous concrete slabs, comprising in combination a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively and having flat faces along the opposed sides thereof and parts spaced outwardly of said faces and provided with openings therethrough and spaces at the sides of said openings, a plurality of cross-sleeves between the load distributing bars adapted to have the end portions thereof embedded in the slabs respectively and having the outer extremities thereof extending through the openings in said parts and abutting against said flat faces, angularly disposed locking lugs on said outer extremities of the sleeves operative to clamp said extremities in abutting relation with said flat faces and adapted in connection with the assembly of the joint to pass through the openings at the sides of the hole and then be brought into interlocking relation with the opening defining portions of the parts by rotation of the sleeves relatively to the bars, and dowel rods fitting slidably within the sleeves.

8. A joint for contiguous concrete slabs, comprising in combination a plurality of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of dowel rods extending at right angles to and between the load distributing bars and having the end portions thereof adapted for disposition in the slabs respectively, open ended sleeve elements fitting slidably around the end portions of the dowel rods and having flat end faces positioned in abutting relation with the bars, and interlocking connections between said sleeve elements and the bars whereby said end faces and bars are clamped together in abutting relation in order to seal the outer extremities of said elements.

9. A joint for contiguous concrete slabs, comprising in combination a filler strip adapted to fit between the slabs, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their central portions extending through the strip, and means on said central portions of the members for holding the filler strip against sidewise displacement with respect to said members during pouring of the concrete in connection with formation of the slabs.

10. A joint for contigucus concrete slabs, comprising in combination a filler strip adapted to fit between the slabs, a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their extreme outer ends connected to the bars and their central portions extending through the strip, and means on said central portions of the members for holding the filler strip against sidewise displacement with respect to said members during pouring of the concrete in connection with formation of the slabs.

11. A joint for contiguous concrete slabs, comprising in combination a compressible filler strip adapted to fit between the slabs and yield in response to expansion thereof, a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of cross-members between the load distributing bars adapted to have the end portions thereof embedded in the slabs respectively and having their extreme outer ends connected to the bars and the central portions thereof extending through the strip, and washers on the central portions of the members for holding the filler strip in place and against sidewise displacement with respect to the members during pouring of the concrete in connection with formation of the slabs.

12. A joint for contiguous concrete slabs, comprising in combination a filler strip adapted to fit between the slabs, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their central portions extending through the strip, washers slidably mounted on the central portions of the members and adapted to engage the filler strip and hold it in place and against sidewise displacement with respect to sleeves during pouring of the concrete in connection with formation of the slabs, and outwardly extending lugs on said central portions of the members for holding the washers against axial displacement in one direction with respect to said members.

13. A joint for contiguous concrete slabs, comprising in combination a compressible filler strip adapted to fit between the slabs and to yield in response to expansion thereof, a pair of laterally spaced load distributing bars adapted for embedment in and to extend transversely through the slabs respectively, a plurality of cross-sleeves between the load distributing bars adapted to have the end portions thereof become bonded to the slabs respectively and having their outer extremities connected to the bars and the central portions thereof extending through the filler strip and weakened so as to permit the end portions to move to and from one another in response to expansion and contraction of the slabs, means associated with the central portions of the sleeves for engaging the strip and holding it against sidewise displacement during pouring of the concrete in connection with formation of the slabs, and dowel rods mounted slidably within the sleeves and extending across said central portions of the sleeves.

14. A joint for contiguous concrete slabs, comprising in combination a yieldable filler strip adapted to fit between the slabs, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their central portions extending through the strip, washers on the central portions of the members for holding the filler strip in place and against sidewise displacement with respect to the members during pouring of the concrete in connection with formation of the slabs, and means extending between and carried by the washers and serving to reinforce the portions of the strip between the cross-members against bending or sagging during said pouring of the concrete.

15. A joint for contiguous concrete slabs, comprising in combination a yieldable filler strip

adapted to fit between the slabs, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their central portions extending through the strip, washers on the central portions of the members for holding the filler strip in place and against sidewise displacement with respect to the members during pouring of the concrete in connection with formation of the slabs, and a stiffening bar carried by the washers and extending lengthwise of and against the strip.

16. A joint for contiguous concrete slabs, comprising in combination a compressible filler strip adapted to fit between the slabs and yield in response to expansion thereof, a plurality of laterally spaced cross-members adapted to have the end portions thereof embedded in the slabs respectively and having their central portions extending through the strip, washers on the central portions of the members for holding the filler strip in place and against sidewise displacement with respect to the members during pouring of the concrete in connection with formation of the slabs, and a strip-stiffening, channel bar extending lengthwise of and against the strip and carried by the washers so that the open side thereof faces the strip and receives a portion thereof when it is compressed as the result of slab expansion.

ERNEST H. GEYER.