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3,156,142

NUT RUNNER ATTACHMENT

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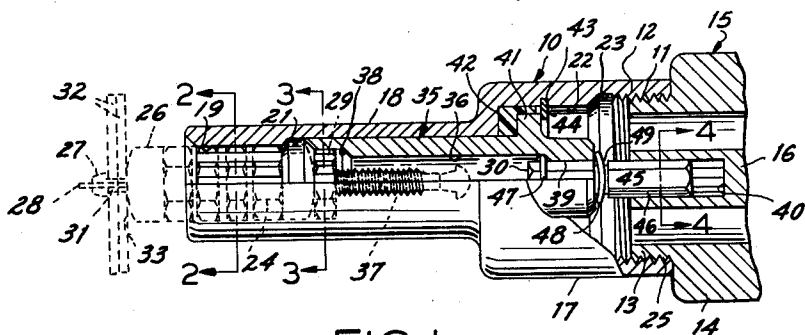


FIG. 1

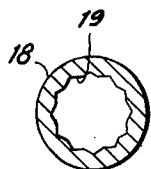


FIG. 2

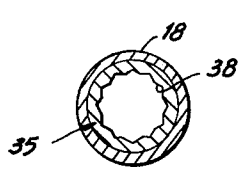


FIG. 3

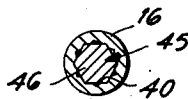


FIG. 4

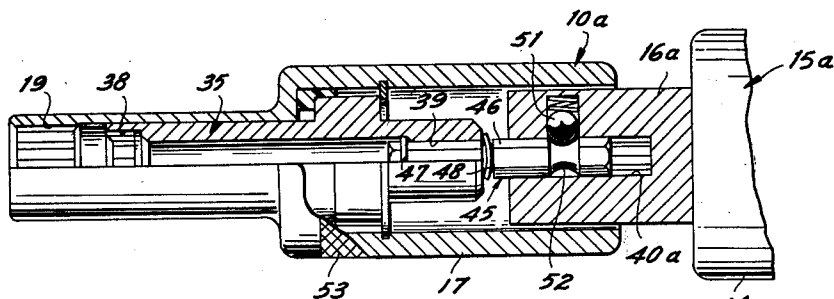


FIG. 5

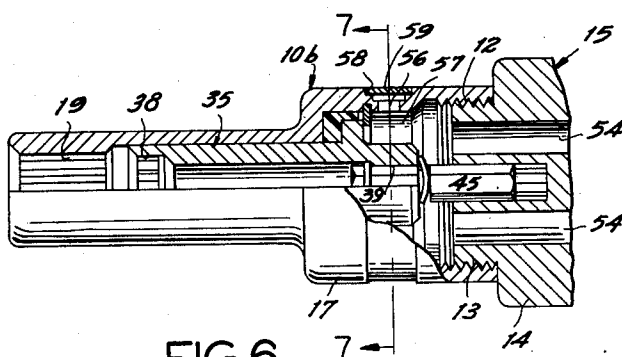


FIG. 6

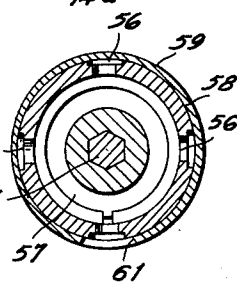


FIG. 7

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NUT RUNNER ATTACHMENT

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4 Claims. (Cl. 81-54)

This invention relates to an improved nut runner attachment, and more particularly to an improved tool or attachment which may be used as a nut runner for tightening or loosening a rotatable actuator nut of a fastener while holding the fastener itself from rotating.

This invention is particularly useful for attachment to a drive means, such as a motor, or the like, which has adjustable, or other, means for limiting the torque thereof.

In my co-pending application, entitled Nut Runner Attachment, Serial No. 52,496, filed August 29, 1960, now Patent No. 3,024,682, a nut runner attachment is described and claimed for the same purpose but provides means integral therewith for limiting the torque applied to the nut of a fastener. The instant application provides means whereby a drive means having an integral torque limiting means may be used without the necessity of providing such in the attachment itself, thereby minimizing the cost thereof and duplications of tools.

The present invention provides means for removably securing the attachment to the external housing of a drive means for support thereof, holding means for removably and non-rotatably supporting the body of a fastener and means whereby the rotation of the driven shaft of the motor is translated into a rotation of the rotatable nut means of the fastener to actuate, or optionally release, the fastener depending on the direction of rotation of the drive shaft.

Therefore, it is an object of this invention to provide a new and improved nut runner attachment which is removably securable to the housing of a motor or other driver member for quickly and easily translating rotation of the driven shaft of the motor into rotation of an actuator nut of a fastener of the character described above while supporting the fastener.

An object of this invention is to provide a new and improved nut runner attachment which provides means for easily and readily attaching the attachment to the power drive means.

It is another object of this invention to provide a new and improved runner attachment in which a power translator portion thereof is automatically connected to the driven shaft of the motor when the attachment is removably secured to the housing of the motor.

A further object of this invention is to provide a new and improved nut runner attachment which provides means for relieving air pressure resulting from the operation of the cooling means of the driving member, and also includes means for predetermining direction of expelling the air during relief thereof.

Yet another object of this invention is to provide a new and improved nut runner attachment of the character described which is smooth, quiet and efficient in its operation, due to improved thrust bearings provided for moving parts thereof.

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Yet another object of this invention is to provide a new and improved nut runner attachment which is economical to manufacture and capable of mass production.

A still further object of this invention is to provide a nut runner with reduced diameter dimensions at the end opposite from that which attaches to the driving motor. The purpose for this being to facilitate the application of fasteners in the closest pattern possible with minimum restriction imposed by the dimensional character of this invention.

A general object of this invention is to provide a new and improved nut runner attachment of the character described which overcomes disadvantages of prior means and methods heretofore intended to accomplish generally similar purposes.

These and other objects of this invention will be more apparent from the following detailed description, drawings and appended claims.

In the drawings:

FIGURE 1 is a vertical, cross-sectional view as taken substantially along the longitudinal center of the nut runner attachment of this invention with parts shown in elevation and illustrated as being removably secured to the housing of a motor;

FIGURE 2 is a vertical, cross-sectional view as taken substantially along the line 2-2 of FIGURE 1;

FIGURE 3 is a vertical, cross-sectional view as taken substantially along the line 3-3 of FIGURE 1;

FIGURE 4 is a vertical, cross-sectional view as taken substantially along the line 4-4 of FIGURE 1;

FIGURE 5 is a vertical, cross-sectional view, similar to FIGURE 1, illustrating a second embodiment of this invention;

FIGURE 6 is a cross-sectional view, similar to FIGURES 1 and 5, illustrating a third embodiment of this invention; and

FIGURE 7 is a vertical, cross-sectional view as taken substantially along the line 7-7 of FIGURE 6.

Referring in detail to the drawings, and more particularly to the FIGURES 1-4, inclusive, there is shown by way of illustration, but not of limitation, a nut runner attachment designed and constructed in accordance with this invention and generally referred to by the numeral 10. The nut runner attachment 10 is illustrated in FIGURE 1 as having a body 11 removably secured as by a threaded engagement with external threads 12 formed on a boss 13 of the housing 14 of a motor or other drive means generally designated by 15.

The drive means 15 does not form a part of this invention and is therefore only partially illustrated in its securement to the attachment 10. It is, as explained above, a motorized means preferably having its own clutching mechanism, various such type of drive means being available and having a driven shaft 16 yieldably driven by the motor thereof.

The body 11 is cylindrical in configuration and includes an enlarged end 17 and a reduced end 18, the reduced end 18 having a bore 19 of non-circular configuration, as best seen in FIGURE 2, and a cylindrical counterbore 21 coaxial therewith, as best seen in FIGURES 1 and 3. A substantially enlarged counterbore 22 and a further enlarged counterbore 23 are both coaxial to the bores 19 and 21, the counterbore 23 being internally threaded at 25 and complementary to the before-mentioned threads

12. The non-circular bore 19 is configured to provide a plurality of facets to adapt the bore to be engageable with external non-circular surfaces 24 of a fastener shown in broken lines 26 in FIGURE 1.

The fastener may be one of several types designed for application by being inserted through suitable holes provided in the work to be held and actuated by the procedure of rotating a threaded nut provided for that purpose. The fastener 26 includes a pair of protractable and retractable formed wires or pins 27 and a spreader 28. When a nut member 29 of the fastener is rotated in one direction it causes the formed wires 27 to be retracted into the fastener and spread so the heads of the pins lock against the sides of holes 31 to hold two or more skins 32 between the heads and a work-engaging surface 33 of the fastener 26. The attachment 10 actuates the pins 27 by translating rotation of the driven shaft 16 of the drive means 15 into a rotation of a sleeve generally designated by the numeral 35 which engages the nut member 29 of the fastener, in a manner to be hereinafter described, while the body of the fastener 26 is non-rotatably secured in the non-circular bore 19 of the reduced end 18 of the attachment 10. When the driven shaft 16 is rotated in one direction, the nut member 29 is rotated to retract the pins within the fastener 26 and clamp the skins 32. When the driven shaft 16 is rotated in an opposite direction, the nut member 29 is driven in a direction to move axially away from the fastener 26 and release the pins 27 for release of the skins 32.

The sleeve 35 is rotatably disposed within the counter-bore 21 and includes an axial bore 36 providing clearance for a stud 37 of the fastener 26, a counterbore 38 of non-circular configuration formed in an end of a sleeve member adjacent to the non-circular bore 19 of the body 10 which non-rotatably engages the nut member 29 of the fastener 26, and a reduced non-circular bore 39 adjacent to the opposite end thereof, the bores 36, 38 and 39 being substantially coaxial. The sleeve 35 is held against axial movement relative to the body 10 by an annular radial flange 41 abutting a cup-shaped thrust bearing 42 and a split ring 43 residing in a groove 44 formed in the counter-bore 22. The thrust bearing 42 is preferably made of a low friction material such as Teflon, nylon, or the like.

A connector means 45 connects the sleeve member 35 and the driven shaft 16 to translate rotation of the shaft 16 into rotation of the sleeve member 35. The connector 45 comprises a shaft having a non-circular portion 30 complementary to the non-circular reduced bore 39 of the sleeve 35 and a similar non-circular portion 46 slidably received in a non-circular and complementary socket 40 formed in the shaft 16. The connector 45 is removably secured to the sleeve 35 by a split ring 47 (optionally, a flange integral with the portion 44), slidably residing in the bore 36 and a similar split ring 48 residing in a reduced portion 49 of the connector 45 and abutting the outer end of the sleeve 35. The split ring 47 engages an internal shoulder formed by the bores 36 and 39, whereas, as previously mentioned, washer 48 abuts the outer end of the sleeve 35. It will be noted that the connector means 45 is adapted to automatically engage the socket 40 when the enlarged end 17 of the body 10 is secured to the boss 13 of the motor body 14.

Referring to FIGURE 5, there is shown a nut runner attachment, generally designated by the numeral 10a, which is modified for securement to a motor 15a, which does not have the externally threaded boss 13 of the motor 15 of the first embodiment. In the instant adaptation, the motor 15a includes a driven shaft 16a which extends outwardly of the motor housing 14a. The driven shaft 16a includes a non-circular longitudinal bore 40a in which the non-circular end 46 of the shaft 45 is slidably disposed. A spring-biased detent 51, in the form of a sphere, engages an annular groove 52 of the shaft end 46 for releasably holding the driven shaft 16a to the non-

circular shaft 45 so as to translate rotation of the shaft 16a into a rotation of the sleeve 35. In the instant embodiment, parts which are identical to the first embodiment are represented by identical numbers.

The opposite, non-circular end of the shaft 45 is disposed within the non-circular bore 39 of the sleeve member 35, the shaft 45 being held relative thereto by the split rings 47 and 48, as in the first embodiment. The enlarged end 17 of the body may be non-rotatably secured to the exterior of the motor body 14a in any suitable manner, or, as illustrated in FIGURE 5, has a clearance fit with the shaft 16a and includes a manually engageable outer surface which is knurled, or otherwise roughened, as indicated by the numeral 53, to facilitate manual gripping thereof so as to hold the body and bore 19 from rotating while the sleeve 35 is rotated.

In all other respects, the embodiment 10a is identical to the first embodiment 10, wherein a fastener 26 is non-rotatably held in the non-circular bore 19 while the nut 29 thereof is rotated by the sleeve 35 in response to rotation of the shaft 16a.

In the embodiment 10b, illustrated in FIGURES 6 and 7, the nut runner attachment is identical in all respects to the first embodiment 10, having a threaded engagement with external threads 12 of the boss 13 of a motor housing 14, with the exception that provision is made for directing exhaust air of a motor 15 having a forwardly directed flow of air from a blower fan thereof (not shown) as through forwardly directed air passages 54. For this purpose, a plurality of radial openings 56 are provided in the annular wall of the enlarged portion 17 and communicating with the air passages 54 through the inner chamber 57 of the body. The openings 56 communicate with an annular groove 58 formed in the exterior of the body portion 17 and in which a C-shaped closure member 59 resides. The closure member 59 is rotatable relative to the body portion 17 and includes a gap 61 registerable with one of the openings 56 for selectively uncovering one of the openings 56 so as to direct air flowing from the passages 54 in the desired direction and away from the operator. In the previous embodiments 10 and 10a, air passages (not shown) direct air outwardly from the motor instead of forwardly towards the attachment.

While there is herein shown and described what is conceived to be the most practical and preferred embodiments of this invention, it is recognized that departures may be made therefrom within the scope of this invention which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

What is claimed as new and desired to secure by Letters Patent is:

1. An attachment comprising: An elongate tubular member having an enlarged end and opposite reduced end adapted to grip a fastener housing, a sleeve rotatably mounted in said tubular member, means for preventing relative longitudinal movement of said tubular member and said sleeve, said means comprising bearing means and ring means mounted interiorly in the enlarged end of said tubular member in spaced relation and an annular flange on said sleeve extending between said bearing means and said ring means and in contact therewith, said sleeve having one end thereof counterbored to receive and to grip a nut, said sleeve end being spaced axially inwardly of the reduced end of said tubular means, connector means non-rotatably fixed to an opposite end of said sleeve, said connector means comprising a non-circular shaft having on end thereof inserted into said sleeve and secured thereto by fasteners, the other end of said shaft extending outwardly of said tubular member for connection with motor means for rotating said sleeve relative to said tubular member.

2. An attachment as claimed in claim 1 wherein said other end of said connector shaft is provided with an annular groove adapted to receive locking means on the motor means for securing the connector shaft thereto.

3. An attachment as claimed in claim 1 wherein the enlarged end of said tubular member is provided with means for securing said tubular member non-rotatably to the motor means.

4. An attachment as claimed in claim 1 wherein said enlarged end of said tubular member is provided with vent means.

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