Oct. 7, 1947. W. G. HOLLWARTH 2,428,459

BOLT ANCHOR APPLYING TOOL

Filed Dec. 14, 1944 2 Sheets-Sheet 1

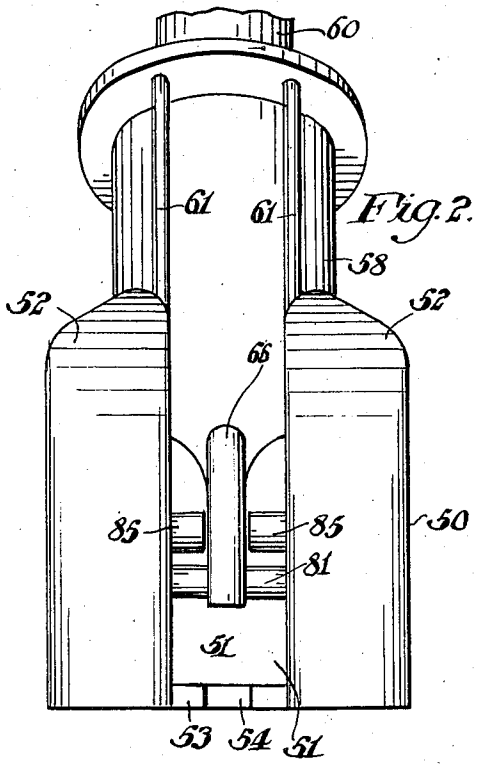


Fig. 2.

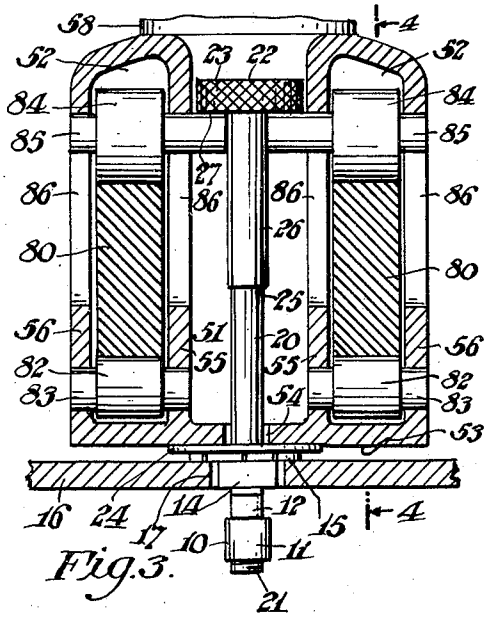


Fig. 3.

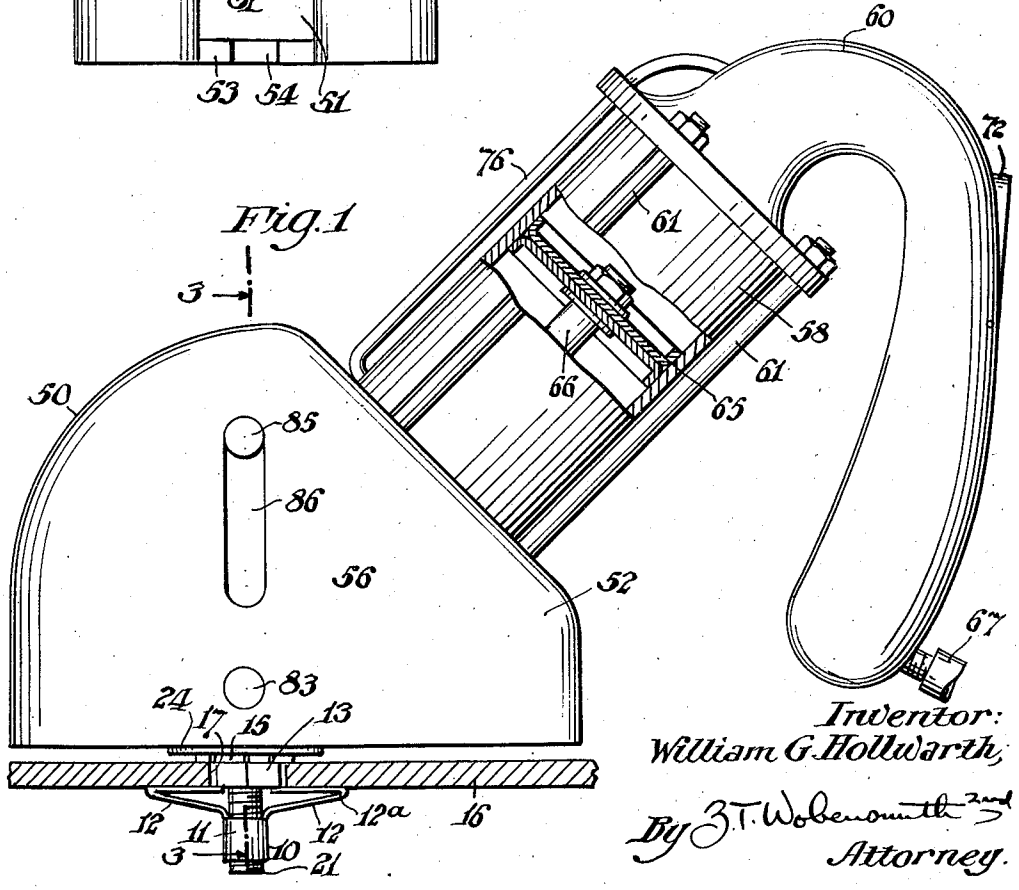


Fig. 1

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Fig. 6.

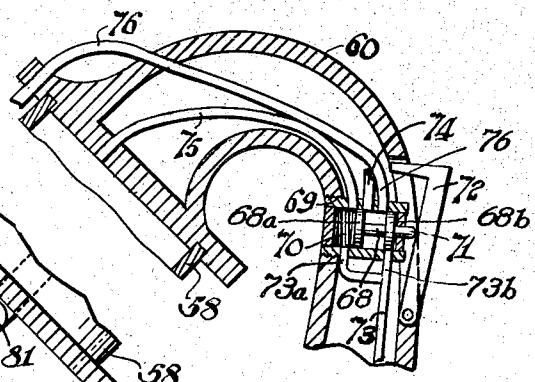


Fig. 4.

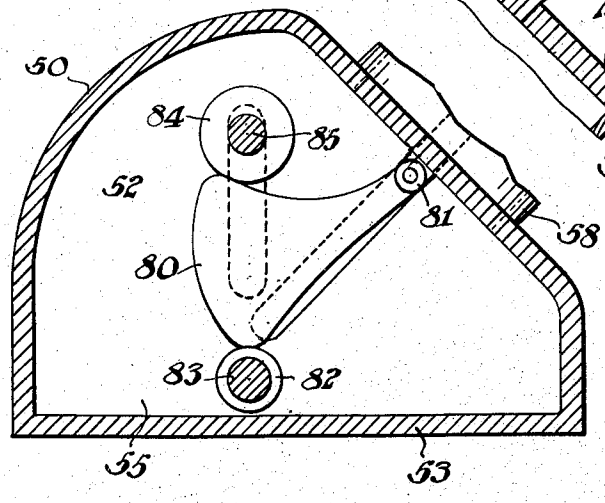
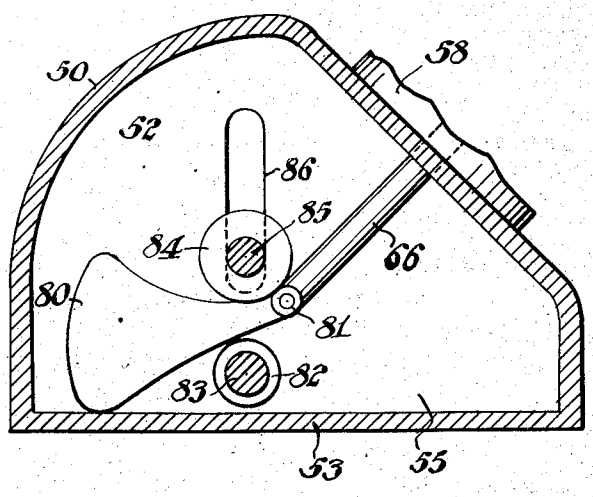


Fig. 5.



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Patented Oct. 7, 1947

2,428,459

UNITED STATES PATENT OFFICE

2,428,459

BOLT ANCHOR APPLYING TOOL

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Application December 14, 1944, Serial No. 568,134

5 Claims. (Cl. 218—19)

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My invention relates to bolt anchor applying tools and more particularly to tools for applying bolt or screw anchors of the type which includes an internally threaded sleeve, spreadable side portions and a crown head and which are adapted to be inserted in a hole in a support and secured therein. The tool of the present invention is especially suited for use with bolt or screw anchors of the type known in the trade as "toggle screw anchors."

The apparatus heretofore available for applying bolt or screw anchors of the type heretofore referred to, other than that shown in my prior application for Letters Patent for Bolt anchor applying tools, filed October 27, 1944, Serial No. 560,675, has not proven satisfactory in use. The shortcomings of the prior apparatus were due in part to the difficulty in the manipulation thereof and the lack of certainty of the operation of such apparatus. The apparatus available for applying the anchors prior to that shown in my application for Letters Patent aforesaid did not position the side portions of the fasteners for proper gripping, was slow in its action, and did not provide for a quick and accurate applying of the anchors.

In accordance with the present invention, a bolt anchor applying tool is provided which is simple and sturdy in construction, is quick in its action, is positive in its mounting of the anchor, provides for the spreading of the side portions of the anchor to the desired extent for most effective gripping and carries out its functions with a minimum of effort on the part of the operator.

In accordance with the present invention also, a power operated bolt anchor applying tool is provided which is highly effective in use.

Other advantageous features will be apparent from the specification and claims.

The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Figure 1 is a view in side elevation of an anchor applying tool in accordance with the present invention, parts being broken away to show the details of construction;

Fig. 2 is a view of the tool shown in Fig. 1 as seen from the left hand side;

Fig. 3 is a vertical sectional view taken approximately on the line 3—3 of Fig. 1;

Figs. 4 and 5 are fragmentary vertical sectional views taken approximately on the line 4—4 of Fig. 3 and showing different operating positions; and

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Fig. 6 is a fragmentary sectional view through a portion of the handle showing the valve for controlling the operation of the tool.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes may be made in the structure disclosed without departing from the spirit of the invention.

Referring more particularly to the drawings, a bolt or screw anchor 10 of the type for which the applying tool is particularly adapted is shown in detail in Figs. 1 and 3. The bolt anchor or fastener 10 preferably includes an internally threaded sleeve 11 from which expansible and deformable side strip portions 12 extend to a head 13. The side strip portions 12 preferably have bend lines or creases 12a formed thereon to start the bending of the side strips 12 in the desired direction upon the application of a compressive force thereon. The head 13 preferably includes a collar 14 with outwardly or radially extending wings or lugs 15. The bolt anchor 10 is adapted to be inserted in any desired type of support 16 of wood, plaster, tile, masonry, sheet material, or the like, and in any desired direction, horizontally or vertically up or down, in a hole 17 drilled or bored in the support 16 for the purpose. When the bolt anchor 10 is secured in position the lugs or wings 15 are disposed on the outer surface of the support 16 with the outer ends of the lugs or wings 15 extending inwardly into the outer surface of the support 16 in gripping relationship to aid in preventing rotation of the anchor 10 after the securing thereof.

The anchor applying tool in accordance with the present invention and as illustrated in the drawings preferably includes an anchor compressing element comprising an actuating stem 20 externally threaded at its inner end 21 and secured at its outer end in an actuating head 22. The actuating head 22 is knurled or otherwise roughened on its peripheral edge 23 for aiding in turning the same with the fingers when desired. The end portion 21 is adapted to engage with the threads in the sleeve 11 upon turning of the head 23. Spaced from the head 22 a disc or washer 24 is provided, slidable on the stem and stopped in one direction by a shoulder 25 formed on the stem 20 by enlarging the same, as at 26, at the end toward the actuating head 22, or in any other desired manner. The actuating head 22 has an inner face 27 for actuating engagement as hereinafter explained.

The anchor applying tool also includes power

operated mechanism for the anchor compressing element. The power operating mechanism preferably includes a casing 50 having a central open space 51 with compartments 52 on each side thereof. The casing 50 has a flat bottom wall 53 with a slot 54 therein for the reception of the stem 20. The compartments have spaced vertical side walls 55 and 56 extending from the bottom wall 53 and a cylinder 58 is secured to the casing 50, preferably at an inclination. The cylinder 58 preferably includes a cylindrical tube held in position on the casing 50 and with a handle 60 held in assembled relationship with respect thereto, studs 61 being provided for this purpose. The cylinder 58 has fluid connections to the opposite ends thereof for supplying fluid under pressure as hereinafter pointed out. A piston 65 is provided within the cylinder 58, the piston 65 having a piston rod 66 extending therefrom.

In order to actuate the piston 65 an air supply line 67 is connected to the handle 60 and a manually actuated valve member 68 is provided for controlling the pressure conditions on opposite sides of the piston 65.

The valve member 68 is mounted in a ported sleeve 69, has spaced plug portions 68*a* and 68*b* has a spring 70 pressing against one end thereof and has a stem portion 71 projecting therefrom for engagement by an actuating lever 72 which extends outwardly from the handle portion 60 for engagement by the thumb of the user.

The sleeve 69 has a fluid connection 73, with branches 73*a* and 73*b*, connected to the air supply line 67, has a passageway 74 in communication with the atmosphere, and has fluid connections 75 and 76 in communication with the upper and lower ends, respectively of the cylinder 58.

For the purpose of actuating the head 22, each of the compartments 52 has mounted therein a cam 80 of the character illustrated in Figs. 4 and 5, the cams being actuated from the piston rod 66 by cross head members 81 extending thereto, to which the cams 80 are pivotally connected. Each cam 80 is adapted to bear against or ride on a lower roller 82 mounted on a spindle 83 carried in the walls 55 and 56 and to actuate a follower roller 84 carried on a spindle 85. The spindles 85 are adapted to slide in suitable slots 86 formed in walls 55 and 56 of the casing 50. The inner ends of the spindles 85 are adapted to engage the lower face 27 of the actuating head 22 for moving the same upwardly to bend the side strips 12 of the bolt anchor 10 the desired position.

The mode of operation of the applying tool will now be pointed out.

The support 16 is prepared by having a hole 17 drilled or bored therein at the location where it is desired to secure the bolt or screw anchor 10. The bolt or screw anchor may then be mounted on the stem 20 with the enlarged portion 26 of the stem extending through the collar 14 and with the threaded inner end 21 in engagement with the threads in the sleeve 11. The head 13 of the anchor 10 is preferably positioned with the wings or lugs 15 in engagement with the disc or washer 24. Turning of the head 22 to obtain the desired character of mounting is facilitated by the roughened surface of the peripheral edge 23.

If desired the bolt or screw anchor 10 may first be positioned in the hole 17 and the stem 20 inserted and positioned. The location of the

disc or washer 24 with respect to the shoulder 25 will indicate whether the threaded end 21 is properly in engagement with the sleeve 11 thereby avoiding the possibility of injury to the threads on the end 21 or in the sleeve 11 during the securing of the bolt anchor or fastener 10.

The casing 50 is then brought into position with the stem 20 in the slot 54, with the wall 53 above or outside the disc or washer 24 and with the spindle ends 85 adjacent the face 27 of the head 22.

The valve member 68 in its normal position admits air under pressure through the branch 73*a* the passageway 75 to actuate and retain the piston 65 in its down position so that the spindle ends 85 will allow the stem 20 to project its maximum distance outwardly from face 53 of casing 50 for engagement of its threaded end with a non-collapsed fastener.

When it is desired to complete the securing of the fastener 10 the lever 72 is depressed against the force of the spring 70. This moves the valve member 68 to a position where the plug 68*a* thereof closes the branch 73*a* to cut off further delivery of pressure fluid through the line 75 to the upper end of the cylinder 58 and to connect the line 75 to the atmosphere through the port 74. At the same time pressure fluid is supplied through branch 73*b* the line 76 to the lower end of the cylinder 58 for driving the piston 65 upwardly in the cylinder 58. Upon the upward movement of the piston 65 the piston rod 66 actuates the cross head 81 which in turn operates the cams 80 to elevate the cam rollers 84. The movement of the rollers 84 through the spindles 85 moves the head 22 and the actuating stem 20 carried thereby in an outward or upward direction and thereby moves the sleeve 11 outwardly. This applies a compressive force on the side strip portions 12 spreading the side strip portions 12 to the desired extent and into gripping engagement with the support 16 as shown in Fig. 1. The distance the sleeve portion 11 is moved is thus regulated by the cams 80 which prevents deformation of the side strip portions 12 beyond their most effective securing positions.

Upon the completion of the mounting of the fastener 10 the lever 72 is released. The valve 68 returns to its initial position in which the plug 68*b* closes the branch 73*b* and opens line 76 to exhaust port 74, and the plug 68*a* cuts off line 75 from exhaust port 74 and again connects it to the branch 73*a* whereby the piston 65 is moved downwardly so that the spindle ends 85 are withdrawn from their engagement with the face 27 of the head 22. The head 22 may then be turned by hand to unscrew it from the fastener 10 and the casing 50 may then be removed and is ready for use in mounting another fastener 10.

I claim:

1. In apparatus for securing a bolt anchor in a support, a casing, a fluid pressure responsive member movably mounted with respect to said casing, manually actuated valve means for controlling the movement of the fluid pressure responsive member, fixed abutment means in said casing, slidably mounted means in said casing, cam means connected to said fluid responsive means and in engagement with said abutment means and said slidably mounted means for actuating said slidably mounted means, and means actuated by said slidably mounted means for engaging the bolt anchor in securing relationship.

2. In apparatus for securing a bolt anchor in a support, a casing, a fluid pressure responsive

member movably mounted with respect to said casing, manually actuated valve means for controlling the movement of the fluid pressure responsive member, a fixed abutment in said casing, an actuator member activated by said fluid responsive member and slidably mounted in said casing for movement therein, a member having diverging face portions respectively in engagement with said abutment and in actuating engagement with said actuator member, and means actuated by said actuator member for securing engagement with the bolt anchor.

3. In apparatus for securing a bolt anchor in a support, a casing, a cylinder fixedly mounted with respect to said casing, a piston reciprocable in said cylinder, manually actuated valve means for controlling the movement of the piston in the cylinder, a fixed abutment in said casing, a slidably mounted actuator member in said casing, a cam member actuated by said piston and interposed between said abutment and said slidably mounted member and in engagement therewith for actuating said slidably mounted member, and means actuated by said slidably mounted member for engaging the bolt anchor in securing relationship.

4. In apparatus for securing a bolt anchor in a support, a casing, a cylinder fixedly mounted with respect to said casing, a piston reciprocable in said cylinder, manually actuated valve means for controlling the movement of the piston in the cylinder, a fixed abutment in said casing, a slidably mounted actuator member in said casing, a

cam member having diverging face portions one of which is in engagement with said abutment and the other of which is in actuating engagement with the slidably mounted member, a connecting member between said piston and said cam member and means actuated by said slidably mounted member for engaging the bolt anchor in securing relationship.

5. In apparatus for securing a bolt anchor in a support, a casing, a cylinder fixedly mounted with respect to said casing, a piston reciprocable in said cylinder, manually actuated valve means for controlling the movement of the piston in the cylinder, fixed abutments in said casing, slidably mounted members in said casing, spaced cam members in said casing connected to said piston and interposed respectively between one of said fixed abutments and one of said slidably mounted members for actuating said slidably mounted members, and means actuated by said movably mounted members for engaging the bolt anchor in securing relationship.

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The following references are of record in the file of this patent:

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