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PAVING DOWEL SUPPORTING STRUCTURE

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Fig. 1.

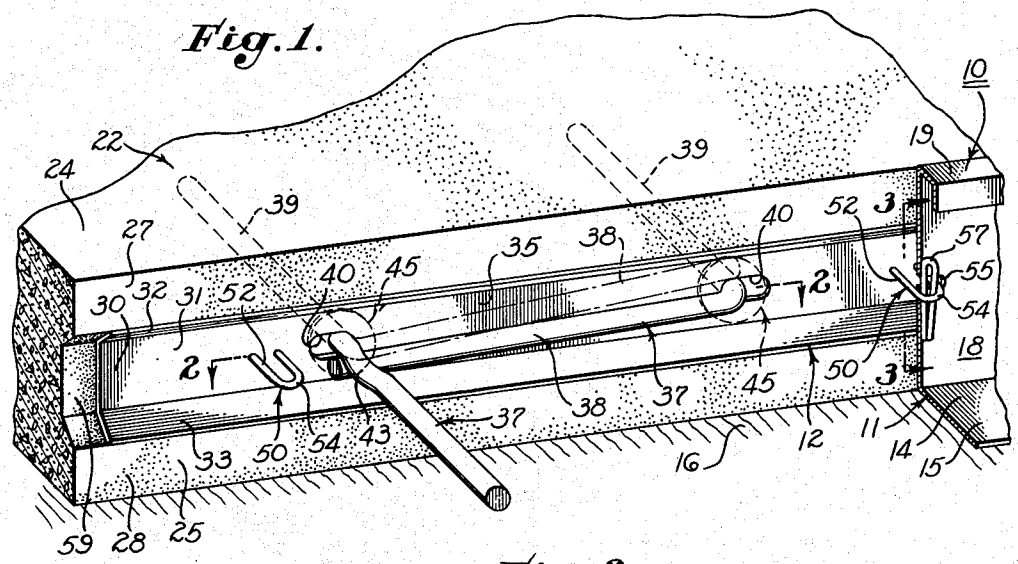
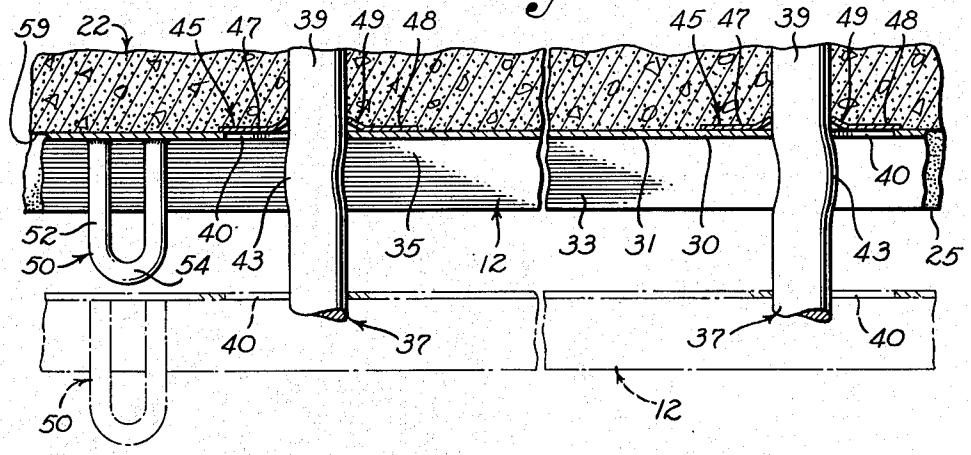


Fig. 2.



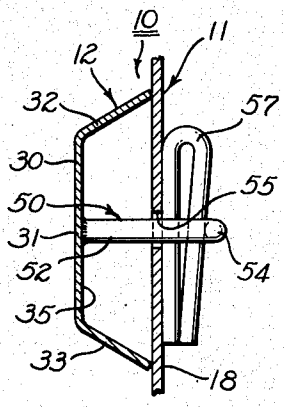


Fig. 3.

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PAVING DOWEL SUPPORTING STRUCTURE

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9 Claims. (Cl. 25—118)

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This invention relates to a paving dowel supporting structure designed to be utilized in supporting paving dowels which are incorporated in the concrete of a road or other structure as it is laid.

When concrete roads and other concrete surfaces are laid, it is common practice to form the lanes of the roads or the sections of other surfaces in separate, parallel lanes or sections. In order to bind adjoining lanes or sections together so that they may be maintained in the same horizontal plane and be prevented from spreading away from one another, transverse metallic paving dowels are embedded in the concrete of the lanes or sections as they are laid, said dowels having portions extending from the edges of the lanes or sections already poured which may be embedded in the concrete of an adjoining lane or section when it is poured. Thus, the separately poured lanes or sections are maintained in lateral and longitudinal alignment and movement of one lane or section with reference to another is prevented.

Some of the major disadvantages encountered in prior art dowel supporting structures have been the fact that conventional dowel supporting structures are provided with a plurality of apertures or openings and numerous excrescenses through which the poured concrete is respectively able to flow and about which it is respectively able to agglomerate, thus materially impeding the removal of the dowel supporting structure from the free ends of the dowels after the concrete has been poured.

It is, therefore, a primary object of my invention to provide a paving dowel supporting structure which consists of a minimum number of component parts which are not exposed to concrete as it is poured so that the deposition and agglomeration of concrete thereupon is prevented and the difficulty of disassembly encountered with prior art dowel supporting structures is eliminated.

An additional object of my invention is the provision of a dowel supporting structure which includes a dowel retainer having a plurality of openings therein through which the free ends of the dowels may project, said openings being provided with sealing means which encompass the peripheries of the dowels which project therethrough to prevent the influx of concrete into the dowel retainer which would cause the ends of the dowels in the interior of the retainer to be covered with concrete and fixedly positioned in the retainer, thus rendering the removal of the retainer

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from the dowels extremely difficult. By the use of the sealing means of my invention, the possibility of concrete influx is eliminated and the interior of the dowel retainer is kept completely free of concrete, thus permitting the retainer to be readily removed from the dowels after the concrete has been poured.

Another object of my invention is the provision of a structure of the aforementioned character in which the sealing means for the dowel receiving openings are constituted by a plurality of sealing members having resilient or flexible portions engageable with the peripheries of the dowels where they project through the openings and having substantially stiff portions for overlying the openings around the dowels to prevent the influx of concrete through said openings.

It is common practice to bend paving dowels into right angles, one leg of each dowel being disposed in a retainer of some sort while the other end thereof is projected through an opening in the retainer over the prepared bed of a lane so that the concrete may be deposited upon the projecting leg of the dowel to secure it in the lane. After the concrete has set, the dowel retainer must be removed from the dowels and it is necessary to straighten the bent legs of the dowels to permit such removal. When the dowels are bent outwardly to straighten them, a hump is generally formed in the dowel immediately adjacent or at the right angle bend which previously existed in the dowel. These humps frequently render it extremely difficult to remove the dowel retainers from the dowels and considerable time is wasted in accomplishing such removal.

A further object of my invention is the provision of a dowel retainer for paving dowels which has a plurality of dowel receiving orifices formed in a wall thereof, said orifices being substantially over-size so that, when the bent legs of the dowels are straightened, the over-size dowel receiving openings will permit the removal of the retainer from the dowels because the humps left in the dowels at the bends therein will be accommodated by the over-size dowel receiving openings.

Another object of my invention is the provision of a dowel retainer of the aforementioned type in which the over-size openings therein are provided with sealing means mountable upon the peripheries of the dowels extending through the openings for overlying the borders of the openings to prevent the influx of concrete into the retainer. Since the dowel receiving openings are the only openings in the wall of the retainer and since these openings are completely sealed by the seal-

ing means mounted upon the peripheries of the dowels projecting therethrough, it is impossible for concrete to flow into the interior of the retainer and agglomeration difficulties encountered with prior art devices are eliminated.

Dowel retainers and supports are conventionally utilized in conjunction with paving forms which consist of a base, a vertical wall extending upwardly from said base and a tread provided at the top of said vertical wall, the retainers being mounted on the vertical wall to suspend them at an appropriate height so that the dowels supported and retained thereby may be maintained in the desired position when the concrete is poured thereupon. Conventionally, the retainers are provided with bolt holes in a wall thereof through which bolts are inserted, the free ends of the bolts fitting into bolt receiving openings in the vertical wall of the paving form and having a nut or other fastener engageable therewith to maintain the retainers on the vertical wall. Obviously, the insertion of these bolts consumes a considerable amount of time, and concrete can flow through over-size bolt holes when the heads of the bolts are not flush with the wall of the retainer thus permitting the interior of the retainer to be filled with concrete and the bolt heads themselves become encrusted with concrete rendering it extremely difficult to remove the bolts from the retainers when disassembly of the retainers from the paving form is desired.

It is another object of my invention to provide a paving dowel retainer which includes a plurality of fasteners supported on an interior wall thereof, said fasteners being receivable in suitably formed apertures in the vertical wall of the paving form. Since these fasteners are secured to the interior wall of the retainer, the superfluous openings found in conventional retainers are eliminated and the possibility of the influx of concrete therethrough is also obviated. Furthermore, the incrustation occurring with conventional fasteners which have portions projecting beyond the retainer is eliminated thus materially expediting the disassembly of the paving forms from the retainers after the concrete has set.

An additional object of my invention is the provision of fasteners of the aforementioned type which are of substantially U-shaped configuration and which are designed to have the bight ends of the U received in longitudinally elongated apertures in the vertical wall of the paving form. The provision of such U-shaped fasteners provides a more stable and rigid union between the retainer and the paving form than has been hitherto possible and the assembly of the retainer on the paving form is considerably expedited.

An additional object of my invention is the provision of a spring fastener insertable in the bights of the previously mentioned U-shaped fasteners which project beyond the vertical wall of the paving form, such insertion of the spring fasteners securing the U-shaped fasteners in the apertures provided in the vertical wall of said paving form.

Other objects and advantages of my invention will be apparent from the following specification and the accompanying drawing which is for the purpose of illustration only and in which:

Fig. 1 is an isometric view showing a paving dowel supporting structure constructed in accordance with my invention;

Fig. 2 is a longitudinal sectional view taken on the broken line 2—2 of Fig. 1; and

Fig. 3 is an enlarged, vertical sectional view taken on the broken line 3—3 of Fig. 1.

Referring to the drawing, and particularly to Fig. 1 thereof, I show a paving dowel supporting structure 10 which generally includes a paving form 11 and a paving dowel retainer 12 securable thereto in a manner which will be made apparent below.

The paving form 11 consists of elongated segments 14 formed of steel or similar material and having a base portion 15 which rests upon the prepared bed 16 of the roadway or other surface which is to be covered with concrete. Formed integrally with, or otherwise suitably connected to the base portion 15, is a vertical form wall 18, said wall having secured to the upper edge thereof a tread 19 which receives the wheels of a paving or grading machine and supports the paving or grading machine as it traverses the paving form 11.

In order to illustrate the manner in which the paving form 11 and the paving dowel retainer 12 cooperate in configuring the edge of a lane of a concrete roadway, such a lane 22 is partially illustrated in Figs. 1 and 2 of the drawing. The lane 22, when laid by the paving machine, not shown, has a top surface 24 and an edge 25, said edge being configured to intimately mate with an adjacent lane to be subsequently laid in order to prevent the vertical, lateral, and longitudinal shifting of the lane 22 with respect to the lane subsequently laid. As will be readily apparent from consideration of Fig. 1 of the drawing, the edge 25 is provided with top and bottom vertical portions 27 and 28, respectively, which are formed by the engagement of the concrete as it is poured with corresponding portions of the vertical form wall 18 of the paving form 11.

The dowel retainer 12 which is a portion of the dowel supporting structure of my invention is constituted by an elongated member 30, said member having a substantially vertical dowel supporting wall 31 which is disposed in substantial parallelism with the vertical form wall 18 of the paving form 11 and which has integrally formed therewith or otherwise fixedly secured thereto, upper and lower spacing walls 32 and 33, respectively, the upper wall 32 being angularly oriented in an upward direction and having its edge in engagement with the face of the vertical form wall 18, while the lower spacing wall 33 is angularly oriented in a downward direction and has its edge also maintained in engagement with the vertical form wall 18 to define an elongated dowel receiving chamber 35.

Paving dowels 37 are bent into right angles, as best shown in Fig. 1 of the drawing, one leg 38 thereof being disposable in the dowel receiving chamber 35 defined by the dowel retainer 12 and the face of the form wall 18, while the other leg 39 projects from the dowel retainer 12 and the dowel receiving chamber 35 therein through a dowel supporting opening 40 provided in the vertical dowel supporting wall 31 of the retainer 12. When the legs 38 of the dowels 37 are disposed in the dowel receiving chamber 35 of the dowel retainer 12, the legs 38 of two adjacent dowels 37 overlap each other and serve to prevent the rotation of the legs 39 projecting through the openings 40 in the dowel supporting wall 31.

In order to permit the removal of the retainer 12 from the legs 38 of the dowel 37 after the legs 39 thereof have been embedded in the con-

crete of the lane 22, the dowels are straightened in the manner shown in Figs. 1 and 2 of the drawing. However, as will be noted, a pronounced hump or bend 43 remains in the dowel 37 even after the dowel has been straightened into the position shown in Figs. 1 and 2 of the drawing. This is due to the fact that it is impossible to completely straighten the dowels 37 by the methods used in the field and with the tools and at the speed which is necessary in order that the removal of the retainer 12 from the dowels 37 be accomplished expeditiously. As is readily apparent, with conventional small size dowel supporting openings which closely conform to the over-all dimensions and configurations of the peripheries of the dowels, the bends 43 remaining in the dowels 37 after they have been straightened prevent or, at the very least, considerably impede the removal of the retainers 12 from the dowels. To overcome this difficulty, I provide the dowel supporting openings 40 considerably larger than the over-all diameters of the dowels supported therein so that the retainer 12 supported upon the dowels may be shifted longitudinally in order to permit the retainers to be eased over the bends or humps 43 which remain in the dowels 37. This is a very important feature of my invention since it materially expedites both the setting up of the dowel retainers 12 on the dowels 37 in view of the fact that the dowels 37 do not have to be painstakingly threaded through relatively small openings in the retainers, and in view of the fact that the dowel retainers 12 can be readily removed from the straightened dowels after the lane 22 of the roadway has been laid.

In order to prevent the influx of concrete to the interior of the dowel receiving chamber 35 of the retainer 12, I provide sealing means 45 which both encompass the peripheries of the dowels 37 and are supported thereupon in overlying relationship with the over-size dowel supporting openings 40 in the vertical supporting wall of the dowel retainer 12. When disposed in such overlying relationship, the sealing means 45 completely cover the openings 40 and prevent the ingress or influx of concrete through the openings 40 or past the peripheries of the dowels 37 to the interior of the dowel receiving chamber 35 thus preventing the agglomeration of concrete upon the dowels in the chamber 35 and eliminating the possibility that solidified concrete will prevent the expeditious removal of the retainer 12 from the dowels 37 when such removal becomes necessary.

The sealing means 45 is exemplified, in the present embodiment of my invention, by substantially annular sealing elements 47, said elements having substantially rigid skirt portions 48 at the peripheries thereof and being provided with relatively flexible dowel engaging portions 49 which may be resilient in nature to cause them to cling to the peripheries of the dowels 37 with which they are associated to prevent the dislodgement of the sealing elements 47 from the dowels 37 and out of overlying relationship with the over-size openings 40 in the dowel retainers 12. Although I show the sealing elements 47 as being annular in configuration, it is, of course, obvious that the sealing elements 47 are not limited to the specific configuration shown since the shape thereof may be altered to conform to desirable variations in the shape of the dowels and the shape and over-all dimensions of the openings 40. The prevention of the influx of concrete into the interior of the retainer 12 is a major contribution of my invention since it eliminates much of the difficulty encountered with such influx in prior art constructions and materially expedites the removal of the retainer from the dowels at the cessation of the road laying activities.

Of course, when the dowels 37 are securely disposed in the retainer 12, it is merely necessary to place the sealing means 45 on the individual dowel and run them up against the face of the dowel mounting wall 31. It is intended that the sealing means of my invention be disposable in nature so that the removal thereof from the dowels 37 after the concrete has been laid will not be necessary.

Secured to the interior of the vertical dowel supporting wall 31 of the dowel retainer 12, is a plurality of longitudinally spaced fastener means 50, said spaced fastener means being constituted by substantially U-shaped elements 52, the ends of which are fixedly secured to the interior of the vertical wall 31 of the retainer 12 by means of welding, and the bights 54 of which are insertable through elongated openings 55 provided in the vertical form wall 18 of the paving form 11 to mount the retainer 12 on the paving form 11. After the retainer 12 is so mounted, a spring clip 57 is disposed between the back of the form wall 18 and the bight 54 of the U-shaped fastener 52. Thus, the dowel retainer 12 is securely fastened to the vertical form wall 18 and, since the ends of the substantially U-shaped fasteners 52 are mounted on the interior of the vertical supporting wall 31 of the retainer 12, and since there is no possibility of influx of concrete into the interior of the chamber 35 due to the provision of the sealing means 45 for the over-size openings 40, and the elimination of fastener receiving holes in the vertical wall 31, the engagement of the U-shaped fasteners 52 with the elongated openings 55 in the form wall 18 may be readily released so that the form wall can be easily separated from the retainer during dismounting of the dowel supporting structure 10. Another advantage of the fastening means 50 of my invention is the fact that the elongated openings 55 in the vertical form wall 18 can be rendered considerably oversize because of the widely spaced bearing of the bight portion 54 of the U-shaped fasteners 52 to facilitate the expeditious mounting of the retainer 12 on the paving form 11.

The manner in which dowels 37 can be securely, but temporarily, mounted in the dowel supporting structure 10 of my invention is as follows: the paving form 11 is first securely disposed on a prepared bed 16 of the roadway adjacent the predetermined edge of the lane 22 and is fastened in such position by conventional fastening means, not shown. The dowels 37, bent into right angle form, are disposed in the retainer 12 in such a manner that the legs 38 of adjacent dowels overlie each other, as best shown in Fig. 1 of the drawing. Of course, the legs 39 of the dowels 37 are permitted to project through the dowel supporting openings 40 in the vertical dowel supporting wall 31 of the retainer 12. At the same time as the dowels are inserted in the retainer 12, the sealing means 45 are disposed upon the legs 39 and moved into overlying relationship with the over-size openings 40 in the retainer 12. The retainer 12 is then moved into position on the vertical form wall 18 of the paving form 11 so that the U-shaped fasteners 52 may have their bights 54 inserted in the elongated apertures 55 in the vertical form wall 18. After such insertion has been accomplished, the spring fasteners

57 are forced between the back of the form wall 18 and the bights 54 of the U-shaped fasteners 52 to securely, but demountably, maintain the retainer 12 on the face of the form wall 18.

When the lane 22 of roadway is laid, an elongated, longitudinally oriented groove 59 is formed by the retainer 12 in the edge of the lane 22 between the upper and lower vertical edges 27 and 28 thereof and the legs 39 of the dowels 37 which project through the openings 40 in the retainer 12 are embedded in the concrete of the lane 22. After the concrete of the lane 22 is cured, the dowel supporting structure 10 is demounted by removing the paving form 11 from operative relationship with the retainer 12, this being accomplished by the removal of the spring fasteners 57 from the bights 54 of the U-shaped fasteners 52 and the removal of the vertical form wall 18 of the paving form 11 from engagement with the bights 54 of the U-shaped fasteners 52. Subsequently, the dowels 37 are straightened as well as possible into the positions shown in Figs. 1 and 2 of the drawing, the small hump or bend 43 remaining therein. Because the openings 40 in the vertical wall 31 are substantially over-size, the humps 43 in the straightened dowels 37 do not prevent the expeditious removal of the retainers 12 therefrom since, as best shown in the dotted lines of Fig. 2 of the drawing, the bends or humps 43 are readily accommodated in the over-size openings 40 and the expeditious removal of the retainer 12 from the straightened dowel 37 is accomplished.

I thus provide by my invention a paving dowel supporting structure which includes a retainer for said dowels having over-size openings therein to facilitate the ready removal of the retainer from the dowels after the concrete has been poured. I also provide by my invention sealing means for preventing the influx of the concrete through the aforesaid over-size openings into the interior of the dowel retainer and improved fastening means for securing the retainer to the paving form with which it is associated which can be readily disengaged from the paving form to facilitate the demounting of the paving dowel structure.

I claim as my invention:

1. In a supporting structure for maintaining a plurality of paving dowels in longitudinal alignment on a paving form having a base and a form wall extending upwardly from said base, the combination of: a unitary elongated dowel retainer mountable on said form wall having a supporting wall disposable in spaced, parallel relationship with said form wall and upper and lower inwardly and angularly oriented walls engaging said form wall, said supporting wall having a plurality of dowel receiving openings therein; and fastener means secured to the interior of said supporting wall and inwardly of the exterior of said supporting wall for maintaining said retainer thereupon.

2. In a supporting structure for maintaining a plurality of paving dowels in longitudinal alignment on a paving form having a base and a form wall extending upwardly from said base, the combination of: a unitary elongated dowel retainer mountable on said form wall having a supporting wall disposable in spaced, parallel relationship with said form wall and upper and lower inwardly oriented walls engaging said form wall, said supporting wall having a plurality of dowel receiving openings therein of substantially greater length than the diameters of the dowels extending therethrough; and substantially U-shaped fastener means secured to the interior of said supporting wall whereby the exterior of said supporting wall presents a smooth surface broken only by said dowel receiving openings, said fastener means being receivable in said form wall for maintaining said retainer thereupon.

3. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; a unitary elongated member having a plurality of oversize dowel supporting openings formed therein and having inwardly oriented upper and lower walls adapted to engage said form wall, said member having a plurality of fasteners secured to the interior thereof and engageable with said apertures; and sealing means having substantially rigid skirt portions at the peripheries thereof and having flexible dowel engaging portions disposable on said dowels for overlying and sealing said openings to prevent the influx of concrete into said member.

4. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; and a unitary elongated member having a plurality of longitudinally spaced, dowel supporting holes provided therein and having inwardly oriented upper and lower walls adapted to engage said form wall, said member having a plurality of longitudinally spaced fasteners whose bases are secured to the interior and inwardly of the exterior thereof and engageable with fastening members positioned adjacent said apertures and bearing on adjacent areas of said form wall.

5. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; a unitary channel-shaped elongated member having a plurality of oversize dowel supporting openings formed therein, said member having a plurality of substantially U-shaped fasteners secured to the interior thereof and engageable with said apertures; and sealing means disposable on said dowels for overlying and sealing said openings to prevent the influx of concrete into said member.

6. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; a unitary channel-shaped elongated member having a plurality of longitudinally spaced, dowel supporting holes provided therein, said member having a plurality of longitudinally spaced fasteners whose bases are secured to the interior and inwardly of the exterior thereof; and elongated fastening members engageable with portions of said fasteners for retaining said elongated member on said form wall.

7. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; a unitary channel-shaped elongated member having a plurality of longitudinally spaced, dowel supporting holes provided therein, said member having a plu-

rality of longitudinally spaced substantially U-shaped fasteners secured to the interior and inwardly of the exterior thereof engageable with said apertures; and spring members engageable with the bights of said U-shaped fasteners projecting through said apertures for retaining said elongated member on said form wall.

8. In a paving dowel retainer structure, the combination of: a paving form having a base and a form wall connected to said base, said form wall having a plurality of longitudinally spaced apertures therein; a unitary channel-shaped elongated member having a plurality of longitudinally spaced, dowel supporting holes provided therein, said member having a plurality of longitudinally spaced fasteners secured to the interior and inwardly of the exterior thereof engageable with said apertures; and sealing means disposable on said dowels for overlying and sealing said openings to prevent the influx of concrete into said member.

9. In a supporting structure for maintaining a plurality of paving dowels in longitudinal alignment on a paving form having a base and a form wall extending upwardly from said base, the combination of: a unitary elongated dowel

retainer mountable on said form wall having a supporting wall disposable in spaced, parallel relationship with said form wall and upper and lower inwardly oriented walls engaging said form wall, said supporting wall having a plurality of dowel receiving openings therein; and a plurality of longitudinally spaced fastener means secured to the interior of said supporting wall and receivable in said form wall for maintaining said retainer thereupon.

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