“IMPROVED CONNECTOR FOR USE IN FORMING JOINTS”

FIELD OF THE INVENTION

[0001] The invention relates to an improved connector for use in forming joints. The invention is particularly suited for use in connecting portions of a post-tensioned concrete structure, such as floor slabs, in a manner that allows the portions to move relative to each other as occurs during settling of the portions.

BACKGROUND TO THE INVENTION

[0002] The following discussion of the background to the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

[0003] Post-tensioning (**“PT”**) is a technique used in the construction of buildings, particularly those where the floors of the building are intended to have long spans uninterrupted by vertical pillars. PT involves reinforcing (strengthening) concrete or other materials with high strength steel strands or bars. These strands and bars are generally referred to as tendons.

[0004] The problem with this approach is that it is generally not possible to pour an entire floor as a single floor plate due to size restriction, continuity requirements and/or restraint conditions. As a consequence, the floor is commonly formed in sections or individual slabs. These sections or slabs are commonly poured at different time to each other. To ensure that the floor is more or less continuous, each section or slab contains suitable tendons such as PT wire cables or PT strand cables.

[0005] As each section or slab cures and settles, the sections or slabs may move relative to each other. This means that the joint connecting the sections or slabs must be capable of accommodating this relative movement. At the same time, the joint operates to allow temporary release of restraining effects of the various sections relative to one another and thus ensure that the maximum amount of PT pre-compression force is transferred into the floor plates. If insufficient PT pre-compression force is transferred into the floor plates there exists the possibility of

cracking within the sections or slabs – thereby reducing the longevity and the integrity of the resulting floor plate.

[0006] One past method of allowing for such movement and transfer of pre-compression force has been to place temporary movement joints at strategic locations within the building. Each temporary movement joint allows for movement during curing and settling of the structural elements that it joins. Once the joined structural elements have cured and settled, the temporary movement joint is permanently locked so as to provide a more or less continuous floor or other element of the building.

[0007] While this approach works, almost all temporary movement joints of the prior art suffer from one or more of the following problems:

- If the surfaces that the temporary movement joints seek to connect move relative to each other during settling, an air gap may be formed which leaves both the temporary movement joint and at least part of the tendon exposed to the atmosphere and thus subject to corrosion and the like until sealed.
- There is significant difficulty in sealing the temporary movement joint – in particular the underside of the temporary movement joint.

[0008] A consequence of the first problem is that prior art temporary movement joints must be made from corrosion resistant materials, such as stainless steel. When combined with the fact that the materials must also be fire resistant or incorporate other attributes to meet building regulations, the cost of manufacturing such temporary movement joints may be up to ten times higher than the cost of manufacturing from less exotic materials.

[0009] The second problem presents a situation where the temporary movement joint is not adequately strengthened or that sealant may be lost from the joint. In both cases, a workman is then required to caulk the temporary movement joint at a later date and thus ensure that the temporary movement joint is properly sealed and thereby locked in place. This requirement for remedial action is time-consuming and expensive in addition to delaying completion of the building.

[0010] The applicant sought to address these problems through the connector the subject of International Patent Application PCT/AU2015/000064 titled "Connector for Use in Forming Joints". This invention used a first member (typically a female

member) installed in the first surface. The second member (being a male member adapted to be mated with the female member) is then installed and the second surface formed around it. This use of members installed in both surfaces creates the potential for the unit to fail under excessive forces in any of the three axis of movements that the invention allows for. This includes vertical deflection or stepping.

[0011] It is therefore an object of the present invention to provide a connector for use in forming joints that ameliorates, at least in part, one or more of the aforementioned problems.

SUMMARY OF THE INVENTION

[0012] Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to”.

[0013] In accordance with a first aspect of the invention there is an improved connector for use in forming joints comprising:

a housing having an enlarged seal housing at a first end; and

a sealing screen adapted for receipt in the enlarged seal housing, the sealing screen incorporating an elastic membrane surrounding an aperture,

where, the aperture is adapted to sealingly engage a dowel bar and where, movement of the dowel bar laterally, vertically or telescopically is accommodated for by the elastic membrane in a manner that ensures that the dowel bar remains sealing engaged by the aperture.

[0014] In its preferred arrangement, the sealing screen is substantially flat.

[0015] The enlarged seal housing may be connected to a chamber by way of a first opening, the first opening being at a position above the housing when in use, the chamber incorporating a first spigot at a position lower than the first opening. In such an arrangement, it is further preferred that the enlarged seal housing have at least one abutment, such that when the sealing screen is received within the enlarged seal housing it makes contact with the at least one abutment and thereby ensures that grout entering the chamber by way of the first opening is able to flow through to the remainder of the housing.

[0016] The improved connector may have a second spigot provided in the housing remote from the first spigot. The housing may also have at least one pair of stops provided internally therein, the stops operable to guide the positioning of the dowel bar.

[0017] In further configurations, the housing may have at least one projection extending therefrom into the aperture, the at least one projection thereby operable to limit lateral movement of the dowel bar. The housing may also have a retainer provided in an end spaced from the enlarged seal housing, the retainer operable to receive one or more of the following: a bar chair; a prop.

[0018] Preferably, the housing may have an external surface having a plurality of surface irregularities or discontinuities provided therein. This plurality of irregularities or discontinuities take the form of a plurality of ribs. Such ribs assist in securing the improved connector within its intended surface.

[0019] Similarly, the housing may be adapted such that, in use, the upper surface of the housing has a reservoir defined therein. This reservoir allows the weight of the intended surface material to accumulate and further solidify its position within the surface.

[0020] The sealing screen may have at least one alignment ledge for facilitating orderly lateral movement of the dowel bar. The aperture of the sealing screen may be adapted to receive a dowel cap, and the dowel cap incorporates a sealing ring for sealingly engaging the dowel bar.

[0021] The improved connector may further comprise a dowel sleeve, the dowel sleeve adapted to be received within the housing at a position proximate the first end, the dowel sleeve operable to receive a portion of the dowel bar and thereby restrict vertical movement of the dowel bar. Furthermore, the housing may incorporate at least one cut-out provided therein proximate the first end, the dowel sleeve further comprising at least one retention strip of equal dimension to the at least one cut-out.

[0022] Ideally, the housing has at least one cut-out provided therein proximate the first end, the dowel sleeve further comprising at least one retention strip of equal dimension to the at least one cut-out, the dowel sleeve adapted to be received within the housing when the at least one retention strip is received within the at least one cut-out.

[0023] In accordance with a second aspect of the present invention there is a dowel bar for use with an improved connector as described in the first aspect of the invention, the dowel bar comprising at least one ribbed section and one smooth section, the smooth section being adapted to be received within the dowel sleeve when properly positioned within the improved connector.

[0024] Preferably, the smooth section of the dowel bar having a diameter substantially equal to the smaller of the height or width dimension of the dowel sleeve. Similarly, it is preferred that the dowel bar has a length such that part of the dowel bar may be received along the full interior length of the housing and still properly place the smooth section within the dowel sleeve.

[0025] An end of the dowel bar intended not to be received within the housing preferably has at least one threaded portion, the threaded portion adapted to allow for retention of an anchor nut.

[0026] In accordance with a third aspect of the present invention there is a method of forming a joint between a first surface and a second surface, the method comprising the steps of:

installing an improved connector according to any one of the configurations described as the first aspect of the invention in the first surface and allowing the first surface to settle;

inserting a dowel bar according to any one of the configurations described as the second aspect of the invention into the aperture of the improved connector, such that at least a portion of the dowel bar protrudes therefrom; and

creating a second surface around the portion of the dowel bar protruding from the improved connector and allowing the second surface to settle.

[0027] This method can be used where the first surface is a wall and the second surface is a floor slab.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is an isometric view of a housing of an improved connector with a dowel sleeve installed therein and a sealing screen positioned in exploded view.

Figure 2 is a front isometric view of the improved connector as shown in Figure 1, but with the sealing screen installed as intended for use.

Figure 3 is an exploded side isometric view of the housing as shown in Figure 1 with the dowel sleeve installed in the lower portion.

Figure 4 is a rear isometric view of the housing as shown in Figure 1.

Figure 5 is an exploded isometric view of the sealing screen as shown in Figure 1.

Figures 6a and 6b are a side plan view and front plan view of a dowel cap.

Figure 7 is an isometric view of a dowel bar as used with the improved connector as shown in Figure 1.

Figure 8 is a flowchart of a typical method of installing the improved connected as shown in Figures 1 to 7.

PREFERRED EMBODIMENTS OF THE INVENTION

[0029] In accordance with a first embodiment of the invention there is an improved connector 10 for use in forming joints. The improved connector 10 comprises:

- a housing 12;
- a dowel sleeve 14;
- a sealing screen 16; and
- a dowel bar 18.

[0030] Housing 12 is hollow having an exposed end 20, a rear end 22, an upper side 24, a lower side 26 and sides 28. The length (L) of the housing 12 corresponds with the length of a portion of the dowel bar 18. This will be described in more detail below.

[0031] Extending from the upper side 24 at a point proximate the rear end 22 is a structure 30 from which extends a first spigot 32. The first spigot 32 is arranged to be substantially parallel to central axis X-X.

[0032] Proximate the same position about the rear end 22 as the structure 30, but extending from the lower side 26 is a retainer 34. The retainer 34 has a plurality of slots 36 provided therein. The slots 36 are adapted to facilitate retention of the rear end 22 of the housing 12 on a bar chair (not shown) or reinforcement bar (also not shown).

[0033] Each side 28 is provided with surface irregularities or discontinuities in the form of ribs 38. The ribs 38 assist in securely retaining the submerged housing 12 in the first section (not shown) of slab of flooring when in its uncured state.

[0034] Also mounted to each side 28 is a ramp 40. Each ramp 40 has a sloping side 42 and a flush side 44. The flush side 44 is arranged so as to present a continuous surface between the flush side 44 and the side 28 to which it is mounted. Each flush side 44 also has a height (H) equal to that of the structure 30.

[0035] The sloping sides 42 are arranged to face each other. In this manner, the sloping sides 42 operate to define a reservoir 46.

[0036] At an end 48 of the reservoir 46 corresponding with the exposed end 20 of the housing is a first cut-out 50. A second cut-out 52, of corresponding size and position, is provided in the lower side 26. The role of the cut-outs 50, 52 will be described in more detail below.

[0037] A plurality of stops 54 are provided internally to the housing 12. Each stop 54 is positioned so as angled towards central axis X-X.

[0038] The housing 12 is attached to a seal housing 56 at its exposed end 20.

[0039] The seal housing 56 has a housing side 58, a seal side 60 and side walls 62. Extending from the housing side 58 at a position proximate a side 28 is a second spigot 64. The second spigot 64 is also arranged to be substantially parallel to central axis X-X.

[0040] The seal housing 56 has two recessed areas 66 provided in the housing side 58. Each recessed area 66 is positioned adjacent a cut-out 50, 52. The depth of the cut-outs 50, 52 is roughly equivalent with the length (L_1) of the side walls 62.

[0041] Additionally, the recessed area 66 adjacent first cut-out 50 extends between the sloping sides 42 along their full length. The recessed area 66 adjacent second

cut-out 52 is of identical size and shape to the recessed area 66 adjacent first cut-out 50. Furthermore, the recessed areas 66 are arranged such that longer ends 68 are opposite each other about opening 70.

[0042] Each side wall 62 meets its adjacent side walls 62 at corners 74. Through apertures 71 are provided in each corner 74. Each through aperture 71 extends from the housing side 58 to the seal side 60. Each through aperture 71 is of greater diameter at the housing side 58 relative to its diameter at the seal side 60.

[0043] An abutment 72 extends about the internal periphery of the side walls 62 and corners 74 on the seal side 60. The combined height of the abutment 72 and sealing screen 16 is substantially equal to the length (L_1) of the side walls 62.

[0044] The dowel sleeve 14 comprises an open-ended rectangle. The dowel sleeve 14 has a housing end 76, an opening end 78, and a pair of retention strips 80. The retention strips 80 are attached to the wider sides of the dowel sleeve 14 such that they protrude at the opening end 78. The dimensions of the retention strips 80 are equal to the dimensions of the cut-outs 50, 52 as extending into their respective recessed areas 66.

[0045] In this preferred embodiment, the dowel sleeve 14 is made of a rigid metal.

[0046] The sealing screen 16 is of size and shape so as to fit neatly within the side walls 62 on the seal side 60 and accounting for the corners 74. When so fitted, the abutment 72 ensures that a gap is created between the seal side 60 and the sealing screen 16.

[0047] The sealing screen 16 comprises an exterior frame 82, an elastic membrane 84, a positioner 86 and a dowel cap 100. When assembled without the dowel cap 100, the sealing screen 16 is substantially flat.

[0048] As is shown in Figure 5, the exterior frame 82 is formed from two mating parts that are welded together when formally assembled. In this manner, the two mating parts of the exterior frame 82 operate to sandwich the elastic membrane 84 about its external periphery. This will be referred to hereafter as the outer seal of the elastic membrane 84.

[0049] The exterior frame 82 also has horizontal alignment ledges 88 are provided on an opening side 90. The horizontal alignment ledges 88 oppose each other.

[0050] The positioner 86 similarly comprises two mating parts that are also welded together when formally assembled. The two mating parts of the positioner 86 operate to sandwich the elastic membrane 84 about its internal periphery. This will be referred to hereafter as the inner seal of the elastic membrane 84.

[0051] The positioner 86 also has opposing alignment rails 92. When the elastic membrane 84 is not under telescopic tension, each alignment rail 92 is received within its corresponding horizontal alignment ledge 88.

[0052] An aperture 94 is provided centrally within the positioner 86. The aperture 94 has a plurality of retaining flanges 96 extending about its perimeter. Each retaining flange 96 is tapered relative to the aperture's 94 internal wall 98.

[0053] The dowel cap 100 has a securing portion 102, a sealing flange 104 and a sealing ring 106. The securing portion 102 is of same size and diameter as aperture 94. The securing portion 102 also has a plurality of sealing threads 108 extending about its perimeter. The sealing threads 108 are similarly tapered so as to allow them to mate with the retaining flanges 96 when the dowel cap 100 is properly received within the positioner 86.

[0054] The sealing flange 104 extends from the circumference wall of the dowel cap 100. In this manner, when the sealing threads 108 mate with the retaining flanges 96, the sealing flange 104 operates to seal off this area of connection.

[0055] Positioned centrally within the dowel cap 100 is an aperture 110. The aperture 110 has a slot (not shown) provided about its perimeter into which the sealing ring 106 is retained by compressive forces. The sealing ring 106 is of size to receive part of the dowel bar 18. To facilitate this reception, and potential subsequent movement of the dowel bar 18, the sealing ring 106 is made from an elastomeric material.

[0056] The dowel bar 18 has a first portion 112, a smooth portion 114 and a second portion 116. The first portion 112 and the second portion 116 have a plurality of angled ribs 118 provided thereon at equal distances along its length (L2).

[0057] Exposed end 120 of first portion 112 is threaded so as to allow it to mate with an anchor nut 122.

[0058] This first embodiment of the invention will now be described in the context of its intended use.

[0059] When it is required to join two concrete slabs across a common join, formwork is prepared in accordance with the location and size and shape of the floor to be formed. This formwork includes mostly horizontal boards for forming the floor. Substantially vertical formwork strips are securely connected to the horizontal boards where a joining edge of the floor is to be formed.

[0060] Once the formwork is installed, the improved connector 12 is prepared for installation.

[0061] Preparing the housing 12 for installation is performed by inserting the dowel sleeve 14 into opening 61. The dowel sleeve 14 is inserted such that the housing end 76 points towards structure 30.

[0062] When properly positioned within the housing 12, the retention strips 80 are received within the cut-outs 50, 52. Due to the general exact fit between the retention strips 80 and the planar area defined by the cut-outs 50, 52 and recessed areas 66, the retention strips not only ensure the retention of the dowel sleeve 14 in the housing 12, but also ensures that the dowel sleeve 14 does not move relative to the housing 12.

[0063] Note that in this position, the longer ends 68 of the recessed areas 66 are in the same general vertical plane as the seal side 60 of the side walls 62.

[0064] With the dowel sleeve 14 installed, the sealing screen 16 may be installed into the space defined by the side walls 62 on the seal side 60. As mentioned above, the sealing screen 16 is of a size and shape so as to fit neatly within this space. This fit ensures that the sealing screen 16 is retained in place during normal manipulation of the improved connector 10, but can be removed when appropriate force is applied to it.

[0065] Installation of the sealing screen 16 creates a gap between the sealing screen 16 and the screen side 60 of the seal housing 56. This gap allows for grout to enter

into the body of the housing 12 and also to facilitate ease of movement of the positioner 86.

[0066] With the sealing screen 16 installed the aperture 94 surrounds the longer ends 68 of the recessed areas 66. The dowel cap 100 may now be installed.

[0067] Installation of the dowel cap 100 is achieved by inserting the securing portion 102 into aperture 94. Once so installed, the dowel cap 100 is rotated such that the sealing threads 108 mate with the retaining flanges 96. This connection is then sealed by the overlay of the sealing flange 104.

[0068] The improved connector 12 is then manipulated such that the sealing screen 16 and the seal side 60 of the side walls 62 make contact with a vertical formwork strip. Once so positioned, screws 124 are placed so that they each extend through through apertures 71. The screws 124 are aligned such that each screw's head 126 is adapted to cover or be received within its respective through aperture 71 at its housing side 58. The screws 124 are then appropriately manipulated such that a portion of the threaded element (not shown) of the screw digs into the vertical formwork strip. When all the screws 124 are so manipulated, the improved connector 12 is then held in its desired position relative to the formwork.

[0069] If needed to ensure correct positioning of the improved connector 12 overall, the rear end 22 of the housing 12 can be propped up by installing a bar chair into slots 36.

[0070] Grout tubes (not shown) are then fitted to the first spigot 32 and the second spigot 64 and arranged so that their exposed ends will not be submerged in the resulting section of flooring.

[0071] Concrete reinforcing in the form of mesh is then placed over the horizontal boards and positioned such as to be embedded in the first section of flooring when poured. With all of the mesh appropriately positioned, the uncured concrete is poured to create the first section of flooring. Once the first section has cured, the vertical formwork strip is removed and the joining surface is cleaned so as to be free of debris.

[0072] With the vertical formwork strip removed, the sealing screen 16 with dowel cap 100 duly installed is exposed as part of the joining surface.

[0073] The dowel bar 18 may now be inserted into the housing 12 by way of the sealing ring 106. When properly inserted, the sealing ring 106 deforms to surround part of the smooth portion 114 of the dowel bar 18. This deformation also acts to create a seal about the dowel bar 18.

[0074] Proper installation of the dowel bar 18 is such that the dowel sleeve 14 receives the smooth portion 114 along its full length with the second portion 116 extending fully into the housing 12. The first portion 114 thus extends into the space to be occupied by the second slab. If not already installed, the anchor nut 122 is installed onto the exposed threaded end 120.

[0075] It is to be noted here that both the first portion 112 and the second portion 114 has a diameter substantially equal to the height of the dowel sleeve 14. In doing so, the dowel sleeve 14 operates to severely restrict, if not eliminate, vertical deflection of the dowel bar 18 during subsequent settlement of the remaining section of flooring.

[0076] With the dowel bar 18 properly installed, concrete reinforcing in the form of mesh is then placed over the horizontal boards and positioned such as to be embedded in the remaining section of flooring when poured along with the first portion 114. With all of the mesh appropriately positioned, the uncured concrete is poured to create the remaining section of flooring.

[0077] As the remaining section of flooring settles, the improved connector 10 allows the dowel bar 18 to move relative to each other both telescopically and laterally in line with movement during settling of the remaining section of flooring, but restrict all vertical movement of the dowel bar 18.

[0078] To elaborate, when the dowel bar 18 is properly received within the improved connector 10, telescopic movement is accommodated for by the positioner 86 moving away from the opposing alignment rails 88. Similarly, horizontal movement is accommodated for by the horizontal alignment ledges 92 moving along the opposing alignment rails 88.

[0079] It is to be noted that the size of aperture 94 must be sufficient such that when the dowel bar 18 moves laterally – taking the dowel cap 100 and positioner 86 with it – it is not impeded by the longer ends 68.

[0080] It is to be further noted that when the dowel bar 18 moves – either telescopically or laterally, the internals of the housing 12 remain sealed. This is first achieved by the sealing ring 106 which has deformed to surround the smooth portion 114. Additional sealing is achieved due to the flexible nature of the elastic membrane 84, which remains in position by reason of its inner and outer seals.

[0081] Once the remaining section of flooring has settled, grout is pumped through the grout tube attached to the second spigot 64. As the pumped grout enters the second spigot 64 it enters first chamber 128. This grout is then forced upwards until it reaches an opening 130 provided internally in its upper end – at which point it enters the space provided by the abutment 72 between the seal housing 56 and the sealing screen and, ultimately, into the interior of the housing 12 proper.

[0082] Of particular note is that as the opening provided internally to the first chamber is higher than the side walls 62, as the grout enters the interior of the housing 12 proper, it does so at a level equal to the main grout rail level.

[0083] Once fully grouted, the grout tubes are cut off and the joined surfaces treated so as to remove all trace of the improved connector in the finished floor.

[0084] While the invention has been described in this specification in the context of connecting two floor slabs, it should be appreciated that the invention can be used without need of modification beyond that of the general person skilled in the art to facilitate its use in connecting a floor slab to a wall structure.

[0085] It should be appreciated by the person skilled in the art that the above invention is not limited to the embodiments described. In particular, the following modifications and improvements may be made without departing from the scope of the present invention:

- **[0086]** While the invention has been described above in the context of its assembly, it is to be noted that it the improved connector 12 is intended to be provided as a substantially assembled piece (i.e. with the dowel sleeve 14 and sealing screen 16 already installed in the housing 12). Furthermore, where exploded views of the connector are shown, this is for purposes of illustrating the invention only and that the final product will have such components welded or otherwise connected to form an integral whole.

- **[0087]** Ideally, the improved connector 10 should be of sufficient size to ensure that the dowel bar 18 is surrounded by at least 20mm of grout along its length internally within the housing 12.
- **[0088]** The grout tubes may be arranged to provide grout connections between improved connectors 10 in the same manner as described in the applicant's earlier International Patent Application PCT/AU2015/000064.
- **[0089]** The first and second spigots 32, 64 may be modified as required. Ideally, these components are modified to facilitate quick fit connectors.
- **[0090]** The through holes 71 may be modified as required to facilitate retention of any suitable fastener, such as nails.
- **[0091]** Ribs 28 may be replaced with corrugations, troughs, crests, projections or depressions.
- **[0092]** Ribs 28 may have any suitable form, shape, size or profile that increases the contact area between the exterior of the housing 12 and the uncured concrete slab and thus assist in securing in place the improved connector 10.
- **[0093]** The elastic membrane 84 may be made from flexible material.
- **[0094]** With the exception of the dowel sleeve 14, which the applicant is of the view should always be made out of a metal material, the improved connector 10 may be made from a plastic, ceramic or metal material. When made from a metal or ceramic material, the improved connector 10 has greater fire resistant properties when compared to an improved connector 10 made from plastic.
- **[0095]** While the preferred embodiment has longer ends 68 not acting as an impediment to the horizontal movement of the dowel bar 18, were it is desire to limit the horizontal movement of the dowel bar 18, the longer ends 68 can be correspondingly enlarged relative to aperture 94.
- **[0096]** The stops 54 may be used to provide additional guidance to the position of the dowel bar 18 or may simply be used to provide additional strength to the housing 12.

[0097] It should be further appreciated by the person skilled in the art that the invention is not limited to the embodiments described above. Additions or modifications described, where not mutually exclusive, can be combined to form yet further embodiments that are considered to be within the scope of the present invention.

We Claim:

1. An improved connector for use in forming joints comprising:
   a housing having an enlarged seal housing at a first end; and
   a sealing screen adapted for receipt in the enlarged seal housing, the sealing screen incorporating an elastic membrane surrounding an aperture,
   where, the aperture is adapted to sealingly engage a dowel bar and where, the application of a force that causes the dowel bar to move laterally, vertically or telescopically relative to the position of the housing is accommodated for by the elastic membrane in a manner that ensures that the dowel bar remains sealingly engaged by the aperture.
2. An improved connector for use in forming joints according to claim 1, where the sealing screen is substantially flat.
3. An improved connector for use in forming joints according to claim 1 or claim 2, where the enlarged seal housing is connected to a chamber by way of a first opening, the first opening being at a position above the housing when in use, the chamber incorporating a first spigot at a position lower than the first opening.
4. An improved connector for use in forming joints according to claim 3, where the enlarged seal housing has at least one abutment, such that when the sealing screen is received within the enlarged seal housing it makes contact with the at least one abutment and thereby ensures that grout entering the chamber by way of the first opening is able to flow through the enlarged seal housing to the housing.
5. An improved connector for use in forming joints according to claim 3 or claim 4, the improved connector having a second spigot provided in the housing remote from the first spigot.
6. An improved connector for use in forming joints according to any preceding claim, where the housing has at least one pair of stops provided internally therein, the stops operable to guide the positioning of the dowel bar.
7. An improved connector for use in forming joints according to any preceding claim, where the housing has at least one projection extending therefrom into the aperture, the at least one projection thereby operable to limit lateral movement of the dowel bar.

8. An improved connector for use in forming joints according to any preceding claim, where the housing has an external surface having a plurality of surface irregularities or discontinuities provided therein.
9. An improved connector for use in forming joints according to claim 8, where the plurality of irregularities or discontinuities take the form of a plurality of ribs.
10. An improved connector for use in forming joints according to any preceding claim, where the housing has a retainer provided in an end spaced from the enlarged seal housing, the retainer operable to receive one or more of the following: a bar chair; a prop.
11. An improved connector for use in forming joints according to any preceding claim, where, in use, the upper surface of the housing has a reservoir defined therein.
12. An improved connector for use in forming joints according to any preceding claim, where the sealing screen has at least one alignment ledge for facilitating orderly lateral movement of the dowel bar.
13. An improved connector for use in forming joints according to any preceding claim, where the aperture is adapted to receive a dowel cap, and the dowel cap incorporates a sealing ring for sealingly engaging the dowel bar.
14. An improved connector for use in forming joints according to any preceding claim, further comprising a dowel sleeve, the dowel sleeve adapted to be received within the housing at a position proximate the first end, the dowel sleeve operable to receive a portion of the dowel bar and thereby restrict vertical movement of the dowel bar.
15. An improved connector for use in forming joints according to claim 14, where the housing has at least one cut-out provided therein proximate the first end, the dowel sleeve further comprising at least one retention strip of equal dimension to the at least one cut-out, the dowel sleeve adapted to be received within the housing when the at least one retention strip is received within the at least one cut-out.
16. An improved connector for use in forming joints according to any preceding claim, where the joint is a vertical joint.
17. An improved connector as claimed in claim 14 or claim 15, further comprising a dowel bar, the dowel bar comprising at least one ribbed section and one smooth section, the smooth section being adapted to be received within the dowel sleeve when properly positioned within the improved connector.

18. An improved connector as claimed in claim 17, the smooth section of the dowel bar having a diameter substantially equal to the smaller of the height or width dimension of the dowel sleeve.
19. An improved connector as claimed in claim 17 or claim 18, having a length such that part of the dowel bar may be received along the full interior length of the housing and still properly place the smooth section within the dowel sleeve.
20. An improved connector according to any one of claims 17 to 19, where an end of the dowel bar intended not to be received within the housing has at least one threaded portion, the threaded portion adapted to allow for retention of an anchor nut.
21. A method of forming a joint between a first surface and a second surface, the method comprising the steps of:

    installing an improved connector according to any one of claims 1 to 15 in the first surface and allowing the first surface to settle;

    inserting a dowel bar according to any one of claims 17 to 20 into the aperture of the improved connector, such that at least a portion of the dowel bar protrudes therefrom; and

    creating a second surface around the portion of the dowel bar protruding from the improved connector and allowing the second surface to settle.
22. A method of forming a joint between a first surface and a second surface according to claim 21, where the first surface is a wall and the second surface is a floor slab.
23. A method of forming a joint between a first surface and a second surface according to claim 21 or claim 22, where the joint is a vertical joint.