Aug. 4, 1942. S. S. COLT 2,291,795

TIE ROD SHIELD EXTRACTING TOOL

Filed Aug. 26, 1941 2 Sheets-Sheet 1

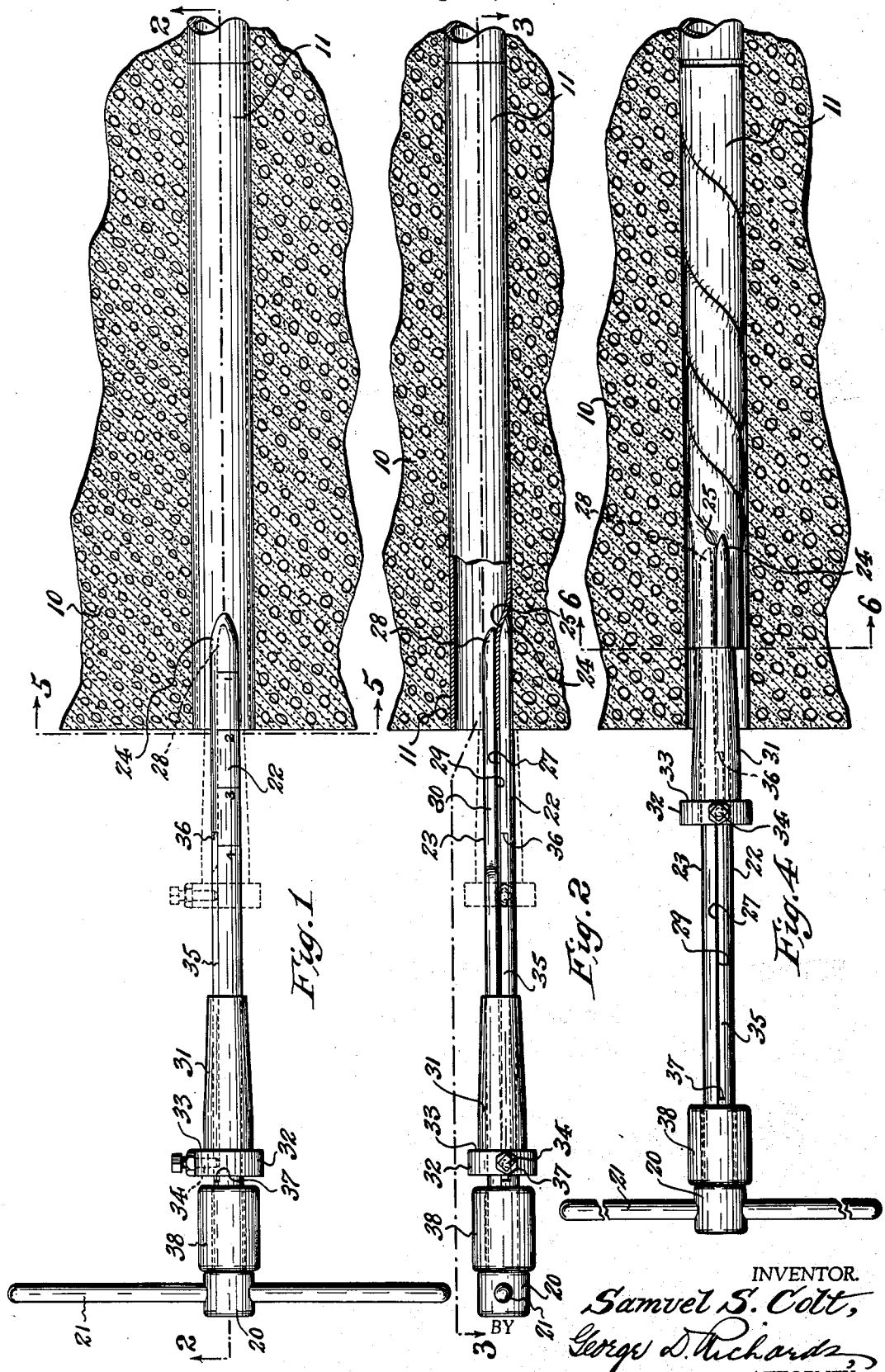


Fig. 1

Fig. 2

Fig. 4

INVENTOR.
Samuel S. Colt,
BY
George D. Richards,
ATTORNEY.

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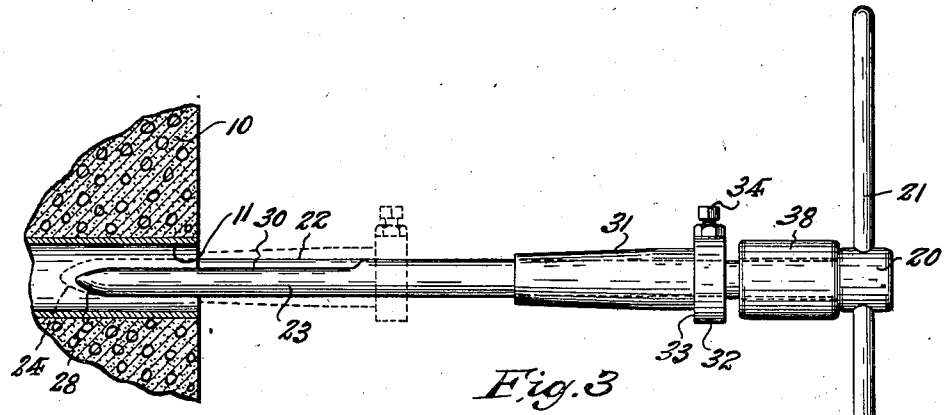


Fig. 3

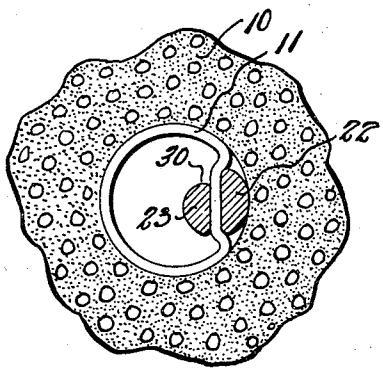


Fig. 5

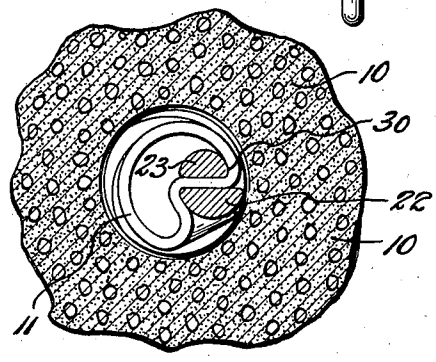


Fig. 6

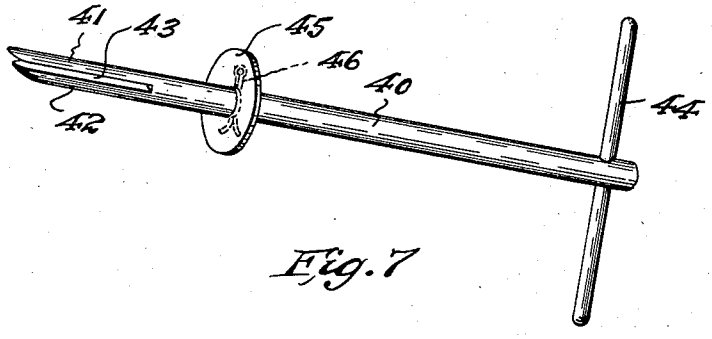


Fig. 7

INVENTOR.
Samuel S. Colt,
BY George D. Richards
ATTORNEY.

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UNITED STATES PATENT OFFICE

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TIE ROD SHIELD EXTRACTING TOOL

Samuel S. Colt, West Orange, N. J.

Application August 26, 1941, Serial No. 408,309

9 Claims. (Cl. 294—103)

This invention relates to means for manipulating and extracting from a cast concrete structure shield tubes employed to envelop the form wall tie rods and other internally disposed parts of the form in which the concrete structure was cast.

In my co-pending application for United States Letters Patent Serial No. 406,147, I have disclosed a novel tubular means for shielding the tie rods and other internally disposed parts of wall retaining or tying means of a concrete casting form against contact with the concrete poured into the latter, whereby such tie rods etc. may be easily removed and salvaged when the form is dismantled from the completed concrete structure formed therein. In the use of such shielding means, it is desirable to remove the same, in whole or in part, from the completed concrete structure, so that voids left in the latter by removal of the tie-rods etc., may be plugged and pointed up, at least as to the portions thereof adjacent to the exterior faces of said concrete structure. The tubular shielding means above referred to is made of material adapted to yield to torsionally applied force, whereby the same will contract diametrically when twisted so that it will be separated from contiguous surfaces of an enveloping cast concrete mass, subject to easy withdrawal from the latter.

This invention therefore has for an object to provide a novel tool for application to a tubular shield device of the kind mentioned, which is subject to manipulation so as to torsionally twist the shield tube to diametrically contract the same, and thus loosen it from a surrounding concrete mass, while at the same time so engaging or gripping the shield tube as to permit transmission thereto, or to a predetermined part thereof, of withdrawing movement, whereby to extract the same from the concrete mass after it is loosened therefrom by torsionally effected contraction.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiments of this invention are shown in the accompanying drawings, in which:

Fig. 1 is a fragmentary vertical sectional view through a cast concrete mass, the same showing application to a shield tube imbedded therein of the manipulating and extracting tool by operation of which said shield tube may be contracted and withdrawn, said tool being shown in side elevation; Fig. 2 is a horizontal sectional view, taken on line 2—2 in Fig. 1, the tool being shown in elevation; Fig. 3 is a vertical sectional view, taken on line 3—3 in Fig. 2, the tool being shown in elevation; and Fig. 4 is a view similar to that of Fig. 1, but showing operative manipulation of the tool to apply torsional force to the shield tube to diametrically contract the latter subject to ultimate withdrawal from the cast concrete mass.

Fig. 5 is a transverse sectional view, taken on line 5—5 in Fig. 1, but drawn on an enlarged scale; and Fig. 6 is a transverse sectional view, taken on line 6—6 in Fig. 4, and also drawn on an enlarged scale.

Fig. 7 is a perspective view of a simplified form of shield tube manipulating and extracting tool according to this invention.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the drawings, the reference character 10 indicates the concrete mass which surrounds the shield tube 11 desired to be removed therefrom.

A preferred form of the shield tube manipulating and extracting tool is shown in Figs. 1 to 6 inclusive, and comprises a longitudinal bar, preferably of round cross-sectional shape and of suitable length, having affixed to its rearward end, by the hub member 20, a cross-bar 21 which serves as a hand grip or handle by which the tool may be operatively manipulated. The tool bar is longitudinally split diametrically to divide the same into two opposed gripper sections 22 and 23. One of said gripper sections, as 22, terminates at its free forward end in a tapered leading end 24, the inner face 25 of which is chamfered to provide an inner inclined face divergently extending from its interior face 27 to its extremity. The free end 28 of the other gripper section 23 is also of preferably tapered conformation but terminates short of the leading end 24 of the gripper section 22 so as to be stepped back therefrom. By this arrangement, the advanced leading end 24 of the gripper section 22 affords means for quick and easy insertion of the forward end of the tool between an exterior surface of the shield tube 11 and the contiguous surface of the concrete mass 10, whereby the tool may be thereafter thrust inwardly into engagement with the shield tube 11 in such manner that a wall portion of the latter enters and is engaged between the opposed interior faces 27 and 29 respectively of the gripper sections 22 and 23. The conformation of the end portions of said gripper sections 22 and 23 is subject to more or less variation, although preferably one section should have a wedge or chisel shaped end portion which leads or is advanced beyond the end portion of the other gripper section.

Preferably the gripper section 23, which, upon insertion of the tool in operative engagement with a shield tube to be manipulated, lies along an interior surface of the engaged shield tube wall, is cut away, as at 30, along its top longitudinal margin, whereby to step down its top margin relative to the top margin of the opposed gripper section 22, so that when the tool grips the shield tube wall, and is thereupon rotated clockwise to torsionally twist the shield tube, clearance will be provided for the reception and passage of the shield tube wall around the external face of said gripper section 23 (see Fig. 6), thereby avoiding frictional rubbing of the shield tube wall against the contiguous surface of the surrounding concrete mass, and possible consequent fracture or disintegration of such wall part.

Slidably mounted for longitudinal movement over the gripper sections 22 and 23 comprising the tool bar is a combined clamp and bearing sleeve 31. This sleeve 31 is provided at its rearward end with an annular diametrically enlarged head 32, which also provides a stop shoulder 33. Engaged through said head 32 to project into the bore of said sleeve is a stop screw 34. The upper longitudinal margin of the gripper section 22 is provided with a cutaway portion adapted to provide a runway 35 for said stop screw 34; said runway terminating at its forward end in a stop shoulder 36 engageable by said stop screw 34 to limit forward sliding movement of the sleeve 31, and at its rearward end in a stop shoulder 37 engageable by said stop screw 34 to limit rearward sliding movement of said sleeve 31. Preferably said sleeve is of tapering conformation toward its forward free end.

Mounted on the tool bar, behind the hub member 20 of the handle cross-bar 21, is an auxiliary hand-grip member or collar 38 in which the tool bar is freely rotatable.

If desired, one of the gripper sections, preferably the gripper section 22 may be calibrated in inches, measured from its free end, to provide indicating graduations, as shown in Fig. 1, whereby the user may visually determine the extent of initial insertion of the tool relative to the shield tube to be manipulated and withdrawn from a surrounding concrete mass.

In a concrete form, the walls thereof are usually held in spaced assembled relation by suitable tying and retaining means, including tie-rods which extend across the form interior. The internally disposed parts of the tie-rods are protected from contact with the concrete cast in the form by enveloping the same in shield tubes 11, whereby the cast concrete mass is prevented from contacting with and adhering to the tie-rods. After the cast concrete has set, the form may be dismantled by releasing the tying and retaining devices, and then stripping away the form walls and withdrawing tie-rods so as to merely leave within the concrete mass said shield tubes 11.

After the form walls have been stripped away from the completed concrete structure, the outer end portions of the shield tubes 11 will be exposed at the faces of the concrete mass, subject to the application thereto of the above described tool, whereby said tubes may be manipulated and extracted from the concrete.

To apply the novel tool to a shield tube end, the sleeve 31 is first retracted on the tool bar to the rearward position thereof, as shown by full lines in Figs. 1, 2 and 3 of the drawings. The leading tapered end portion 24—25 of the gripper section 22 is first inserted between a side of the shield tube 11 and the contiguous surface of the concrete mass, whereupon the tool is thrust inward so as to engage the wall of the shield tube between the gripper sections 22 and 23, whereby the gripper section 22 is disposed along the external surface of said shield tube wall and the gripper section 23 along the internal surface thereof. The tool being thus initially applied to a shield tube desired to be manipulated, the sleeve 31 is slid forward until it abuts the shield tube end, as shown by broken lines in Figs. 1, 2 and 3. As said sleeve 31 is thus moved over the forward end portions of the gripper sections 22 and 23, it forces the latter toward each other so as to firmly grip and clamp the shield tube wall portion engaged therebetween.

The tool being thus operatively related to a shield tube desired to be manipulated and extracted, the operator thereupon rotates the tool clockwise about its longitudinal axis, thereby torsionally twisting the tube (see Figs. 4 and 6). The torsional force thus applied to the shield tube twists the same with diametrically contracting effect thereupon, thus operating to separate its external surfaces from the contiguous surfaces of the surrounding concrete. This twisting of the shield tube is also accompanied by a longitudinal contraction thereof, which causes the sleeve 31 to enter the opening in the concrete mass (see Fig. 4). As thus entered in said opening, the sleeve 31 also serves as a bearing in support of the rotation of the tool. If the shield tubes are of considerable length, inward penetration of the sleeve and tool will be limited by abutment of the stop shoulder 33, provided by the sleeve head 32, against the exterior face of the concrete mass 10, and consequently the shield tube will be compelled to move outward, and will thus be entirely loosened from the concrete. When the shield tube has been loosened, the operator may grasp the hand grip member or collar 38 with one hand and thereby exert an outward pull upon the tool while continuing to rotate the same with the other hand. Such manipulation maintains the contracted loosened condition of the shield tube while it is being bodily withdrawn out of the opening in the concrete mass.

In some cases it is desired to remove only an outlying end portion of the shield tube separable or adapted to be separated from the main body of the latter which may be left to remain in the interior part of the concrete mass. If the tube end portion is separable from the main body, the tool, when manipulated, will quickly contract, loosen and withdraw the same; and I have found that by providing the extremity of the end portion 28 of the gripper section 23 with a sharp cutting edge, rather than a dull or blunt edge, such sharp edge will tend to score or cut the shield tube wall, whereby an end portion of the tube may be easily torn away and separated from the main body thereof for removal.

From the above it will be readily understood that the tool functions in use to quickly loosen and remove a shield tube, in whole or in part, from its initial imbedded disposition within the mass of a concrete structure, so that when removed, the voids in said mass may be plugged with cement and closed in accordance with required standard practice.

While the tool in the form above described affords a preferred construction thereof, I am

aware that various changes could be made therein, and that the same may well be modified in one respect or another. Illustrative of this, I have shown in Fig. 7 of the drawings, a somewhat simplified form of the tool, which embodies, however, the general principles of this invention. As shown, this simplified form of the tool comprises a main body or bar **40**, having a bifurcated free end portion which forms opposed gripper sections **41** and **42** bounding an intermediate slot **43** adapted to receive the wall of a shield tube to which the tool is operatively applied, and having at its rearward end a cross-bar handle portion **44**. A washer **45** may be mounted on the body or bar **40** rearwardly of the gripper sections, the same being stopped in desired position by a cotter pin **46**, which is passed through the body or bar **40**. It will be obvious that this modified form of the tool may be applied to a shield tube so as to grip the wall thereof subject to turning for application of torsional force to said tube to loosen the same from the surrounding concrete mass, so that the same may then be withdrawn from the latter. The washer **45** may serve as a stop to limit inward movement of the tool under foreshortening pull of the contracted shield tube.

Having now described my invention, I claim:

1. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, a bifurcated free end portion to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, and a stop means mounted on the tool bar rearwardly of said gripper sections.

2. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, a bifurcated free end portion to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, and one of said gripper sections having a chamfered extremity projecting beyond the extremity of the other gripper section.

3. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, a bifurcated free end portion to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, one of said gripper sections having a chamfered extremity projecting beyond the extremity of the other gripper section, and a stop means mounted on the tool bar rearwardly of said gripper sections.

4. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, at least the forward end portion of said tool bar being divided longitudinally to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, and a sleeve slidably mounted on said tool bar subject to forward movement thereon, whereby to force and hold said opposed gripper sections in gripping relation to the shield tube wall engaged therebetween.

5. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, at least the forward end portion of said tool bar being divided longitudinally to provide oppposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, a sleeve slidably mounted on said tool bar subject to forward movement thereon, whereby to force and hold said opposed gripper sections in gripping relation to the shield tube wall engaged therebetween, and one of said gripper sections having a chamfered extremity projecting beyond the extremity of the other gripper section.

6. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, at least the forward end portion of said tool bar being divided longitudinally to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, one of said gripper sections having a chamfered extremity projecting beyond the extremity of the other gripper section, said latter gripper section being of reduced width whereby to downwardly offset a longitudinal margin thereof below that of the opposed gripper section, and a sleeve slidably mounted on said tool bar subject to forward movement thereon, whereby to force and hold said opposed gripper sections in gripping relation to the shield tube wall engaged therebetween, said sleeve having a diametrically enlarged stop head at its rearward end.

7. A tool for the purposes described and as defined in claim 6 including a hand grip element mounted on the tool bar behind the handle means thereof, to which hand grip element said tool bar is rotatably related.

8. A tool for the purposes described and as defined in claim 4 including a hand grip element mounted on the tool bar behind the handle means thereof, to which hand grip element said tool bar is rotatably related.

9. A tool for the purposes described comprising, a tool bar having a handle means at its rearward end portion, at least the forward end portion of said tool bar being divided longitudinally to provide opposed gripper sections adapted to straddle and grip the wall of a shield tube to be manipulated, one of said gripper sections having a chamfered extremity projecting beyond the extremity of the other gripper section, said latter gripper section being of reduced width whereby to downwardly offset a longitudinal margin thereof below that of the opposed gripper section, a sleeve slidably mounted on said tool bar subject to forward movement thereon, whereby to force and hold said opposed gripper sections in gripping relation to the shield tube wall engaged therebetween, said sleeve having a diametrically enlarged stop head at its rearward end, means to limit sliding movements of said sleeve, and a hand grip element mounted on the tool bar behind the handle means thereof, to which hand grip element said tool bar is rotatably related.

SAMUEL S. COLT.