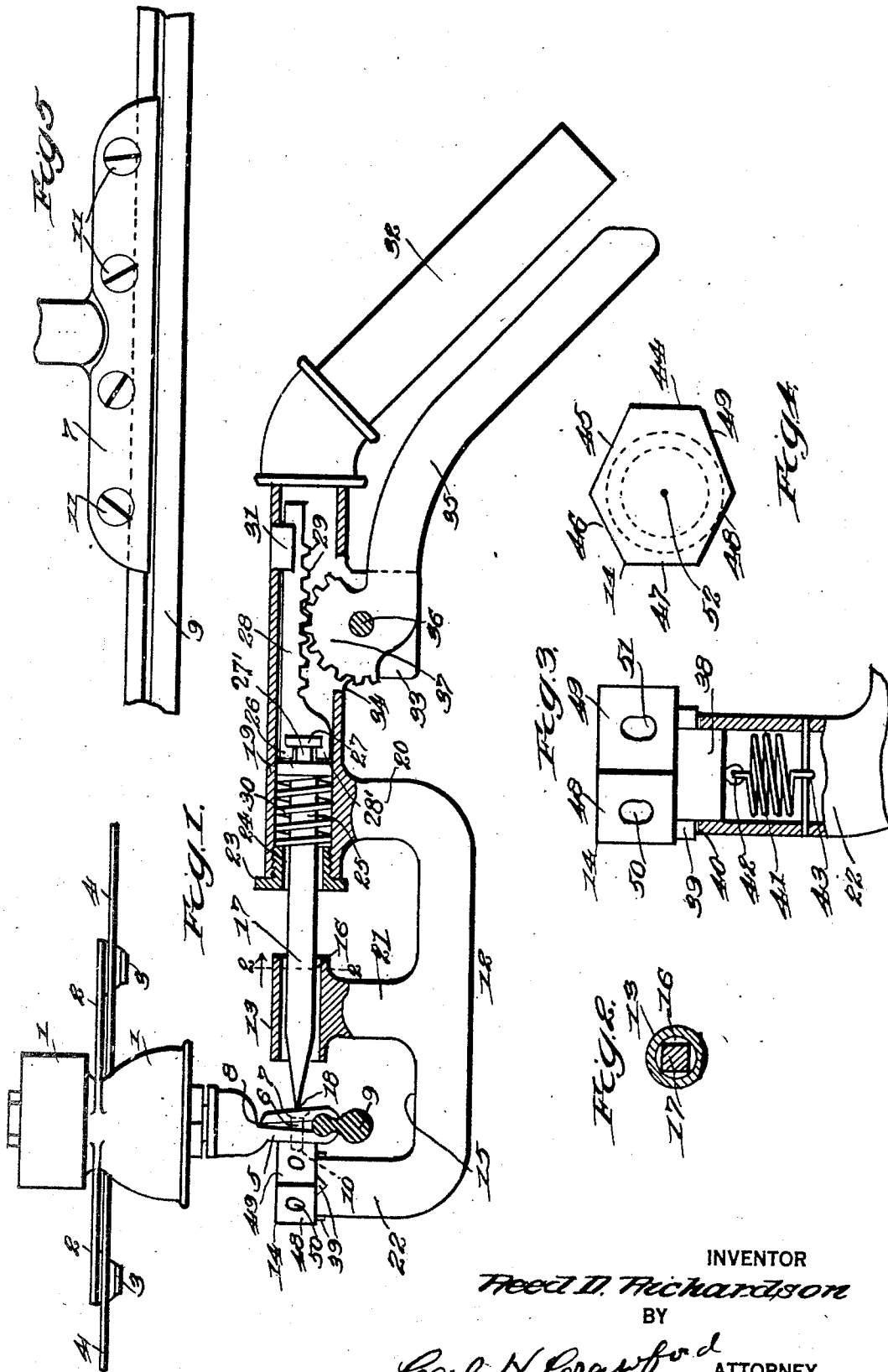


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R. D. RICHARDSON
SCREW TIGHTENER AND LOOSENER
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INVENTOR

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SCREW TIGHTENER AND LOOSENER.

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To all whom it may concern:

Be it known that I, REED D. RICHARDSON, a citizen of the United States, residing at Spokane, in the county of Spokane and State of Washington, have invented new and useful Improvements in a Screw Tightener and Loosener, of which the following is a specification.

The object of this invention is to provide a novel device for tightening and loosening screws.

One of the special uses of the device of this invention is in tightening the screws of trolley hangers. These hangers have what is termed "ears" that are forced into clamped relation against a laterally grooved or figure 8 trolley wire. When the hangers are first installed, it requires the greatest effort with an ordinary screw driver, to turn the screws tight enough, and it also requires one extra man to "back-up" the hanger when the screw driver is thrust against the screws. After hangers have been installed, it is necessary to go over the road at frequent intervals and tighten up these screws.

By reason of the great pressure necessary to exert on the screw driver, it frequently happens that the groove in the screw head becomes mutilated, especially when the screw driver slips. Then it is necessary to remove such mutilated screw by means of a cold chisel or like implement and put in a new screw.

Now, the above and many other objectionable features now encountered are entirely avoided by means of my improved device which involves power means for thrusting the screw driver in sustained engagement with the groove of a screw with such a degree of pressure that the driver cannot slip and mutilate the screw groove, in tightening or loosening a screw.

A further feature consists in a device that can be manipulated by one operator either in originally installing or in tightening up loose or slack screws.

The device of my invention has many other features that will be more fully described in connection with the accompanying drawing and which will be more particularly pointed out in and by the appended claims.

In the drawing:—

Fig. 1, is a view in side elevation, partly

in section, showing the manner in which my improved screw tightener is employed in tightening the screws of a trolley hanger.

Fig. 2, is a sectional view on line 2—2 of Fig. 1.

Fig. 3, is an enlarged view of my improved abutment block and illustrating the manner in which it is connected with the frame of the device.

Fig. 4, is a plan view of the abutment block.

Fig. 5, is a view in side elevation of the screw-head side of a trolley hanger looking from the right of Fig. 1.

Like characters of reference designate similar parts throughout the different figures of the drawing.

In order to render the device of this invention easily understood, I have shown it in its operative relation to a trolley hanger which I will first describe in a general manner.

The hanger head is indicated at 1, and the same is provided with laterally extending arms 2 having curved terminals 3, about and through which the transversely disposed hanger wire 4, is strung. The hanger is provided with a fixed ear 5, which is shown equipped with four threaded openings in which clamping screws 6, are disposed. A clamping ear 7, is fulcrumed at its upper edge against ear 5, as shown at 8, and the lower edges of the ears are shaped to grasp the upper cross section of a figure 8 trolley wire 9. The ends 10, of screws 6, frequently project slightly beyond the screw-end side of the hanger, as shown, and the screw heads 11, are disposed on the screw-head side of the hanger.

When a trolley wire is first installed, the screws 6 are tightened as close as possible but at periodic intervals, it is necessary to go over the road and again tighten these screws.

I will now describe the device of my invention and the manner in which it is used in connection with a trolley hanger.

My device includes a frame generally indicated at 12, the same having a screw driver bearing 13 and an abutment block 14, and being recessed at 15, to under-span the hanger in order to dispose the coacting parts in alined relation on opposite sides of the hanger, as shown in Fig. 1. I have shown the driver bearing 13, provided with a cylin-

drical bore 16, in which is slidably and rotatively mounted a screw driver 17, of polygonal cross section. The operative end 18, of the driver 17, is sharpened to the requisite extent to form an effective edge to enter a screw head groove and turn a screw.

In longitudinal and alined spaced relation in the rear of bearing 13, is a thrust bearing 19. The thrust bearing 19, the driver bearing 13, and the abutment block 14, are shown mounted on frame posts 20, 21 and 22, respectively, of the frame 12. Said thrust bearing 19, has a removable thrust collar 23, which is shown threaded into the forward end of said bearing and which is provided with a cylindrical bore 24 preferably the same diameter as the bore 16, of bearing 13. Now the thrust end 25, of driver 17, is rotatively and longitudinally movable in collar 23, and extends into bearing 19 a considerable distance. The driver is provided with a head 26, journalled in bearing 19, and on said head is disposed a swivel stud 27 having a neck 27'. A thrust or rack bar 28, having teeth 29, has on its forward end a thrust coupling 28' that is disposed in swivelled thrust connection with said stud 27 whereby the driver 17 may readily be rotatively adjusted. It will now be clear that the driver 17, is in end to end thrust relation with rack bar 28, and that the driver 17 is capable of being rotated while end thrust is applied thereto. A spring 30, expansively acting, is interposed between collar 23 and head 26, and normally acts to retract driver 17 and said rack bar 28, to the right of Fig. 1. Guides 31, in bearing 19, may serve to hold the rack bar against rotative movement.

Now it will be clear that a polygonal portion of the driver 17, is freely accessible between bearings 13 and 19, so that a wrench can be applied to turn the same. If desired, a ratchet device could be installed for this purpose and mounted on the frame 12, but in practice, this has been found to add to the weight of the device to such an extent as to discount its advantages over the use of an ordinary wrench.

I will next describe the novel means for actuating the rack bar and screw driver.

The frame 12, is elongated to form what is shown to be a downwardly inclined handle 32, adapted to be grasped by the right hand of the user. The bearing 19, is provided with lugs 33, abreast of an opening 34, in which a lever 35, is pivoted at 36. Lever 35 has a toothed segment 37, the teeth of which are at all times in mesh with the teeth 29, of rack bar 28. Said lever is proportioned and disposed in a manner to lie closely adjacent handle 32, when the driver 17 is projected, so that with one hand, the user can hold both the lever and the handle, leaving the left hand free.

I will next describe my improved abutment block and the manner in which the same is adjustable on the frame.

The post 22, is tubular, and block 14, has a stud 38, that slidably fits the interior of said post. Block 14, has V-shaped lugs 39, adapted to seat in correspondingly formed V-shaped notches 40, in post 22, so that block 14 can be securely held in various positions of rotative adjustment. A contractile spring 41, has one end secured to said stud at 42, and the other end anchored to said post 22, at 43, to hold said block 14 engaged with notches 40. Block 14, is provided with six abutment faces designated at 44 to 49, inclusive, and suitably centered in each face is a recess, two being shown at 50 and 51. These recesses accommodate the projecting ends 10, of the screws 6, so that a good abutment backing can be afforded with the total area of an abutment face in full abutting contact with ear 5. It is a feature of the invention to dispose the abutting faces 44 to 49, at different radial distances from the adjusting axis of block 14, which axis is indicated at 52, the same being coincident with the longitudinal axis of post 22. Now the distance between the left hand end of bearing 13, and the block 14, is fixed as the maximum distance or space required. However, the width of the hanger ears varies considerably, and when thin ears are operated upon, the radially greater distance face 44, would be used, while with heavy hangers, the radially lesser distance face 47, would be used. By means of this feature, the total range of movement of the screw driver can be appreciably lessened and this is a material advantage.

I will next briefly describe one manner in which the device may operate and be operated.

When hangers are initially installed, the screws 6 are turned home by an ordinary screw driver. However, after they have been turned as far as possible by hand, then it is desirable to securely tighten the screws. Thus, it will now be clear that the primary object of this device is not to rapidly start and turn a screw home, but on the contrary, it is the object to employ my device as a tightener, to tighten up screws after they have been turned into as final a position as possible by hand. Thus, my device is a hand power slow, and heavy duty tool.

Now assuming that it was desired to tighten the screws 6, the device would be placed in the position generally shown in Fig. 1. The openings 50, are preferably about the size of the screw ends so that in case the latter project, these openings serve to center the abutment, and the latter may be supported on the screw ends, to a measure. The lever 35, is next retracted toward the position shown in Fig. 1, and a wrench is applied to

rotatively adjust the driver so that it will be in registry with the slot of the screw head. Then, a final tension or pressure is placed on lever 35, and because of the powerful leverage advantage of the latter, the driver end 18 will be sunk in the screw head slot very tightly. This action causes the frame to slightly shift and cause the abutment block to "back-up" against ear 5, with a pressure corresponding to the pressure imparted to the driver 17, on the screw head. With the device in this position, it is supported by the hanger and the right hand of the user. Now the user takes in his left hand, a suitable wrench and applies it to that portion of the polygonal driver 17, between bearings 13 and 19, and turns the driver the requisite degree to tighten the screw. As a matter of fact, in practice, only a slight turning movement is usually necessary to tighten a screw unless the latter has become abnormally loose.

It will be clear that screws sometimes rust, or in other ways become fast in a loose position, and hence, it requires that to avoid mutilating the slot in the screw head, a very great pressure must be exerted on the screw driver to seat the latter in the slot in a manner to prevent slippage. After the screw has been tightened, the user releases the lever 35, with his fingers, without releasing the handle 32, and the spring 30, instantly retracts the driver 17, thereby freeing the device for subsequent application to another screw.

I desire to point out that when the leverage afforded, is fully applied, as it usually is, and because of the manner in which the ears are fulcrumed at 8, that such pressure acts, incidently to bring the lower edges of the ears toward each other so that the strain is relieved, appreciably, from the threads of the holes in the ears and from the threads of the screws. Thus, in actual practice, I have never stripped the threads of the screws in the use of this device, which has been a relatively extensive use.

It will be clear that the same intensive lengthwise pressure necessary for this power screw tightener, would not be at all necessary in tightening the nut on a bolt, as the mere engagement of a nut tightener on a nut, is sufficient because after it is once applied it cannot slip. It will also be clear that I do not employ the abutment as a clamp, but primarily to form a backing for that side of the hanger or work opposite to the side on which pressure is applied by the driver, hence, the block 14, is truly an abutment.

It will be seen that the screw driver is revolvably journaled in bearing 13, in which the driver is also longitudinally slidable, and that the thrust bearing 19 revolvably journals the swivelled end of the screw

driver, and also non-rotatably and longitudinally slidably journals the rack bar.

While I have herein shown and described the device of my invention in the utility of tightening screws of trolley hangers, it will be clear that the device is applicable in tightening screws on other kinds of work where substantially the same relation is present between the device and the work acted upon.

Hence, I do not wish to be limited to the showing herewith made, except for such limitations as the claims may import.

I claim:—

1. In a screw tightener or loosener for trolley hangers, a frame provided with aligned screw driver and thrust bearings in longitudinally spaced relation with respect to each other and adapted to be disposed on the screw-head side of the hanger, said frame having an abutment block adapted to be disposed abreast of the screw-end side of the hanger, a polygonal screw driver having a screw driver end and a thrust end and the intermediate portion of said driver being journaled in said driver bearing for rotative and longitudinal movement therein and with a portion of its length accessible between said bearings for turning application of a wrench thereto, the thrust end of said driver being slidably and rotatively mounted in said thrust bearing, a rack bar longitudinally slidable in said thrust bearing and being in swivelled connection with the thrust end of said driver, a spring normally acting to retract said driver away from the hanger, and a hand lever pivoted to said frame and having a toothed segment meshing with said rack bar for imparting sustained thrust on said driver while the latter is being rotated to tighten or loosen a screw.

2. In a screw tightener and loosener for trolley hangers, a frame having an upwardly extending tubular frame post provided with notches in its upper edge, an abutment block rotatively adjustable about an axis coincident with the axis of said post and having a series of abutment faces disposed at different radial distances from the rotative axis of said block, said block having a lug adapted to be selectively engaged with anyone of said notches on longitudinal and rotative movement of said block with respect to said post, said block having a stud telescoping said post, a spring connected with said stud and post to hold said lug in engagement with a selected notch and retain said block in its adjusted position, a screw driver in said frame, and means for thrusting said driver into sustained engagement with the groove of the screw to be turned.

3. In a screw tightener or loosener, a frame having an abutment for the screw

end, a screw driver for engagement with the screw head and having a polygonal cross section, a thrust bar in end to end relation to said screw driver, said frame having 5 bearings for said screw driver and thrust bar and exposing a portion of the polygonal screw driver for application thereto of a turning instrument to loosen or tighten a screw, and means for actuating said thrust 10 bar to force said screw driver into sustained relation with the groove of a screw.

4. In a screw tightener and loosener, a frame having an abutment for the screw end, a screw driver for engagement with the

screw head and having an exposed portion 15 to be gripped to turn said screw driver, a rack bar in end to end swivelled connection with said screw driver, said frame having a screw driver bearing revolubly journal- 20 ling said screw driver and a thrust bearing revolubly journalling the swivelled end of said screw driver and non-rotatively and longitudinally slidably journalling said rack bar, and toothed means for longitudi- 25 nally actuating said rack bar.

In testimony that I claim the foregoing as my own, I hereby affix my signature.

REED D. RICHARDSON.