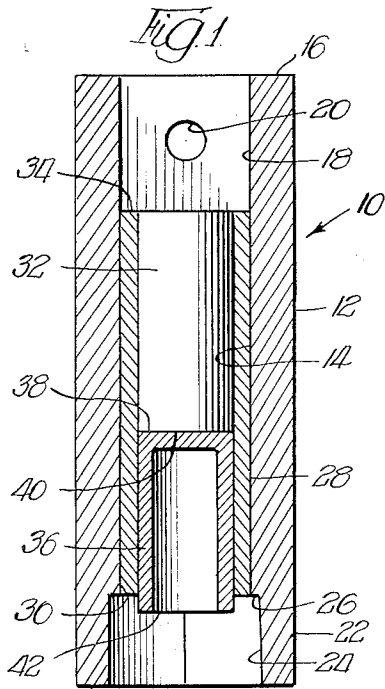
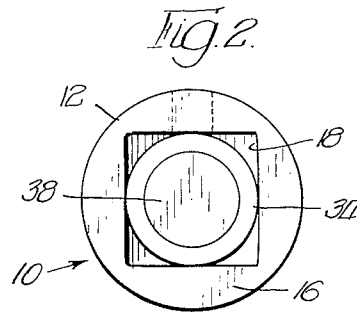
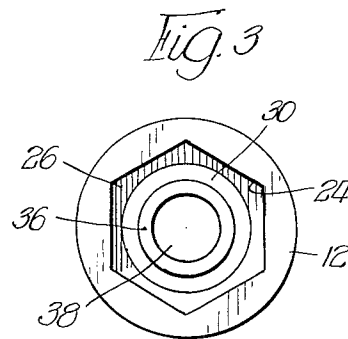
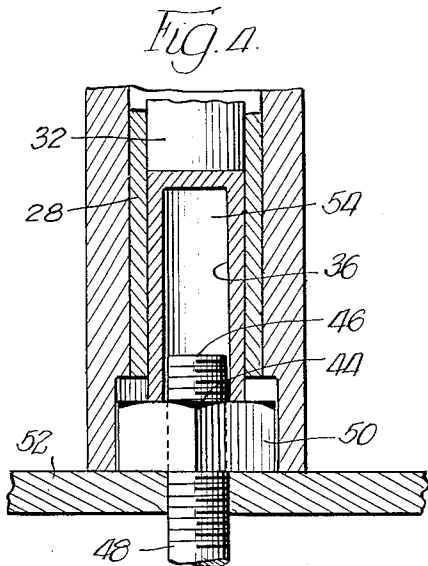
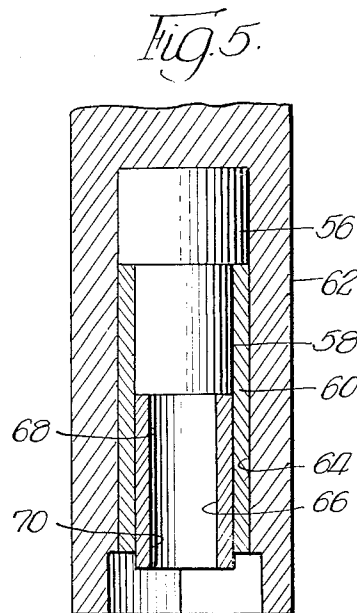


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2,714,829

MAGNETIC WRENCH HAVING ITS MAGNET INWARDLY SPACED FROM
ITS NUT-ENGAGING SOCKET BY A HOLLOW MAGNETIC SLEEVE
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MAGNETIC WRENCH HAVING ITS MAGNET INWARDLY SPACED FROM ITS NUT-ENGAGING SOCKET BY A HOLLOW MAGNETIC SLEEVE

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5 Claims. (Cl. 81-125)

This invention relates to a magnetic socket wrench and more particularly to a socket wrench in which a magnet is utilized for holding a nut in position in said wrench for threading onto a bolt or stud, or the like.

An object is to provide a socket wrench of this type in which the magnet is disposed inwardly from the inner limits of a nut-engaging socket so as to be relatively free from the possibility of damage through impact, and yet has its magnetic attraction effectively transmitted to the nut to be held and driven.

Still another object of this invention is to provide a magnetic socket wrench of the character described, which is simple in both construction and operation and therefore which can be readily manufactured and which has high commercial utility.

The present invention is an improvement over the prior art as represented by applicant's United States patent, Number 2,671,369, issued March 9, 1954, and the United States patent to Ray M. Brown, number 2,630,036, issued March 3, 1953. In each of these two prior art devices a retractable magnet is provided to permit the work piece to be inserted into the socket of the wrench to varying depths, while still maintaining contact with the magnet. Such an arrangement also permits a bolt upon which a nut is being driven to protrude into the wrench as the nut is tightened down.

One of the principal objections to socket wrenches of this character which have a retractable magnet is that foreign matter can get into the clearance hole and cause the magnet to stick and therefore render it inoperative as far as its ability to accommodate positions of varying depths of the work piece is concerned. In addition, the magnet is ordinarily quite brittle and, since it is directly abutted by the bolt or work piece, it is easily damaged or actually broken, which, of course, then renders the tool inoperative.

Further objects and advantages of this invention will become evident as the description proceeds and from an examination of the accompanying drawings, which illustrate several embodiments of the invention and in which similar numerals refer to similar parts throughout the several views.

In the drawings:

Figure 1 is a view in elevation and partly in vertical section of one form of magnetic socket wrench incorporating the invention.

Figure 2 is a plan view from above of the socket wrench shown in Figure 1.

Figure 3 is a plan view from below of the socket wrench shown in Figure 1.

Figure 4 is a view in elevation and partly in vertical cross-section of the socket wrench shown in Figure 1, in operative association with a nut and bolt member.

Figure 5 is a view in elevation and partly in vertical section of a modified form of socket wrench also incorporating the invention.

Referring now to Figures 1, 2, and 3, a socket wrench is shown therein, indicated generally by the numeral 10.

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This embodiment is shown by way of example and includes a shank 12 which is preferably provided with a tubular bore 14 through at least a portion thereof. The upper end 16 of the shank may have a female square drive opening 18 formed therein, adapted to receive in driving engagement the square end of a driving tool. An opening 20 may be provided in the end portion 16 to receive a spring pin adapted to keep the shank in place on the driving tool. The opposite end 22 of the shank may be provided with a socket opening 24 which may be hexagonal in cross-sectional configuration, as best shown in Figure 3. Obviously, the openings 18 and 24 could be of any other desirable cross-sectional configuration and, as a matter of fact, the upper end 16 of the shank could be provided with a fixed handle similar to that of an ordinary screw driver, if desired. Likewise, the opening 24 could be made of any desired cross-sectional configuration adapted to fit the form of fastening device to be driven. Similarly, the bore 14 could be other than circular in cross-section if desired, but is preferably circular.

A shoulder 26 is preferably formed at the inner end of the socket 24 and a sleeve 28 of substantially non-magnetic material is inserted in the bore 14 so that its lower end 30 is substantially flush with the shoulder 26. A preferably cylindrical permanent magnet 32 is disposed within the upper end 34 of the sleeve 28 while a preferably tubular, hollow extension member 36 of magnetic material is disposed within the end 30 of the sleeve 28. The upper end 38 of the extension member 36 is preferably disposed in abutment with the lower end 40 of the magnet 32, the end 38 in this embodiment preferably being closed. The opposite end 42 of the extension member is disposed so that it protrudes slightly into the socket opening 24, as shown in Figure 1.

The shank 12 is preferably made of a good grade of steel which is hardenable and magnetic. The sleeve 28, as previously stated, is of substantially non-magnetic material, which term is herein used in the practical sense to designate materials of very low magnetic permeability. The magnet 32 is preferably of the bar type, being circular in cross-section and having the opposite poles thereof at opposite ends of the magnet. It is preferably formed of Alnico alloy or some similar material with very high magnetic properties.

In actual operation, the size of the tool selected should be such that it is adapted to receive within the socket 24 the nut to be driven, and the extension member 36 should have an internal diameter such that the bolt or threaded stud upon which the nut is to be threaded is capable of being received therewithin. The nut to be driven is placed within the socket 24 in abutment with the outer end 42 of the extension member 36 and is maintained in that position by operation of the magnet 32. The nut may then be driven onto the bolt 48, or the like, and after it has passed the point where its upper side 44 (as shown in Figure 4) is flush with the upper end 46 of bolt 48, that end will protrude into the extension member 36. In Figure 4 the nut 50 is shown seated on the bolt 48 which extends through the sheet element 52, the nut 50 having been driven onto the bolt 48 down into abutment with said sheet. It is clear that if the opening 54 within the extension member 36 were not provided, the end 46 of the bolt 48 would come into abutment with a portion of the wrench member and the latter would be displaced from its initial driving position with respect to the nut 50. Figure 4 therefore clearly illustrates the particular advantage of this type of construction in connection with the driving of a nut onto a bolt, or the like, to any substantial degree.

As shown in Figure 5, several modifications are possible so as to form alternative embodiments of the in-

vention. For example, the magnet may take the form shown in Figure 5, which magnet 56 has a lower portion 58 of reduced diameter enclosed within the sleeve 60 in the bore 64 of the shank member 62. In such a modification, preferably not more than half of the length of the magnet 56 should be in contact with the bore 14. Such an arrangement will provide a better path for the magnetic lines of flux than is provided in the form of tool shown in Figure 1.

Regarding this path as a separate "magnetic circuit," it is clear that in the form of device shown in Figure 1, there is a gap in the circuit between the upper end of the magnet 32 and the shank 12 since the sleeve 28 is formed of substantially non-magnetic material. Actually, this is no real source of difficulty in the form of device shown in Figure 1, since the square end on the driving tool which is inserted in the opening 18 will normally abut the upper end of the magnet 32. In some instances, however, it may be preferable to provide a more positive contact between the magnet and the shank such as is achieved in the form of construction shown in Figure 5.

Obviously, the magnetic circuit in either form of device extends down through the shank to the socket opening 24 and thence through the nut or workpiece received therein and disposed in contact with the extension member 36 or 66. This latter member, as previously discussed, serves to complete the circuit between the workpiece and the lower end of the magnet.

Likewise, as shown in Figure 5, the extension member 66 may be provided, which differs from the extension member 36 previously described in that the upper end 68 thereof is open, as well as the lower end 70.

In the drawing and specification, there has been set forth several preferred embodiments of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation. Changes in form and in the proportion of parts, as well as the substitution of equivalents are contemplated, as circumstances may suggest or render expedient, without departing from the function or scope of this invention as further defined in the following claims.

I claim:

1. A socket wrench particularly adapted for driving nuts on bolts, comprising a hollow shank provided at the outer end thereof with an internal non-circular bore for receiving the workpiece to be rotated by the wrench, a sleeve of substantially nonmagnetic material secured within said hollow shank, a magnet secured within said sleeve, and a second hollow sleeve of magnetic material secured within said first named sleeve with one end in association with said magnet and the other end extending into said non-circular bore, said second sleeve being adapted to retain the workpiece within said bore through magnetic attraction.

2. A socket wrench particularly adapted for driving nuts on bolts, comprising a hollow shank provided at the outer end thereof with an internal non-circular bore for receiving the workpiece to be rotated by the wrench,

a sleeve of substantially non-magnetic material secured within said hollow shank with one end adjacent said non-circular bore, a magnet secured within said sleeve in spaced relation to said end of said sleeve adjacent said non-circular bore, and a second hollow sleeve of magnetic material secured within said first named sleeve with one end in association with said magnet and the other end extending into said non-circular bore, said second sleeve being adapted to retain the workpiece within said bore through magnetic attraction.

3. A socket wrench particularly adapted for driving nuts on bolts, comprising a hollow shank provided at the outer end thereof with an internal non-circular bore for receiving the nut to be rotated by the wrench, a sleeve of substantially non-magnetic material secured within said hollow shank with one end adjacent said non-circular bore, a magnet secured within said sleeve in spaced relation to said end of said sleeve adjacent said non-circular bore, and a second hollow sleeve of magnetic material secured within said first named sleeve, said second sleeve having a closed end disposed in abutment with one end of said magnet and an open end extending into said non-circular bore and being adapted to retain the nut within said bore, and to receive the end of the bolt, upon which said nut is being driven, within said second sleeve.

4. A bolt clearance socket particularly adapted for driving nuts on bolts, comprising a shank member having a non-circular nut receiving opening at one end thereof, a magnet secured within said shank in spaced relation to said non-circular opening, a sleeve of substantially nonmagnetic material secured within said hollow shank and encompassing a substantial portion of said magnet, and a hollow magnet extension piece of magnetic material disposed in said sleeve with one end in association with one end of said magnet and the other open end protruding centrally into said nut receiving opening so as to normally retain a nut within said opening by magnetic attraction and to receive the end of the bolt, upon which said nut is driven, within the open end thereof so that said nut may be retained within said opening and simultaneously driven onto said bolt beyond the point where it is flush with the end thereof.

5. In a bolt clearance socket wrench having a shank with an opening in one end thereof adapted to receive a nut in driving relation, the combination of a non-magnetic sleeve, a magnet at least partially encompassed by said sleeve, and a magnet extension piece with an opening therein adapted to receive a bolt onto which said nut is driven, said extension piece having one end disposed in association with said magnet with the opposite end extending into the opening in said shank.

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