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A. B. WITMER

3,087,364

BOLT REMOVER TOOL

Filed Dec. 26, 1961

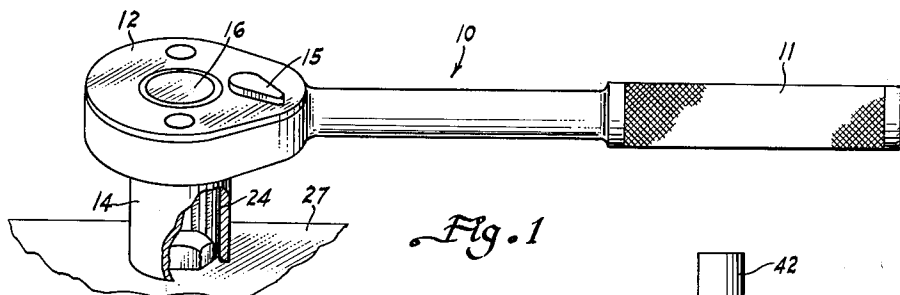


Fig. 1

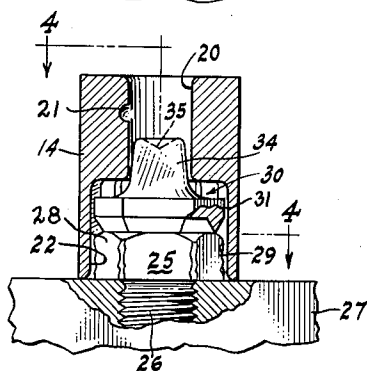


Fig. 2

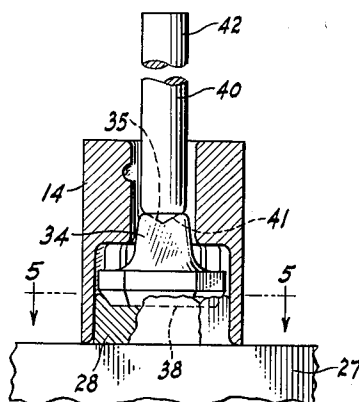


Fig. 3

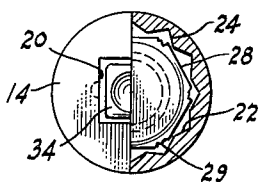


Fig. 4

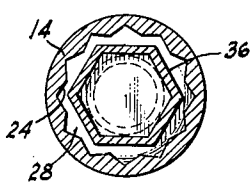


Fig. 5

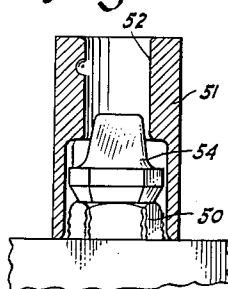


Fig. 7

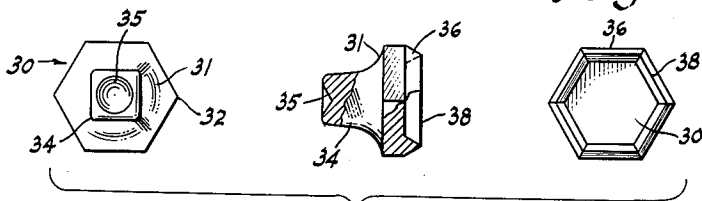


Fig. 6

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BOLT REMOVER TOOL
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This invention relates generally to hand tools and more particularly to a tool adapted to be used in removing bolts, nuts and the like.

It frequently happens that a bolt, for example, becomes 'frozen' in place after long use. If an improper tool is used in an attempt to remove the bolt, such as a pair of pliers or a wrench of a wrong size, then the corners on the head of the bolt may become worn without achieving removal. Subsequently, if a socket wrench is employed on the bolt, the splines of the socket may be unable to grip the bolt head, merely being rotatable about the periphery of the head.

One object of this invention is to provide a bolt remover tool adapted to be used in cooperation and in combination with the socket of a ratchet wrench whereby bolt heads and the like with worn away, rounded corners may be removed.

Another object of this invention is to provide a set of bolt remover tools for use with a socket wrench set, there being one tool for each size of wrench socket, and a single punch useable with all tools of the set.

Another object of this invention is to provide a bolt remover tool so designed that it may be used with the socket of a wrench set without impairing the normal use of the socket.

A further object of this invention is to provide a tool of the character described whereby worn bolt heads and the like may be quickly and easily removed, with minimum physical effort.

A still further object of this invention is to provide a tool of the character described which is simply designed, rugged, dependable and low cost.

Other objects of this invention will be apparent hereinafter from the specification and from the recital in the appended claims.

In the drawing:

FIG. 1 is a perspective view of a socket wrench with which the bolt remover tool of this invention is useable, the socket of the wrench being broken away;

FIG. 2 is an enlarged vertical section through the socket of the wrench mounted over a bolt to be removed and having located therein a bolt remover tool constructed according to this invention;

FIG. 3 is a view similar to FIG. 2 showing a punch inserted in the socket opening and driven downwardly to force the remover tool into the bolt head;

FIG. 4 is a plan, section taken on the lines 4-4 of FIG. 2 looking in the direction of the arrows and showing the bolt head free of the socket;

FIG. 5 is a section taken on the line 5-5 of FIG. 3 looking in the direction of the arrows and showing the bolt head swedged into engagement with the socket;

FIG. 6 shows the remover tool in plan, part side elevation part section, and bottom; and

FIG. 7 shows a smaller socket and tool for a smaller bolt head.

Referring now to the drawing by numerals of reference, and first to FIG. 1, 10 denotes a ratchet wrench of conventional construction. It comprises a handle 11 and a head 12 having a rotatable shaft 16 to which a desired size of socket 14 may be connected. Head 12 has a pawl control lever 15 which, in one pivoted position, enables the user of the wrench to rotate shaft 16 and thus socket 14 in one direction and when pivoted to another position enables rotation of socket 14 in the opposite di-

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rection. Shaft 16 has a rectangular, socket engageable, lower end, not shown.

Socket 14 has a cylindrical periphery and a vertically extending upper bore 20 which is rectangular in cross-section to snugly receive the lower end of shaft 16. Bore 20 is formed with a depression 21 to receive a spring loaded ball, not shown, on the lower end of shaft 16 to releasably connect the parts. The lower portion of the inside of the socket has an enlarged bore 22 having axially extending angular splines 24, shown best in FIG. 4, to receive the corners of a bolt or the like to be removed. It is understood that the particular socket 14 used in any given operation depends, of course, on the size of the bolt, nut or the like to be worked upon.

It sometimes occurs that the wrench user wishes to remove a bolt 25 having a shank 26 threaded into a piece 27 and having a head 28 the corners 29 of which are worn down, as shown best in FIGS. 2 and 4. Such worn corners frequently result when wrong tools are used in an attempt to remove the bolt, or proper tools are improperly used. When a bolt head is so worn, socket 14 is freely rotatable about bolt head 28 without exerting a torque thereon.

To enable the removal of bolt 25 with the socket wrench a remover tool 30 of this invention is provided. Tool 30 is of such size that it fits into bore 22 of socket 14. The tool has a hex body 31 formed with corners 32 which interengages the socket splines 24. Projecting upwardly from body 31 is a rectangular neck 34 which mates with and fits into the lower end of rectangular bore 20. The top of neck 34 has a depression 35 located on the vertical axis of the tool. The base of body 31 has a downwardly projecting hexagonally shaped rib 36 which is V-shaped in cross section and sharpened to provide a cutting edge 38.

Useable in cooperation with tool 30 and with the wrench removed from socket 14 is a punch 40 (FIG. 3) adapted to be inserted in bore 20 and having a bevelled lower end 41 which fits into depression 35. The top 42 of punch projects outwardly of socket 14 and is adapted to receive one or more hammer blows to drive tool 30 downwardly to thereby force the cutting edge 38 of rib 36 into the head 28 of bolt 25. This produces a swedging action on the upper end at least of bolt head 28 and metal is forced radially outwardly into operative engagement with the splines 24 of socket 14. When so swedged, punch 40 can be removed and the head 12 of wrench 10 can be applied to socket 14. Then bolt 25 can be readily removed, manipulating wrench handle 11.

In addition to this swedged connection of the bolt head with the socket splines, the bolt head and remover tool become locked together against rotatable movement because of the downward projection of rib 36. Since tool corners 32 engage socket splines 24 any rotation of socket 14 also rotates tool 30. A torque is thus applied to the top of the bolt head by tool 30 as well as to the periphery of the head by socket 14.

Even though socket 14, tool 30 and bolt head 28 are locked together against relative rotatable movement after punch 40 has been used, the parts are readily movable relative to each other in an axial direction.

According to this invention, a set of remover tools 30 is provided to correspond to the various size sockets of the wrench set, there being one tool for each socket size. FIG. 7 shows a smaller bolt 50 and a suitable smaller socket 51 therefor. It will be noted that while socket 51 is of a different size than socket 14, the bore 52 of the socket is the same as bore 20. The tool 54 is appropriate for such socket size.

With an insert remover tool of this invention, a bolt or nut with worn and rounded corners can be readily

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removed with a ratchet wrench, the swedging operation of the tool being cooperative with the wrench socket to produce the desired result. The simple tool design renders the cost low. Each tool is rugged and dependable. When used, it will not impair the wrench socket with which it is cooperative.

While this invention has been described in connection with a particular embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as fall within the scope of the invention or the limits of the appended claims.

Having thus described my invention what I claim is:

1. A tool in combination with the socket of a wrench to remove a bolt or the like wherein the head of the bolt has corners rounded to such an extent that the socket is unable to apply a removing torque thereto, and wherein said socket has an axial bore and axial splines which surround the periphery of the bolt head when the socket is positioned on the head comprising, in combination, a tool body which fits into said socket and is axially movable relative thereto, said tool body having peripheral corners operatively engaging said socket splines whereby the body is locked against rotatable movement relative to the socket, and a rib projecting axially from one end of the tool body adjacent a radial outer portion thereof and engageable with the bolt head, whereby when a punch is inserted in said socket bore with one end engaging said tool body and an opposite end projecting outside of the socket, a hammer blow applied thereon will drive the tool body axially and force said rib into the bolt head to thereby swedge the head radially outwardly, the forcing of said rib into the bolt head locking the tool body and bolt head against relative rotation and the swedging action locking the bolt head and socket against relative rotation whereby a torque subsequently applied to the socket will result in removal of the bolt.

2. A tool in combination with the socket of a wrench to remove a bolt or the like wherein the head of the bolt has corners rounded to such an extent that the socket is unable to apply a removing torque thereto, and wherein said socket has an axial bore and axial splines which surround the periphery of the bolt head when the socket is positioned on the head comprising, in combination,

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a tool body which fits into said socket and is axially movable relative thereto, said tool body having peripheral corners operatively engaging said socket splines whereby the body is locked against rotatable movement relative to the socket, and a rib projecting axially from one end of the tool body adjacent a radial outer portion thereof and engageable with the bolt head, whereby when a punch is inserted in said socket bore with one end engaging said tool body and an opposite end projecting outside of the socket, a hammer blow applied thereon will drive the tool body axially and force said rib into the bolt head to thereby swedge the head radially outwardly, said rib being V-shaped in cross section and provided with radial corners whereby when the rib is forced into the bolt head the tool body and bolt head are locked against relative rotation and the swedging action locking the bolt head and socket against relative rotation whereby a torque subsequently applied to the socket will result in removal of the bolt.

3. A tool as recited in claim 2 wherein said body has a neck extending from the end of the body opposite said one end, and having a depression to receive one end of said punch.

4. A tool in combination with the socket of wrench for removing a bolt having a head with rounded corners, and splines in the socket being unable to grip the head, comprising a tool body which fits into the wrench socket and has corners operatively engaging the socket splines whereby when the socket is rotated the tool body rotates therewith, a V-shaped rib formed on one axial end of said body adjacent a radial outer portion thereof and having a sharp edge adapted to seat on the bolt head, whereby when a punch is inserted in said socket for engagement with said tool, a hammer blow thereon will force said rib into the bolt head and swedge the head radially outwardly into operative engagement with the socket splines.

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