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2,525,950

TOOL FOR PULLING ANCHOR RODS IN CONCRETE FORMS

Filed Dec. 21, 1948

4 Sheets-Sheet 1

Fig. 1.

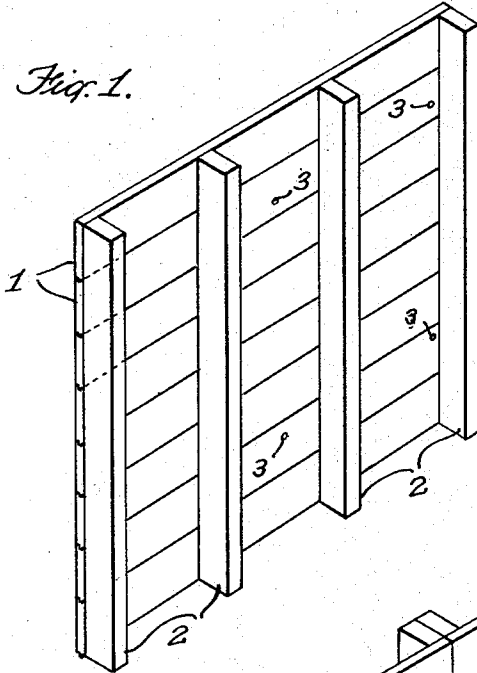


Fig. 3.

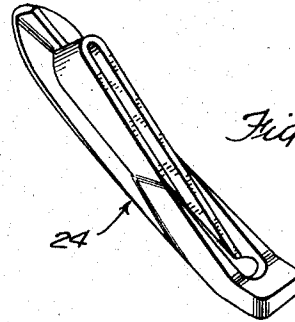
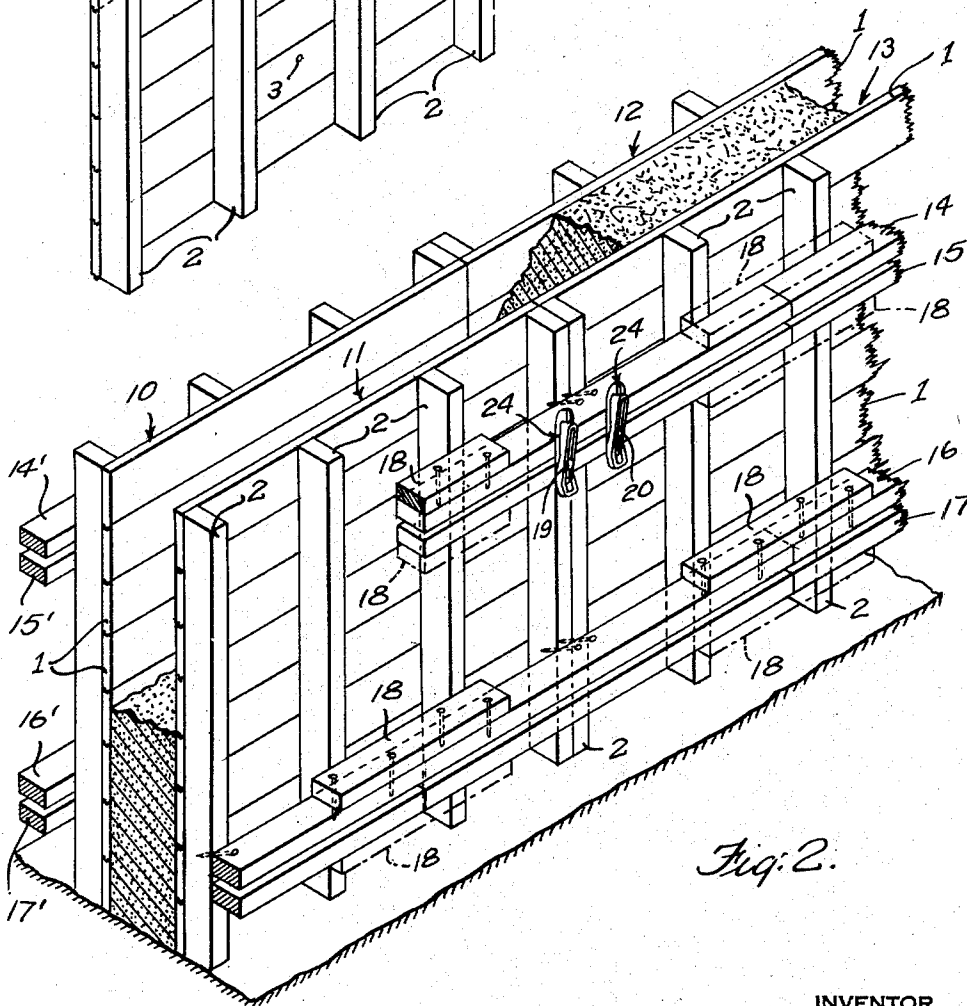


Fig. 2.

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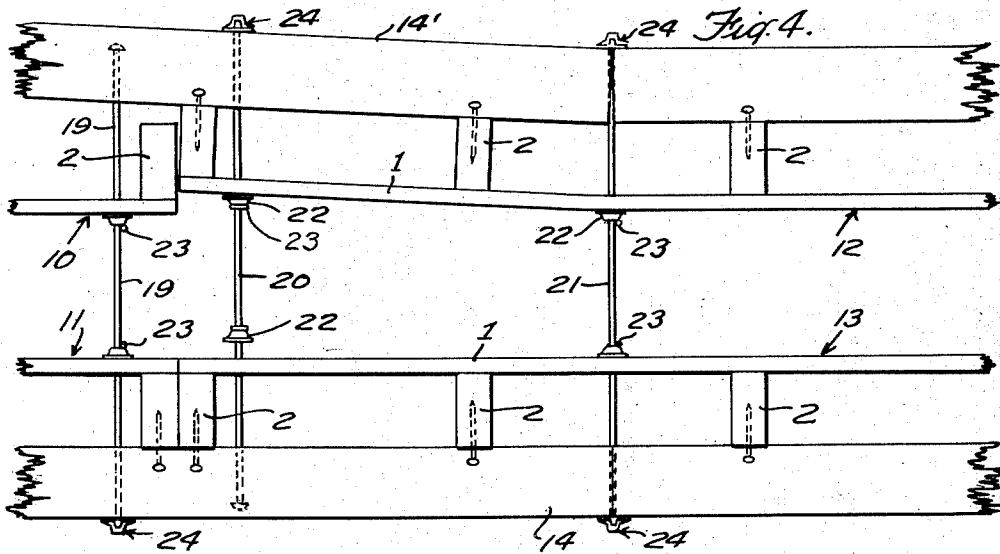
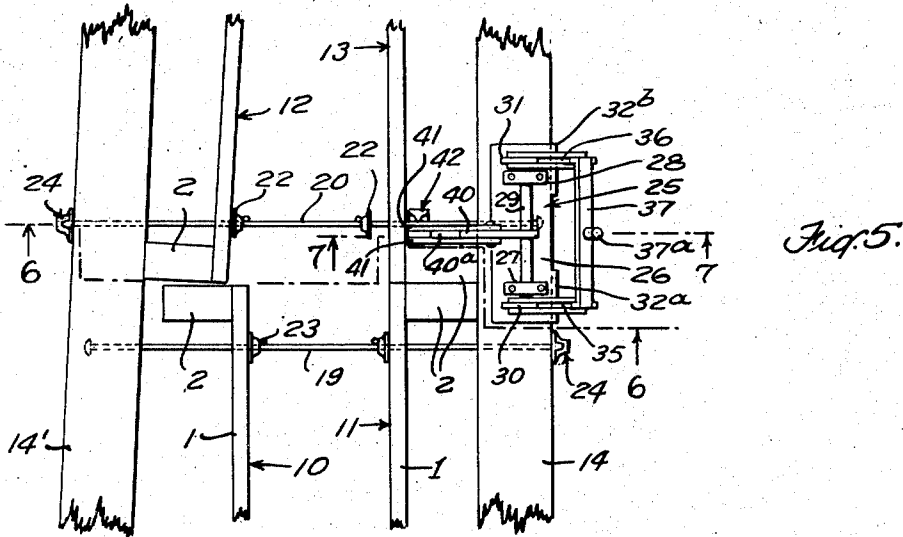
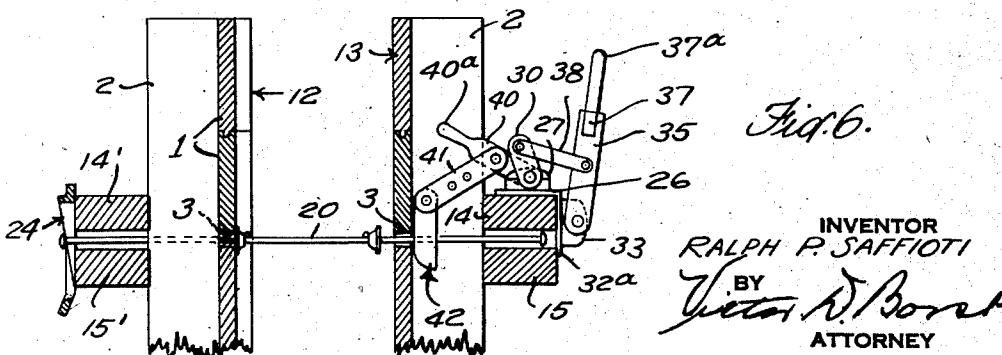
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4 Sheets-Sheet 2



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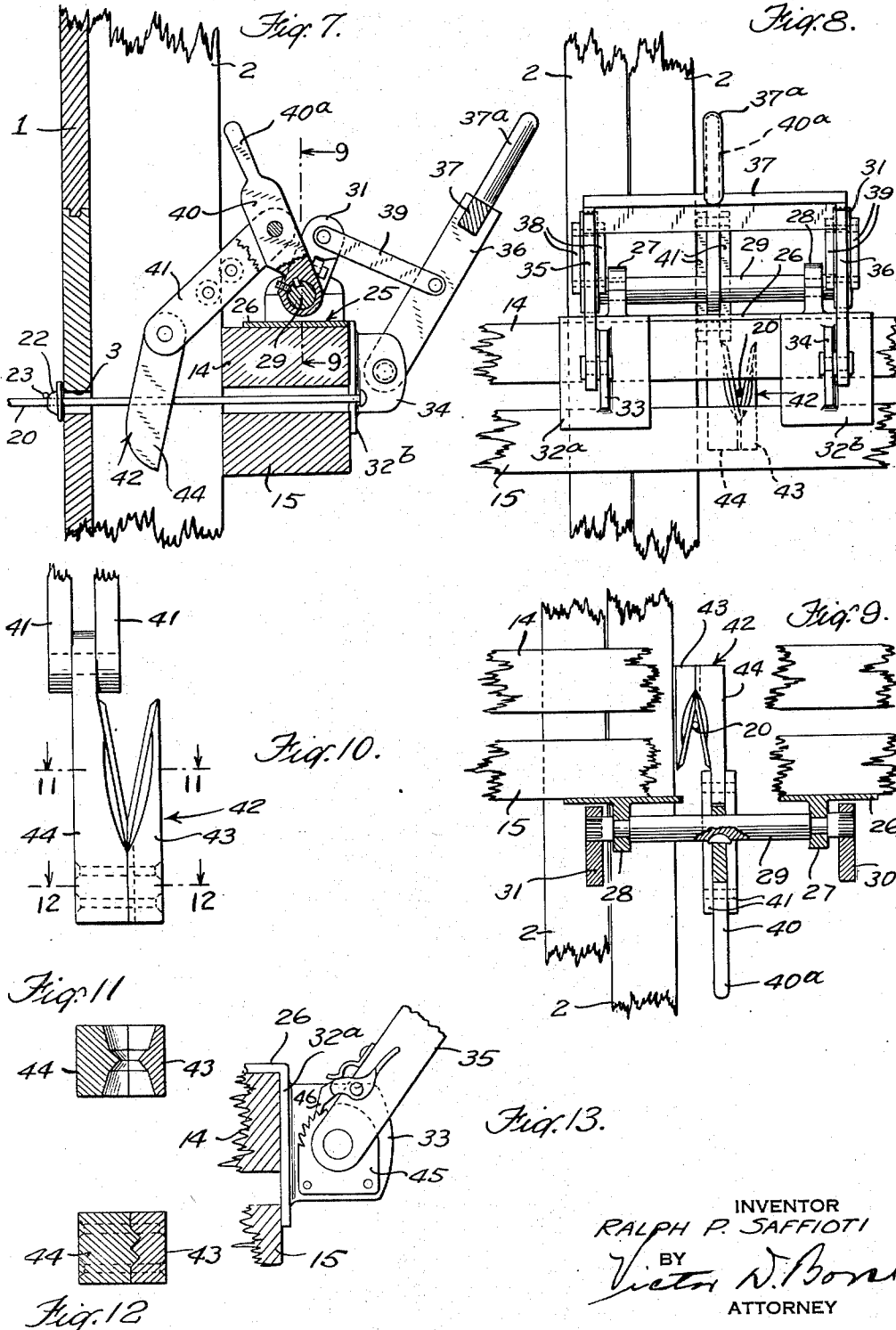
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TOOL FOR PULLING ANCHOR RODS IN CONCRETE FORMS

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4 Sheets-Sheet 3



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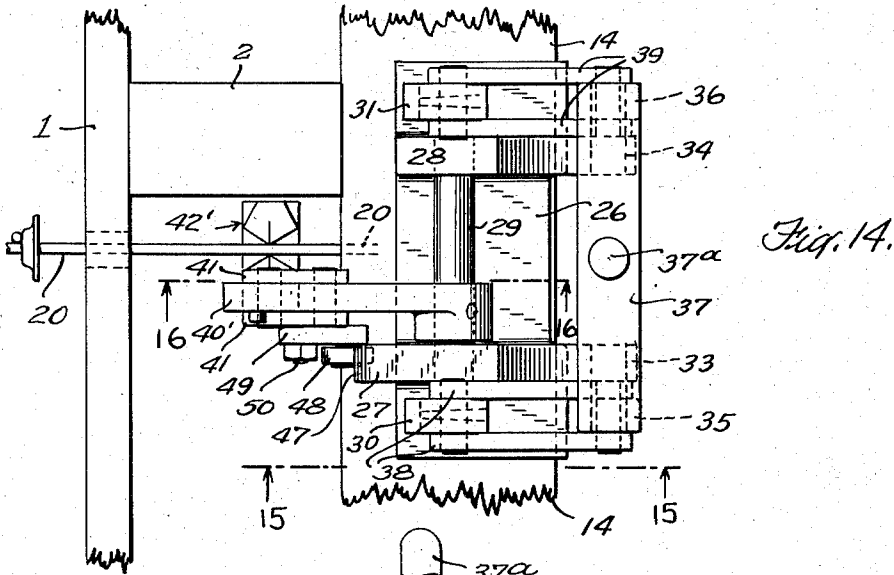
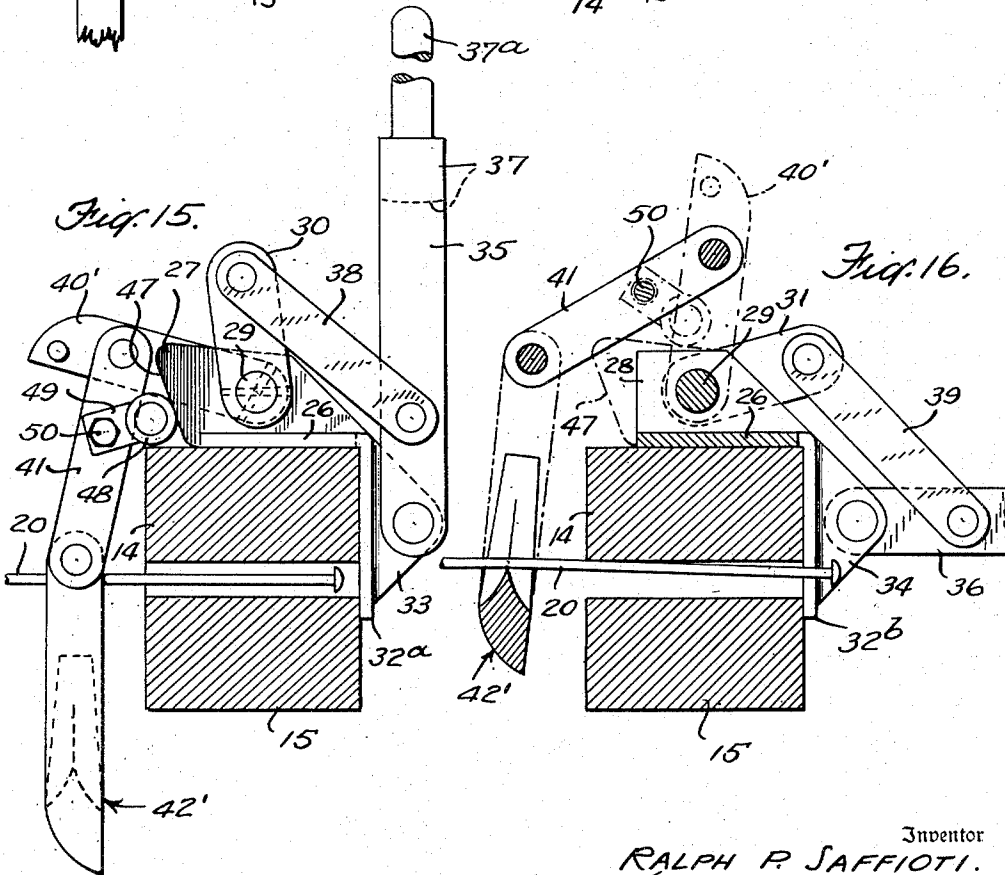
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TOOL FOR PULLING ANCHOR RODS IN CONCRETE FORMS

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4 Sheets-Sheet 4



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TOOL FOR PULLING ANCHOR RODS
IN CONCRETE FORMS

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7 Claims. (Cl. 254—29)

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This invention relates to tools of the claw variety which are adapted to grip or seize a rod or similar member and to be operated to exert a longitudinal pull upon the member. More specifically, the tool of this invention is designed to be used in connection with the erection of concrete forms as an aid in getting the screw anchor or tie rods through far enough to get the fastening means, known as the snap ties, on the ends of the rods with the snap ties bearing against the outer face of the form. However, as will appear from the subsequent description, the tool is susceptible of various other uses.

For pouring concrete walls, sectional forms are used which are usually composed of boards fastened by studding, two forms being set up in opposed relation at a space determined by the thickness of the wall. To hold the forms in position, rods pass through them at intervals with collars bearing on the inner faces of the forms and bifurcated wedge members, the snap ties, entered on the protruding ends between the heads on the rods and the outer faces of the forms. In setting up the forms, rods are usually inserted from the inner side out, first at one end in the form on that side and secured in place, and then the other ends are similarly entered in the opposing form. If the collars on that end can be brought up against the inside face of the form, the headed ends will project through far enough to insert the snap ties.

However, frequently there is enough abnormality due to warping or other cause, to prevent the second inserted end or ends of a rod or rods from projecting externally of the form sufficiently to insert the snap ties, and it is then that the two opposing forms have to be brought into their relative places by exerting a pull on a rod that does not protrude, using the form as a fulcrum.

In accordance with this invention, that is done by means of a special tool that is designed for the purpose and constitutes the subject matter of the invention. It is particularly designed for use with forms that have the sections united and reinforced by longitudinal timbers known as wales. The tool is designed to sit upon a wale and to react inside of the wale and grip a rod and bear against the wale in pulling on the rod. Thus a force is exerted to pull the two sections of the form toward each other until the rod is caused to protrude sufficiently through the second section.

The specific embodiment of the invention which is illustrated in the drawings will now be

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described, after which the invention will be pointed out in claims.

Fig. 1 is a perspective view of a section of a form for pouring a concrete wall.

5 Fig. 2 is a perspective view of a portion of a complete wall form.

Fig. 3 is a perspective view of a wedge or snap tie.

10 Fig. 4 is a plan of a portion of a wall form including portions of two sections on each side, the forms being in the process of erection and illustrating the problem.

Fig. 5 is a plan of the parts shown in the left end of Fig. 4 with the tool embodying this invention applied.

15 Fig. 6 is a sectional elevation on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged sectional elevation on the line 7—7 of Fig. 5 and showing the parts after 20 the tool is operated to draw the rod substantially into place.

Fig. 8 is an elevation of the parts shown in Fig. 7 as viewed from the right of that figure.

Fig. 9 is a sectional elevation on the line 9—9 25 of Fig. 7, but showing the tool reversed.

Fig. 10 is a detail in elevation of the claw member and its immediately associated parts.

Fig. 11 is a sectional plan on the line 11—11 30 of Fig. 10.

Fig. 12 is a sectional plan on the line 12—12 of Fig. 10.

Fig. 13 is a detail in side elevation showing a modified form which includes means to lock the operating handle and hence the rod which is 35 being pulled, in adjusted position.

Fig. 14 is a plan of a modified construction of puller embodying the invention, together with the immediately adjacent parts of the form to which it is applied.

Fig. 15 is a side elevation of the same with the supporting timbers in section on line 15—15 of 40 Fig. 14.

Fig. 16 is a sectional elevation of the same on line 16—16 of Fig. 14.

45 The entire molding form is made up of sections such as shown in Fig. 1. These are of any length, usually four feet, and of a height according to the height of the wall to be poured, generally approximately eight feet. They are made of boards 1 usually having a tongue and groove joint, running horizontally and joined together by spaced studs 2, usually two inches by four inches. The opposing sections are joined together 50 by rods, usually six to a section, which are molded in and are left in the concrete, the protruding

ends being cut off when the forms are removed. For the purpose of receiving these rods, the forms are provided with holes 3, usually there being three in a horizontal row near the top and three in a horizontal row near the bottom. As shown, the outer ones are just inside the outer studs and the middle ones are at the center.

Fig. 2 shows a portion of a form set up and containing a partial concrete wall, there being shown two complete opposing form sections 10 and 11, and the major portion of two adjoining sections 12 and 13. As shown, these sections on each side are secured together in alinement by two by four inches horizontal timbers known as wales. Usually these wales are disposed in pairs, one pair near the top and one pair near the bottom of the forms, being applied with their narrow sides to the outer faces of the studs 2 by temporary fastenings, a single oblique nail into each stud being used in the construction shown.

The two wales of the upper pair on the one side are numbered 14 and 15 in the drawings, and the two of the lower pair on the same side are numbered 16 and 17. The corresponding wales on the opposing forms are numbered 14', 15', 16', and 17', respectively. As shown, the wales are of the length of the form sections, being staggered with respect to the sections, and their joints may be strengthened by cleats 18 which span the joints. The wales of each pair are spaced slightly and are so disposed that the horizontal rows of holes 3 are in alinement with the respective spaces between them, as shown in Figs. 6 and 7 with respect to the upper row of holes.

The tie rods, which are the so-called screw anchor rods, and which go through the holes 3 and tie the forms together, are of such construction as to pass through the holes 3 and are centered by collars that bear against the inner faces of the forms and so space the forms, and they are of a length to extend just outside the wales through the space between them and receive fastening means on their outer ends to bear against the outer faces of the wales. Three such tie rods are shown, for example, in Fig. 4, numbered 19, 20 and 21, respectively. Rod 19 passes through the right end of forms 10 and 11, and rods 20 and 21 pass through the left end and center, respectively, of forms 12 and 13. These rods have two sliding collars 22 on them with two stop means 23 welded or otherwise fixed on the rods at the proper distance each side of the center of the rod to limit the inward movement of the collars and space the sections of the forms at the desired distance. At each end the rods are provided with small heads, and a so-called snap tie 24, such as shown in Fig. 3. These snap ties are bifurcated or slotted with the opening at the bottom large enough to go over the head of the rod, and having a wedge portion, as shown, so that as they are pushed down they wedge between the head of the rod and the face of the wales, as shown, for example, in Fig. 2.

The situation with regard to rod 21 in Fig. 4 represents a normal condition where the rod is in place with the snap ties applied, and the sections 12 and 13 at that vertical plane are locked together at the spacing determined by the collars 22. The condition at the left end of sections 12 and 13 in Fig. 4 is, however, representative of more or less typical abnormal conditions which call for the use of the tool which constitutes the present invention.

As shown, the section 12 at the left of rod 21 is warped so that sections 12 and 13 at that end

do not come into parallelism and hence the rod 20 when secured in one form will not protrude sufficiently through the other form to apply the snap tie. Similarly, although sections 10 and 11 may be parallel, the rod 19 will not reach through the wales at the one end because of the warping. What is required is to exert a pull on one or the other of rods 19 and 20 so as to push or pull the warped end of section 12 into place. This is done, in accordance with the invention, by a tool that bears on the wales and pulls on the rod so that, in case of a pull on the rod 20, the rod and parts fastened to it are pulled toward the bearing wale, and in case of a pull on the rod 19, the wale and parts carried by it are pushed inward relative to the rod.

In Figs. 5, 6, 7 and 8, the tool is shown as applied to the wales 14, 15 so as to pull on the rod 20. As shown in Fig. 4, this rod, due to the warping of section 12, does not extend through the space between the wales 14, 15 and it is necessary to pull the rod until the collar 22 comes up against the inner face of section 13, thus bringing the left end of section 13 into line with section 10 and bringing the head of rod 20 sufficiently beyond the wales 14, 15 to receive a snap tie 24.

The puller tool, in the form shown, has an angle plate 25 the legs of which meet at a right angle so as to seat and fit upon the corner of a wale. The horizontal leg 26 of the plate 25 has near each end an upstanding bearing member, 27 and 28, respectively, in which bears a shaft 29. The bearing portions of the shaft are reduced in diameter, and the bearings are split to receive the shaft. The protruding ends of shaft 29 are shown as serrated, and on these serrated ends are secured lever arms, 30 and 31, respectively, which constitute part of the crank means to rock the shaft 29.

The rest of the crank means comprises a handle pivoted on the vertical leg of the angle plate 25 and operatively connected to the lever arms 30 and 31. The vertical leg of the plate consists of two end portions 32a and 32b with an opening between them to accommodate the rod and the snap tie.

The pivoted handle consists of an inverted U-shape member the legs of which are pivoted in bearing brackets on the plate members 32a and 32b. These plate members are provided with outstanding bearing brackets 33 and 34, respectively. A leg 35 of the handle is pivoted at its lower end in bearing bracket 33, and the other leg 36 of the handle is similarly pivoted in bearing bracket 34. A cross member 37 is secured in slots in the upper ends of legs 35 and 36 and completes the U-shape handle, the cross member having at its center an upstanding hand grip member 37a.

A pair of links 38 pivotally connect the center of the leg 35 with the outer end of the pivot arm 30, and a similar pair of links 39 similarly connect the leg 36 with the lever arm 31. Thus it will be seen that the actuation of the hand grip 37a will crank the shaft 29 and rock the shaft.

To grasp the tie rod at a point inside the wales in the zone of the studs, articulated claw means are connected to the shaft 29 to be actuated by it. As shown, a radial arm 40 is splined on the shaft 29 at the center thereof, and this may be formed at its outer end into a hand grip 40a to supplement 37a so that the tool may be operated by both hands. This arm 40 is pivotally connected by a pair of links 41 to one arm of a V-shape claw member 42, at the open end of the

claw so the V-opening is at one side of the line of the links 41. This claw has its inner faces beveled as indicated in Figs. 10 and 11, and is preferably composed of two separate members which have dovetail engaging faces, as shown in Fig. 12 and are thus riveted together to hold them against relative movement.

In applying the tool, it will be apparent that it is set upon the wale, as shown in Fig. 7, and the shaft is rocked forward, as shown in Fig. 6, and the claw is caused to grip the rod. The shaft is then rocked back to the position shown in Fig. 7 until the rod is pulled through far enough to permit application of the snap tie.

In case the rod is too near the stud to permit the claw to grasp it in the position shown in Fig. 8, the tool may be reversed and applied to the lower corner of wale 15, as shown in Fig. 9, thus permitting the claw to get closer to the stud.

As shown in Fig. 13, ratchet means may be provided to lock the handle and hence the rod in an operated position, while, for example, the snap tie is being applied. A toothed ratchet 45 in this construction is attached to the bracket 33, and a spring pressed pawl 46 on the leg 35 will ride over the teeth and lock the handle in the operated position. A thumb piece on the pawl facilitates withdrawal of the pawl when it is desired to relieve the grip of the claw on the rod and release the tool from the rod.

The modified form shown in Figs. 14, 15 and 16 involves the use of a cam to direct the claw in its gripping approach and engagement. In this construction, the bearings 27 and 28 for the shaft 29 are made continuations of the bearings 33 and 34, respectively, and the bearing 27 is continued beyond the leg 26 of the angle member to provide a cam face 47 which is generally vertical but somewhat overhanging or forwardly inclined, and terminates at its top in a rounded corner which merges into the top or horizontal face of the bearing. Instead of the central radial arm 40, the shaft 29 has a radial arm 40' offset toward the left on the shaft and having a hub which is proximate the inner face of the bearing 27. The claw 42', which is substantially like the claw 42, is pivotally connected with the arm 40' by links 41. The left hand link 41 carries a roller 48 in position to engage the cam surface 47 on the bearing 27. This roller is adjustably attached to the link 41 through an arm 49 on a screw stud 50, being pivotally adjustable on the stud to raise and lower the roller and being locked on adjusted position by a nut.

The action of the cam appears in Figs. 15 and 16. With the handle upright, the claw hangs down from its pivotal attachment to the links 41 with the roller contacting the cam face near its bottom. As the handle is swung down toward the position shown in Fig. 16, the roller, which acts as a cam follower, causes the claw to move up and slightly to the left due to the inclination of the cam face, until the rod 20 is wedged in the claw, the slight forward component of movement causing the claw to get a secure bite on the rod. As shown in Fig. 16, the rod bears against the bottom of the wale 14 at the end of the rise of the claw and the wale thus cooperates to allow the claw to get a good bite. At this stage the roller passes over the rounded corner and the rest of the movement of the roller is along the horizontal top surface of the bearing, during which the continued movement of the handle causes the claw to effect an outward pull on the

rod, bringing it to the position shown in Fig. 16 at which the snap tie may be inserted.

It is obvious that the invention may be otherwise variously embodied, within the principle and scope of the invention as defined in the following claims.

I claim:

1. A tool for pulling tie rods for concrete forms which are braced by wales attached to the spaced vertical studs, said tool comprising an angle plate adapted to fit upon a wale and having on one leg spaced, upstanding bearing members, a shaft journaled in the bearing members, the other leg having two disconnected, spaced end portions with a bearing bracket on each portion, handle means journaled in the bearing brackets, means operatively connecting the handle means with the shaft, a radial arm secured to the shaft, a claw member adapted to grip a rod, and a link member pivotally attached at one end to the radial arm and at the other end to the claw.

2. A tool for pulling tie rods for concrete forms which are braced by wales attached to the spaced vertical studs, said tool comprising an angle plate adapted to fit upon a wale and having on one leg spaced, upstanding bearing members, a shaft journaled in the bearing members, the other leg having two disconnected, spaced end portions with a bearing bracket on each portion, inverted U-shape handle means journaled in the bearing brackets, a lever arm radially secured on each end of the shaft, linkage operatively connecting each leg of the handle with one of the lever arms, a radial arm secured to the shaft intermediate its ends, a claw member adapted to grip a rod, and a link member pivotally attached at one end to the radial rod and at the other end to the claw.

3. A tool for pulling tie rods for concrete forms which are braced by wales attached to the spaced vertical studs, said tool comprising a right angle plate one leg of which has a central opening and which is adapted to fit upon a wale, two upstanding bearing members on the other leg of the plate, a shaft journaled in the bearing members, a radial arm fixed on the shaft within the region of said opening, a V-shape claw member adapted to grip a rod, and a link pivotally attached to the radial arm and to one arm of the claw at its open end and supporting the claw opposite said opening.

4. A tool for pulling tie rods for concrete forms which are braced by wales attached to the spaced vertical studs, said tool comprising a right angle plate one leg of which has a central opening and which is adapted to fit upon a wale, two upstanding bearing members on the other leg of the plate, a shaft journaled in the bearing members, a radial arm fixed on the shaft within the region of said opening, a V-shape claw member adapted to grip a rod, a link pivotally attached to the radial arm and to one arm of the claw at its open end and supporting the claw opposite said opening, and means carried by the said one leg for rotating the shaft.

5. A tool for pulling tie rods for concrete forms which are braced by wales attached to the spaced vertical studs, said tool comprising a right angle plate one leg of which has a central opening and which is adapted to fit upon a wale, two upstanding bearing members on the other leg of the plate, a shaft journaled in the bearing members, a radial arm fixed on the shaft within the region of said opening, a V-shape claw member adapted to grip a rod, a link pivotally attached to the radial arm and to one arm of the claw at its

Open end and supporting the claw opposite said opening, bearing brackets on the said one leg on opposite sides of the opening, a U-shape operating handle having its legs journaled in the bearing brackets, and crank means operatively connecting the shaft to each leg of the handle.

6. A tool for pulling tie rods for concrete forms which are braced by wales attached to spaced vertical studs, said tool comprising an angle member adapted to be seated upon a wale, bearing means on the angle member, a longitudinally disposed shaft journaled in the bearing means, manual means to rotate the shaft, an actuating arm secured to the shaft, a claw member adapted to grip a rod, a link member pivotally attached at one end to the actuating arm and at the other end to the claw, a cam on the angle member having a generally vertical cam surface, and a cam follower carried by the link member in position to engage the cam surface and guide the upward component of movement of the claw.

7. A tool for pulling tie rods for concrete forms which are braced by wales attached to spaced

vertical studs, said tool comprising an angle member adapted to be seated upon a wale, bearing means on the angle member, a longitudinally disposed shaft journaled in the bearing means, manual means to rotate the shaft, an actuating arm secured to the shaft, a claw member adapted to grip a rod, a link member pivotally attached at one end to the actuating arm and at the other end to the claw, one of the bearing means being provided on its inner edge with a generally vertical but slightly overhanging cam surface, and a cam follower carried by the link member in position to engage the cam surface and guide the upward component of movement of the claw.

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