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3,298,261

MULTI-SOCKET WRENCH

Filed May 28, 1965

2 Sheets-Sheet 1

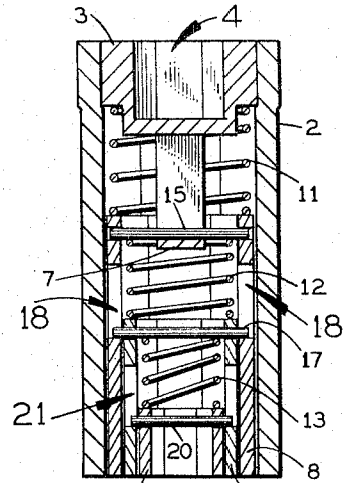
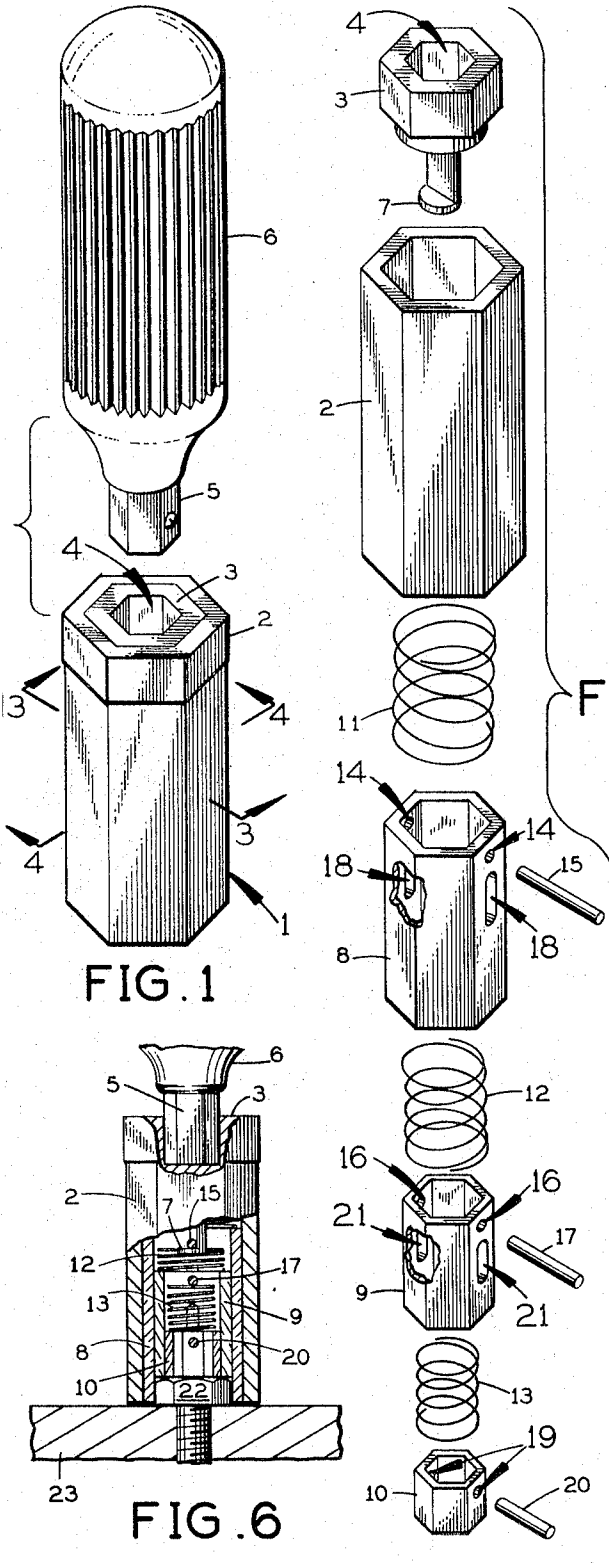


FIG. 3

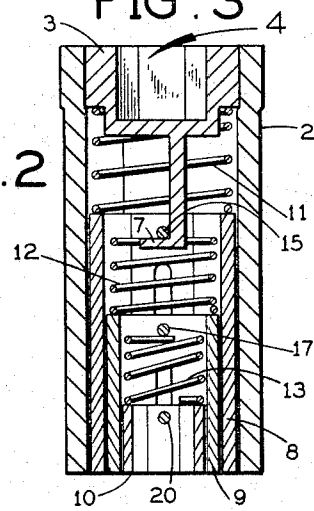


FIG. 4

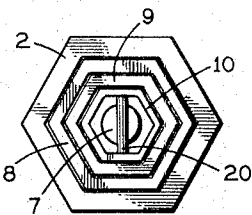


FIG. 5

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2 Sheets-Sheet 2

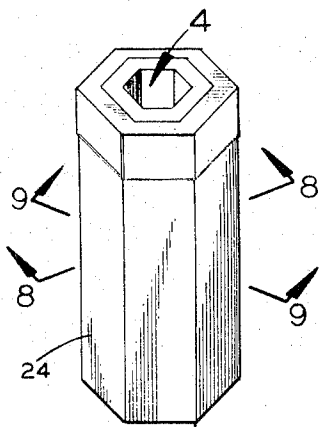


FIG. 7

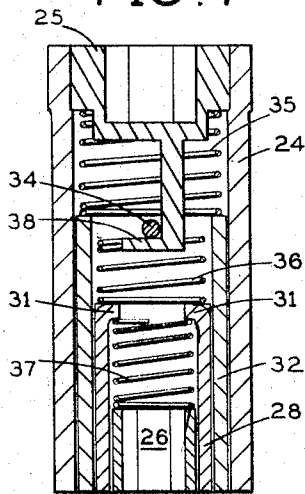


FIG. 8

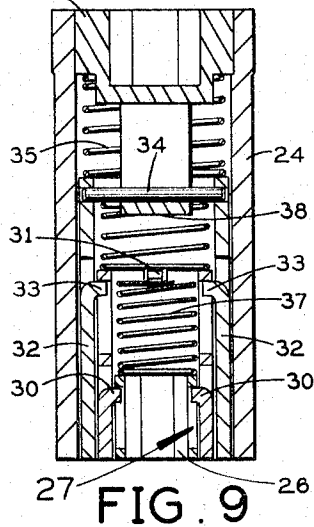


FIG. 9

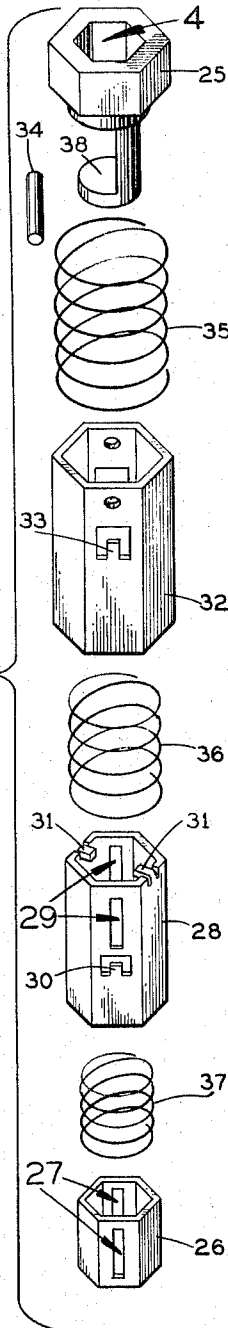


FIG. 10

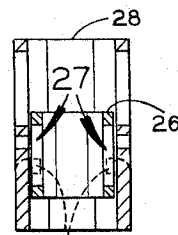


FIG. 11

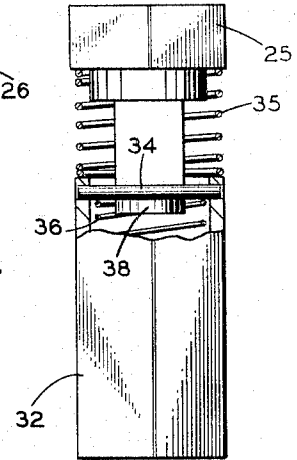


FIG. 12

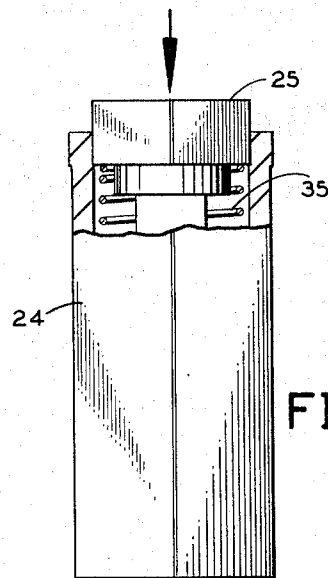


FIG. 13

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MULTI-SOCKET WRENCH

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2 Claims. (Cl. 81-185)

This invention relates in general to hand tools and more particularly to a socket wrench assembly adapted to automatically engage and rotate a predetermined number of bolt heads or nuts of different sizes.

A practical, reliable multiple socket wrench has been a long sought tool and certain prior multiple socket wrenches required the manually selective projection of a desired size with construction of limited reliability.

Another prior form of multiple socket wrench embraced a complicated nested construction of sockets in which each of the displaceable sockets are separately and telescopically urged by separate concentric springs bearing against the rear side of each socket. This construction inherently requires each socket to be of a relatively large different size and the reliability is limited to the interfering action of the concentrically positioned springs, as well as complicated expensive manufacture of both the sockets and housing therefor.

The present invention overcomes the above objections and disadvantages by the provision of a compact multiple nested socket wrench which may be manufactured at relatively low cost and of high reliability and with a construction permitting adaptation to bolt heads and nuts of "standard" small differences in size and of many shapes.

A principal object of the invention is the provision of a nested multi-socket wrench adapted to be snap secured and rotated by conventional handle means including a predetermined number of nested socket members corresponding to a like number of bolts and nuts of predetermined different size and corresponding shape and whereby each of said size bolt or nut will be engaged by its corresponding socket member when the said assembly is simply pressed thereupon by a manually operated handle.

A further object of the invention is the provision of a nested multi-socket wrench in which a predetermined plurality of open tubular sockets are each slidably retained within a tubular housing having an open end thereof forming the largest size of said sockets.

Another object of the invention is the provision of a socket assembly in which a plurality of nested sockets are retained within the outside one thereof including telescopic means whereby the open end of any one of each of said sockets will engage a corresponding bolt head or nut when said assembly is pressed thereon.

Another object of the invention is the provision of a nested socket wrench assembly in which the open end of each socket thereof is normally positioned in a common plane normal to the axis of rotation thereof including a multi-spring means for normally holding said sockets in said plane and for permitting the retraction of each of the sockets smaller than the bolt head or nut engaged.

Another object of the invention is the provision of a multi-socket wrench having a primary socket formed from a length of polygonal tubing and having a predetermined number of nested coaxial secondary sockets of like shape slidably positioned within said primary socket including a hook, spring and pin means in said housing for normally holding the outer ends of all sockets in common plane with each of said secondary sockets adapted to limited movement within said housing.

These and other objects and advantages in one embodiment of the invention are described and shown in the following specification and drawing, in which:

FIG. 1 is a perspective view of the multi-socket wrench and a conventional handle therefor.

FIG. 2 is an exploded perspective view of all of the elements in the wrench, shown in FIG. 1.

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FIG. 3 is a cross sectional elevation taken through section line 3-3, FIG. 1.

FIG. 4 is a cross sectional elevation taken through section line 4-4, FIG. 1.

FIG. 5 is a bottom plan view of the wrench, shown in FIG. 1.

FIG. 6 is a fragmentary cross sectional elevation illustrating the wrench engaged on a bolt head with a handle attached.

FIG. 7 is a perspective view of a multi-socket wrench of alternate construction.

FIG. 8 is a cross sectional elevation taken through section line 8-8, FIG. 7.

FIG. 9 is a cross sectional elevation taken through section line 9-9, FIG. 7.

FIG. 10 is a perspective exploded view of elements within the wrench shown in FIG. 7.

FIG. 11 is a cross sectional view of elements shown in FIG. 9, in changed position.

FIG. 12 is a fragmentary elevation of the elements shown in FIG. 10 when assembled.

FIG. 13 is a fragmentary elevation of the wrench shown in FIG. 7 illustrating final assembly.

In the particular embodiment of the multi-socket wrench hereinafter described, the construction is adapted to fit four standard sizes of hexagonal bolt heads, cap-screws or nuts of hexagonal shape, and referring to FIG. 1, a socket assembly 1 has for an outer housing a length of hexagonal tubing of high tensile steel as a casing or primary socket 2, the lower end of which forms a primary socket of largest size.

A body member 3 is press fitted, with an interference fit, into one end of the primary socket, which body has a hexagonal recess 4 therein coaxial therewith for slidably receiving a hexagonal driving projection 5, such as secured in and extending from a typical handle 6. The projection 5 is equipped with a well-known ball detent therein for maintaining frictional engagement within recess 4.

Referring to the exploded view, FIG. 2, the body member 3 is provided with a coaxial integral member extending downward forming a retainer means or hook 7 for retaining the next smaller size secondary socket 8 within socket 2 and permitting limited inward movement thereof.

The second next smaller sized secondary socket 8 is formed by a length of hexagonal tubing which is dimensioned to be slidably retained within the primary socket 2. Likewise, a third smaller sized secondary socket 9 of hexagonal tubing is dimensioned to be slidably retained within socket 8 and a fourth smaller secondary socket 10 made of a length of hexagonal tubing is dimensioned to be slidably retained within socket 9.

Upon assembly, a coil spring 11 has one end thereof positioned against a circular shoulder in the body member 3 and the opposite end thereof bearing against the upper edge of socket 8 and with a pin 15 retained in transverse holes 14 through socket 8 with the pin resting upon the upper surface of the hook 7, as shown in FIG. 3, which assembly will partially compress spring 11 and urge socket 8 into its idle position, shown in FIGS. 3 and 4, for direct engagement over a hexagonal bolt head or nut of corresponding size.

The upper end of a coil spring 12 is positioned between the lower side of the pin 15 and the upper edge of socket 9 with a pin 17 positioned through holes 16-16 in socket 9 and longitudinal slots 18-18 in socket 8, as shown in FIGS. 3 and 4, thus positioning socket 9 for engagement over a proper bolt head or nut.

A still smaller coil spring 13 is positioned within socket 9 between the lower side of a pin 17 retained in the transverse holes 16-16 in socket 9 against the upper edge of socket 10.

The assembly of the secondary inner sockets is com-

pleted by the engagement of pin 20 through transverse holes 19—19 in socket 10 and the longitudinal slots 21—21 in opposite sides of socket 9. The inner socket assembly is then telescoped into the upper side of socket 2 and the body 3 pressed into the upper end thereof. FIG. 5 clearly shows the position of the four sockets when viewed from the bottom.

It is now apparent that each of the nested sockets 8, 9, and 10 are retained within sockets 2 and are independently urged into their normal downward positions, as shown in FIGS. 3 and 4, by virtue of the hook 7, and the slots 18 and 21 and springs 11, 12 and 13 and the pins 15, 17 and 20.

In operation and referring to FIG. 6, and under the assumption that the body 3 is engaged by a suitable driving means, such as projection 5 and handle 6, then when the housing is concentrically placed over a bolt head or nut of one of the four sizes the sockets of the smaller sizes will slide upward against the restraining action of their corresponding springs.

FIG. 6 illustrates a cap screw 22 with a hexagonal head threaded into a body 23 and engaged by socket 8 of the said third smaller size.

It is now apparent that the multi-wrench will automatically engage each size hex head or nut within the range of the four corresponding sockets comprising the assembly by the upward movement of all sockets of smaller size than the head or nut to be engaged.

It is apparent that sockets of a wide variety of cross sectional shapes may be embraced in the above described concept. For example, a multi-socket wrench for square bolt heads and nuts is intended to include rectangular coil springs, but otherwise substantially the same as the hexagonal sockets previously described. It is also apparent that the aforesaid construction is applicable to multi-socket wrenches of more or less sockets.

The invention also comprehends an alternate construction shown in FIGS. 7—13, inclusive, in which all pins except the upper-most pin 15 are eliminated by the use of integral projections die cut and later die formed upon assembly to interconnect the three internal sockets.

Referring to FIGS. 7, 8, 9, and 10, the outer socket 24 and the body member 25 may be substantially identical to elements 2 and 3, respectively, shown in FIG. 2, whereas the socket of smallest size 26 is provided with a pair of oppositely disposed slots 27, as shown.

The next smaller size socket 28 is provided with a pair of opposite slots 29—29 and a pair of lower projections 30 in opposite sides of the socket and a pair of upper projections 31 extending from opposite sides of the upper end of socket 28.

The third larger socket 32 is provided with a pair of opposite projections 33 in opposite sides thereof and a transverse pin 34 substantially the same as the pin 15, shown in FIG. 2. Springs 35, 36, and 37 are also substantially the same as those shown in FIG. 2.

Referring to FIGS. 9, 10, and 11, the projections 30 are die formed inward in slidable engagement with slots 27 in socket 26, thus permitting limited axial movement of sockets 26 within socket 18 with spring 26 bearing upon the upper edge of the socket and the lower edges of projection 30.

The projections 33 integral with socket 32 are die formed into slots 29 of socket 28 providing the latter with limited axial movement within socket 32 and pin 34 is positioned transverse in socket 32 in a manner like pin 15, shown in FIG. 3, which pin is adapted to rest upon the upper surface of hook 38 of body 25 which has a recess 4 therein substantially the same as the recess 4 for receiving a driving handle. Spring 35 is positioned between a shoulder around the body 25 and the upper edge of socket 32 for urging the latter downward.

When the parts previously described are assembled, as shown in FIG. 12, then the assembly is placed within the socket member 24 and the body member 25 pressed

therein the direction shown by arrow with an interference fit. The enlargement of the upper portion of the outer socket is exaggerated in both FIGS. 1 and 13 to illustrate the secure bonding fit of the body member within the outer socket.

It is to be noted that each of the nested sockets may include a pair of oppositely disposed projections from each lower edge, which projections will provide a plurality of spanner wrenches for engagement with holes or slots in spanner type bolts or nuts.

It is to be understood that certain other modifications in the construction, utilizing the features above described, are intended to come within the scope of the appended claims.

Having described my invention, I claim:

1. In a multi-socket wrench of the character described a primary outer socket of polygonal tubing of substantially uniform cross section and wall thickness with one end portion thereof adapted to engage over a first size said polygonal shaped bolt head or nut for rotating same, a drive means secured in the opposite end portion of said primary socket for connecting same to a driving means for rotating said socket about the axis thereof, an inner socket of said polygonal shape and substantially uniform wall thickness slidably retained within said primary socket in close proximity therewith with the outer end portion thereof adapted to engage over a second size polygonal bolt head or nut for rotating same, a pin secured in the opposite end of said inner socket in transverse central relation thereto, a retainer means integral with said drive means and extending within said outer socket for engaging said pin for holding the said outer end portion of said inner socket substantially coplanar with said end portion of said outer socket and permitting predetermined inward movement of said inner socket, compression spring means biased between the inner side of said drive means and the inner end of said inner socket for normally urging the latter into said normal position.
2. The construction recited in claim 1 including a longitudinal slot through the opposite sides of said inner socket, a second inner socket of said polygonal shape and substantially uniform wall thickness slidably retained within the first mentioned inner socket in close proximity therewith with the outer end portion thereof adapted to engage over a third size polygonal bolt head for rotating same, a second pin secured in the opposite end of said second inner socket in transverse central relation thereto with each opposite end of said second pin engaged in each opposite said slot for permitting said second slot to move from a normal position with the outer end substantially coplanar with said first socket a predetermined distance inward therefrom, a second compression spring means biased between said second pin and the inner end of said second socket for normally holding the outer end of the latter in said normal position.

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