

[54] **LIFT CONNECTOR FOR PRECAST MEMBERS**

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[51] Int. Cl. **B66c 1/66, E04c 5/00**

[58] Field of Search 294/78 R, 82 R, 83 R, 89, 294/93, 94; 52/699, 700, 701, 704, 706, 707, 708, 711

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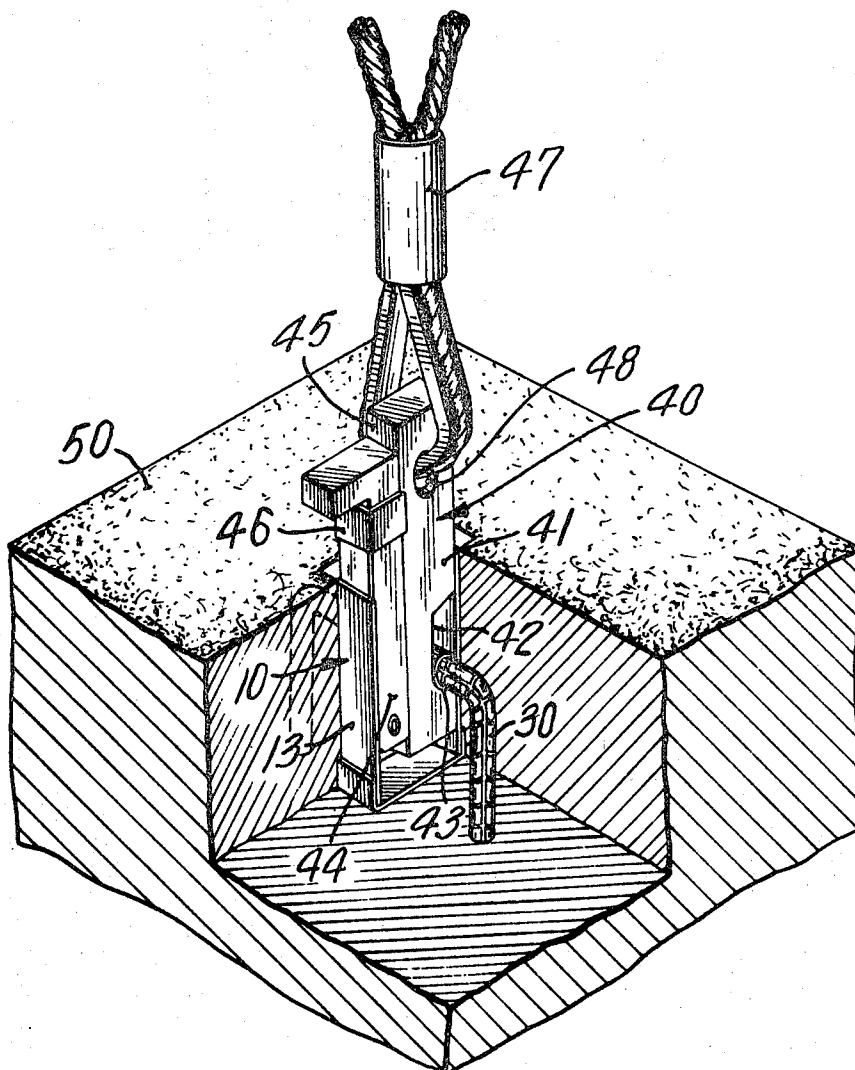
Primary Examiner—Evon C. Blunk

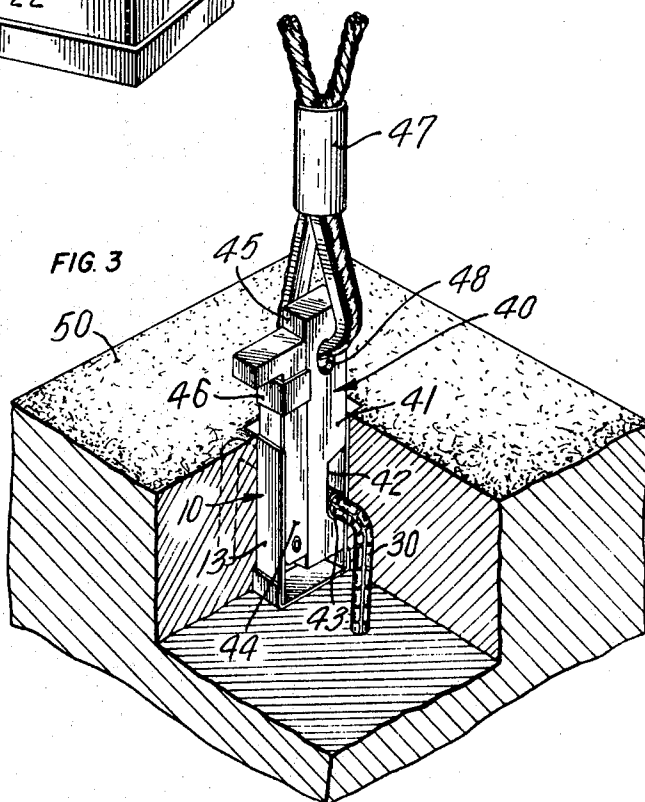
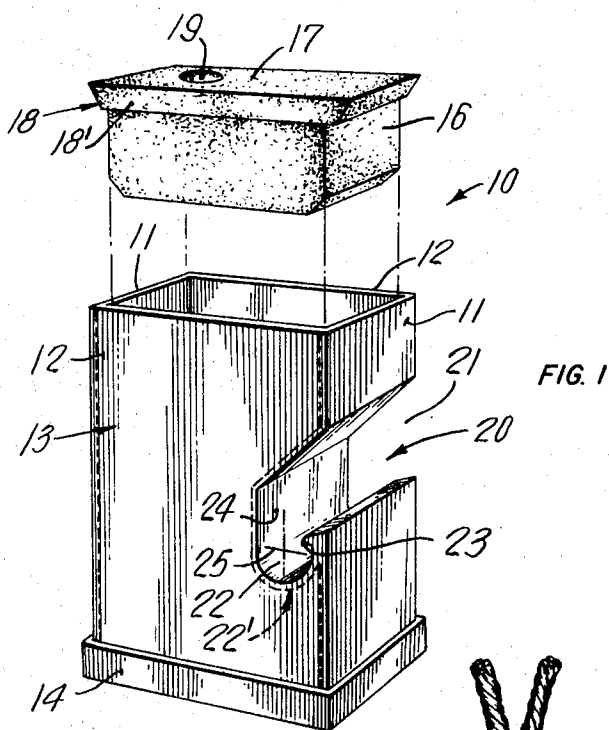
Assistant Examiner—Johnny D. Cherry

[57] **ABSTRACT**

A connector for precast members comprising a hollow housing having at least one side wall, a closed end, and an open end. A removable plug is retained in the open end of the housing. An aperture is provided in the side wall of the housing and has at least an aperture side wall. Retention means are located in the aperture side wall and adapted to retain a rod or cable extending in the aperture and externally of the housing. The retention means formed in the aperture side wall also provides engageable abutment means internally of the housing whereby to engage with a lifting device.

5 Claims, 5 Drawing Figures





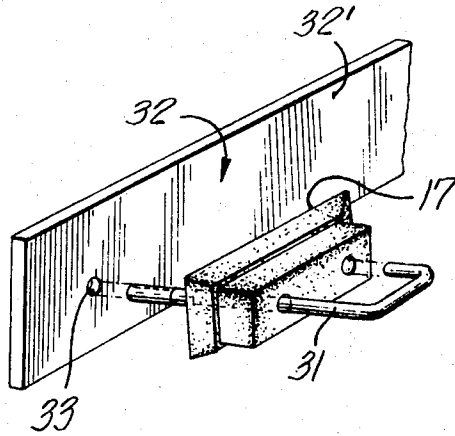


FIG. 2A

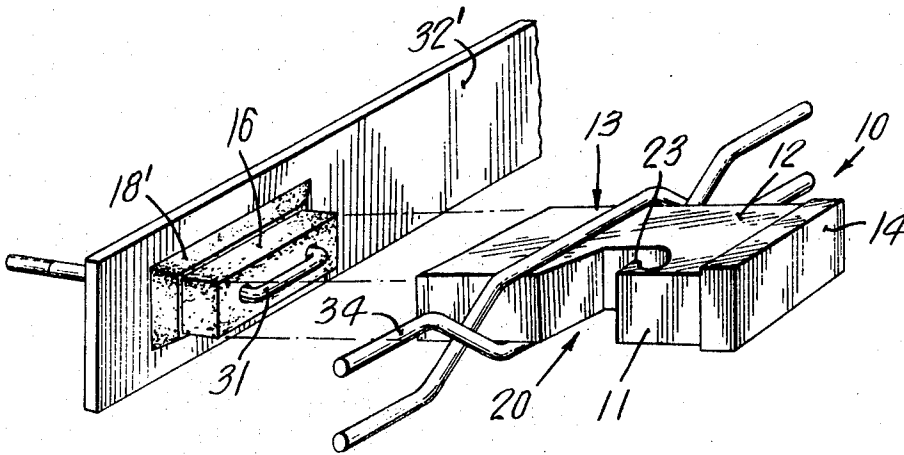


FIG. 2B

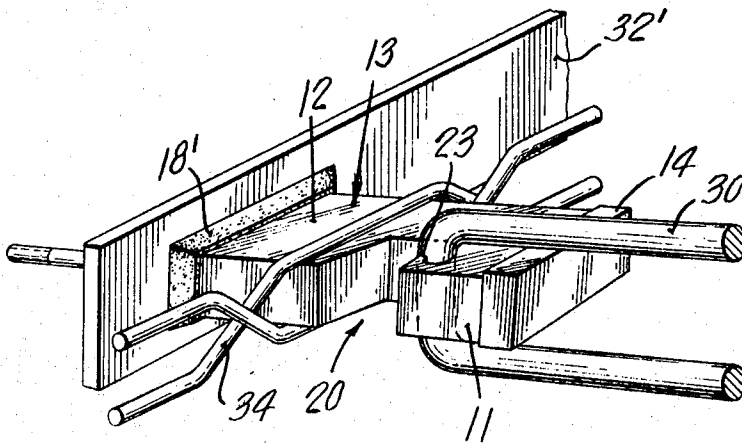


FIG. 2C

LIFT CONNECTOR FOR PRECAST MEMBERS

BACKGROUND OF INVENTION

1. Field of the Invention

The present invention relates to an improved connector secured in a face of a precast member to permit transportation of the member.

2. Description of Prior Art

Heretofore, precast concrete members, in the form of slabs or panels, etc., have been transported by such means as metal hooks or loops of metal wires secured in the concrete and extending above a face of the slabs or panels. Lifting bolts may also be secured in the precast members. To lift the panels in position when constructing a building, the hooks, loops or bolts are engaged by hooks operated from a crane which transports the panels into position for securement, such as to a building frame. After the precast panels are held in position against the building frame, it is then necessary to sever these hooks, bolts or loops of metal in order to obtain a flat face on the panel not to interfere with other panels during assembly. These metal hooks, bolts or loops are unscrewed or cut by such means as an acetylene torch or other steel cutting implements.

Thus, with the prior art it is required to have a cutting implement to sever the loops, bolts or hooks during installation. This is a time consuming job and requires, in most cases, the assistance of a laborer qualified to operate the cutting device. Also, the cutting device must be transported to follow the assembly of precast members.

Further disadvantages of the above known method is that these hooks, bolts, or loops can break during transportation if the concrete slabs or panels are fairly heavy in relation to the size of these members and the manner in which the members are anchored in the precast slab or panel.

A further disadvantage of the prior art method is that once the hooks, bolts or loops are severed there is no further means of transportation for the slab or panel. Thus, if it is required to remove or displace the panel after the hooks have been severed, then this becomes a very costly proposition and a time consuming job.

SUMMARY OF INVENTION

It is a feature of the present invention to provide a connector for precast members which substantially overcomes the above-mentioned disadvantages.

It is a further feature of the present invention to provide a connector which is located internally of a concrete member and which is permanently secured therein and does not require to be severed during installation of the member.

According to the above features, from a broad aspect, the present invention provides a connector for precast members comprising a hollow housing having at least one side wall, a closed end and an open end. A removable plug is retained in the open end of the housing. An aperture is provided in the side wall of the housing and has at least an aperture side wall. Retention means are located in the aperture side wall and adapted to retain a rod extending in the aperture and externally of the housing. The retention means formed in the aperture side wall also provides engageable abutment means internally of the housing whereby to engage with a lifting device.

BRIEF DESCRIPTION OF DRAWINGS

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a connector constructed in accordance with the present invention.

FIGS. 2A, 2B and 2C are perspective views showing the assembly of the connector of the present invention in a form for making a precast member, and

FIG. 3 is an isometric view showing the combination of the connector of the present invention secured in a concrete member and utilized in combination with a lifting device.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. 1, there is shown generally at 10, the connector of the present invention. As herein shown, the connector 10 comprises a generally rectangular hollow housing 13 having two pairs of opposed side walls 11 and 12. One end of the housing 13 is closed by any suitable closure means herein shown as a detachable closure cap 14. The other end 15 of the housing is open and is provided with a removable plug 16.

The housing 13 and the cap 14 are molded from plastic material. The detachable plug is preferably, although not exclusively, made of rubber material, herein a low abrasive urethane compound, and is provided with a flat outer surface 17. The upper enlarged section 18 of the plug 16 has outwardly flared sidewalls 18' which extend from the open end 15 of the housing 13 to the flat outer face 17. The purpose of the flared side walls 18' is to facilitate removal of the plug 16 from a precast concrete member or panel. A hole 19 extends from the outer face 17 through the plug to detachably secure a connecting rod 31 (see FIGS. 2A and 2B). An aperture or groove 20 extends transversely across a pair of opposed side walls 12 and defines a mouth opening 21 extending across one of the side walls 11 of the other pairs of side walls. The mouth opening 21 leads to a rod retention end 22 defined by the aperture or groove 20. Retention means, in the form of a lip 23 is located adjacent the retention end 22 and is formed integrally with the aperture side wall 24.

The retention end 22 of the aperture 20 is of arcuate shape and adapted to retain a reinforcing rod 30 (see FIG. 2C) of substantially circular cross-section. The diameter of the arcuate retention end 22 is such as to snugly receive the reinforcing rod 30 therein. Also, this retention end 22 provides an engageable abutment 22' internally of the housing 23 to engage with a lifting device 40 (see FIG. 3) described later. The lip 23 extends internally of the retention end 22 and is located above the center horizontal plane 25 of the arcuate end 22. Also, the mouth 21 is sufficiently wide to permit ease of passage of the rod 30 therethrough. Instead of providing the aperture or groove 20, it is within the ambit of the present invention to provide a through bore extending transversely across the pair of side walls 12 and positioned adjacent an end wall 11. The retention lip 23 would still be formed in the bore side wall 24 which would then extend entirely about the through bore. The extension of the lip 23 is such as to frictionally retain the rod 30 therein, to keep it stationary relative to the housing 12.

Although the connector 10 herein described is of rectangular configuration, other conceivable suitable shapes may be provided. Also the shape of the aperture or through bore can be altered depending on the cross section of the rod 30. For example, the retention end 22 may be square or rectangular to receive square or rectangular rods and these may be retained by the lip 23 or a suitable protruding edge.

Referring now to FIGS. 2A, 2B, and 2C, there is shown the manner of assembly of the connector 10 in a form for making a precast concrete member. Firstly, a hole 33 is drilled at a convenient location on a form side wall 32. A connector rod 31 is secured in the hole 19 in the outer face 17 of the plug 16 in any convenient manner and extends through the hole 33 in the form side wall 32. This connecting rod 31 secures the plug with its outer flat face 17 flush against the inner surface 32' of the form side wall 32. The plug 16 is thus secured to the form side wall 32 as shown in FIG. 2B.

Referring to the FIGS. 2B and 2C there is shown the manner in which the connector housing is secured to the plug 16. The open end 11 of the housing 13 is then fitted on the plug 16 and extends substantially at the center of form side wall 32. If reinforcing rods are to be secured in the edge of the precast member to be formed, the reinforcing rods 34 may be located in position about the connector housing 13. Once the housing 13 is in position over the plug 16 as shown in FIG. 2C, a reinforcing rod 30 is inserted into the groove and retained in the retention end of the groove by the lip 23. Thus, it can be seen that the reinforcing rod 30 is maintained in position and it is not required to attach it to other reinforcing members as it is not loosely held. In the case where the housing is provided with a through bore, it is required to place the U-shaped reinforcing rod 30 into the through bore before assembling the housing 13 to the plug 16. The advantage of the aperture with the groove 20, is that it facilitates the insertion of angular rods, such as rod 30, into position in the retention end of the aperture 20.

After the connector and reinforcing rod 30 are assembled in the form, the concrete is poured in form to make a concrete slab or panel.

Referring now to FIG. 3 there is shown a lifting device 40 which is utilized to engage in the connector 10. After the form is removed from the precast member, the plug 16 is removed from the edge surface on the member thus providing access to the interior of the connector housing 13. The lifting device 40 is made of high-tensile steel and comprises a substantially elongated rectangular hook member 41 having a hook cavity 42 in a side wall thereof. The lower end 43 of the hook cavity 42 is arcuately shaped whereby to engage under the retention end 22 of the aperture 20 formed inside the housing 13, herein the engageable abutment 22'. In order to positively engage the lower end 43 of the hook cavity 42 under the retention end 22 of the aperture 20, a spacer member 44 is slidably retained on the face 45 opposite to the face having the hook cavity 42 therein. Herein shown, the spacer member 44 is of substantially square cross section and of the same width as the hook member 41.

To engage the lifting device 40 into the connector 10, the spacer member 44 is retracted by pulling it upwardly relative to the hook member 41 through the sleeve 46. The hook member 41 is then inserted in the housing 13 with the hook cavity 42 facing the abutment

22'. The hook cavity 42 is then brought into engagement with the abutment 22' and the spacer member 44 is slid downwardly in the housing 13. As shown, the hook member 41 and spacer member 44 are of such dimensions as to be in close sliding fit with the inner surface of the housing 13. Also, the reinforcing rod 30 is embedded above the arcuate end 43 of the hook cavity 42 whereby to provide reinforcement in this area where the lifting forces are applied. A steel cable and clamp attachment 47 is secured to the upper end of the hook member 41 in a through bore 48.

As can be ascertained, the hook action of the lifting device is fool-proof, easy to install and cannot disengage itself accidentally. Also, the lifting device can be disconnected very easily and does not require severing of any lift or engaging members which protrude from the faces of the precast member as in the prior art.

The size of the connector 10, the lifting device 40, cable for the lifting device and anchor reinforcing rod 30 is determined by the weight of the precast member. For example, with a concrete member of one ton, it is recommended that the connector 10 be of 2½ inches in length and 1 inch in width and 3 inches high. With a precast member weighing 2½ tons, the connector should be of 2¾ inches in length, 1½ inches in width, 3¾ inches in height. With a precast member of five tons, the connector should be of 3¾ inches in length, 1½ inches in width and 5½ inches in height. These are only typical examples of a few sizes of members.

I claim:

1. A connector for precast members and engageable by a lifting device having an elongated rectangular hook member having a hook cavity in a side wall thereof defining a hook section thereunder, and a spacer member slidably retained on a further side wall of said hook member opposite said hook cavity, said connector comprising a hollow housing having opposed parallel side walls, a closed end and an open end, said connector being adapted for securement to a form wall, a groove extending transversely between a pair of said opposed parallel side walls and defining a mouth opening extending across one of said side walls, said groove having a rod retention end, a lip extending from an edge of said groove adjacent said rod retention end, said lip extending parallel to the longitudinal axis of said groove and internally of said groove to frictionally retain and position a portion of a reinforcing rod extending across said retention end and projecting within a form in which concrete is to be poured, an engageable abutment cavity formed internally of said housing between said groove and said closed end, said hook section of said hook member being positioned in said engageable abutment cavity and being prevented from moving out from under said engageable abutment by said spacer member.

2. A connector as claimed in claim 1 wherein said retention end is arcuate, said lip being located above the central horizontal plane of said arcuate shape.

3. A connector as claimed in claim 1 wherein a removable plug is retained in said open end.

4. A connector as claimed in claim 3 wherein said removable plug has a flat outer face, a hole in said face extending through said plug to detachably secure a rod thereto to hold said housing in a precast form and to remove said plug from said housing when retained in a precast member.

5. A connector as claimed in claim 4 wherein said housing is molded from plastic material, said closed end being a cap detachably secured to said housing, said plug being formed of rubber material and having an outwardly flared enlarged upper section extending above said housing open end to said flat outer face.

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