Oct. 15, 1968 C. I. WILLIAMS 3,405,904

TIE ROD FOR ACCURATELY SPACING WALL FORMS

Filed Dec. 2, 1965

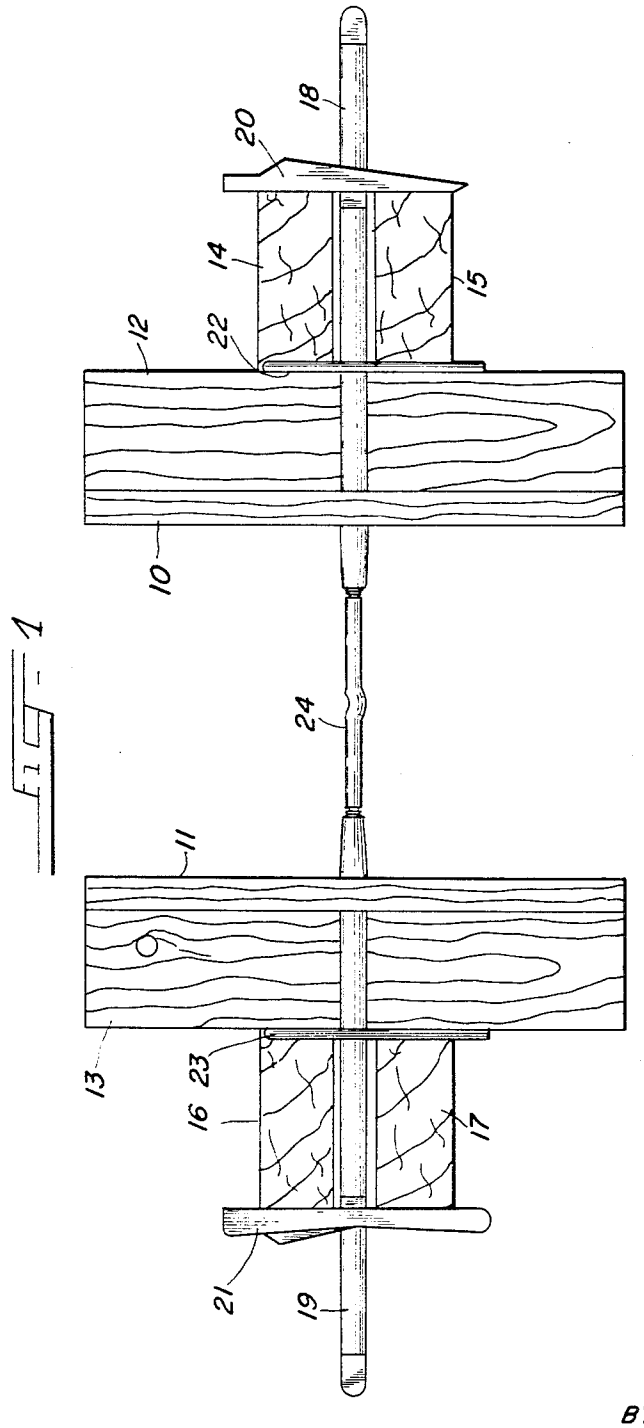


FIG - 1

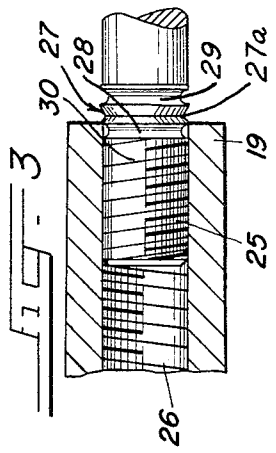


FIG - 3

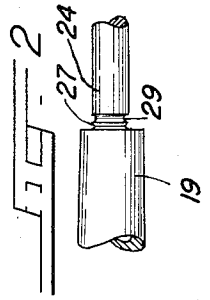


FIG - 2

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United States Patent Office 3,405,904 Patented Oct. 15, 1968

3,405,904

TIE ROD FOR ACCURATELY SPACING WALL FORMS

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Filed Dec. 2, 1965, Ser. No. 511,072
1 Claim. (Cl. 249—40)

ABSTRACT OF THE DISCLOSURE

A wall form tie assembly including a central tie rod threaded at both ends and provided with annular abutments axially spaced from the threads to limit the depth of threaded engagement of the rods into bolts positioning the form structure.

This invention relates to the securing of wall forms preparatory to pouring concrete. It is conventional practice to secure wall forms in parallel relationship by extending tie rods in the intervening space between the forms, and securing these rods to bolts that intersect the form structure on both sides. These bolts are normally fixed in predetermined relationship to the form structure, and the accuracy of the spacing of the forms is determined by the interengagement of the tie rods with the bolts. It is the usual practice to provide threading on the opposite ends of the tie rods, and this threading engages interior threading on the inner ends of the bolts. The degree of penetration of the tie rod into the ends of the bolts will obviously determine the form spacing, and reliance on control of the length of the threaded portion on the rod is not proven to be accurate enough according to previous practice. The threads are normally either cut or rolled on the ends of the rods, and it is very difficult to control the degree of penetration of the rod into the bolt merely by controlling the length to which the normal helical threading extends along the rod. Variations in diameter of the rod, and also of the pitch diameter of the interior threading of the bolt, will have a considerable effect upon the degree of penetration, as well as the abruptness of the termination of the helical thread as the die or cutting tool is disengaged from the rod. Swaged ears on the dies of the rod (parallel to the rod axis) have been used to limit the penetration of the rods into the bolts, but these require a separate operation in addition to the thread formation.

Applicant has found that the accuracy of the spacing of the forms can be considerably improved by providing an annular ridge which defines the degree of penetration of the rods into the bolts. The formation of this ridge can be combined with the threading operation for maximum economy. The several features of the invention will be analyzed in detail through discussion of the particular embodiment illustrated in the accompanying drawing. In the drawing:

FIGURE 1 is a sectional elevation showing a typical tie assembly securing wall forms in spaced relationships.

FIGURE 2 is a fragmentary view on an enlarged scale showing the interengagement of a threaded end of the tie rod with the adjacent end of the bolt.

FIGURE 3 is an enlarged section showing the function of the annular ring abutment in limiting the penetration of the rod into the end of the bolt.

In the form assembly shown in FIGURE 1, the opposite panels **10** and **11** are stiffened by the "studs" **12** and **13**, respectively, and pairs of "walers" as shown at **14–15** and **16–17** are arranged transversely with respect to the studs to transfer the stresses from the poured concrete to the bolts **18** and **19** through the wedges **20** and **21**. The "hairpins" **22** and **23** are heavy pieces of wire

bent into the configuration suggested by the name, with one leg traversing a diametral hole in the bolts. The walers are confined between the hairpins and wedges, so that the bolts may be considered as normally fixed in position with respect to the walers in both directions perpendicular to the form panels, and therefore with respect to the form structure. The heavy pressure against the form panels resulting from the poured concrete is therefore resisted by the tie rod **24** which interconnects the bolts **18** and **19**. The pressure against one form is transferred through the studs and walers to the associated bolt, and these pressures are balanced one against the other by the tie rods. To facilitate the initial positioning of the forms prior to pouring the concrete, a spacing flange (not shown) is occasionally provided on the bolts **18** and **19** in a position to bear against the inner face of the forms **10** and **11**. This is an optional feature, however, and is conventional practice.

With the arrangement shown in FIGURE 1, it is obvious that the maintenance of an accurate spaced relationship between the form panels **10** and **11** would depend upon the control of the degree of penetration of the threaded ends of the tie rod **24** into the bolts **18** and **19**. This is accomplished by the arrangement shown in detail in FIGURE 3. The tie rod **24** has a portion of its length threaded as shown at **25** for engagement with the interior threading **26** on the bolt **19**. The exterior threading **25** is preferably rolled onto the rod **24** by a die, which has the advantage of minimizing the reduction of cross sectional area of the rod at that point due to the threading. The limitation of the penetration of the rod **24** into the interior threading **26** is provided by the annular ridge **27**, which is preferably rolled into the material forming the threaded portion. The same die responsible for forming the threads is provided with ridges which engage the material of the rod **24** to define the grooves **28** and **29**, having the effect of separating some of the material of the previously-threaded portion away from the helical formation and into an annular configuration. The ridge **27** is thus axially-spaced from the remaining threading, and forms an abutment against which the end **30** of the bolt **19** can engage to define the final axial relationship between the rod **24** and the bolt. The same construction is provided at the opposite ends of the tie rod **24**. This arrangement forms a much more accurate and positive limit to the penetration of the tie rod **24** than is the case where reliance is made merely upon the termination of the formation of the helical threading by withdrawal of the forming tool. Variations in pitch diameter and other variables are also largely by-passed through the use of the arrangement shown in FIGURE 3.

It is important that the grooves **28** and **29** be restricted to a depth such that the resulting rod diameter at the base of the grooves is not less than the root diameter of the threading **25**. This precaution minimizes the weakening of the rod so that the strength is no less than that of the threaded area. With a light grooving action of this nature, the material constituting the ridge **27** is formed by material brought together from both axial directions to form a fold at *27a*. This is not objectionable.

The particular embodiments of the present invention which have been illustrated and discussed herein, are for illustrative purposes only and are not to be considered as a limitation upon the scope of the appended claim. In this claim, it is my intent to claim the entire invention disclosed herein, except as I am limited by the prior art.

I claim:

1. In combination with a pair of spaced wall forms each including panel means, studs bearing against said panel means, and walers extending across said studs, and also including oppositely-aligned bolts intersecting said panel means, and extending between adjacent studs and

adjacent walers, said bolts being normally fixed with respect to said walers in a predetermined relative position, said bolts having interiorly threaded inner ends, a tie for interconnecting said bolts and accurately spacing said forms, comprising:

a rod having exteriorly threaded end portions adapted to engage the interiorly threaded ends of said bolts, said rod having integral annular ridges axially spaced from the ends of said threaded end portions by sections of said rod of a diameter less than, or equal to, the minor diameter of said threads, and forming abutments limiting the extent of axial penetration of said rod into said bolts, thus determining the spacing of said forms.

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