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LE ROY J. WENDLING

2,750,828

MAGNETIC SOCKET WRENCH

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FIG-1

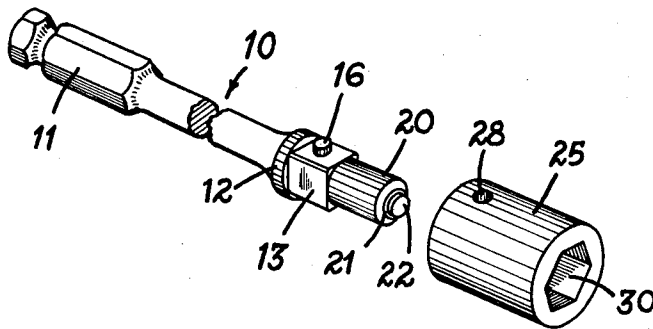


FIG-2

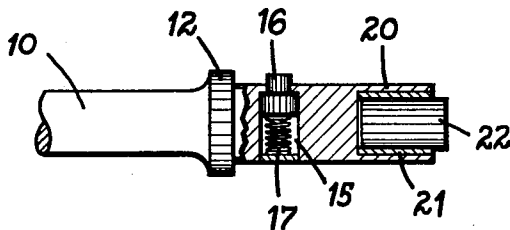


FIG-3

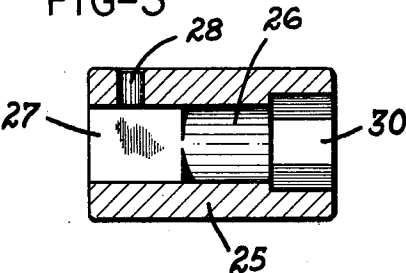


FIG-4

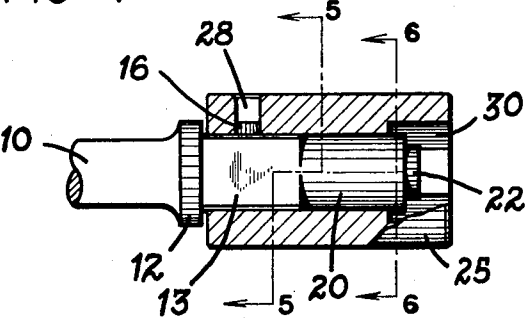


FIG-5

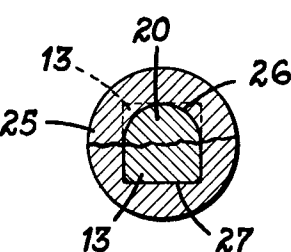
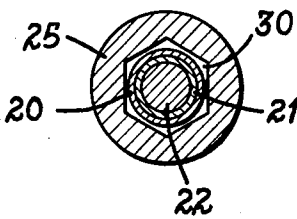


FIG-6



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MAGNETIC SOCKET WRENCH

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2 Claims. (Cl. 81—125)

This invention relates to driving implements and more particularly to magnetic socket wrenches.

It is the principal object of the invention to provide a magnetic socket wrench which is simple and rugged in construction, relatively free of moving parts and capable of heavy duty, and which provides for magnetically retaining the heads of screws, nuts or other fastening members.

It is a further object to provide such a socket wrench in which the removable and replaceable socket member is properly guided and supported substantially throughout its length to assure reliable and satisfactory operation of the device in use.

It is a still further object to provide such a wrench in which the permanent magnet is fixed in predetermined proper relation on a shank and arranged to develop the desired magnetic attraction for the head of the fastening member through proper correlation of the relationship of the socket when in assembled position upon the shank.

Other objects and advantages will be apparent from the following description, the accompanying drawings, and the appended claims.

Fig. 1 is a perspective view showing the shank with a portion of its shaft broken out and a socket member separated therefrom;

Fig. 2 is a fragmentary elevation, parts being broken away in order to show the driving end of the shank in longitudinal section;

Fig. 3 is a longitudinal sectional view through the socket;

Fig. 4 is a fragmentary elevation showing the socket in assembled position on the driving end of the shank, a major portion of the socket being broken away and shown in longitudinal section; and

Figs. 5 and 6 are cross-sectional views on the lines 5—5 and 6—6 respectively of Fig. 4.

Referring to the drawings which illustrate a preferred embodiment of the invention there is shown a shank indicated generally at 10 having a driving portion 11 which may have any proper shape such as to be received in a chuck, handle, or other suitable member. The shank 10 is formed integrally with an enlarged circular section 12 which is faced off to form a noncircular shoulder portion 13. As shown this may conveniently be square in cross section or such other noncircular shape as may be desired. The shoulder 13 is cross-bored as shown at 15 forming a recess for receiving a locking pin 16 which projects through one face of the shoulder, being spring-pressed to latching position by internal spring 17.

Projecting forwardly from the shoulder 13 and integral with the shank 10 is a sleeve 20 shown as being circular in cross section and preferably of a diameter corresponding to the distance across the flats of shoulder 13. The outer end of the sleeve 20 is bored and receives a nonmagnetic bushing 21 therein. A suitable material for this purpose is brass, and is of appreciable thickness in relation to the section of sleeve 20 to provide in effect

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a nonmagnetic gap to cause diversion of the magnetic flux toward the inner and outer ends of the magnet.

The magnet is shown at 22 and is a straight bar magnet of highly magnetic material such as an Alnico magnet, or similar alloy. It is fitted into the bushing 21 by being pressed therein and as shown is longer than the bore such that when assembled it has an overhanging end portion. The extent of the overhang may be determined at the time of actual assembly by the extent to which the magnet is pressed into the bushing, but when so assembled it thereafter retains a fixed relationship to the shank and sleeve construction. Its inner end is in close magnetic relation with the magnetic material of the sleeve so that the lines of force are directed thereinto, to travel forwardly toward the outer end thereof.

A typical socket is shown at 25, being a hollow magnetic element having a cylindrical bore 26 located generally centrally of the socket member and of a diameter only slightly larger than that of sleeve 20. At its inner or driving end the socket is formed with a noncircular portion 27 cooperating with the noncircular shoulder 13 and of the same shape; hence in the form shown the driving end 27 is substantially square in cross section. It is likewise provided at one point with a bore 28 through its wall adapted to receive the projecting end of locking pin 16.

At its outer or working end the socket is formed with a recess 30 of hexagonal or other shape as desired to fit a particular size and shape of fastening element, it being understood that a series of such socket members will be similarly shaped as to the bore and driving end 27 but will have different sizes of recessed ends 30.

As shown in Fig. 4 the socket member is receivable over the driving end of the shank and in its fully assembled position the socket engages the shoulder portion 13 in driving relation therewith while the bore 26 fits over and is guided and supported by the sleeve portion 20 over a major portion of its length. Preferably the relationship of the parts is such that with locking pin 16 in place in bore 28 the sleeve 20 will project through bore 26 and into the inner or bottom end of recess 30. Since the magnet 22 overhangs the end of the sleeve 20, this will position the end of the magnet beyond the bottom of and well within the recess 30.

Hence the tool is especially well-adapted for engaging the head of a fastening element, and picking it up by magnetic attraction or retaining the head in the socket following loosening thereof, with the head in close magnetic contact with the end of the magnet. To complete the magnetic path, as will be evident from Fig. 4, the lines of force must traverse the air gap into the forward edge of the socket, and thus the sleeve 21 in cooperation with the relationship described herein tends to direct the magnetic flux into a path most suitably adapted for attracting and retaining the head of a fastening element. At all times the socket is adequately guided and supported during operation over a substantial area extending up to and immediately adjacent the bottom of recess 30 where the torque is applied to the fastening element, and there is no occasion where the socket becomes jammed or locked upon the shank. Removal and replacement are accomplished simply by inserting a tool to depress the head of pin 16 below the inner end of bore 28, whereupon the socket can be removed and replaced by another having a different size working end. With the socket removed the end of the magnet and the sleeve may be readily freed of filings or particles which may be attracted thereto.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise

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form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A magnetic socket wrench comprising an integral shank formed with a noncircular shoulder thereon and with a circular sleeve projecting outwardly therefrom, a bushing of nonmagnetic material within said sleeve, a permanent bar magnet fixedly mounted within said bushing and having its free end projecting beyond said sleeve, a hollow socket having a circular bore receivable over said sleeve in guiding and supporting relation thereon and having a driving socket at its inner end receivable in driving relation on said noncircular shoulder, said hollow socket having a recess at its outer end for receiving a workpiece, and means for releasably securing said socket upon said sleeve in predetermined axial relation thereon such that said magnet projects from said bore a limited distance into a bottom portion of said recess to locate the free end of said magnet in close magnetic relation with a driven workpiece.

2. A magnetic socket wrench comprising an integral shank formed with a noncircular shoulder thereon and with a circular sleeve projecting outwardly therefrom, a bushing of nonmagnetic material within said sleeve and extending to the outer end thereof, a permanent bar

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magnet fixedly mounted within said bushing and having its free end projecting beyond said sleeve, a hollow socket having a circular bore receivable over said sleeve in guiding and supporting relation thereon and having a driving socket at its inner end receivable in driving relation on said noncircular shoulder, said hollow socket having a recess at its outer end for receiving a workpiece, and means for releasably securing said socket upon said sleeve in predetermined axial relation thereon such that said sleeve and said bushing project from said bore a limited distance into a bottom portion of said recess to locate the free end of said magnet in close magnetic relation with a driven workpiece.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 24,066	Brown	Oct. 4, 1955
1,927,844	Pfauser	Sept. 26, 1933
2,260,055	Reardon	Oct. 21, 1941
2,624,223	Clark	Jan. 6, 1953
2,677,294	Clark	May 4, 1954
2,718,806	Clark	Sept. 27, 1955

FOREIGN PATENTS

340,443	Germany	Sept. 13, 1921
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