

Dec. 25, 1956

J. A. McLAUGHLIN
CONCRETE SPACER TIE ROD

2,775,018

Filed April 16, 1953

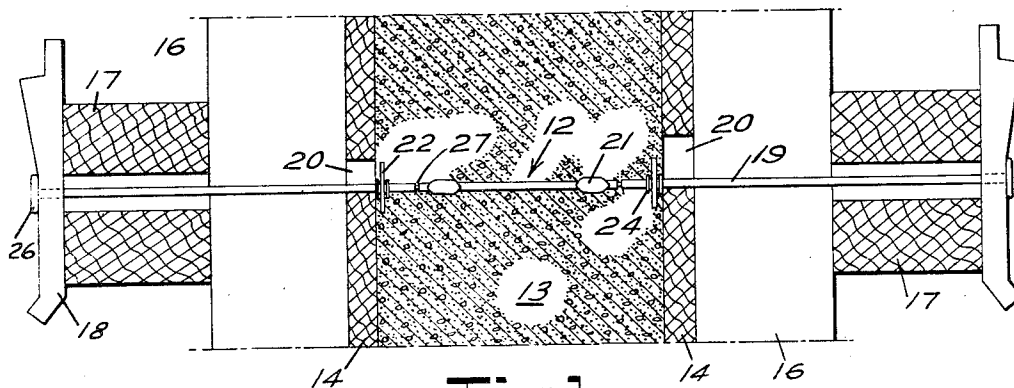


Fig. 1.

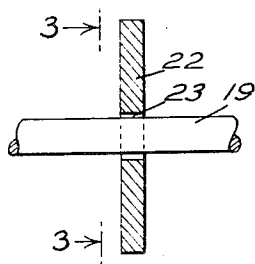


Fig. 2.

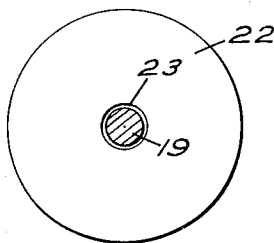


Fig. 3.

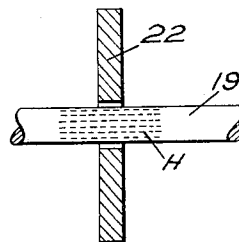


Fig. 4.

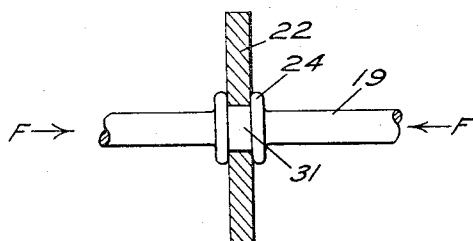


Fig. 5.

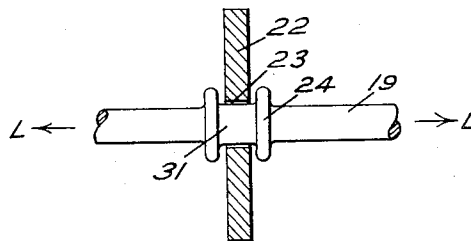


Fig. 5.

INVENTOR
JAMES A. McLAUGHLIN
BY *Gerber & Zimmerman*
ATTORNEYS

1

2,775,018

CONCRETE SPACER TIE ROD

James A. McLaughlin, Lafayette, Calif.

Application April 16, 1953, Serial No. 349,194

2 Claims. (Cl. 25—131)

This invention relates to an improved tie rod for use in the erection of concrete walls or the like.

As is well known in the art, in the erection of concrete wall sections, a pair of parallel spaced panels are utilized, such panels being spaced apart the thickness of the wall, and between which the flowable concrete mixture is poured. Obviously, some tie means are required to prevent relative movement between the panels, and in a large number of cases, such means includes a plurality of rods or bars which traverse the space between the panels and which pass through suitable opposed apertures formed in the latter. To prevent inward movement of the respective panels, such rods are provided with stop members which are locked against inward axial movement and which are arranged to engage inner portions of the panels; and outward panel movement is usually prevented by means of walers interconnecting the rods adjacent the outer portions of the panels. After the concrete has hardened, the walers and panels are removed from the new solidified concrete, leaving the outer ends of the rods exposed. Therefore, in order to provide for a smooth wall surface, it is necessary to break off the exposed rod portions, such action usually being effected by bending and twisting the rod at a weakened area provided adjacent the stop members, whereby the latter are likewise broken off and removed.

The foregoing has proven reasonably adequate, yet certain shortcomings are present which renders the same somewhat less than completely satisfactory. One of the primary disadvantages lies in the fact that in most of the prior art tie rod constructions, the stop means were not capable of independent rotation about the rod, and therefore, in order to twist the exposed portion of the rod in breaking the latter, it was likewise necessary to twist the stop means, which were embedded in the concrete. It should be apparent that such action is not only time consuming, but also requires a great deal of force and skill applied by the workmen. Unfortunately, the tie rods in which such relative radial movement was not permitted, then possessed a further shortcoming in that the stop means were only restrained against inward axial movement, and frequently, the stop means would become lost by sliding outwardly on the rods, through the aforesaid panel apertures during assembly of the rods and panels.

Accordingly, it is an object of the present invention to provide a concrete tie rod spacer in which the means for preventing inward displacement of the panels are positively prevented against axial displacement along the rod in either direction, and yet in which such stop means are capable of free rotary movement about the rod.

Another object of my invention is to provide a spacer of the type described in which the stop means comprises a relatively flat washer-like element, freely journaled on the rod, and maintained in fixed axial position on the rod.

Still another object of this invention is to provide a device of the aforementioned character in which weakened

2

rod areas are provided axially inwardly of the axially spaced stop means whereby the rods may be broken at such areas and portions of the rods, including the stop means, may be removed from the concrete.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

Figure 1 is a cross-sectional side elevation of a concrete wall section, illustrating my improved spacer tie rod in operative position on the building forms.

Figure 2 is a side elevational view of a portion of the rod with the stop means placed thereon prior to carrying out the further steps in my method of constructing the finished device.

Figure 3 is an end view taken substantially in the plane indicated by line 3—3 of Figure 2.

Figures 4, 5, and 6 are views similar to Figure 2 generally illustrating the successive steps in carrying out my improved process or method of manufacture.

As illustrated in Figure 1 of the drawing, the tie rod, generally indicated by the numeral 12, is shown in position on a portion of concrete wall 13 undergoing construction. The concrete is maintained between parallel spaced panels or sheathing 14 during the setting period, and such panels are secured in fixed spaced relationship by means of tie rod 12, vertically extending studs 16, horizontal walers 17, and locking wedges 18 as will be presently explained.

Rod 12 is preferably constructed of generally cylindrical body 19, and is arranged to traverse the spacing between panels 14, pass through apertures 20 formed in the latter, and extend past the studs and walers for engagement with wedge 18. As will be noted, the rod may be provided with flattened portions 21 to resist rotary movement of the rod after the concrete has set, and is further provided with stop means to prevent axially inward movement of panels 14. As here shown, such stop means comprises an annular disk or washer 22 having a central opening 23 slightly larger than that of body 19. The latter is provided with radially enlarged offset portions 24 disposed on each side of the washer and slightly spaced therefrom, whereby the washer will be free to rotate while still being restrained against axial displacement.

In conventional construction, the apertures 20 must be of a size to permit passage of the washer 22 there-through, and the studs 16 are laterally spaced from the rods. Usually, double 2 x 4 walers 17 are used, one on each end of the rods, and the wedge locked into place with the outer surface of the walers and an enlarged head 26 at the distal end of the rod. In stripping the forms, after the concrete has hardened, the wedges, walers, studs and panels are removed in that order, leaving a relatively lengthy piece of rod protruding from the opposed surfaces of the wall 13.

It is in connection with the removal of such exposed rod ends that the importance of the rotation of washer 22 becomes apparent. To remove the rod ends, the latter are bent at the wall surface, and twisted until broken at a frangible area effected by a diametrically reduced rod portion or breakback 27. If the washer was rigidly secured to the rod, in twisting the latter, it would not only be necessary to break the bond between the rod and concrete, but it would be likewise necessary to break the greater bond between the larger washer and concrete. By virtue of the relative rotation, the rod may be twisted until the latter breaks at portion 27, and then as the

3

washer has at most only a thin film of concrete thereover, it is not too difficult to pull the washer free from the wall with the broken end portion of the rod. The holes left in the wall by the removal of the washers may then be filled with any suitable mastic material.

It was previously mentioned that after the forms are assembled, it is only necessary to prevent inward movement of the washers, as the inward panel load is dependent thereon. However, in the erection of the forms, it is equally important that the washers are prevented against outward axial movement, and for this reason, it is important that enlarged portions 24 are disposed adjacent each side of the washer. If the outer deformed portion was deleted, and the tie passed through opposed holes in the panels, it would be very easy for the washer to slide axially outwardly through its associated panel aperture, even though the other of the apertures can be of a size smaller than that of the washer. This, of course, would result in no washer being present to perform its required and essential inward load bearing functions.

With the foregoing details of construction and use of the tie rod of my invention, attention is now directed to Figures 2 through 6 of the drawing wherein I have illustrated, in somewhat diagrammatic form, a method of making that portion of the rod on which the washer 22 is journalled.

In Figures 2 and 3, there is shown such portion of the rod body 19 with the washer 22 encircling the same, but free to move axially as well as radially on the rod. The next step comprises the heating of that portion of the body 19 in proximity to the washer by any suitable means such as electrical resistance, induction, open flame or the like, until the rod metal is red hot and in a deformable state. Such heating is indicated by the letter H in Figure 4.

While the rod is in a heated condition, an inward axial force F is applied to the rod from opposite sides of the washer 22. This force is sufficient to compress and deform the heated metal on both sides of the washer into the radially enlarged portions 24, but as will be seen in Figure 5, such portions are in immediate adjacent relationship to the sides of the washer, and the rod area 31 disposed intermediate portions 24 will likewise be radially enlarged to fill the washer aperture 23. This deformation will result in providing the desired axial stop portions 24 for the washer, but will not permit the necessary free rotation of the washer on the rod.

The final step, which is indicated by Figure 6 of the drawing, comprises the application of outward and opposed axial loads L to the rod 19 from opposite sides of the washer while the rod is still in a heated condition. Such load will result in an axial separation of portions 24 away from the sides of the washer, and at the same time

4

stretches and reduces the diameter of rod area 31 to less than that of the washer aperture whereby the washer is again capable of relative rotation on the rod, although positively limited to a slight amount of axial movement therealong. The exact degree of axial movement will naturally be determined by the extent of load L and the resulting stretching of the rod, but it is preferable to only stretch the rod sufficiently to merely move the washer and portions 24 apart from each other. Desirably, the rod diameter between the flange portions 24 will be slightly larger than the rod diameter on the other side of portions 24 in order to compensate for the loss of cold working strength which occurs upon heating of the rod in this area.

I claim:

1. A device for spacing a pair of panels for forming a concrete wall, comprising a rod arranged to extend between and through said panels, washers mounted on said members and arranged for positioning at the inner sides of said panels whereby the washers will be at least partially embedded in the concrete, each washer having an axial opening therein through which the rod is extended and being larger than the rod whereby the rod may be rotated in the opening relative to the washer, and stops on the rod at each side of the washers and spaced apart sufficiently to permit free rotation of the rod relative to the washers.

2. A device for preventing inward displacement of a panel for forming a concrete wall, comprising a rod arranged to extend through the panel and the space for the wall, a washer mounted on said rod and freely rotatable relative thereto and arranged for positioning at the inner side of the panel whereby on the formation of the wall and the subsequent removal of said panel said washer will be substantially exposed, stops fixed to the rod and positioned at the opposite sides of the washer to limit axial movement of the washer on the rod whereby the rod will be permitted unlimited rotational movement with respect to the washer while axial movement of the washer on the rod will be limited, said rod being provided with a weakened portion axially inwardly of said stops and washer so that when the rod and washer have become anchored in the wall rotation of the rod within the washer will effect a severance of the rod at said weakened portion.

References Cited in the file of this patent

UNITED STATES PATENTS

728,118	Lehmann	May 12, 1903
1,814,703	Johnson	July 14, 1931
2,095,714	Pinaud et al.	Oct. 12, 1937
2,107,130	Schenk	Feb. 1, 1938