Nov. 29, 1949 C. BEAN 2,489,851

DOWEL RETAINER FOR USE WITH CONCRETE PAVEMENT FORMS

Filed April 27, 1946 2 Sheets-Sheet 1

Fig. 1

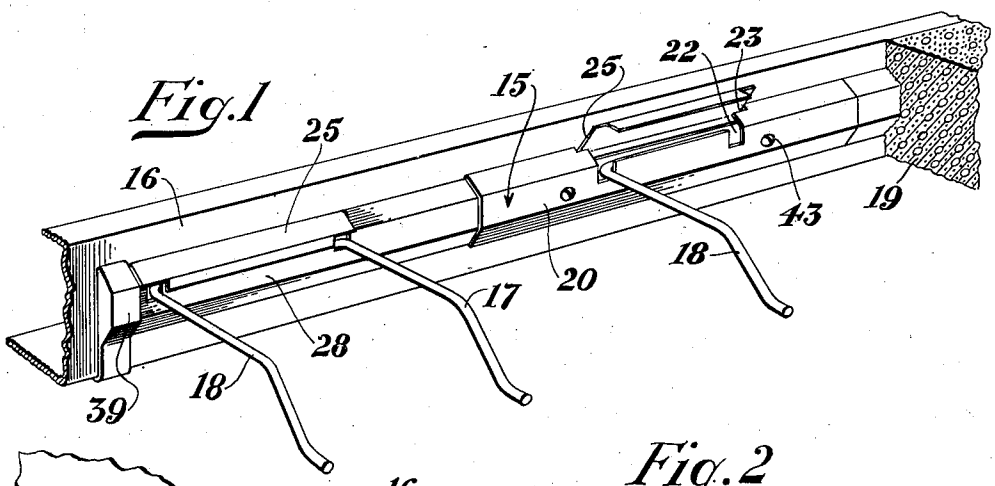


Fig. 2

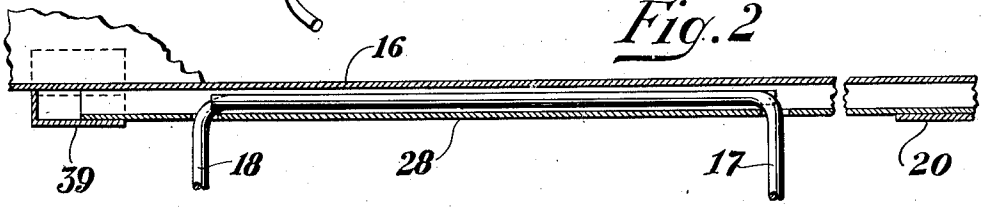


Fig. 3

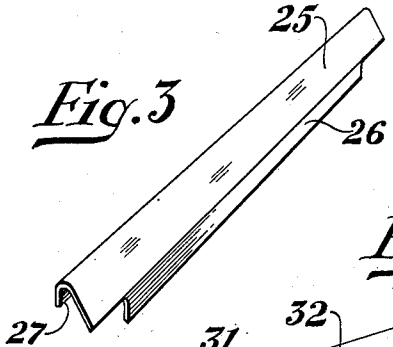


Fig. 4

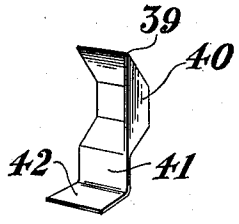


Fig. 5

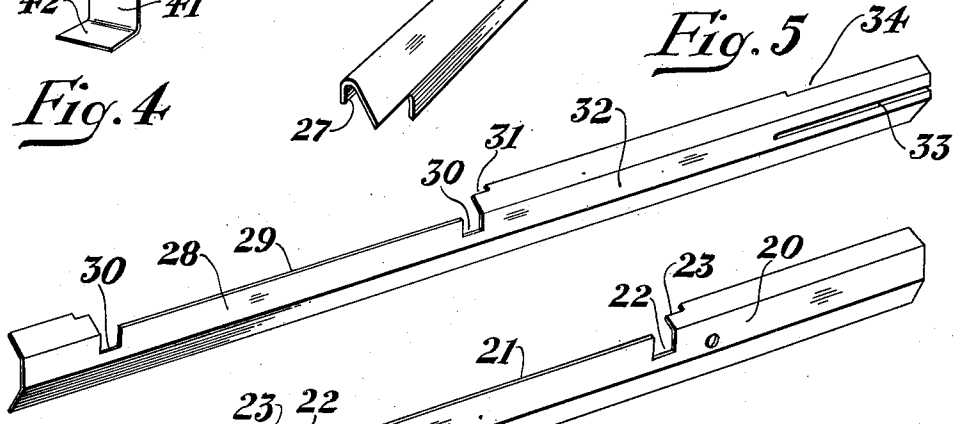
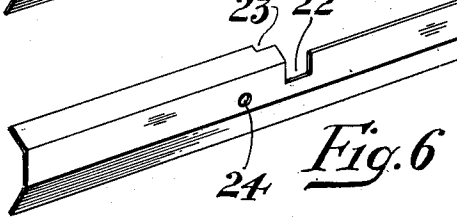


Fig. 6



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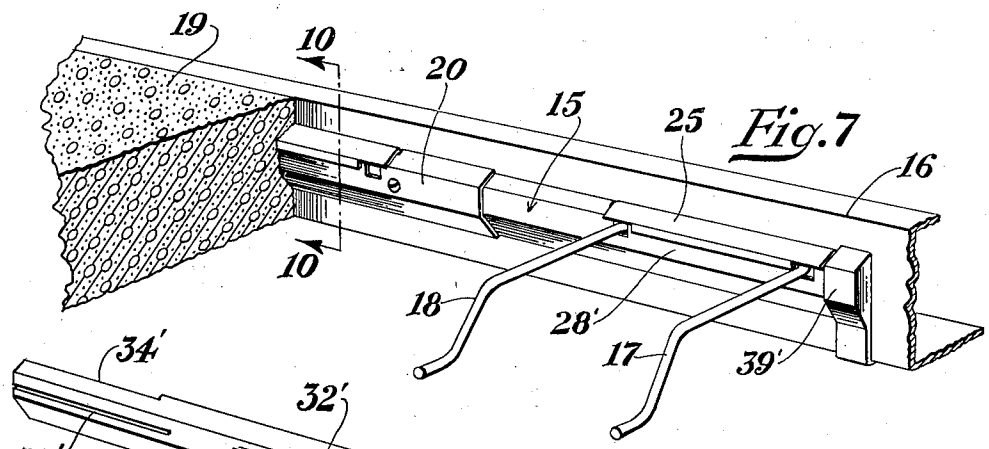


Fig. 7

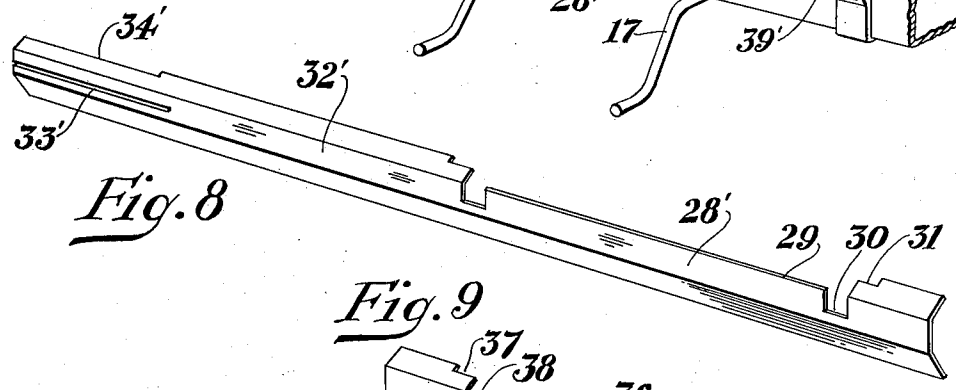
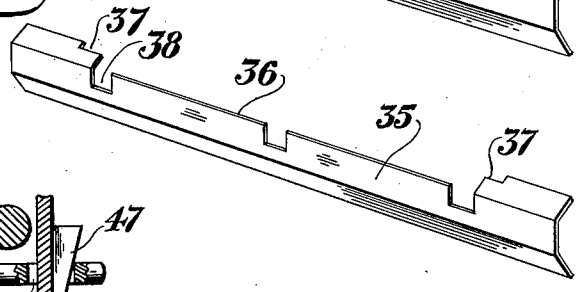


Fig. 8

Fig. 9



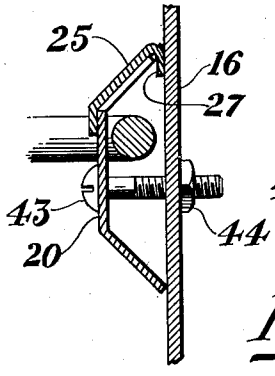


Fig. 10

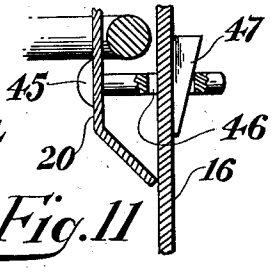


Fig. 11

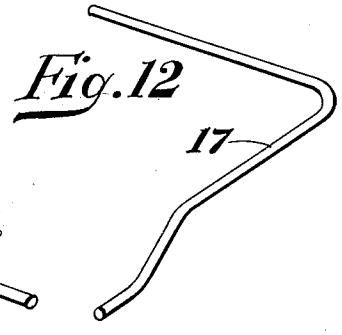


Fig. 12



Fig. 13

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DOWEL RETAINER FOR USE WITH CONCRETE PAVEMENT FORMS

Clinton Bean, New Rochelle, N. Y.

Application April 27, 1946, Serial No. 665,464

7 Claims. (Cl. 25—118)

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This invention relates to an improved dowel retainer to be used in the construction of concrete roads and pavements.

My invention relates generally to dowel retainers of the type disclosed in my Patent #2,178,386 granted on October 31, 1939. In the construction of concrete roads or pavements it is general practice to form a plurality of separate parallel lanes and to bind the lanes together by means of transverse metallic dowels extending between and embedded in adjoining lanes. The dowel retainers are mounted on the road forms and are used to retain the dowels in position while the concrete is being poured and while it sets.

It is an object of the present invention to provide an improved dowel retainer which will form a substantially continuous keyway in the side edge of the lane of concrete.

A further object is the provision of an improved dowel retainer assembly which is flexible in character so as to enable the operator to obtain the desired spacing between the dowels and between the dowels and the expansion joints under the varying conditions which might be encountered in road and pavement construction.

Another object is the provision of an improved dowel retainer unit having a cover which may be readily opened and closed so as to permit the removal and insertion of the dowels without separation of the cover from the unit.

Other objects include the provision of an improved dowel retainer assembly of relatively simple construction having a minimum number of parts which can be readily applied to and removed from the road forms and which can be repeatedly reused over a relatively long period of time.

Further objects will be apparent from the accompanying drawing in which:

Fig. 1 is a perspective view of a dowel retainer assembly applied to a road form illustrating the manner in which it is used,

Fig. 2 is a longitudinal sectional view of a portion of the assembly,

Fig. 3 is a perspective view of a cover unit,

Fig. 4 is a perspective view of a bracket unit used in supporting the assembly,

Fig. 5 is a perspective view of one type of telescoping retainer unit,

Fig. 6 is a perspective view of the primary type of retainer unit,

Fig. 7 is a perspective view of a portion of a dowel retainer assembly viewed from the opposite end of Fig. 1,

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Fig. 8 is a perspective view of another type of telescoping unit,

Fig. 9 is a perspective view of an inter-connecting filler unit,

Fig. 10 is a cross-sectional view on the line 10—10 of Fig. 7 with portions omitted showing one manner of attaching the primary units to the road form,

Fig. 11 is a view similar to Fig. 10 showing a modified attaching means and

Figs. 12 and 13 are perspective views of left and right-hand dowels.

Referring now to the drawings more particularly Figs. 1 and 7, I have illustrated my improved dowel retainer assembly 15 as applied to the inner surface of one standard type of road form 16 and retaining the left and right bent dowels 17 and 18 in position so that when the concrete lane 19 is poured one end of the dowels will be embedded therein.

The dowel retainer assembly is formed of several different types of units the primary type of unit is indicated by the numeral 20 and is shown most clearly in Fig. 6. This unit is of generally channel-shape having a flat central portion and angularly disposed inwardly projecting upper and lower portions formed integral therewith. The central part of the upper depending portion is cutout as indicated at 21 so as to permit the insertion and removal of the ends of the dowels. In this connection the central portion 21 is preferably substantially as long as the bent ends of the dowels which are retained therein. Adjacent its two ends the central cutout portion 21 is provided with notches 22 through which the projecting portions of the dowels extend and the notches should be large enough to comfortably accommodate the dowels. To accommodate the cover and to permit it to be readily opened and closed I form small recesses 23 in the upper edge of the unit 20 immediately adjacent the notches 22.

The unit 20 is also provided with a pair of apertures 24 suitably spaced apart and serving to accommodate bolts or studs to be used in removably attaching the retainer assembly to a road form. The apertures 24 are preferably positioned beneath the plane of the lower edge of notch 22 so that the bolts or studs will not interfere with the end of a dowel which might project beyond an aperture.

A suitable cover is provided for the cutout portion 21 and this cover takes the form of a member 25 shown most clearly in Fig. 3 having an angularly disposed portion corresponding to

the angularly disposed upper portion of the primary unit 20 with a depending flange 26 at the lower end thereof which is adapted to overlie the front of the unit 20 and a depending flange 27 at the upper portion thereof which projects inside the unit 20. The cover 25 is of such a length as to rest at its two ends in the recesses 23 and the recesses are of such a size that the upper surface of the cover will normally be substantially flush with the upper edge of the unit 20. The depending flange 26 is of substantially the same length as the distance between the two inner edges of the notches 22 and overlies the upper portion of the forward wall of the primary unit 20 between the two notches. The cover accordingly does not block the notches 22 and permits the dowels to project outwardly therethrough. The cover may readily be pivoted to open position as shown in Fig. 1 so as to permit the insertion and removal of the dowels without physically separating the cover from the unit.

In addition to the primary unit I also provide telescoping units similar to those shown at 28 and 28' in Figs. 5 and 8 respectively. Telescoping unit 28 is generally used at the left end of an assembly and telescoping unit 28', which is a mirror image of unit 28, is generally used adjacent the right end of an assembly. Each of the units has a cutout portion 29 corresponding to the cutout portion 21, in the primary unit and also notches 30 corresponding to notches 22 and recesses 31 corresponding to recesses 23. The cover 25 also serves as a cover for the cutout portions of the telescoping units 28 and 28'. The telescoping units are also formed with laterally projecting extensions adapted to telescope into and under the end of a primary unit 20. In unit 28 the extension 32 projects from the right end thereof, whereas, in unit 28' the extension 32' extends from the left end thereof. The extensions are provided with slots 33 and 33' respectively extending inwardly from the edges thereof in the same plane as the apertures 24 in the primary units 20. The slots provide clearance for and accommodate the attaching bolts or studs so as to permit the telescoping of the units with the primary units without interference from the bolts or studs. So as to facilitate the telescopic action of the units 28 and 28' with the primary unit 20 the telescoping units should be slightly smaller in cross sectional size than the primary units.

The lateral extension of the telescoping units should also be provided with recesses 34 and 34' extending inwardly from the end of the extension along the upper edge thereof. These recesses should correspond in depth with the recesses 23 in the primary units 20 and provide clearance for and serve to accommodate the cover 25 when the units are telescoped with the primary units to a point beyond the recesses 23. The recesses 34 and 34' may be slightly shorter than the slots 33 and 33'. However, the difference in length should be no greater than the distance between the aperture 24 and the beginning of the recesses 23 in the primary retainer unit 20.

In order to give greater flexibility to the assembly I prefer to provide a relatively shorter interconnecting filler unit 35, shown most clearly in Fig. 9 and which is slightly longer than the cutout portion 21 in the primary unit 20. The filler unit is similar in cross sectional size and shape to the telescoping unit 28 and 28' that is, it is a little smaller in cross sectional size than the primary unit 20. The filler unit is also provided with a central cutout portion 36 corresponding to the cutout portion 21. Recesses 37 corresponding with the recesses 23 and with three notches 38. The two end notches in the filler unit correspond with the notches 22 in the primary unit and the central intermediate notch is provided so as to provide for greater flexibility and a greater range of adjustment. The filler unit projects for a short distance beyond the recesses 37 at both ends approximately equal to the projection of 28' beyond recess 31 on the right-hand side of Fig. 8. In use the filler unit is disposed between two of the primary units with the ends thereof fitted into and telescoping with respect to the ends of the primary units and on occasion it is used at the end of an assembly adjacent an expansion joint. Accordingly, the filler units require no apertures for bolts or other fastening means to attach it to the forms.

In addition to the foregoing parts the assembly also preferably includes a suitable bracket such as the brackets 39 and 39' respectively used to support one end of the telescoping units 28 and 28'. The bracket 39, as shown in Fig. 4, is provided with a flat center portion and with angularly disposed upper and lower portions corresponding in cross-sectional size and shape to the cross-sectional shape of the primary unit 20. In addition the end of the bracket is closed by means of the plate 40. Projecting downwardly from the lower edge of the bracket is a support 41 with a flange 42 projecting inwardly from the lower edge thereof. In use, the flange 42 is inserted beneath the road form 16 and the end of the telescoping unit 28 is inserted therein as shown in Figs. 1 and 7. The opposite end of the telescoping unit is inserted in and supported by one of the primary units 20. A bracket 39' which is a mirror image of the bracket 39 is provided for the opposite end of the assembly.

As previously stated the primary units may be supported on the road forms by means of nuts and bolts or studs. Typical arrangements are shown in Figs. 10 and 11. Thus, in Fig. 10 a bolt 43 projects through an aperture 24 in primary unit 20 through an aperture in road form 16 and a nut 44 is applied to the opposite end thereof. In Fig. 11 a stud 45 is illustrated as extending through the aperture 24 in plate 20 and through an aperture in road form 16. The stud is provided with a longitudinal slot 46 into which a wedge 47 is forced thereby securely holding the assembly in position.

In describing the use of my improved assembly I will give an illustration of one typical set of requirements as to conditions and spacing of dowels which is encountered in the field. It should be understood, however, that different conditions and different requirements as to spacing may be encountered and that different dimensions may be employed without departing from my invention. In one typical form of installation the first dowel must be no more than approximately 1 foot from an expansion joint and the second dowel no more than approximately 2 feet therefrom. Thereafter, the dowels may be approximately 5 feet apart. To meet these conditions I have found that the primary retainer units and the telescoping retainer units may conveniently be approximately 5 feet long and the interconnecting filler unit approximately 2'10¾'' long. The distance between the remote edges of the notches 22, 30 and 38 in each type of unit may be approximately 2'¾''. The spacing between the apertures 24 in the arrangement

illustrated may be 30''. The usual road form 16 is formed in 10 feet units and each of these units may be drilled adjacent the center at 30'' intervals to accommodate the bolts 43 or studs 45. In this connection I have found that good results are obtained by uniformly drilling each road form with four holes at 30'' intervals so positioned that these holes amply clear the fastening devices usually three in number attached to the outside face of the road forms through which iron pins are driven into the ground and by means of which the road forms are secured to proper alignment (not shown).

In using my dowel retainer assembly the sub-grade is first prepared and the road forms are assembled in the usual manner. Thereafter, the dowel retainer units are assembled on the forms so as to provide a continuous keyway and so as to provide for proper spacing of the dowels with respect to the expansion joints and with respect to each other. Assuming a spacing between expansion joints of 77 feet I will briefly describe the manner in which the units are assembled with particular reference to Figs. 1 and 7. Fig. 1 illustrates the first end of the assembly adjacent the left hand expansion joint and Figure 7 illustrates the right end of the assembly adjacent the right hand expansion joint.

The assembly of the units is started by applying the first primary unit 20 to the road form by means of a bolt or stud through the right-hand aperture and a convenient hole in the road form which will bring the left hand end of this unit more than 3'1½'' from the left hand expansion joint. The bracket 39 is then installed at the required distance from the expansion joint by inserting the flange 42 beneath the road form. If the distance between the left end of the first primary unit and the expansion joint is greater than 3'6'' a telescoping unit 28 is applied between the bracket and the primary unit. This is accomplished by inserting the extension 32 of this telescoping unit into the primary unit and inserting the opposite end into the bracket 39. The telescoping unit is then adjusted so as to bring the left hand notch 30 in the telescoping unit approximately one foot from the expansion joint. Considerable adjustment can be obtained due to the telescoping character of the unit and due to the provisions of slot 33 to accommodate the bolt or stud and also the recess 34 to provide clearance for the cover.

If the distance between the left hand end of the first primary unit and the expansion joint is less than 3'6'' then one of the fittings 35 is installed between the bracket and the primary unit by inserting the respective ends thereof into the bracket and beneath the end of the primary unit. When either the telescoping unit 28 or the fitting 35 has been installed in this fashion a bolt or stud is inserted in the left aperture of the first primary unit and a corresponding hole in the road form if this was not previously done and tightened. The bolt or stud at the right end of this unit is then tightened.

Thereafter a plurality of the primary units 20 are attached in succession to the road form so they are connected end to end providing a continuous keyway. In the present example due to the spacing between the expansion joints eleven more primary units are applied. The operator then proceeds to the next or right hand expansion joint and works backwardly therefrom in the manner illustrated in Fig. 7. Thus, he applies the first primary unit 20 to the road form by means of the first set of apertures which will bring the right hand end thereof more than 3'1½'' from the expansion joint. A bracket 39' similar to the bracket 39 but closed on the opposite side thereof from bracket 39 is applied to the road form and then if the distance between the left hand end of the primary unit 20 and the right hand expansion joint is greater than 3'6'' a telescoping unit 28' is applied between the bracket and the primary unit in the manner previously described in connection with the other end of the assembly.

There will then be a remaining gap of either 5 feet or 30'' in length. If it is 5 feet a primary unit is installed therein. If it is 30'' an inter-connecting fitting 35 is installed therein with its opposite ends inserted beneath the ends of the two adjacent primary units.

If other work is to be done on the sub-grade before inserting the dowels the covers are placed in position to prevent dirt or any foreign matter from entering the retainers. Thereafter to insert the dowels it is not necessary to physically remove the covers but merely to pivot them to open position.

In order to obtain proper spacing of the dowels in accordance with the present example a pair of dowels should be inserted in each of the telescoping units at the two ends of the assembly. Dowels are also inserted in the proper apertures (or notches) of the adjacent primary units so that a spacing of five feet or less is obtained. In the succeeding primary units the dowels can be placed in the corresponding apertures (or notches) so that they are positioned approximately 5 feet apart. If a fitting 35 has been used to close the above mentioned gap a dowel may be used in the central intermediate notch to obtain a spacing of five feet or less between dowels.

Where dowels of the type shown in the accompanying drawings are employed it is necessary to have dowels having both left hand and right hand bends as shown so that the protruding ends of the dowels will always be offset downwardly.

The concrete may be poured in the usual manner and reenforcing mesh may be employed when desired. After the concrete has set the nuts are removed from the bolts 43 or the ends of the bolts are clipped or where studs 45 are employed the wedges 47 are removed. The road forms can then be withdrawn leaving the dowel retainer assembly and dowels in position. It will be appreciated that the dowel retainers can be readily withdrawn from position, without disturbing the free ends of the dowel bars and reused many times.

When the next lane of concrete is to be poured the protruding ends of the dowels which will be positioned in the keyway formed in the side of the first concrete lane are bent so as to project outwardly at right angles from the lane. Prior to this time, however, the keyway serves as a shield to encase the ends of the dowels and prevents them from interfering with the other operations. Because of the several types of retainer units shown and described herein, an assembly can be provided which will meet any condition normally encountered in road and pavement construction. The telescoping units can readily inter-engage with the primary units without interfering with the bolt or stud and without preventing the proper operation of the cover. Also, the inter-engagement between the telescoping unit and the primary unit and also between the inter-connecting fitting and primary units is

such as to permit the ends of the dowels which are encased in the retainer to project in either direction inside the retainer without any interference or obstruction. The brackets 39 and 39' serve not only to support the two ends of the assembly but also to terminate the keyway the required distance from the expansion joints.

It should be understood that the dowel retainer units may be made of any suitable material such as plastics or sheet metal particularly sheet steel.

It will thus be seen that I have provided an improved dowel retainer assembly of relatively simple construction which is flexible and accommodates itself to varying conditions, which may be conveniently installed and which can be repeatedly reused over a long period of time. It will also be appreciated that the dimensions herein given in connection with the example installation are merely illustrative and that they may be varied considerably. It should also be understood that modifications may be made in the illustrated embodiment of my invention without departing from the invention as set forth in the accompanying claims.

I claim:

1. A dowel retainer to be applied to a concrete form in pavement construction comprising a retainer unit having a substantially straight flat front wall adapted to be applied to the road form in spaced parallel relationship and angularly disposed upper and lower walls connected to the front wall and adapted to extend substantially to the road form when the unit is applied thereto, the upper wall having a cutout portion providing an opening for the insertion and removal of the dowels and the edge of the upper wall being recessed for a short distance beyond the two ends of the cutout portion so as to provide clearance for the accommodation of a cover member.

2. A dowel retainer to be applied to a concrete form in pavement construction comprising a retainer unit having a substantially straight flat front wall adapted to be applied to the road form in spaced parallel relationship and angularly disposed upper and lower walls connected to the front wall and adapted to extend substantially to the road form when the unit is applied thereto, the upper wall having a cutout portion providing an opening for the insertion and removal of the dowels and the edge of the upper wall being recessed for a short distance beyond the two ends of the cutout portion and a cover member for the opening in the unit comprising an angularly disposed panel adapted to overlie the cutout portion of the top wall of the retainer unit and a flange depending downwardly from the upper edge thereof and adapted to project inside of the retainer unit said cover member being of such a length that the two ends thereof rest in the recesses in the upper wall of the retainer unit at the two ends of the cutout portion whereby the cover may be pivoted between open and closed positions.

3. A dowel retainer to be applied to a concrete form in pavement construction comprising a retainer unit having a substantially straight flat front wall adapted to be applied to the road form in spaced parallel relationship and angularly disposed upper and lower walls connected to the front wall and adapted to extend substantially to the road form when the unit is applied thereto, the upper wall having a cutout portion providing an opening for the insertion and removal of the dowels and the edge of the upper wall being recessed for a short distance beyond the two ends of the cutout portion and a cover member for the opening in the retainer unit comprising an angularly disposed panel adapted to overlie the cutout portion in the upper wall of the retainer unit, a flange depending from the upper edge of the panel and adapted to project inside the retainer unit said cover being of such a length as to rest in the recesses formed in the upper wall of the retainer unit at the two ends of the cutout portion whereby the cover may pivot between open and closed positions.

4. A dowel retainer for use with concrete forms in pavement construction comprising a retainer unit having a substantially straight flat front wall adapted to be applied to the form in spaced parallel relationship therewith, upper and lower walls connected to the upper and lower edges of the front wall and extending therefrom at an angle, said upper and lower walls adapted to extend substantially to the form when the unit is applied thereto, said upper wall being formed with a cutout portion forming an opening to permit the insertion and removal of dowels said front wall having notches extending downwardly from the cutout portion to permit the projecting end of a dowel to extend therethrough and the edge of the upper wall being formed with recesses adjacent the two ends of the cutout portion; and a cover member for the opening in the unit said cover member having an angularly disposed panel adapted to overlie the cutout in the upper wall of the retainer unit, a flange depending from the lower edge thereof and adapted to overlie the front wall of the retainer unit between the notches, and a flange depending from the upper edge thereof and adapted to project inside the retainer unit, the panel and the last mentioned flange being of such a length as to rest in the recesses in the upper wall of the retainer unit whereby the cover may be pivoted between open and closed position.

5. A dowel retainer assembly for use with concrete forms in pavement construction comprising a plurality of substantially channel shaped retainer units adapted to be secured to concrete forms with the open face in confronting relationship therewith and in substantially continuous straight line relationship to each other so as to provide a substantially continuous keyway, each of said units having an opening to permit the insertion and removal of the dowels, a notch through which ther end of a dowel can project and a cover for the opening, one of said units having a stud projecting therethrough for connecting it to the concrete form and the adjacent unit being provided with a lateral extension telescoping into the first mentioned unit the lateral extension having an elongated slot extending inwardly from the end thereof to accommodate the aforesaid stud.

6. A dowel retainer assembly for use with concrete forms in pavement construction comprising a plurality of dowel retainer units each formed with a substantially straight flat front wall adapted to be applied to the road forms in spaced parallel relationship therewith and angularly disposed upper and lower walls adapted to extend from the front walls substantially to the road form when the retainer unit is applied thereto, the upper wall being provided with a cutout portion providing an opening for insertion and removal of dowels and the edge of the upper wall being provided with recesses at the two ends

of the cutout portion for accommodating the ends of a cover, one of said units being adapted to be attached to the road forms by means of a stud extending therethrough and the adjacent unit having a lateral extension telescoping into the end of the first mentioned unit whereby relative adjustment in length can be obtained, the lateral extension being provided with an elongated slot extending inwardly from the end thereof for accommodating the aforesaid stud and the upper edge of the lateral extension being provided with a recess adapted to register with the recess at one end of the cutout portion of the first mentioned unit.

7. A dowel retainer for use with concrete forms for pavement construction comprising a retainer unit adapted to be used in telescoping relationship with other retainer units and having a substantially straight flat front wall adapted to be applied to the concrete form in spaced parallel relationship therewith and angularly disposed upper and lower walls adapted to extend substantially to the concrete form when the unit is applied thereto, said upper wall being provided with a cutout portion providing an opening for

the insertion into and removal from the unit of the dowels and the unit having a laterally projecting extension adapted to telescope into another dowel retainer unit said extension having an elongated slot extending inwardly from the end thereof adapted to accommodate a stud from another unit and having an elongated recess formed along one edge thereof and adapted to register with a recess in another unit.

CLINTON BEAN.

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