Sept. 10, 1940. F. BEDNAREK 2,214,267

TIE-WIRE TOOL

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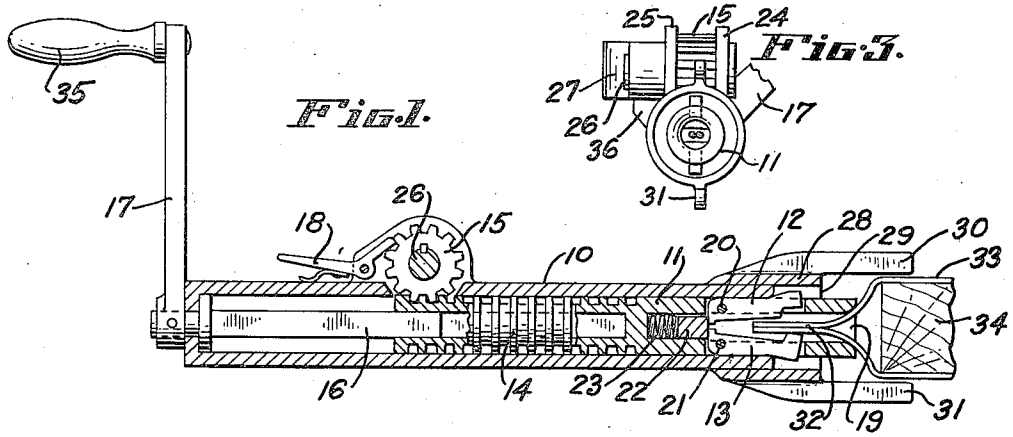


Fig. 1.

Fig. 2.

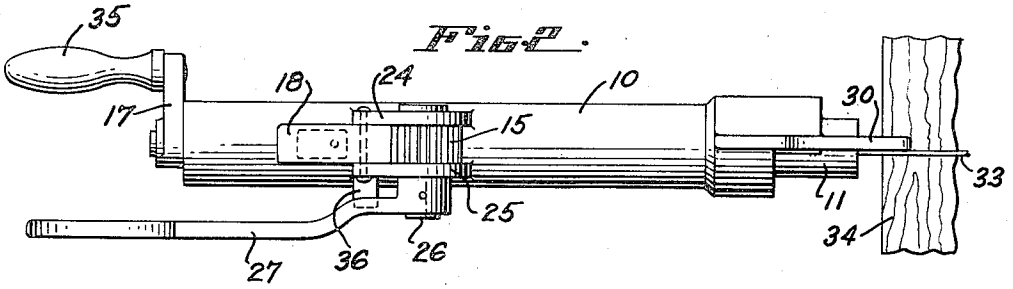


Fig. 3.

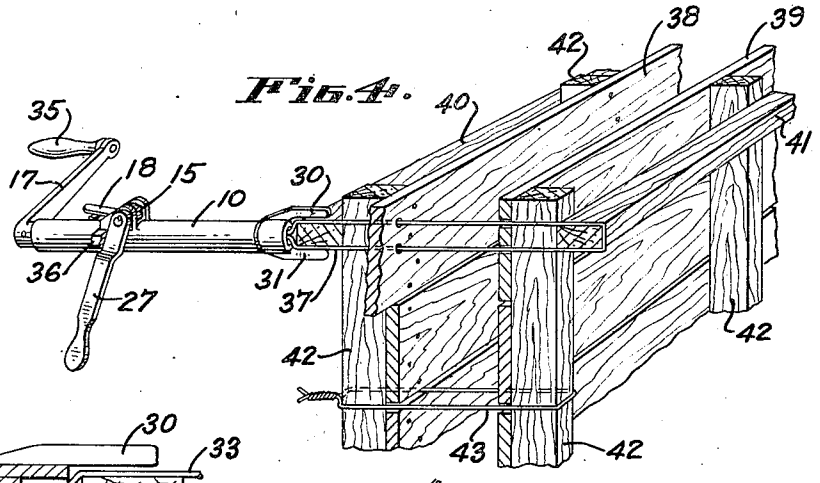


Fig. 4.

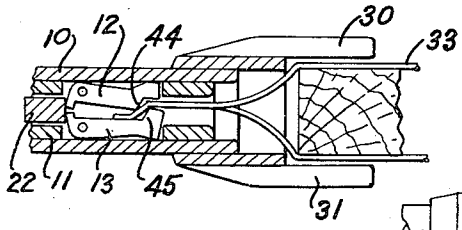


Fig. 5.

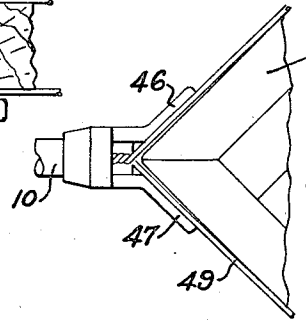


Fig. 6.

INVENTOR.
Frank Bednarek
BY
W. H. Atkinson
ATTORNEY.

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TIE-WIRE TOOL

Frank Bednarek, San Francisco, Calif.

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5 Claims. (Cl. 140—119)

My present invention relates to a tie-wire tool for twisting and securing the extending ends of a tie-wire together, and more particularly to a tool for twisting and securing the extending ends of tie-wires used in securing concrete form side walls, as practiced in the construction of concrete structures.

An object of the invention is to provide a new, novel and simple tool for tensioning and twisting the extending ends of a tie-wire in a practical and efficient manner.

Another object of the invention is to provide a new and novel tie-wire tool by means of which a tie-wire may be first tensioned and subsequently twisted to secure its ends together in a simple and convenient manner.

A further object of the invention is to provide a tie-wire tightening and twisting tool in which the tensioning and twisting is effected in a new and novel manner by lever operated means.

Other objects and advantages of the invention will be in part evident to those skilled in the art and in part hereinafter pointed out in connection with the accompanying drawing, wherein there is shown by way of illustration and not of limitation preferred embodiments thereof.

In the drawing, wherein like numerals refer to like parts throughout the several views;

Figure 1 is a side elevation partially in section and with parts broken away to disclose the internal details thereof,

Figure 2 is a plan or top view of the device in its extended position,

Figure 3 is an end view of the device with the ends of a tie-wire in section,

Figure 4 is a fragmentary perspective view showing the tool as applied to the work and in its retracted position,

Figure 5 is a fragmentary sectional view showing the ends of a tie-wire as gripped in the tool, and

Figure 6 is a fragmentary view showing the tool as modified for use in securing a tie-wire upon a packing case or the like.

In the past, in constructing forms such as are used in connection with the pouring of concrete walls, foundations and the like, it has been customary, after forming the walls, to secure them in fixed spaced relation by means of bolts and/or tie-wires which extend through the walls and are then twisted together. Where tie-wires of this type have been used, it has been the practice to twist the ends thereof by the use of heavy plyers. In carrying out this operation, the jagged ends of the wires are exposed and often result in serious injury to the operators. It is, therefore, a further object of the present invention to provide a tool by means of which the ends of a tie-wire may be effectively twisted together and tensioned in an efficient manner and without danger of injury to the workmen.

In its preferred embodiment my improved tie-wire tool, as illustrated in the drawing, comprises a cylindrical body member 10 in which there is rotatably and slidably mounted a cylindrical rack 11 at the working end of which there is pivotally mounted wire engaging jaws 12 and 13. The cylindrical rack 11 has circumferential rack teeth 14 with which a rack gear 15 cooperates and extending into the cylindrical rack 11 there is a keyed or splined shaft 16 having a crank 17 at its outer end by means of which the shaft 16 and the cylindrical rack 11 may be rotated, as will hereinafter appear. Associated with the rack gear 15 there is also shown a latching device 18 that serves to hold the cylindrical rack 11 during rotation thereof in any position to which it is retracted. The wire gripping jaws 12 and 13 are shown as disposed in slots which extend oppositely from a cylindrical opening 19 at the work engaging end of the cylindrical rack 11. As shown, these jaws 12 and 13 are pivotally mounted respectively upon pins 20 and 21 and have outwardly flared ends which provide inclined surfaces that will engage the inside wall of the body member 10 when the cylindrical rack 11 is moved to the left. For the purpose of moving the jaws 12 and 13 into an open or wire receiving position when the cylindrical rack 11 is moved to the right, as illustrated in Figure 1 of the drawing, these jaws are shown as engaged by a plug 22 which is urged outwardly by a spring 23.

As shown in Figure 2, the rack gear 15 is mounted between spaced ears 24 and 25 formed upon the body member 10 and as keyed upon a shaft 26 that carries a lever arm 27 by means of which the rack gear 15 can be rotated. At the work abutting end of the body member 10 there is shown an enlarged collar 28 having a surface 29 that is adapted to abut with the work, and extending outwardly in diametrically opposed positions, the collar 28 has two projecting members 30 and 31 that operate, as will hereinafter appear, to prevent rotation of the tie-wire tool when the cylindrical rack 11 with its wire gripping jaws 12 and 13 are rotated by the lever arm 17.

In Figures 1 and 2 of the drawing, the tool is shown as in position to grip the ends 32 of a tie-wire 33 which has been passed around and extends outwardly from a purline 34. When the

parts are in this position, it will be understood that upon the application of a force upon the lever 27, the rack gear 15 will be caused to rotate in a clockwise direction, as viewed in Figure 1, and thus the cylindrical rack 11 will be moved to the left axially within the body member 10, and as a result the wire gripping jaws 12 and 13 will be caused to move inwardly toward each other and grip the ends 32 of the tie-wire 33. As the cylindrical rack 11 is moved still farther to the left, the tie-wire 33 will be placed under tension, while the tool body 10 will be moved relatively to the right until its work abutting surface 29 comes into contact with the purline 34. After the cylindrical rack 11 has been moved inwardly to this point, the latch 18 will serve to hold it in this position and as a subsequent operation the workmen can, by imparting rotation to the shaft 16 in either a clockwise or counter-clockwise direction, cause the cylindrical rack 11 with its jaws 12 and 13 to rotate within the body member 10 and thus effectively twist the ends 32 of the tie-wire 33 and at the same time maintain the pre-established tension therein.

At this point it will be noted that the shaft 16 is shown as square in cross-section and as extending into a squared recess formed centrally in the cylindrical rack 11. The lever 17 is also shown as having a grip forming handle 35 by means of which the shaft 16 can be conveniently rotated after the cylindrical rack 11 has been retracted by rotation of the rack gear 15 through the medium of the lever 27. Associated with the lever 27, it will be noted that the body member 10 carries a stop forming abutment 36 which serves to limit rotation of the rack gear 15 between the limits of the teeth formed upon the cylindrical rack 11. It will also be noted that the two projecting members 30 and 31 which extend outwardly from the work engaging end of the tool are spaced from each other a distance slightly greater than the dimension of the purline and/or stud with which they cooperate. In operation, after these projecting members 30 and 31 have been extended along the sides of a purline or stud, as will hereinafter appear, the entire tool will turn slightly upon an intial rotation of the shaft 16 until these projecting members 30 and 31 engage the purline or stud and at this point they will operate to prevent further rotation of the tool while the crank lever 17 is being turned. In other words, these projecting members 30 and 31 will serve in cooperation with the purline or stud to prevent rotation of the tool, as a whole, while the tie-wire gripping jaws 12 and 13 are being turned with the cylindrical rack 11 to twist the ends of the tie-wire 33.

Upon referring to Figure 3, it will be noted that the faces of the tie-wire gripping jaws 12 and 13 are of such a width that when the ends 32 of the tie-wire 33 are projected into the central opening 19 of the cylindrical rack 11, they will be positioned between the gripping surfaces of the jaws 12 and 13.

In Figure 4 of the drawing, the tool is shown as applied to the ends of a tie-wire 37 that extends through spaced walls 38 and 39 of a concrete retaining form and around purlines 40 and 41 arranged longitudinally outside of vertically disposed studs 42 to which the boards forming the side walls 38 and 39 of the form are nailed. As here illustrated, the projecting members 30 and 31 engage opposite sides of the purline 40, the entire tool 10 having been drawn up to this position against the purline 40 by a clockwise turning of the lever 27. At this point the latch 18 cooperates with the rack gear 15 and serves to hold the cylindrical rack 11 in its retracted position. With the tool in this position, it will be understood that the operator can now, by rotating the lever 17 through the medium of the crank handle 35, twist the ends of the tie-wire 37 to any desired degree. During this operation, the tie-wire 37 will be drawn up and tensioned as the ends thereof are twisted together. In this figure of the drawing and immediately below the tie-wire 37 the concrete form here illustrated is also shown as having a second tie-wire 43 that has been passed around two of the oppositely disposed studs 42. When the tool is used with a tie-wire arranged in this latter manner, it will be understood that the projecting members 30 and 31 will extend on opposite sides of the adjacent stud 42 and as a result, the lever 27 will be disposed to operate in a substantially horizontal plane as distinguished from a vertical plane, as illustrated.

Reference is now made to Figure 5 of the drawing, wherein the cylindrical rack 11 is shown as retracted into the body member 10. When the cylindrical rack 11 has been retracted in this manner, it will be noted that the wire gripping jaws 12 and 13 will be moved toward each other as they are drawn into the end of the cylindrical bore of the body member 10. At this point it is important to note that the wire engaging surfaces of the wire gripping jaws 12 and 13 are shown as having offset surfaces 44 and which serve to form a kink in the ends 32 of the tie-wire 33. The spacing of these offset surfaces 44 and 45 is made slightly greater than the diameter of any wire which may be inserted therein and at the same time the opposed remaining surfaces of the jaws 12 and 13 are likewise disposed at a distance that will avoid any clamping action upon the ends 32 of the tie-wire 33. In other words, the gripping action of the jaws 12 and 13 is produced by the offset or kinked configuration formed in the wire rather than by a tight gripping action upon the wire by these jaws. As a result of this kinking action, there is no possibility of the ends of the tie-wire slipping from the jaws during the cylindrical rack retracting and wire tensioning operation of the tool. The provision of this clearance between the jaws 12 and 13 when fully collapsed also permits of some variation in the diameter of the tie-wires and facilitates an easy release of the ends after the twisting operation by a return of the cylindrical rack to its initial position, as shown in Figure 1 of the drawing.

In Figure 6 of the drawing, the body member 10 is shown as having a modified work engaging end which comprises diagonally extending surface engaging members 46 and 47 that are arranged at an angle of 45° to the axis of the tool so that they may be placed along the adjacent sides of a packing case 48 for the purpose of tensioning and twisting a tie-wire 49 thereabout.

It is believed that the operation of my improved tie-wire tool will be clearly understood from the above and, therefore, no further description is thought necessary.

While I have, for the sake of clearness and in order to disclose the invention so that the same can be readily understood, described and illustrated specific devices and arrangements, I desire to have it understood that this invention is not limited to the specific means disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and it is desired

to claim it so that all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a tie-wire tool, the combination of a body member having a cylindrical recess therein, a cylindrical rack axially and rotatably mounted within said cylindrical recess and extending out of said recess at the work engaging end of the body member, a pair of wire gripping jaws carried by said rack, a rack gear having lever operated means adapted to cooperate with said cylindrical rack and move said rack and wire gripping jaws away from the work, means for holding said cylindrical rack in any position to which it may be moved by said rack gear, crank operated means for rotating said cylindrical rack within the cylindrical recess of said body member, and means carried by said body member adapted to engage the work and prevent rotation of said body member when said crank means is operated to rotate said cylindrical rack.

2. In a tie-wire tool of the character described, the combination of a body member having an axially extending cylindrical bore, a rack carrying member rotatable and axially movable in the bore of said body member, a pair of wire gripping jaws at one end of said rack carrying member between which the projecting ends of a tie-wire are placed, means for moving said rack carrying member axially with respect to said body member, means cooperating with the pivotally mounted wire gripping jaws at the end of said rack carrying member adapted to impart a wire gripping movement thereto as the rack carrying member is moved axially into the cylindrical bore of said body member, means for rotating said rack carrying member with respect to said body member after said wire gripping jaws have gripped the ends of a tie-wire, and means for holding said rack carrying member against an axial movement during its rotational movement, whereby the tie-wire will be subjected to a tensioning action as the ends thereof are twisted together by rotation of said wire gripping jaws.

3. In a tie-wire tool of the character described, the combination of a body member having an opening into which the ends of a tie-wire may be projected, a cylindrical rack axially and rotatably movable in the opening of said body member, a pair of normally open wire gripping jaws carried by said cylindrical rack between which the projecting ends of the tie-wire are gripped, said wire gripping jaws having outwardly flared ends which when drawn into the opening of said body member will cause said jaws to move into wire gripping relation with respect to each other, means for drawing said cylindrical rack and said jaws into the opening of said body member, and independent means for rotating said cylindrical rack without imparting axial movement thereto with respect to the body member, whereby the ends of the tie-wire will be both twisted and tensioned as the cylindrical rack and the wire gripping jaws rotate.

4. In a tie-wire tool of the character described, the combination of a body member having an opening into which the ends of a tie-wire may be projected, a pair of oppositely disposed and pivotally mounted wire gripping jaws movable within the opening of said body member, a support for said wire gripping jaws movable axially and rotatably within the opening of said body member, said wire gripping jaws having outwardly disposed portions which when drawn into the opening of said body member will cause the jaws to move into wire gripping relation with respect to each other, means for drawing said support and said wire gripping jaws into the opening of said body member, means for rotating said support and said wire gripping jaws when drawn into the body member, whereby the ends of a tie-wire engaged by said wire gripping jaws will be twisted as the support and said wire gripping jaws are rotated, and means for securing said support and said wire gripping jaws against axial movement with respect to said body member when said support with the wire gripping jaws is rotated.

5. In a tie-wire tool of the character described, the combination of a body member having a central opening extending inwardly from one end thereof, a member carried by and adapted to rotate and move axially within the central opening of said body member, a series of spaced concentric teeth at one end of said member forming a circular rack, a rack engaging gear mounted upon said body member and engaging said circular rack, lever means for rotating said gear to move said rack axially of the body member, a pair of wire gripping jaws at the other end of said body member between which the projecting ends of a tie-wire are placed, means cooperating with the pivotally mounted wire gripping jaws at the end of said member adapted to impart a wire gripping movement, thereof as said member is moved axially of the body member by rotation of said rack engaging gear, means operating independently of said rack engaging gear for rotating said member after the wire gripping jaws have gripped the ends of a tie-wire, and means for securing the rack engaging gear against rotation while said member with said wire gripping jaws is rotated, whereby the tie-wire will be subjected to both a twisting and tensioning action as the ends thereof are twisted together.

FRANK BEDNAREK.