

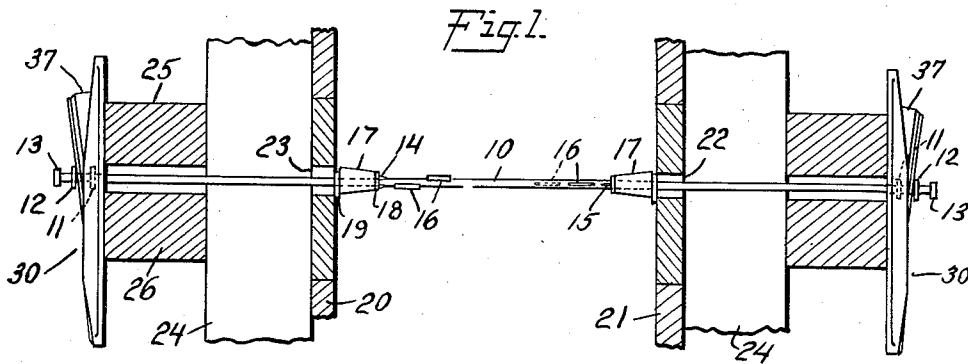
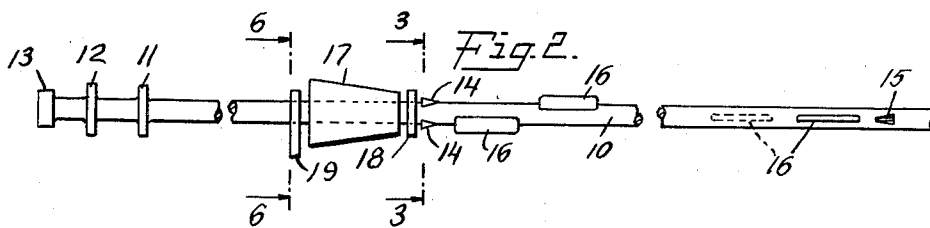
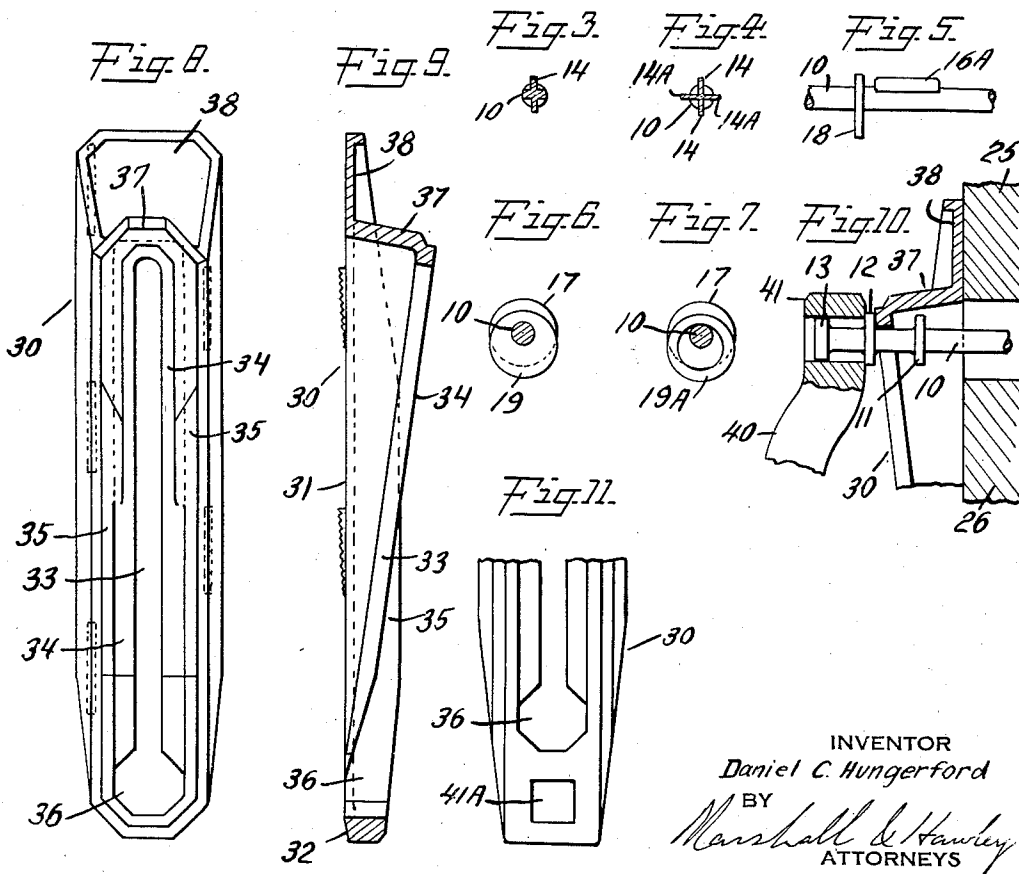
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FORM TIE

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FORM TIE

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This invention relates to improvements in form ties.

Its object is to provide a simple and inexpensive tie for holding concrete forms together in proper spaced relations, and more specifically to provide a novel tie rod and wedge which can be quickly and easily applied to the forms and as readily removed after the concrete has been poured and has set.

Still further objects of the invention are to provide an integral tie rod with spaced heads, the outer ones of which are squared, which provide for variations in the dimensions of the lumber used for the forms, with projecting fins which prevent rotation of the rod in hardened concrete, some of which arrest the movement of the abutment spools and form snap points which permit breakage of the rod by torsion at predetermined points, but do not materially reduce the tensile or bending strength of the rod.

Another feature of this invention is a simple locking device for retaining the abutment spools inside the form boards which make it possible to insert the rods through spaced form boards from one side thereof. The invention further pertains to the wedge by means of which the form is held together by the tie rod and includes improvements in its construction which will appear hereinafter, and to a stripping wrench to cooperate with the heads on the rods to break them after their holding function has been fulfilled. This wrench may be formed on the wedge, if desired.

Referring to the drawing:

Fig. 1 is an elevation of a tie rod and wedge which embody this invention with parts of the form which are held together thereby shown in section;

Fig. 2 is an elevation of the tie rod and its associated parts drawn on a larger scale;

Fig. 3 is an end section of one of the snap points, the section being taken on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3 showing a modification;

Fig. 5 is an end elevation of some of the parts illustrating a further structural modification;

Fig. 6 is a sectional end elevation illustrating the abutment spool lock, the section being taken on the line 6—6 of Fig. 2;

Fig. 7 is a view similar to Fig. 3 showing a modified form of abutment spool lock;

Fig. 8 is a front elevation of a wedge which embodies improvements which are a part of this invention;

Fig. 9 is a sectional side elevation of the wedge shown in Fig. 8;

Fig. 10 is an elevation similar to that shown in Fig. 1 of certain parts shown in the latter figure, illustrating an extreme position of the wedge and showing my improved stripping wrench; and

Fig. 11 shows a modified construction for the lower end of the wedge to form a wrench similar in function to that shown in Fig. 10.

10 designates the tie rod. Near both of its ends are spaced heads 11, 12 and 13, the outer one of which is squared to be engaged by a wrench. Snapping points are formed by indenting the periphery of the rod to form projecting lugs 14 and 15. The lugs 14 are preferably diametrically opposed to each other and so are the lugs 15. This manner of forming the lugs maintains the full cross-sectional area of the rod and does not materially weaken its tensile strength or its bending ability. The indentations do, however, weaken its torsional strength, and form what we have called "snap points" in the rod. A cross section of one of these snap points is shown in Fig. 3. As these lugs project outwardly from the surface of the rod they become embedded in the concrete which after it hardens prevents the rod from turning. Fig. 4 shows four lugs 14, 14 and 14A, 14A, a construction which may be used if desired.

Fins 16 may also be pressed out of the metal of the rod between the lugs 14 and 15. These further prevent rotation of the rod in the concrete after the latter has hardened. Fig. 5 shows one of these fins 16A used to form an abutment and a snap point.

The lugs 15 are spaced from the lugs 14 a distance which predetermines the width of the form which is to be held together by the rod. They form shoulders for arresting the inward movement of abutment spools 17 which are concentrically mounted on the rod and between which and the lugs metallic washers 18 may be interposed. 19 (Figs. 2 and 6) is an eccentric lock washer, the application and function of which will now be described. The abutment spools and washers are placed upon the rod before the heads, lugs and fins are formed.

Referring to Fig. 1, 20 and 21 designate mold boards which are to be held together in spaced relation. Through the board 21 is a hole 22 of sufficient diameter to permit the insertion of the heads 11, 12 and 13 on one end of the rod, but of less diameter than the largest diameter of the abutment spools. The hole 23 in the board 20 is

large enough to permit the passage therethrough of the abutment spool 17 or the larger end of it, if it is of the truncated cone shape shown in the drawing. The lock washer 19 is of the same diameter as that of the larger end of the abutment spool. It has an eccentric clearance hole for the rod 10 and after the spool 17 has been passed through the hole 23, and while the washer is spaced from the spool, the rod 10 is raised to align the washer with the hole and then the washer is passed through the hole 23 against the end of the spool. This effectively retains the abutment spool on the inside of the form board 20 because when the spool and the washer are abutted they form an oval of greater length than the diameter of the hole. If desired, a similar lock washer may be provided for the abutment spool 17 adjacent the other form board 21, but this is not necessary as the hole 22 therein may be of less diameter than the largest diameter of the abutment spool.

Before proceeding with a description of the other parts of this device, I will point out the modification of the lock washer illustrated in Fig. 7. This is a ring 19A having an outer diameter approximately the same as the largest diameter of the abutment spool 17. This ring may be passed through the hole 23 and will immediately drop down below the lower edge of the abutment spool to retain it inside of the form board 20.

Returning to Fig. 1, 24 designates one of the vertical studs outside the form boards and 25, 26 horizontal walers outside the studs. Wedges 30 engage the outer surfaces of the walers and the heads formed near the ends of the rods.

The wedges, which embody several novel features, are shown somewhat in detail in Figs. 8-10. Each wedge comprises a base 31 which is substantially flat to engage the outer surfaces of the walers, except at its lower end which is beveled, as at 32 to facilitate its insertion between the walers and one of the heads of the tie rod. The wedge is slotted throughout the greater part of its length, as at 33 and the sides of the slot form inclined surfaces 34, 34. The parts which form these inclined surfaces are supported by longitudinal side ribs 35 which give the wedge uniform strength throughout its length. The surfaces 34 slope gradually from the base 31, except at their lower ends where they are steeper. The lower end of the slot terminates in a transversely wider open portion 36 of sufficient size to clear the rod heads. The upper end of the slot is closed by a portion 37 which forms an anvil head. Above this head the base is continued to form a heel 38, the purpose of which will be pointed out.

When the parts are assembled as shown in Fig. 1, the inclined surfaces of the wedges engage one or another of the tie rod heads 11, 12 or 13, depending upon the thicknesses of the lumber used in the form. The heads pass through the opening 37 but ride up first on the steep inclined surfaces which engage them. This draws the parts of the mold together and keeps them from separating. Then the parts may be tightened against the abutment spools 17 by hammer blows on the anvil head 37. Fig. 10 shows how the full length of the inclined surfaces 34 may be utilized. When the wedge is driven down its full length, its heel portion 38 forms a bearing for it on the waler 25.

After the concrete has been poured and has set, the wedges are removed and a wrench 40 applied to the outer squared head 13 of the tie rod (Fig. 10). The end 41 of this wrench is thicker than the distance between the squared

head 13 and the next adjacent head 12 which is of larger transverse dimension than that of the opening in the end of the wrench so that it forms a stop for the wrench. A twist of the rod, the inner portion of which is held from turning by the lugs 14, 15 and the fins 16, causes the rod to break at the snap point formed by the indentations adjacent the lugs 14, well within the concrete. This releases the wedge and the end portion of the rod may then be withdrawn. If the end of the rod is roughened at the break, the wedge 30 may be used as a lever to pull it through the abutment spool.

Fig. 11 shows the lower end of the wedge extended to form a wrench with a thick end 41A similar to the end 41 of wrench 40 shown in Fig. 5. This construction also strengthens the small end of the wedge and prevents it from spreading.

Although certain specific embodiments of the invention have been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A tie rod having a plurality of integral spaced heads near its ends, the outer of said heads having flat sides of less lateral dimension than that of the next adjacent head, abutment lugs pressed out of the rod to form a snapping point intermediate said ends, an abutment spool between said lugs and an end of the rod, and an eccentric lock washer between the abutment spool and said end of the rod.

2. A tie rod having a plurality of integral spaced heads near its ends, the outer of said heads having flat sides, abutment lugs pressed out of the rod to form a snapping point intermediate said ends, an abutment spool between said lugs and an end of the rod, and an eccentric lock washer between the abutment spool and said end of the rod.

3. A tie rod having a plurality of spaced heads near its ends, the outer of said heads having flat sides, abutment lugs projecting outwardly from the rod intermediate said ends, an abutment spool between said lugs and an end of the rod, and an eccentric lock washer between the abutment spool and said end of the rod.

4. A tie rod having projecting abutment lugs, abutment spools slidably supported on said rod, a washer adjacent the outer end of one of the spools of approximately the same diameter as the largest diameter of the spool, having an eccentric opening therein through which the rod passes, and said washer and spool being so constructed and arranged as to form an oval of greater length than said diameter when abutted.

5. A tie rod having projecting abutment lugs, abutment spools slidably supported on the rod outside of said lugs, an eccentric lock washer between one of the spools and the adjacent end of the rod, said washer and the adjacent spool being so constructed and arranged as to form an oval of greater length than the greatest diameter of the spool to which it is adjacent.

6. A tie rod for a concrete form, a fixed abutment projecting from said rod, and movable abutment means surrounding the rod and longitudinally slidable thereon, comprising a washer surrounding the rod with its outer diameter slightly less than that of a hole in the form, adapted to

be passed through said hole and arranged to drop by gravity out of concentric relation with the hole.

7. A form tie having abutments thereon, a form member having a hole therethrough to receive said form tie, spacers on said form tie outside of said abutments and a washer adjacent one of the spacers relatively slidable on the form tie in eccentric relation thereto, said spacer and washer being adapted to be passed through the hole in the form member when separated from each other, and to form an oval structure when abutted together having a greater length than the diameter of the hole.

8. A tie rod constructed at predetermined parts with flattened portions which project laterally beyond the surface of other portions of the rod to form spaced abutments and snapping points, abutment spools on said rod outside of said flattened portions, a plurality of integral spaced heads near the ends of the rod, the outer of said heads having flat sides of less lateral dimension than those of the next adjacent heads, and lock washers eccentrically supported on the rod between the abutment spools and the heads.

9. A tie rod constructed at predetermined parts with flattened portions which project laterally beyond the surface of other portions of the rod to form spaced abutments and snapping points, abutment spools on said rod outside of said flattened portions, a plurality of integral spaced heads near the ends of the rod, the outer of said heads having flat sides of less lateral dimension

than those of the next adjacent heads, and lock washers supported on the rod between the abutment spools and the heads, the support of the abutment spools and the lock washers on the rod being such that they are relatively eccentric.

10. Spaced sides of a concrete form constructed with substantially alined holes, combined with a tie rod adapted to extend through the holes in said sides, said tie rod having longitudinally spaced abutments thereon, a washer on the rod outside of one of the abutments, of smaller diameter than that of the hole in the adjacent side of the form and movable within said side to a position eccentric to its adjacent abutment to form therewith an oval structure longer than the diameter of said hole, and means for tightening said sides against one of the abutments and said oval structure.

11. Spaced sides of a concrete form constructed with substantially alined holes, combined with a tie rod adapted to extend through the holes in said sides, said tie rod having longitudinally spaced abutments thereon, an eccentric washer slidably mounted on the rod outside of one of the abutments, of smaller diameter than that of the hole in the adjacent side of the form, arranged to form with its adjacent abutment an oval structure longer than the diameter of said hole, and means for tightening said sides against one of the abutments and said oval structure.

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