SELF-DRILLING TIE ROD FOR CONCRETE CONSTRUCTION FORMS

Filed Nov. 27, 1964
My invention relates to concrete beam column and lintel construction, and is directed particularly to a novel and improved tie rod for setting up forms for such concrete construction.

It is a common practice when building with poured concrete to hold the side walls of the form together in spaced relation by means of elongated metal tie rods extending transversely through aligned holes drilled in the forms and secured in place at the outsides by fasteners such as nuts threaded on the outer ends of the rods over washers or the like to prevent spreading of the forms under the weight of the wet concrete when poured. When the concrete has set, the side nuts or other fastening means are removed and the projecting ends of the tie rod are broken off. It will be apparent that in using such tie rods, the labor involved in drilling the form holes and then setting and securing the tie rods in place and thereafter removing them constitutes a large item in the overall expense of the concrete forming. In construction jobs having many poured concrete walls, beams and/or columns, the labor involved and time consumed in the setting up and removal of concrete forms with ordinary tie rods as heretofore known can become disproportionately great enough to slow down job progress or require the temporary hiring of additional workers.

It is accordingly the principal object of my invention to provide an improved tie rod for formed concrete construction the use of which eliminates much of the labor involved in its placement, securement and removal, thereby overcoming for the most part, the above-described deficiencies characteristic of tie rods heretofore devised.

A more particular object is to provide a tie rod of the character described comprising a rod member that is designed to be used as a drill for simultaneously boring its form holes and positioning itself in place for anchoring.

Another object is to provide a tie rod of the above nature including novel push-on anchors or fasteners for securing the outer ends of the rod with respect to the form sides, which fasteners operate in conjunction with spaced annular grooves formed along the length of the rod, and wherein the grooves provide means for locking the forms in spread relation against the rod fasteners and also provide zones of weakness along the length of the rod ends facilitating breaking off close to the sides of the formed and hardened concrete after removal of the forms.

Still another object is to provide a tie rod for poured concrete forming that is readily adjustable over a wide range of widths commonly used in building construction.

Yet another object is to provide a tie rod of the above nature which will be inexpensive to manufacture, reusable in part, easy to install and remove, and effective and dependable in use.

Other objects, features and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is a vertical section taken through a concrete structure and forms, showing a tie rod embodying the invention in place therein;

FIG. 2 is an end view of the tie rod drill point;

FIG. 3 is a vertical cross-sectional view taken along the line 3—3 of FIG. 1 and illustrating constructional details of the fastener member;

FIG. 4 is a vertical cross-sectional view taken along the line 4—4 of FIG. 3; and

FIG. 5 is a plan view of one of the U-shaped washers used on the rod for holding the form boards in fully spread relation.

Referring now in detail to the drawings, 10 in FIG. 1 designates generally a self-drilling tie rod assembly, embodying the invention shown in place between parallel plywood form boards F, braced by wales or wackers W running along the outsides thereof. The tie rod assembly 10 comprises an elongated rod member 11, fastener members 12 and U-shaped washers 13. The rod member 11, which is preferably of steel, is forged or otherwise formed along a central part of its length with annular grooves 14 of about 3/8 inch in width and 3/4 inch in depth equidistantly spaced about 3/8 inch apart. One end of the rod member 11 is provided with a simple drill point 15, which may be substantially conical in form as indicated at 15a, except for being hollowed out at one side, as indicated at 15b to provide cutting edges and relief means for the cuttings.

The fastener member 12 is preferably formed of sheet steel stock and comprises a tubular body portion 16 flared outwardly at one end and terminating in an inwardlyturned peripheral base portion 17. The other end of the fastener body portion 16 is formed with a plurality, four in the illustrated embodiment, of axially-extending, peripherally-spaced elongated slots 18 defining resiliently outwardly-extending tongues 19, the terminal ends of which are bent inwardly at an angle inclining them slightly to the outside to provide gripping teeth 20. The inner edges of the teeth 20 define a circle the diameter of which is somewhat less than the diameter of the elongated rod member 11, so that said teeth will spring into the annular grooves 14 of said rod member when assembled thereto as hereinafter described. The fastener member 12 is provided with a nail hole 21 in its outwardly flared end adjacent the base portion 17.

In use, after the form boards F and wackers W are erected in the usual way, the rod member 11 will be chucked in a power drill and used to drill its pilot holes as indicated in FIG. 1. The drill will then be removed and a fastener member 12 placed over the projecting end of the rod member and pushed in place against the adjacent wacker W. As illustrated in FIG. 3, the outward inclination of the gripping teeth 20 of the fastener member, and their resiliency, will permit their being readily pushed inwardly over the outer diameter portions of the rod member between the annular grooves 14 until the base portion 17 seats against the outside of the wacker W. Thereafter, any outward movement of the wacker with respect to the rod member will cause the fastener teeth to wedge into the outer corner of the nearest annular groove 14, as illustrated in FIG. 3, and thereby securely grip the rod. The workman can now place a nail N through the fastener nail hole 21 to temporarily hold the fastener in place while he goes around to the other side of the form assembly to place a second fastener member 12 on the drill point end of the rod member to complete the tie rod installation.

Washers 13 which have openings permitting a sliding fit within the rod member grooves 14, can then be placed in the rod grooves adjacent the insides of the form boards F, as illustrated in FIG. 1, to keep the form from bowing inwardly. It will be noted that the entire installation of the tie rod assembly can be made by one workman, or other than by two working one at each side of the form assembly.

After the concrete has been poured and hardened, and the forms are to be removed, the projecting ends of the rod member can either be bent or twisted off with a suitable wrench or the like, the break taking place at the zone of weakness provided by the rod groove 14 closest to the
outside, or usually just inside, the side wall of the formed concrete. In most instances the fastener member 12 will not be damaged in the removal process, so that they can be saved for reuse, thereby effecting even greater economy.

While the elongated rod member 11 is shown and described herein as having a continuous series of annular grooves 14, the grooves in the central portion of the rod could be omitted for a space no greater than the least thickness of formed concrete with which the tie rod is to be used. As the length can also be made to accommodate the greatest thickness of concrete likely to be formed, it will be understood that one size of tie rod according to the invention can be used with a wide range of form board spacings.

While I have illustrated and described herein only one form in which my invention can conveniently be embodied in practice, it is to be understood that this form is given by way of example only, and not in a limiting sense. My invention, in brief, comprises all the embodiments and modifications coming within the scope and spirit of the following claims.

What I claim as new and desire to obtain by Letters Patent is:

1. In a tie rod for concrete construction forms, the combination comprising, an elongated rod, a plurality of closely-spaced annular grooves formed along a central portion of said rod, a drill point at one end of said rod, fastener members received circumjacent over opposite end portions of said rod, means including said annular grooves for preventing withdrawal of said fastener members from said ends of said rods once placed thereon, said withdrawal preventing means comprising a plurality of substantially axially-extending, circularly-arranged, resilient tongue members formed on said fastener members, the outer ends of said tongue members having inwardly-inclined teeth the terminal edges of which define a circle the diameter of which is less than the diameter of said elongated rod.

2. In a tie rod for concrete construction forms, an elongated rod of substantially circular cross-sectional diameter, said rod having along a central part thereof a plurality of equidistantly-spaced grooves, a drill point formed at one end of said rod, a fastener member for each end of said rod, each fastener member comprising a tubular shell portion outwardly flared from one end to the other, said other end of said tubular shell portion having an inwardly-turned peripheral end portion defining a circular base, said one end of said tubular shell portion being of small diameter as compared with said base and being formed with a plurality of peripheral, substantially axially-extending resilient tongue members, the inner ends of said tongue member being integrally formed with inwardly-inclined teeth, the inner edges of said teeth defining a circle the diameter of which is less than the diameter of said rod.

References Cited

UNITED STATES PATENTS

913,538 2/1909 Morgan.
1,293,391 2/1919 Ewing
2,293,743 11/1940 Miles et al.
2,321,157 6/1943 Rees
2,356,153 12/1943 Ryder.
3,263,958 8/1966 Cox et al.

J. SPENCER OVERHOLSER, Primary Examiner.