United States Patent [19]

Carr

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[45] **May 7, 1974**

[54] **MAGNETIC KEEPER ACCESSORY FOR WRENCH SOCKETS**

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[21] Appl. No.: **394,348**

[52] **U.S. Cl.** **81/125,** 335/285, 335/303

[51] **Int. Cl.** **B25b 13/02**

[58] **Field of Search** ..... 335/285, 303; 81/125; 145/50 DA; 248/206 A

[56] **References Cited**

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Primary Examiner—George Harris

Attorney, Agent, or Firm—Sellers and Brace

[57] **ABSTRACT**

A keeper accessory designed to have an interference fit with the interior of a wrench socket and effective to hold a fastener part captive in the socket while being maneuvered into and out of assembled position. The keeper is blanked from magnetized, elastomeric stock with at least a portion of its perimeter bevelled to better accommodate an interference press fit with the interior sidewall of closely related sizes of wrench sockets.

13 Claims, 13 Drawing Figures

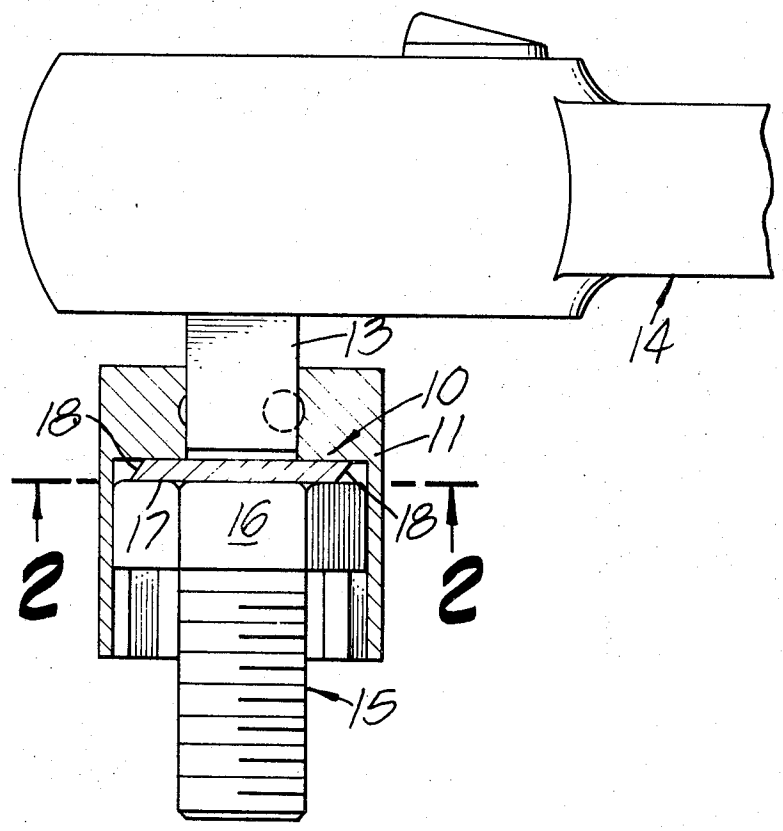
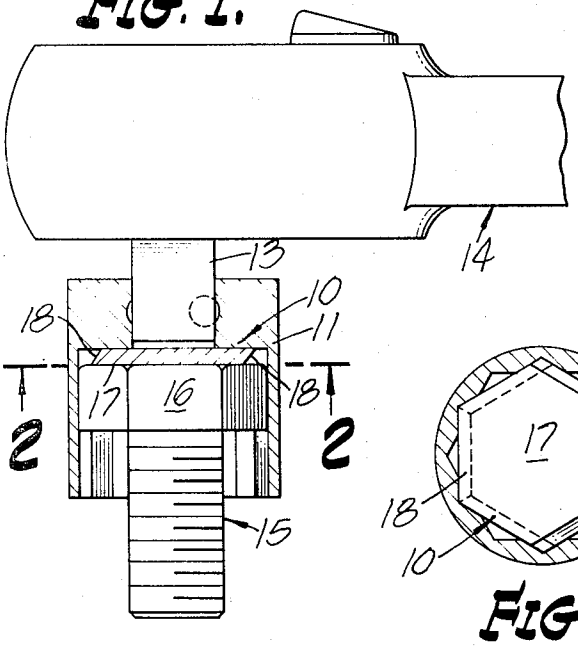


FIG. 1.



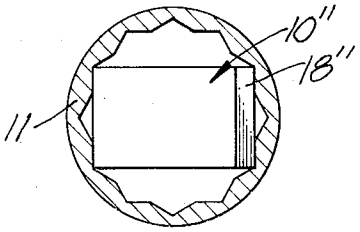


FIG. 4.

FIG. 2.

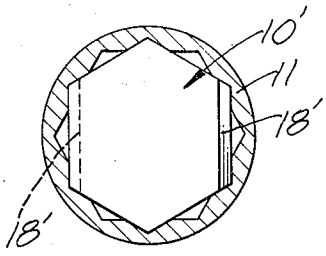


FIG. 3.

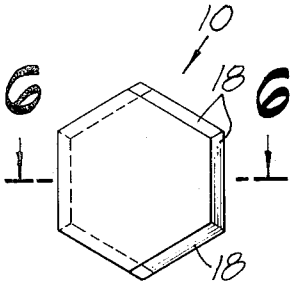


FIG. 5.

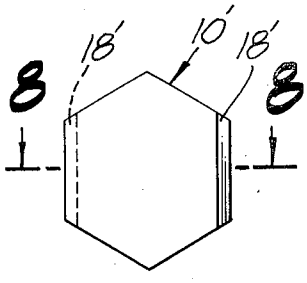


FIG. 7.

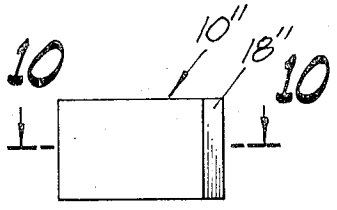


FIG. 9.

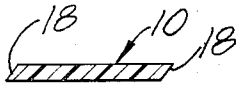


FIG. 6.

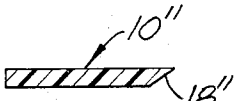


FIG. 10.

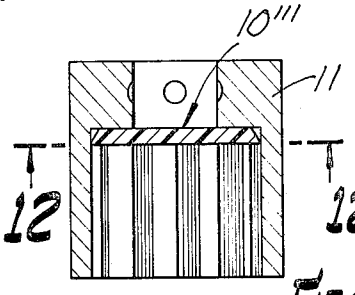


FIG. 11.

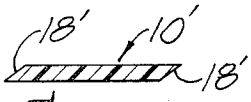


FIG. 8.

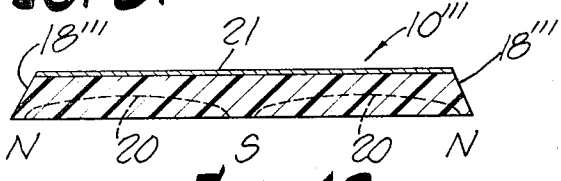


FIG. 13.

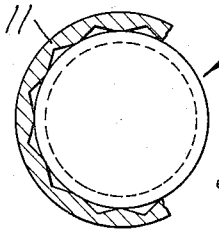


FIG. 12.

MAGNETIC KEEPER ACCESSORY FOR WRENCH SOCKETS

This invention relates to an accessory for tools, and more particularly to a simple, inexpensive, magnetic keeper assembly designed for self-retention within the interior of a socket wrench without need for attaching expedients.

The invention is closely related to my copending application for U. S. Letters Pat., Ser. No. 328,448, filed Jan. 31, 1973 for a magnetic keeper. As is true of my earlier filed application, the keeper herein disclosed is blanked from sheet elastomeric stock having permanently magnetized particles embedded therein. A particular feature of the invention is the fact that the keeper is designed to be blanked from sheet stock material in mass quantities inexpensively and with one or more edges bevelled so as to lie in a plane inclined to the keeper face. The feather edge so provided by the bevel is readily upset and deformed to hold the keeper assembled in the socket by wedge action without causing buckling or objectionable bulging of surface areas in contact with a fastener part. Furthermore, it is found that this bevelled expedient, preferably provided on diametrically opposed edges of the keeper, renders the keeper usable with closely related sizes of wrench sockets. More specifically, a set of keepers as made for a complete set of socket wrenches is usable with equal facility with either a set of metric wrenches or a set of English wrenches. This is a feature of considerable significance at this period in history when large areas of the globe are changing over from the English to the metric system with the result that mechanics will of necessity need wrench sets of both types. The present keeper invention will be usable interchangeably and equally satisfactorily in a wrench of either measurement system.

Accordingly, it is a primary object of the present invention to provide a simple, magnetic keeper accessory having self-retentability in wrench sockets of closely related sizes and effective to retain a fastener part captive therein.

Another object of the invention is the provision of a simple, readily blanked, magnetic keeper accessory for wrench sockets of unique design and versatility.

Another object of the invention is the provision of an inexpensive magnetic keeper accessory having a tapering edge along at least a portion of its perimeter and adapted to have an interference press fit in a wrench socket without causing bulging or distortion of the main body of the keeper.

Another object of the invention is the provision of a simple, inexpensive, homogenous, magnetic keeper accessory readily installed in and removed from a wrench of conventional design and requiring no fastening or retaining means.

Another object of the invention is the provision of a magnetic keeper accessory usable interchangeably without fastener expedients in related sizes of wrench sockets and whether made in accordance with the metric or English measurement systems.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIG. **1** is a fragmentary cross-sectional view of an illustrative embodiment of the invention installed in a wrench socket and in use to hold a fastener part captive therein;

FIG. **2** is a cross-sectional view taken along line **2—2** on FIG. **1**;

FIGS. **3** and **4** are views similar to FIG. **2** but showing variant configurations of the keeper;

FIG. **5** is a plan view of the FIG. **1** keeper per se;

FIG. **6** is a cross-sectional view taken along line **6—6** on FIG. **5**;

FIG. **7** is a plan view of the keeper per se shown in FIG. **3**;

FIG. **8** is a cross-sectional view taken along line **8—8** on FIG. **7**;

FIG. **9** is a plan view of the keeper per se shown in FIG. **4**;

FIG. **10** is a cross-sectional view taken along line **10—10** on FIG. **9**;

FIG. **11** is a vertical cross-sectional view showing still another modification of the keeper;

FIG. **12** is a fragmentary cross-sectional view taken along line **12—12** on FIG. **11**; and

FIG. **13** is an enlarged cross-sectional view of the keeper shown in FIG. **12**.

Referring initially more particularly to FIGS. **1, 2** and **5** there is shown a typical illustrative embodiment of the invention keeper, designated generally **10**, blanked from a thick sheet of magnetized elastomeric stock and shown seated crosswise of the inner end of a conventional 12-point wrench socket head **11**. This wrench socket has a square axial opening telescoped over the shank **13** of a wrenching handle **14**. FIG. **1** shows keeper **10** in use to retain a cap screw **15** of magnetic material captive with its head **16** seated flush against the outwardly facing surface **17** of the keeper.

As is made clear by FIGS. **2** and **5**, keeper **10** is blanked with all six of its edge faces **18** bevelled. It will therefore be appreciated and apparent from the drawing that the leading rim of each of these bevelled edges **18** is acute and relatively sharp angled compared to the obtuse angle made by the other or trailing rim of edge **18**. This fact coupled with the resilient supple nature of the elastomeric material enables the acutely angled leading rim or rims to flex and deform as necessary to accommodate the oversized perimeter of the keeper to the points of contact with the interior sidewalls of the wrench socket. Stated differently, it will be understood that the cross-sectional diameter measured through the leading rims of bevelled edges **18** may be of the order of ten to fifteen thousandths greater than the internal dimensions of the wrench socket at the points of contact with the keeper accessory **10** when lying in a plane at right angles to the axis of the wrench socket and at the inner end thereof. It is a simple matter to assemble this slightly oversized accessory into the inner end of the wrench socket with its innermost face flush against the bottom of the socket. When so installed in a typical 12-point socket, certain portions only of the leading rim of the bevelled edges have an interference fit with the keeper and these portions of the keeper may be slightly compressed and bulged without adverse affect on the flatness of surface **17** in contact with the flat, juxtaposed surface of the fastener head **16**. And this is true even though a hexagonal nut rather than a bolt head is assembled within the wrench socket.

If for any reason it is desired to remove the keeper accessory **10** from the socket it is a simple matter to engage the hooked end of a wire or other tool around the edge of the keeper and withdraw it from the socket for installation into another wrench socket.

Referring now to FIG. **3**, there is shown a variant configuration of keeper, there designated **10'**, and shown installed in the same wrench socket **11**. It is pointed out that keeper **10'** differs from keeper **10** previously described only in that two diametrically opposed flats of the hexagonal perimeter have been bevelled as indicated at **18'**. The leading rim edges of these two bevelled surfaces have an interference fit with the interior side walls of socket **11** whereas the remaining hexagonal faces of keeper **10'** lie perpendicular to the planes of the flat faces of the keeper. These perpendicular hex faces may have a loose fit with the sidewalls since it is the leading rim edges of the bevelled faces which are relied upon to have an interference fit with the wrench socket to retain the keeper assembled in the socket. In all other respects it will be understood that keeper **10'** corresponds with that shown in FIGS. **1–3**.

FIG. **4** shows a third modification of the keeper accessory designated **10''**. This keeper is generally rectangular and has an overall length slightly in excess of the internal diameter of the wrench socket. As shown, only the transverse end of the keeper is bevelled as indicated at **18''** whereas the other transverse end edge lies perpendicular to the flat faces of the keeper. This perpendicular end is held in frictional engagement with the internal sidewalls by the interference fit between the rim edge of the bevelled edge **18''** and the portions of the socket sidewall in contact therewith. This modification of the invention uses substantially less material than the embodiment shown in FIGS. **1–3** and is found to have adequate holding power for all except heavier fastener parts.

Referring now to FIGS. **11–13**, a third embodiment of the keeper accessory is there shown, designated **10'''**. This embodiment is blanked from the same magnetized elastomeric material as described above but is blanked in the form of a disc. It will be understood that the sharp-edged rim of the disc is advantageous because of the ease with which the disc or the hexagonal embodiments of the keeper can be manufactured. This arrangement also has the advantage of minimizing any slight surface distortion produced in the face of the keeper by the interference fit with the socket sidewall, it being well known that the magnetized keeper preferably has a maximum portion of its face in contact with the fastener part for maximum holding capability.

Attention is also called to FIG. **13** showing details not previously described but understood as desirably present in each of the keeper embodiments. For example, attention is called to the flattened horse-shoe shaped dotted lines **20,20** indicating independent horse-shoe shaped magnetized domains each terminating at its ends in a north pole and a south pole lying flush with one face of keeper **10'''**. It will be understood that these magnetized domains **20,20** are aligned with one another with the north pole of one adjacent the south pole end of the closest adjacent magnetized domain. Although only two such domains are shown in alignment with one another with FIG. **13** it will be understood that three, four or more such domains may lie in end-to-end relation crosswise of the entire keeper and this is likewise true of each of the keepers **10,10',10''**. The opposite or upper face of keeper **10'''** shown in FIG. **13** is coated or distinctively marked as indicated by **21** to indicate to the mechanic that this face should be remote from the fastener part and at the innermost end of the wrench socket. If a film of colored material is employed to distinguish this face it is desirable that this film be remote from the face through which the magnetic poles emanate for the obvious reason that the presence of the film constitutes an air gap in the flux circuit through the magnet and the fastener part when in contact with the keeper. This adversely affects the magnet's holding power for well known reasons.

While the particular magnetic keeper accessory for wrench sockets herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the detail of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A keeper accessory for installation in a wrench socket to hold an unattached fastener captive therein, said accessory comprising a plaque of permanently magnetized elastomeric material blanked from stock of uniform thickness having flat parallel opposed faces and having a bevelled edge along at least a portion of its periphery, said keeper including the bevelled edge thereof being sized to have an interference fit transversely of the interior of a wrench socket, and which bevelled edge is upset and deformed by pressure contact with the interior socket sidewall as said plaque is forcibly installed crosswise of the inner end of a wrench socket.

2. A keeper as defined in claim **1** characterized in that said keeper is longer than it is wide.

3. A keeper as defined in claim **1** characterized in that said keeper is generally rectangular.

4. A keeper as defined in claim **3** characterized in that said keeper is bevelled across one end thereof.

5. A keeper as defined in claim **3** characterized in that said keeper as one transverse end lying in a plane generally perpendicular to the parallel faces of said keeper.

6. A keeper as defined in claim **1** characterized in that the same is generally circular and in that a major portion of the perimeter thereof is bevelled and lies at other than an angle of 90° to the opposite planar faces thereof.

7. A keeper as defined in claim **1** characterized in that the same is permanently magnetized to provide a plurality of separate magnetized zones having the poles thereof aligned with one another in parallel rows between the opposite faces of said keeper.

8. A keeper as defined in claim **7** characterized in that said magnetized zones have the poles thereof terminating on the same face of the keeper.

9. A keeper as defined in claim **8** characterized in that one face thereof has a distinctive appearance readily distinguishing it from the other face.

10. A keeper as defined in claim **1** characterized in that said keeper is hexagonal in shape.

11. A keeper as defined in claim **10** characterized in that a plurality of said hexagonal edges are bevelled.

12. A keeper as defined in claim **10** characterized in that all of said hexagonal faces are bevelled and sized to have an interference fit with the interior sidewalls of a hexagonal wrench socket.

13. A keeper as defined in claim **1** characterized in that the edge portion thereof is bevelled acutely to one face of said keeper and in that the material from which said keeper is blanked is readily deformable along said bevelled edges whereby said keeper is adapted to have an interference fit with the interior sidewalls of wrench sockets of different closely related sizes.

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