

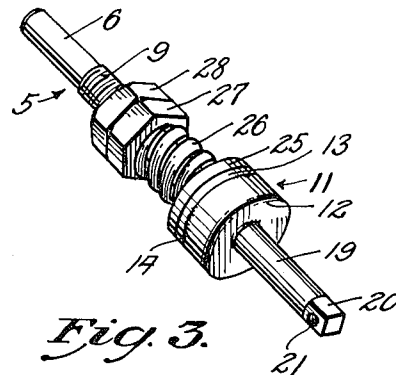
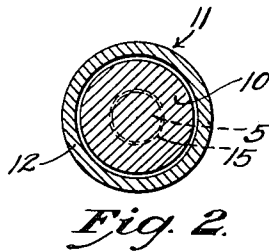
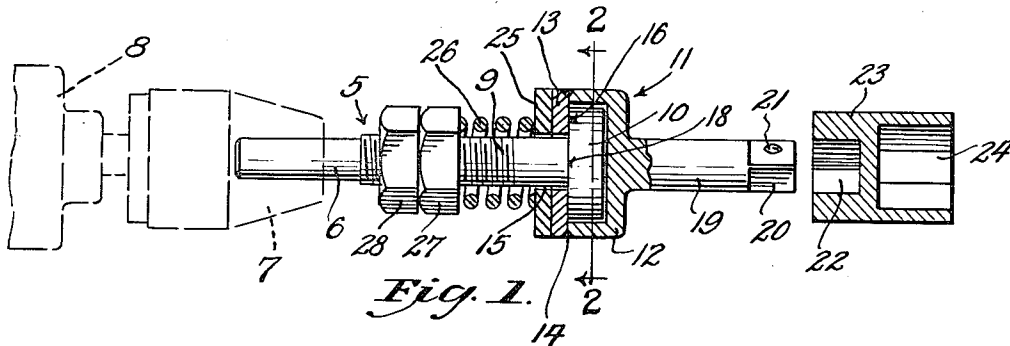
May 1, 1956

E. L. REDMON

2,743,637

TORQUE WRENCH ADAPTER FOR POWER TOOLS

Filed Dec. 21, 1954



1

2,743,637

TORQUE WRENCH ADAPTER FOR POWER TOOLS

Ernest L. Redmon, Columbus, Ohio

Application December 21, 1954, Serial No. 476,805

3 Claims. (Cl. 81—52.4)

This invention relates generally to torque wrenches, and more particularly to an improved torque wrench adapter for use in detachably coupling socket-type wrench heads of various sizes to an associated hand-held power tool, such as an electric motor driven hand drill.

In the past, numerous types and constructions of torque wrenches have been proposed for use in imparting tightening rotation to nuts or similar fastening devices; particularly in operations where it is desirable that such nuts be tightened upon an associated bolt or stud only through the application of a predetermined torque force. However, previous torque wrenches of this type of which I am aware are generally characterized by a relatively high degree of mechanical and structural complexity and consequent high cost.

It follows, therefore, that the primary object of my invention is to improve generally upon previous torque wrenches by providing a relatively structurally simple, yet mechanically efficient torque wrench adapter for hand-held power drills which is operable in combination with such drills to receive various sizes of socket wrench heads and impart rotational torque forces thereto of variable and adjustable magnitude, whereby to insure the tightening of an associated nut positioned in the socket wrench head to a given tension upon an associated bolt or stud.

Another object of this invention is to provide a torque wrench adapter for power driven hand drills which is relatively compact in construction and comprised of but few and relatively simple mechanical parts, and which may be easily connected with an ordinary power driven hand drill to detachably receive varying sizes of socket wrench heads and easily adjusted to impart various predetermined torque forces thereto.

A still further object of the invention is to provide a torque wrench adapter of this type which is composed in the main of external, readily adjustable, and un-machined parts of rugged construction, and which may be manufactured at comparatively low costs, and which, at the same time, possesses the necessary mechanical efficiency to enable the same to effectively accomplish its intended purpose.

For a further and more complete understanding of the present invention and the various additional objects and advantages thereof, reference is made to the following description and accompanying drawing, wherein:

Fig. 1 is a longitudinal vertical sectional view, partially in elevation, showing my improved torque wrench adapter in operative relation to an associated driving tool and socket wrench head;

Fig. 2 is a transverse vertical sectional view taken along the line 2—2 of Fig. 1; and

Fig. 3 is a perspective view of the adapter.

Referring now to the drawing, my improved torque wrench adapter comprises a driving shaft, generally indicated at 5, which is formed at one end with a straight bit-like extension 6 adapted to be clamped within and drivingly received by the chuck portion 7 of an ordinary

2

electric motor driven rotary hand drill or tool, indicated generally at 8, after the manner of a standard drill bit. The shaft 5 is further formed with a screw-threaded intermediate portion 9, and terminates at its opposite end in an integral, relatively diametrically enlarged, disk-shaped head 10. Preferably, the bit-like extension 6 of the shaft 5 is smooth and unthreaded as shown in the drawing, but if desired, the shaft may be threaded throughout its length, with the exception of the head, without adversely affecting the operation of the adapter, as will be hereinafter more fully explained.

Enclosing the disk-shaped head 10 of the shaft 5 is a generally cylindrical clutch drum, indicated in its entirety by the reference numeral 11. The drum 11 is composed of a hollow, open end, cup-shaped section 12 and an annular end wall 13 which is welded, or otherwise suitably and permanently secured, as at 14, to the section 12 after the head 10 is positioned therein. The end wall 13 of the drum is formed with a central bearing opening 15 through which the shaft 5 extends, and which defines on the end wall an inner, flat, annular surface 16 arranged for frictional engagement with the complementary flat annular surface 18 formed on the inner side of the head 10 of the shaft 5.

The cup-shaped section 12 of the drum includes an integral, relatively reduced, axially extending driven shaft 19 which terminates at the outer end thereof in a square, multiangular, wrench head-receiving extension 20. Advantageously, the extension 20 may be suitably recessed to receive and retain a spring-pressed ball 21 which extends partially outwardly from one of the sides of the extension 20 to frictionally engage one of the wall surfaces defining a square, multiangular chamber 22 formed in a socket wrench head 23. The wrench head 23, as shown in Fig. 1, constitutes a standard socket-type wrench head formed with a multiangular nut-receiving socket 24 in the forward end thereof. It will be understood that wrench heads 23 having varying sizes of nut-receiving sockets may be used interchangeably with the present torque wrench adapter in accordance with the size of nuts desired to be tightened during work operations.

Rotatably carried on the shaft 5, adjacent the end wall 13 of the clutch drum, is an annular bearing washer 25. The washer 25 is abutted on one side thereof by an end of a relatively heavy coil compression spring 26 disposed in encircling relation to the intermediate screw-threaded region 9 of the shaft 5. The opposite end of the spring 26 is abutted and held by an adjustable stop nut 27 which is threaded onto the intermediate region 9 of the shaft 5. A lock nut 28 is also threaded on the region 9 of the shaft 5 and, when tightened down against the stop nut 27, serves to hold the latter against accidental backing-off movement on the shaft.

As will be understood, the spring 26 is normally maintained under compression between the stop nut 27 and the bearing washer 25, and under such condition causes the inner wall surface 18 of the head 10 of the shaft 5 to be drawn into tight frictional engagement with the complementary inner surface 16 of the end wall 13 of the drum 11, whereby to effect a yieldable frictional driving engagement between the shaft 5 and the drum 11 and a wrench head 23 disposed on the extension 20. The tension upon the spring 26, and consequently the force tending to hold the head 10 in engagement with the drum 11, may be adjusted within relatively wide limits by simply adjusting the position of the stop nut 27 axially on the intermediate threaded region 9 of the shaft. For example, in nut-tightening operations where it is desired to impart relatively high torque forces to the work, the stop nut 27 is tightened down on the shaft 5 toward the head 10 thereof to compress the spring 26 to a maximum. Con-

3

versely, where relatively light torque is required, the nut 27 may be backed off on the shaft 5 to a point where the spring is only lightly compressed, thereby decreasing the forces tending to hold the head 10 in tight frictional engagement with the end wall 13 of the drum.

In operation, the bit-like shank 6 of the adapter is tightly clamped in the chuck of the hand drill 8 in order that the adapter may be rotated at high speeds upon energization of the motor of the drill or tool 8. The stop nut 27 is then adjusted on the screw-threaded region of the shaft 5 to a position to impart the desired tension upon the head 10 of the shaft in accordance with the torque force desired to be imparted to an associated nut to be tightened. The position of the stop nut 27 upon the shaft 5 for any desired torque output may be easily predetermined by first testing the adapter with a suitable torque-measuring gauge, and, if desired, the intermediate screw-threaded region of the shaft 5 may be suitably indexed or graduated so as to provide ready visual reference for the setting of the stop nut 27 in adjusting the torque output of the adapter. After setting of the stop nut 27, a suitable size wrench head 23 is selected in accordance with the size of nut to be tightened, and the wrench head snapped onto the extension 20 of the adapter. The wrench head is then placed over the nut to be tightened and the motor of the hand drill 8 is energized, whereupon the component parts of the adapter and the nut to be tightened are rotated in unison until the resistance to further tightening of the nut reaches or exceeds the predetermined torque output of the adapter, at which time the drum 11, shaft 19, and wrench head 23 are stopped from rotating and the head 10 of the shaft slips and rotates within the drum 11.

It will thus be seen that the present invention provides a mechanically efficient, structurally simple, and inexpensive torque wrench adapter for power tools which is characterized by its rugged construction, ease of assembly and adjustability, and ready accessibility to parts for adjustment, repair, or replacement purposes.

While I have shown and described in detail a single preferred embodiment of my invention, it will be understood that the same is susceptible to certain modifications as to details of construction and design without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A torque wrench adapter comprising a shaft formed at one end for insertion within the chuck of a rotary hand tool and having an intermediate, externally screw-threaded region thereon, said shaft at the opposite end thereof being provided with a diametrically enlarged disk head having a flat, annular, inner surface; a hollow clutch drum of non-adjustable, unitary construction rotatable on and enclosing the disk head of said shaft and having an end wall formed with an opening through which said shaft extends, said end wall having a flat, annular, inner surface arranged for frictional engagement with the annular inner surface of the disk head of said shaft; stop means threadedly carried in an open position for longitudinal adjustment on the intermediate region of said shaft; spring means carried on said shaft between said stop means and the end wall of said clutch drum for holding the annular inner surface of said disk head in frictional, non-slipping, torque-transmitting engagement with the annular inner surface of the end wall of said clutch drum, said head slipping and turning relative to said drum when predetermined torque forces are applied to the interengaging surfaces thereof; and a second shaft carried by and extending axially outwardly from said clutch drum at the end thereof opposite the said end wall and formed at the outer end thereof with a multiangular extension to drivingly receive a socket-type wrench head.

2. A torque wrench adapter as defined in claim 1, and wherein said stop means comprises a pair of internally threaded nuts adjustable on the intermediate threaded region of said first-named shaft to vary the tension of said spring means and thereby the force holding the annular inner surface of said disk head in frictional engagement with the inner surface of the end wall of said clutch drum.

3. A torque wrench adapter comprising a first shaft formed at one end with a bit extension for driving connection with a rotary power tool, said shaft further including an intermediate, externally screw-threaded region and a diametrically enlarged head at the end thereof opposite to the bit extension, the head of said first shaft being formed with a flat, annular, inner surface; a generally cylindrical drum of non-adjustable, unitary construction rotatably carried on and enclosing the head of said first shaft, said drum having a flat, annular, end wall arranged for frictional, power-transmitting engagement with the flat, annular, inner surface of said head; a second shaft formed integrally with said drum and extending axially and longitudinally outward from the end thereof opposite said flat, annular, end wall, said second shaft terminating in a multiangular extension for the detachable reception of a driven wrench head; openly disposed, longitudinally adjustable, stop means threadedly disposed around the intermediate portion of said first shaft; and coiled, compression-type, spring means carried on said first shaft, said spring means bearing at one end against said stop means and at its opposite end against the end wall of said drum, whereby to urge the flat, annular, inner surface of said head normally into power-transmitting, frictional engagement with the annular end wall of said drum, the adjustment of said stop means on said first shaft serving to vary the compression of said spring means and the frictional forces developed thereby in holding the inter-engaged wall surfaces of the head and drum in power-transmitting engagement, whereby to enable said head to turn relative to said drum when predetermined forces restraining the drum against rotation are encountered.

4

References Cited in the file of this patent

UNITED STATES PATENTS

2,335,574	Thompson et al.	Nov. 30, 1943
2,471,614	Gilman	May 31, 1949