

[54] **MAGNETIC KEEPER ACCESSORY FOR CONVENTIONAL TOOLS**

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[58] Field of Search 335/285, 303, 302; 81/125; 145/50 DA; 7/1 Q

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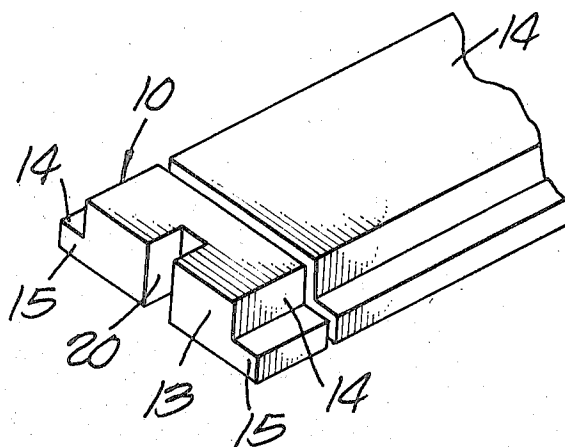
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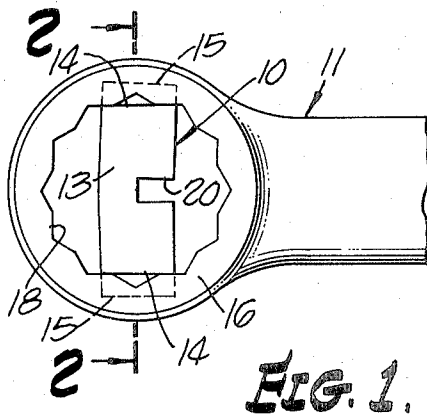
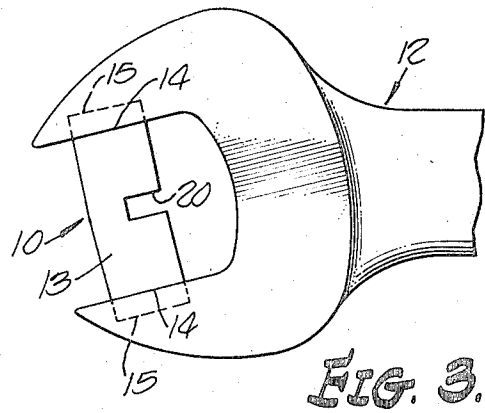
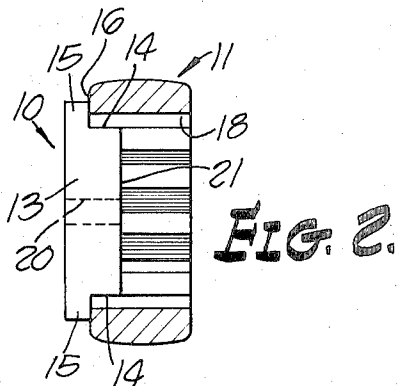
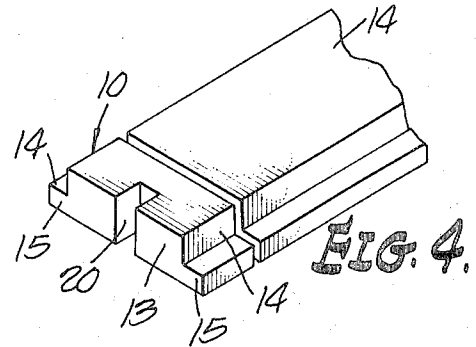
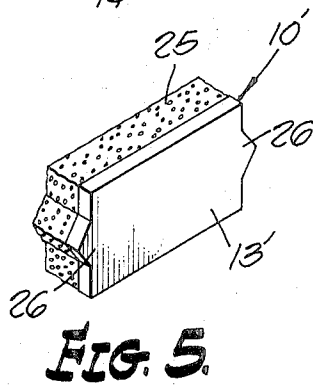
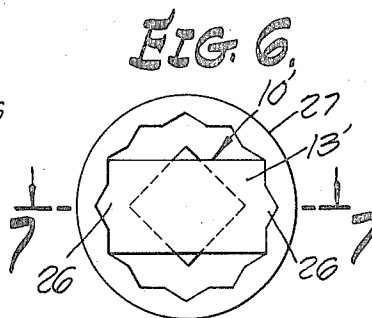
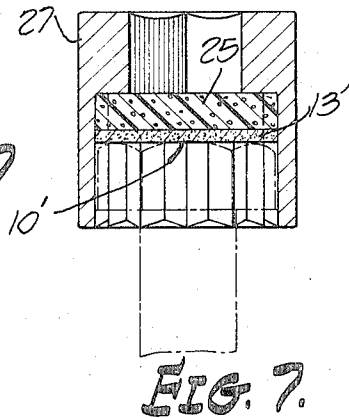
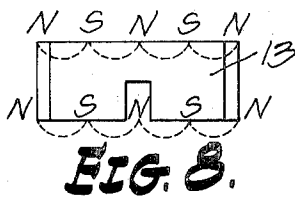
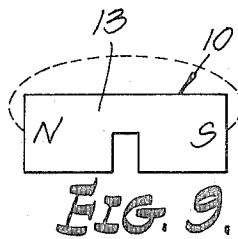
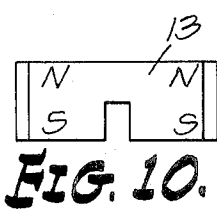
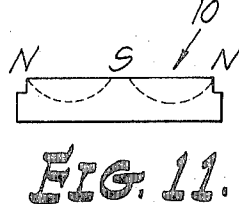
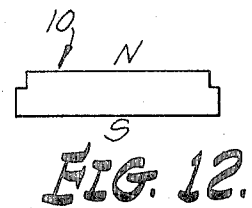
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[57] **ABSTRACT**

A magnetic keeper accessory selectively mountable on conventional end, box and socket wrenches without need for alterations or attaching expedients. The keeper accessory occupies a portion only of the fastener seating portion of a wrench head and the main body is resilient and shaped and sized to have an interference fit with the wrench head and, if made for use specifically with end and box wrenches, it preferably includes stop means to limit the portion of the accessory inserted into the wrench head. Its mid-portion may be suitably weakened to facilitate bowing in the plane of the wrench head to enhance its gripping action on the wrench head.

22 Claims, 12 Drawing Figures





MAGNETIC KEEPER ACCESSORY FOR CONVENTIONAL TOOLS

This application is a continuation-in-part of my co-pending application for United States Letters Patent Serial No. 200,077, filed Nov. 18, 1971 now abandoned, entitled Magnetic Keeper Accessory For Conventional Tools.

This invention relates to keeper accessories for tools, and more particularly to a simple inexpensive magnet designed for self-retention on a tool head of conventional design without alteration of any part of the wrench or need for fastener devices.

Mechanics and technicians have frequent need for assembling and disassembling fastener parts in crowded, restricted or inaccessible locations. To meet such needs, various proposals have been made for tools having provision to hold the fastener parts firmly in place while being maneuvered into and out of an assembly position. Previous proposals to meet these requirements are subject to serious shortcomings and have proven generally unsatisfactory for various reasons. In particular, no prior magnetic keeper has the capability of use interchangeably on various types of conventional wrenches including by way of example end, box and socket wrenches. The present design is related to and embodies certain improvements over the keeper accessory disclosed in my co-pending application for United States Letters Patent Serial No. 187,685, filed Oct. 8, 1971.

The keeper accessory of the present invention, in a typical embodiment thereof, comprises an elongated strip of permanent magnetic material provided with means constructed to span the fastener seating recess of a wrench head with its ends frictionally gripping the juxtaposed interior sidewalls of the wrench head and occupying one end portion of a wrench head. In one construction the magnetic material is laminated to a layer of resilient material likewise sized and shaped to have an interference fit with an end portion of the wrench head and, in still another embodiment, the resilient main body of the keeper is weakened in its midportion to facilitate bowing in the plane of the keeper thereby to increase its tolerance compensating capabilities and its gripping power.

Accordingly it is a primary object of the present invention to provide an improved, inexpensive, highly versatile, magnetic keeper accessory for conventional wrenching tools of a wide variety without need for altering the tool or the need for fastener expedients to hold the accessory assembled to a tool.

Another object of the invention is the provision of a magnetic wafer designed to occupy one end portion of a wrench head and cooperating therewith to hold a fastener part detachably in place in the head.

Another object of the invention is the provision of a magnetic keeper accessory self-retained on the end of a combination wrench handle without interfering with the attachment and detachment of a selected wrench head to the handle and without need for altering any part of the wrench.

Another object of the invention is the provision of a magnetic keeper accessory selectively usable with wrenches including end, box and socket type wrenches and including an elongated resilient strip spanning one end of the fastener seating portion of the head and sized and shaped to have an interference fit with the sidewalls of the end portion of a wrench head.

Another object of the invention is the provision of an elongated magnetic keeper accessory having a permanently magnetized main body having a relaxed length somewhat in excess of the transverse interior width of a wrench head and weakened in its midportion so as to bow in the plane of the strip when forcibly installed across one interior end portion of a wrench head.

Another object of the invention is the provision of a magnetic keeper accessory designed to have a press fit in one end portion of an end or a box wrench and including stop means limiting the portion of the head occupied by the accessory.

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 plan view of one end of a conventional box wrench having one preferred embodiment of the keeper accessory installed therein;

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

FIG. 3 is a fragmentary plan view of the keeper accessory installed in a typical open end wrench;

FIG. 4 is a perspective view of the keeper accessory after being severed from a continuous length of extruded base stock;

FIG. 5 is a view similar to FIG. 4 but showing a second embodiment of the keeper accessory;

FIG. 6 is an end view of a socket wrench head with the FIG. 5 embodiment of the keeper accessory installed therein;

FIG. 7 is a sectional view taken along line 7—7 on FIG. 6 and showing by dotted line a cap screw held captive by the invention keeper; and

FIGS. 8 to 10 are plan views of the first embodiment, selected by way of illustration, and indicating the different modes in which the magnetic strip may be magnetized; and

FIGS. 11 and 12 are edge views of the first embodiment indicating still other modes of permanently magnetizing the keeper.

Referring initially more particularly to FIGS. 1—4, there is shown a typical embodiment of the invention keeper accessory designated 10. In FIGS. 1 and 2, the accessory is installed in the head of a conventional box type wrench 11 whereas in FIG. 3 the accessory is installed in the head of a conventional end wrench 12. The accessory comprises an elongated main body strip 13 of permanently magnetized material.

Keeper strip 13 may be of any suitable construction such as powdered magnetic metal bonded together by any suitable elastomeric binder material including, a construction well known to those skilled in the manufacture of powdered metal permanent magnets. It will be understood that the entire keeper may be molded or extruded to shape as part of a long strip 14 and then separated into separate keepers by severing the strip crosswise thereof as indicated in FIG. 4.

Accessory 10 comprises an elongated strip 13 having a relaxed length somewhat greater than the transverse interior width of the fastener seat of a wrench head and is recessed crosswise of its opposite ends as indicated at 14 to provide stops 15 engageable with the end surfaces 16 of a wrench head. The box type wrench 11 illustrated in FIGS. 1 and 2 has a 12-point fastener seat

or opening 18 adapted to seat a hexagonal fastener in any selected set of 6 points. Since the relaxed length of the strip is somewhat greater than the internal diameter of the fastener seating portion of either the box wrench 11 or the end wrench 12, it will be readily apparent that the portions of the strip forced into assembly in the wrench head have a pronounced frictional grip with the sidewalls of the fastener seat of the wrench.

In a preferred embodiment of keeper 10, the midportion of strip 13 is weakened as by a notch 20 thereby facilitating bowing of the strip in the plane of its width, that is, in a transverse plane through the wrench head. Thus, in FIGS. 1 and 3 it will be understood that strip 13 is bowed or arched to the left in each of these figures thereby storing stresses in strip 13 in the plane of its width and increasing its gripping power with the sidewalls of the fastener seat. This bowing has the additional capability of accommodating a limited range of tolerance variations in the size of the fastener seat. To be noted in particular from FIG. 2 is the fact that the bowing of the keeper in the plane of its width does not cause any bowing or arching of its surface 21 (FIG. 2) which is the surface which will contact the fastener when the wrench is inserted over the fastener. Any bulging of this surface would prevent the keeper surface from lying flush and in direct contact with the end of the fastener and would diminish to some extent the holding power of the keeper for the fastener part.

As is made clear in FIG. 2, the keeper occupies only a narrow axial portion of one end of the wrench head and does not interfere objectionably with the seating of the fastener. The portion of the wrench interior occupied by the keeper is controlled by the axial depth of recesses 14, 14 and stops 15, 15 which abut the end face of the wrench head.

As is made clear by FIG. 4, the keeper is preferably extruded in continuous strips 14 and then severed into individual keepers of appropriate width. The only material wasted is that detached in forming the punchouts 20 which could be of narrow base triangular shape.

Referring now to FIGS. 5-7, there is shown a second embodiment of the keeper accessory designated 10'. This embodiment includes a layer 13' of the same magnetic material employed in making the main body of keeper 10 described above, this material being laminated to a layer of spongy material 25. The opposite ends of keeper 10' includes triangular extensions 26, 26 shaped to seat in diametrically opposed points of a 12-point socket wrench head 27. Keeper 10' is installed in the inner end of the wrench socket as best illustrated in FIG. 7, with the resilient spongy layer 25 innermost. The length of the strip is preferably somewhat longer than the diametric strip of the interior of the socket head so as to grip the sidewalls of the sockets strongly and tenaciously. The triangular extensions 26, 26 assure accurate and proper installation and aid in increasing the holding power of the accessory.

The magnetic material in accessories 10 and 10' may be permanently magnetized in any of a variety of modes clearly indicated in each of the Figures. Thus, it will be understood that strip 13 in FIG. 8 is magnetized crosswise of the width of the strip to provide north poles crosswise of either end and of the midportion of the strip with south pole areas located between each set of north poles. The dotted lines also indicate that the pole ends lie in that surface of the strip which is positioned to engage the end of the fastener. In FIG. 9, strip

13 is magnetized lengthwise of the entire strip with the north pole located at one end and the south pole at the other end.

In FIG. 10 the strip is magnetized crosswise of its opposite ends with the poles located in the respective end corners whereas, in FIG. 11, the strip is magnetized similarly to FIG. 8 but with a pair of similar poles crosswise of the opposite ends with the other similar poles located crosswise of the midportion. In FIG. 12, the strip is magnetized with one face of the strip of one polarity and the other surface of the opposite polarity.

From the foregoing it will be appreciated that the principal difference between the keeper shown in FIGS. 1-4 and FIGS. 5-7 is the omission of the stops 15, 15 in FIGS. 5-7 thereby permitting the keeper to be inserted into the inner end of the fastener seat of a socket wrench. The keeper is readily detached from its installed position in the wrench head by simply withdrawing it axially of the fastener seating opening. The keeper is installed simply by pressing it into the fastener seating opening with appropriately applied finger pressure.

While the particular magnetic keeper accessory for conventional tools 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 use with a wrenching tool to retain a fastener captive thereon while being manipulated into and out of an assembly position, said accessory comprising permanent magnet means, said permanent magnet means including means for securing the same selectively to a conventional end wrench and a conventional socket wrench head without need for modifying the wrench head in any way and with a portion only of said permanent magnet means occupying an interior portion of said head and positioned to have wide area surface contact with the surface of a fastener of magnetic material seated in said head thereby to hold the fastener captive.

2. A keeper accessory as defined in claim 1 characterized in that said accessory comprises a plurality of layers secured together and including a layer of resilient material disposed to have a snug frictional fit with a juxtaposed surface of a wrench when installed thereon.

3. A keeper accessory as defined in claim 2 characterized in that said resilient layer is spongy.

4. A keeper accessory as defined in claim 1 characterized in that said securing means comprises resilient means attached to said permanent magnetic means and sized to have an interference fit with a portion of a wrench head adequate to hold the same in place on the wrench head with said magnet means positioned to engage and hold a fastener seated in the wrench head.

5. A keeper accessory as defined in claim 4 characterized in that said securing means comprises spongy resilient material bonded to one face of said permanent magnet means and shaped to have a press fit with a juxtaposed edge portion of the wrench head when installed thereon.

6. A keeper accessory as defined in claim 1 characterized in that said magnet means is imperforate.

7. A keeper accessory as defined in claim 1 characterized in that said magnet means includes stop means engageable with one end face of a wrench head to limit the portion of the wrench head which can be occupied by said accessory.

8. A keeper accessory as defined in claim 1 characterized in that said accessory is oblong and provided at its ends with oppositely extending triangular extensions sized and shaped to snugly engage a pair of diametrically opposed points of the socket of a hex wrench head.

9. A keeper accessory as defined in claim 8 characterized in that said magnet means includes stop means effective to limit the axial insertion of said accessory into a wrench head and thereby leave room for the reception of a fastener.

10. A keeper accessory as defined in claim 8 characterized in that said magnet means is sized to have a snug frictional fit with a plurality of points of a socket type wrench and adapted to occupy the inner end portion of the well of a socket type wrench head.

11. A keeper accessory as defined in claim 1 characterized in that said resilient material is bonded to said magnetic means.

12. A keeper accessory as defined in claim 1 characterized in that said magnetic means is slightly longer than the diameter of the interior dimension of the wrench head opening thereby necessitating bowing of said magnetic means so long as the same is installed in a wrench head.

13. A keeper accessory as defined in claim 1 characterized in that one face of said wafer is flat and exposed for wide-area direct surface contact with one axial end face of a fastener.

14. A keeper accessory for holding a fastener component to a conventional tool head without need for altering the tool head comprising an elongated strip of elastomeric magnetic material having diametrically opposed portions there shaped and sized to have a press fit crosswise of one end of a conventional wrench head, and said accessory including means limiting the distance that said accessory can be inserted into the wrench to reserve adequate room for a fastener.

15. A keeper accessory as defined in claim 14 characterized in that the same is selectively installable crosswise of one end portion of the fastener seating portion of wrench heads of various types including end wrenches, box wrenches and socket wrenches.

16. A keeper accessory as defined in claim 14 char-

acterized in that said accessory is elongated and generally rectangular in cross section and includes means projecting from its opposite ends adapted to seat against one end face of a wrench head thereby to limit the portion of the fastener seating portion of the wrench occupied by said accessory.

17. A keeper accessory as defined in claim 16 characterized in that said elongated strip of elastomeric magnetic material is weakened in the midportion thereof to facilitate bowing thereof in the plane of said strip whereby one face of said magnetic strip is positioned to lie generally flush with the adjacent end surface of a fastener when the latter is seated in a wrench head having said keeper accessory installed therein.

18. A keeper accessory comprising an elongated strip of flexible magnetic material having a length in excess of the transverse width of a fastener seating recess of a wrench head, said strip being weakened transversely of its midportion to facilitate bowing of the same within the plane of the strip incident to installation of the strip crosswise of a wrench head thereby storing stresses in the strip effective to maintain the same captive in one end portion of the wrench head with the surface of the strip facing a fastener substantially planar and in readiness to lie flush against an end surface of a fastener.

19. A keeper accessory as defined in claim 18 characterized in that said strip is recessed crosswise of its opposite end to provide stops limiting assembly of said accessory axially into a wrench head.

20. A keeper accessory as defined in claim 18 characterized in that said accessory is notched crosswise of the midportion thereof to facilitate bowing of the same in the plane of the strip.

21. A keeper accessory as defined in claim 18 characterized in having been severed from one end of a continuous length of permanently magnetized elastomeric magnetic material and having a width greater than the transverse width of a wrench head with which the keeper accessory is to be used.

22. A keeper accessory for holding a fastener component to a conventional wrenching tool head without need for altering the tool head comprising an elongated strip of non-rigid permanently magnetized magnetic material having a length slightly in excess of the transverse dimension of a socket type wrenching head and adapted to be pressed into a press fit with the interior sidewalls at the inner end of a socket head with its broad outwardly facing surface positioned to lie flush against the exterior end surface of a fastener component when properly seated in the socket head.

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