

Oct. 21, 1969

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3,473,578

FORM TIE BREAKER TOOL

Filed Nov. 20, 1967

2 Sheets-Sheet 1

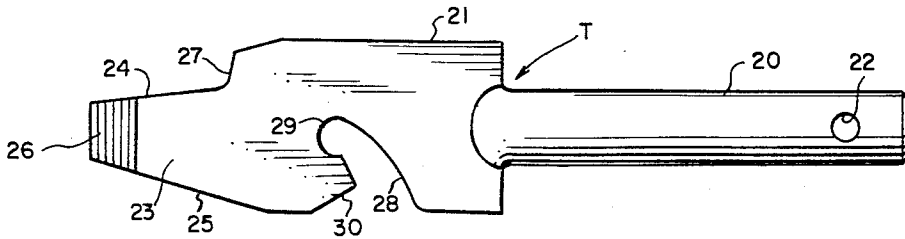


FIG. 1

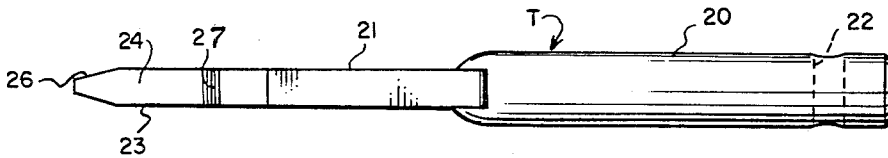


FIG. 2

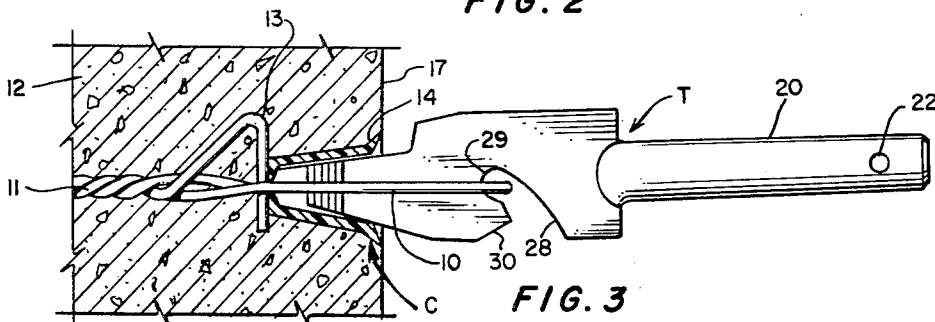


FIG. 3

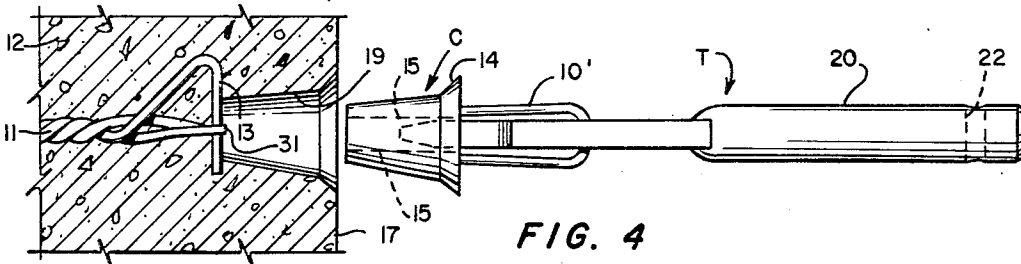


FIG. 4

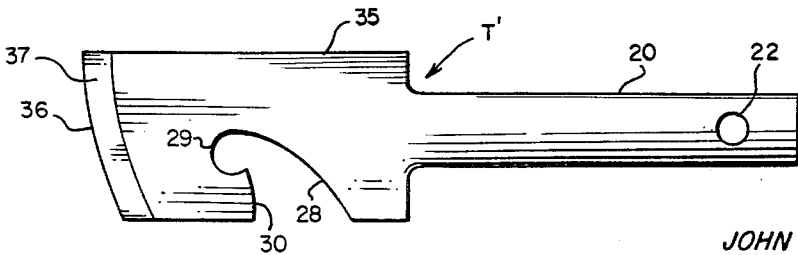


FIG. 5

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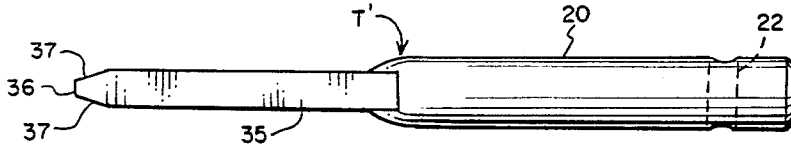


FIG. 6

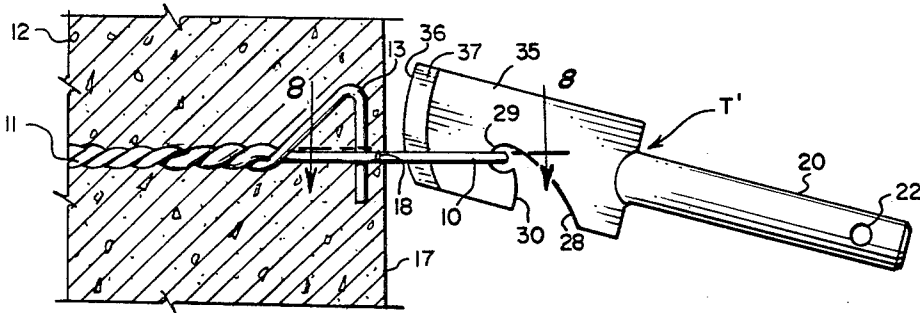


FIG. 7

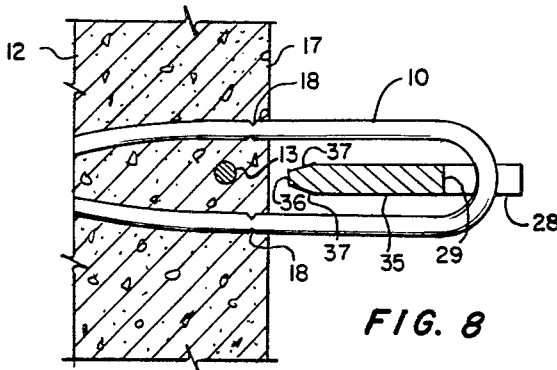


FIG. 8

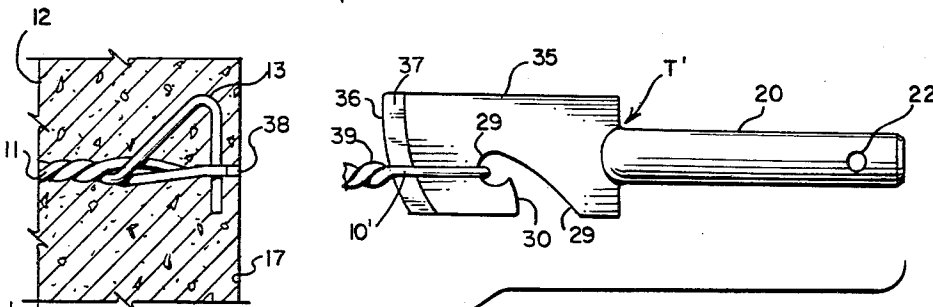


FIG. 9

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**FORM TIE BREAKER TOOL**

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Int. Cl. B21f 7/00; B26f 3/00

U.S. Cl. 140—149

7 Claims

**ABSTRACT OF THE DISCLOSURE**

The invention is a form tie breaker tool comprising aligned shank and blade portions suited for engagement with a form tie terminal loop protrusion on a cast wall surface, to transmit torsional forces applied to the shank for separation of the engaged protrusion from the wall, moderate structural variation of the blade portion of the tool accommodating adaptation of its operative principle to the removal of loop protrusions of diverse particularity. The tool blade, in one preferred form, is characterized by an arcuate slot engageable with the end of the loop and a laterally tapered nose insertable within a form tie supplement; in another form, the tool blade is characterized by a somewhat similar slot and an arcuate, generally wedge shaped, inner end.

The occasion for and the utility of the invention inhere in the practice of reinforced concrete wall construction involving employment of form ties persistent after stripping of the forms as protrusions needful of detachment from the surface of the cast wall.

Conventional form casting of concrete walls has promoted production and use of a variety of specific form ties, among which a type distinguished by narrow, elongated terminal loops outstanding beyond tie fixed spacing stops to obtuse from holes in the form walls for coaction with exterior anchors is in widespread, general use. Upon release of the anchors and removal of the forms, there remain protruding, from the cast wall surface, unembedded terminal loops of the ties which have heretofore been detached by clipping, sawing, flexing to rupture, advance provision of weakened "break points" designed to yield in an inward offset from the wall surface, and tie supplements effective to promote, and to facilitate, loop protrusion detachment yet more deeply within the wall. The merits and demerits of conventional techniques applied to detachment of terminal loop tie protrusions are reasonably manifest and adequately known and have stimulated the concept of the present invention realized as hereinafter detailed in a tool peculiarly suited to separate the tie protrusions of loop type from the cast wall.

A principal object of the invention is to provide a novel and improved tool for effective and efficient detachment of form tie terminal loop protrusions from a cast wall.

A further object of the invention is to provide a novel and improved tool readily applicable and conveniently manipulable to separate form tie terminal loop protrusions from an embedded tie portion traversing a cast wall.

A further object of the invention is to provide a novel and improved tool for effectively applying torsional forces to detachably rupture form tie terminal loop protrusions at or subjacent the exposed surface of a cast wall.

A further object of the invention is to provide a novel and improved tool coactable with form tie supplements, as of the type disclosed and claimed in the copending application of John C. McArdle, Ser. No. 683,212, filed Nov. 15, 1967, to detachably rupture the form tie terminal loop at a point substantially inward from the ex-

posed surface of a cast wall and simultaneously remove the form tie supplement.

A further object of the invention is to provide a novel and improved unitary tool facile of attachment to and manipulation in engagement with a form tie terminal loop, to free the latter for separation from the form tie portion embedded in a cast wall.

A further object of the invention is to provide a novel and improved form tie breaker tool reactive in engagement with a form tie terminal loop protrusion to apply torsional forces for expeditious and slightly detachment of the protrusion from the exposed surface of a cast wall.

A further object of the invention is to provide a novel and improved form tie breaker tool suited for detachment of form tie terminal loop protrusions from exposed surfaces of cast walls which is simple and inexpensive of production in compact, unitary form, which is facile of one hand application to successive positions of repetitious use, which accommodates and functionally transmits torsional forces of diverse origin and intensity, which is rugged and durable to withstand prolonged and arduous use, which is conservative of time and labor incident to the dressing of cast walls, and which is positive and efficient in attainment of the ends for which designed.

Additional objects and the novel features of this invention will become apparent from the description which follows, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a side elevation of a form tie breaker tool of the invention, particularly adapted for coaction with form tie terminal loop protrusions outstanding from the cast wall surface through and from a form tie thimble having a transversely angular, outwardly open, longitudinal cavity;

FIG. 2 is a top plan view of the tool of FIG. 1;

FIG. 3 is a side elevation, on a reduced scale, of the tool of FIG. 1, engaging a form tie terminal loop protrusion associated with a form tie thimble, with the thimble and the surrounding cast wall material being shown in vertical section;

FIG. 4 is a side elevation and vertical section similar to FIG. 3 but showing the tool, the loop protrusion and the thimble following detachment and separation from the cast wall;

FIG. 5 is a side elevation, on the same scale as FIG. 1, of a form tie breaker tool of the invention and forming an alternative embodiment thereof particularly adapted for detachment of terminal loop protrusions of form ties lacking the thimble shown in FIGS. 3 and 4;

FIG. 6 is a top plan view of the tool of FIG. 5;

FIG. 7 is a view similar to FIG. 3 but showing the tool of FIGS. 5 and 6 engaged with a form tie terminal loop protrusion;

FIG. 8 is a fragmentary, transverse section, on an enlarged scale, taken along line 8—8 of FIG. 7; and

FIG. 9 is a view similar to FIG. 4 but showing the tool of FIGS. 5 and 6 and the loop, after the removal of the loop protrusion from the wall.

Conventional practice in the form casting of concrete walls is generally characterized by the use of form ties of diverse specialty, alike applicable to space and consolidate the form walls with provision for expeditious removal of the latter. Within the category of known and available form ties is the type shown in FIG. 3, having a narrow, elongated, closed loop terminal 10 at each end, outstanding as an aligned extension of a straight, inextensible, twisted wire portion 11 embedded in the concrete 12 after pouring of the latter between the form walls. Each loop 10 extends beyond a stop 12 fixed to and transverse of the tie, which stop may abut the inside of a form wall to space the wall apart or abut the inner

end of a thimble or cone C having a frustoconical side wall terminating in an outwardly flared lip 14 which abuts the inside of the form wall for the same purpose. As disclosed in the aforesaid co-pending application of John C. McArdle, Ser. No. 683,212, filed Nov. 15, 1967, cone C is preferably molded of a plastic, such as polyethylene, having a minimal adherence to concrete, while the lip 14 forms a seal against leakage of liquid through the hole in the form wall through which loop 10 extends for engagement with an anchor rod or similar device for clamping against the form wall. The inner end of cone C also forms a seal about the two sides of loop 10 and the hollow interior of the cone is provided with spaced webs 15 of FIG. 4 and grooves in the webs receiving the sides of the loop. Employment of such terminal looped ties, after removal of the anchors and form walls, results in a series of closed loop protrusions marking the surface 17 of the cast wall exposed through removal of the forms and needful of detachment for final dressing and slightly finish of the permanent structure.

Within the typical category of terminal looped form ties extensively in use is the arrangement represented in FIGS. 7, 8 and 9, wherein the stops 12 engage in direct abutment the inner faces of the form walls to determine the spacing between said walls, with a slight retraction away from such direct engagement with the form walls under the influence of the pressures incident to filling of the form. To facilitate acceptable detachment of the loop protrusion resulting from use of the tie arrangement just described, it is known to mark the sides of the closed loop 10 with nicks or constrictions 18 closely adjacent the corresponding stop 12 and thereby establish weakened "break points," at which twisting or flexing of the loop protrusion may act to separate the latter from the embedded portion of the tie immediately subjacent the cast wall surface. Thus, for removing a protruding loop 10 of FIGS. 7 and 8, the loop may be twisted to produce breakage at points 18, while to remove a loop 10 of FIG. 3, the loop and cone C may be simultaneously twisted, to cause the loop sides to break at the inner edge of cone C and the cone, upon removal, to leave a smooth surface cavity 19 in the wall, corresponding in shape to the exterior of the cone. As the loop is detached and the cone is removed, both the removed loop 10' and the cone will remain in the tool T, as in FIG. 4, while the removed loop 10'' of FIG. 9 will remain with the tool T.

The alternative embodiments shown are specifically suited for coaction with and to detach one or the other of the distinctive terminal loop protrusions shown and described, the form tie breaker tool of the invention being a unitary, rigid tool formed in any feasible manner from any appropriate material, such as steel, the tool T of FIGS. 1 and 2 including a shank 20 and an integrally or fixedly aligned blade 21. Shank 20 is designed to receive and transmit applied torsional forces and may be of any suitable conformation, such as cylindrical, as well as equipped at its end, remote from the blade, with an operative connection for means, not shown, immaterially powered or manually actuable, capable of effecting rotation of the shank about its longitudinal axis. A hole 22 diametrically intersecting the shank inwardly from its end remote from the blade will receive a radially disposed lever and symbolizes any functionally equivalent treatment of the shank end. Or, the shank may be clamped in a carpenter's brace or the powered equivalent thereof. Of a thickness freely receivable within the open bight of a terminal loop 10 and having a width exceeding the maximum lateral span of said bight, the blade 21 is symmetrically related to the shank 20 with its longitudinal median line registered as a prolongation of the shank longitudinal axis and terminates in an axially disposed, flat nose 23 having laterally tapered sides 24 and 25 and an end 26 beveled on each side. Nose side 24 extends from a notch 27 and at a lesser angle to the center line of the tool than side 25 for a purpose described later.

Outwardly of notch 27 and on the opposite side of the blade, an arcuate slot 28 has a width freely receptive of the end of a terminal loop protrusion and a curvature inwardly of the blade and longitudinally thereof away from the shank 20, effective to locate the closed but slightly enlarged inner end 29 of the slot on the longitudinal median line of the blade and more remote from the shank 20 than the entrance to the slot. To facilitate hooking onto a terminal loop protrusion 10, the entrance to slot 28 may be enlarged by a chamfer or bevel 30, on the side of the slot opposite shank 20.

The nose 23 of tool T of FIGS. 1 and 2, for the detachment of a terminal loop 10 associated with a thimble C, is first inserted into the thimble C, on the same side of the loop as slot 28, utilizing the wedge shaped end 26 of the nose to separate the sides of the loop within the cone, as necessary, with the lesser inclination of side 24 of the nose permitting readier insertion from that side. Nose 23 is inserted to the inner end of the thimble C, at which position bevel 30 will permit the tool to be moved toward an axial position with respect to the loop and the end of the loop to enter slot 28. A slight withdrawal of the tool will move the end of the loop to the inner end 29 of the slot, as in FIG. 3, in which position the nose of the tool will also be between ribs 15 of the thimble. When the tool is then twisted or rotated, the first revolution will result in the thimble being loosened from the concrete and the sides of loop 10 will twist about each other beyond the nose, thus tending to draw the tool further into the thimble. This twist concentrates stresses on the wires forming the sides of loop 10 at the inner end of the thimble, so that one or a few more revolutions of the tool will cause these wires to break at the inner end of the thimble. The tool, with the separated loop 10' and thimble C attached, is withdrawn, to leave a smooth surfaced recess 19 in the concrete with the broken wire ends 31 at the inner end of the recess, as shown. As will be evident, the removed loop 10' and thimble C may be readily removed from the tool and the removal procedure repeated for successive loops and thimbles. If the surface 17 of the concrete is to be finished smooth, the recesses 19 may be filled with grout or the like, with the uniform size of the recesses and the absence of cracks or spalling in the surface around a recess facilitating such operation.

The tool T' of FIGS. 5 and 6 has a similar shank 20 provided with a hole 22, as well as a blade 35 provided with a similar slot 28 having a slightly enlarged, closed inner end 29 and an associated chamfer or bevel 30, if desired, but is particularly adapted to effect detachment of terminal loop protrusions unassociated with a form tie thimble C. For this purpose, blade 35 has parallel edges, as shown, and extends to a convex, eccentrically disposed, transversely arcuate end 36 having beveled edges 37, as in FIG. 6, to provide a length of blade beyond slot 28 approximating the length of the protruding loop, with sufficient clearance to insert the tool in the loop 10 in a manner described below.

The form tie breaker tool T' is used in the detachment of form tie loop protrusions unassociated with thimbles C by hooking the tool slot 28 into engagement with the end of the loop protrusion 10, while the shank 20 is inclined outwardly and downwardly therefrom, as in FIG. 7. Then the shank 20 is elevated into substantial alignment with the engaged loop and the shank rotated to twist the loop sides between the end of the blade and the concrete and move the eccentric end 36 against the cast wall surface to provide a bearing point. Further rotational force applied to and through the shank 20 to rotate the blade 35, disposed within and longitudinally of the loop bight, will produce rupture of the loop sides at the "break points" 18, or, in the absence of the latter, adjacent the cast wall surface, with separation of the loop protrusion 10'' from the wall, as in FIG. 9, leaving a small recess 38 in the wall face 17. The loop 10'' with

its twisted inner end 39 thus detached, is readily freed from the blade, to qualify the tool for immediate reuse.

Although more than one embodiment of the invention has been shown and described, it will be understood that other embodiments may exist and that various changes may be made therein all without departing from the spirit and scope of the invention.

What is claimed is:

1. A form tie breaker tool for detaching a form tie closed loop protruding from the surface of a cast wall, comprising:

a shank adapted for rotation about its axis;  
a flat blade fixed to one end of said shank in longitudinal alignment therewith, said blade having a thickness freely receivable within the bight of a loop to be detached and a width exceeding the lateral span of said loop; and

means for detachably coupling said blade to a loop in partial reception therewithin and in substantial longitudinal alignment of said shank therewith.

2. A tool as defined in claim 1, wherein:

said means for detachably coupling the blade to a loop includes an arcuate slot in said blade and sized to freely pass the end of the loop and curving laterally and longitudinally of the blade away from said shank, said shank extending from one side of said blade to a closed end substantially midway of said blade.

3. A tool as defined in claim 2, wherein:

the outer edge of said slot remote from said shank is enlarged by an angular bevel; and the inner end of said slot is enlarged.

4. A tool as defined in claim 2, wherein:

said blade is provided with a nose substantially aligned

with said shank and adapted for reception within the cavity of a form tie thimble disposed about said loop and embedded in said wall.

5. A tool as defined in claim 4, wherein said nose is provided with:

a transverse end, beveled on opposite sides; an edge extending from a notch in the edge of said blade opposite said slot to said end and inclined at an acute angle to the center line of said tool; and an edge extending from said slot to said end and inclined at a greater acute angle to the center line of said tool.

6. A tool as defined in claim 2, wherein:

said blade is provided with a convex end eccentric relative to the closed end of the slot.

7. A tool as defined in claim 6, wherein:

said convex end of said blade is provided with an edge beveled on each side; and said convex end of said blade is spaced from the inner end of said slot a distance approximating the length of loop protruding from said wall.

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U.S. Cl. X.R.

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