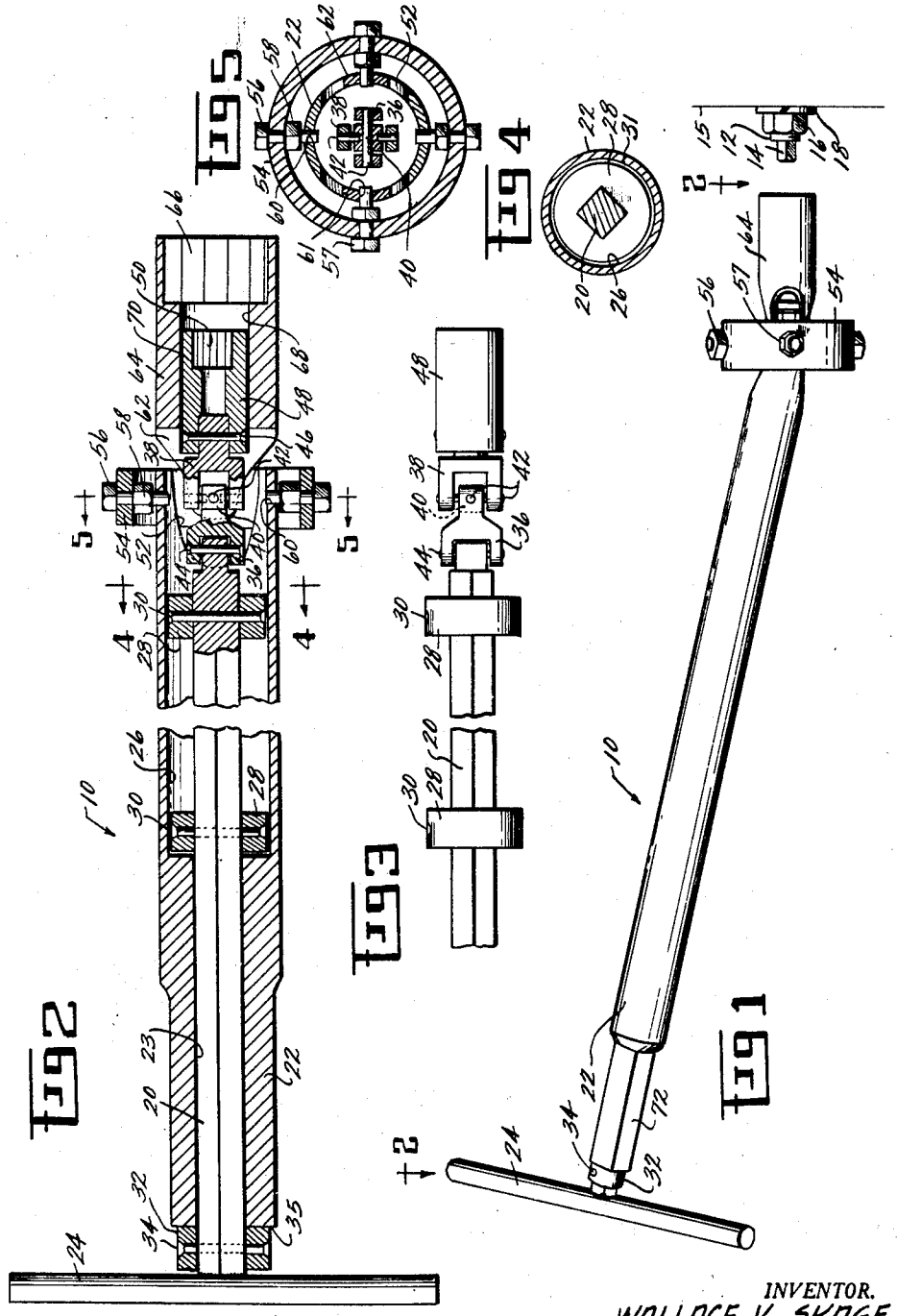
Jan. 1, 1957 W. V. SKAGE 2,775,912

DOUBLE SOCKET WRENCH HAVING UNIVERSAL JOINT DRIVES

Filed July 27, 1955



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United States Patent Office 2,775,912 Patented Jan. 1, 1957

2,775,912

DOUBLE SOCKET WRENCH HAVING UNIVERSAL JOINT DRIVES

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Application July 27, 1955, Serial No. 524,723

4 Claims. (Cl. 81—55)

This invention relates to socket wrenches having universal joint drives and more particularly to a double socket wrench having two coaxial wrench sockets each having its own universal joint and being independently rotatable with respect to each other.

A common method of preventing rotation of a screw which is threaded into an object is to provide a locknut engaging the screw which is then drawn tight against the object to prevent rotation of the screw. In such cases the screw generally has a head smaller in size than the minor diameter of the locknut thread making it considerably smaller in size than the outer contour of the locknut. When necessary to adjust the screw, the locknut is rotated away from the object and this frees the screw for rotation either into or out of the object. When the screw is adjusted to its proper position, the locknut may again be tightly screwed against the object thus again further preventing rotation of the screw.

Ordinarily, in cases of this nature, it is necessary to use two separate wrenches which must be independently operated. It has been found that adjustments of this type are often times clumsy and cumbersome to make. They are especially difficult, if not practically impossible, to make when the screw and locknut combination are located in such a position that they have limited access or there is limited work space in which to use two separate wrenches.

One of the objects of this invention is to obviate the above difficulties.

Another object of this invention is to provide a tool having a pair of coaxial wrench sockets each having its own independent universal joint and independently rotatable so the two may be used to adjust a screw and locknut combination more accurately, easier and faster than is possible with other wrench combinations now available.

Still another object of this invention is to provide a tool of this character which is particularly useful in adjusting a locknut and screw combination located in a particularly inaccessible place.

Briefly stated, in accordance with one aspect of my invention, I provide a pair of coaxial wrench sockets each independently rotatable with respect to the other by means of independent drive shafts and each having a universal joint between its drive shaft and the wrench socket.

My invention will be better understood from the following description taken in connection with the accompanying drawing and its scope will be pointed out in the appended claims.

In the drawing, Fig. 1 is a perspective view of the tool and a screw and locknut arrangement on which it may be used; Fig. 2 is a view of the tool, partly in section, taken along the lines 2—2 of Fig. 1; Fig. 3 is a fragmentary view of the inner wrench socket with its universal joint and drive shaft; Fig. 4 is a cross-section of the tool taken along the lines 4—4 of Fig. 2; and Fig. 5 is a cross-sectional view of the wrench shown in Fig. 2 taken along the lines 5—5.

Referring to Fig. 1 in the drawing I show the tool and a screw and locknut combination on which it may be used. In the drawing, the tool is generally indicated at 10 and the screw and locknut combination is shown to the right of the tool 10 in Fig. 1. The screw and locknut combination comprises an adjusting screw 12 having a head 14 which is screwed into the object 15. A locknut 16 is screwed over the threads of the screw 12 and is drawn up against the lockwasher 18 said lockwasher 18 being around the screw 12 and between the locknut 16 and the object 15. When the locknut 16 is drawn up against the lockwasher 18, a locking action is formed between the internal threads of the locknut 16 and the external threads of the adjusting screw 12 thereby preventing any rotation of the adjusting screw 12 with respect to the object 15. The foregoing description of the screw and locknut combination serves to illustrate the type of mechanism on which the invention may be most effectively used.

Referring now to Fig. 2, I show a detailed cross-sectional view of the tool 10. The tool 10 comprises an inner drive shaft 20 mounted for rotation within an outer drive shaft 22. That is to say, the inner drive shaft 20 is rotatable with respect to the outer drive shaft 22 because of a small clearance 23 between the outer periphery of the inner drive shaft 20 and the bore of the outer drive shaft 22. A handle 24 is secured by welding or other means to the inner drive shaft 20 in order to rotate said inner drive shaft 20. Toward the end away from the handle 24 of the outer drive shaft 22 an enlarged bore 26 is provided. The drive bushings 28 secured to the inner drive shaft 20 by means of rivets 30 act within the enlarged bore 26 to serve as rotating guides for the inner drive shaft 20 and thereby maintain alignment of the inner drive shaft 20 with respect to the outer drive shaft 22 when the shafts are rotating with respect to one another and are under load. Figs. 3 and 4 also serve to illustrate the guide bushings 28 which are circular in shape and also shows the clearance 31 between the guide bushings 28 and the outer drive shaft 22.

I also provide means for taking the axial bearing load of the inner drive shaft 20 with respect to the outer drive shaft 22. In the arrangement illustrated, this comprises a collar 32 secured to the inner drive shaft 20 by means of a rivet 34. The collar 32 is adjacent to the handle 24 although it is apparent that any location along the inner drive shaft 20 would operate satisfactorily. The collar 32 bears against the end 35 of the outer drive shaft 22 and permits free and easy rotation of the shafts 20 and 22 with respect to one another.

I also provide an internal universal joint for an internal wrench socket which is to engage the head 14 of the adjusting screw 12. In the arrangement illustrated in Figs. 2 and 3 this internal universal joint comprises the yoke members 36 and 38 and the block 40. The block 40 is provided with pins 42 which in this case are four in number and project from four of the block faces at 90° angles. Two of the block pins 42 on opposite faces of the block 40 engage holes in the yoke member 36 and the other two pins 42 in the block number 40 engage similar holes in the yoke member 38. By means of the yoke members 36 and 38 and the block 40 a universal joint is provided which allows free rotation of the yoke members 36 and 38 for applications where their axes of rotation are not coincident. The yoke member 36 is permanently connected to the inner drive shaft 20 by means of a rivet 44. The yoke member 38 is permanently connected by means of a rivet 46 to an inner wrench socket 48. The inner wrench socket 48 is provided with a socket 50 which

is selected and sized to engage the head of a screw such as the head 14 of the adjusting screw 12 for example.

I also provide external universal joint means to drive an outer wrench socket which may be adapted to engage a locknut such as the locknut 16, for example. These means are best shown in Figs. 2 and 5 and include a pair of U-shaped recesses 52 provided for clearance on opposite sides of the end portion of the outer drive shaft 22. The purpose of the U-shaped recesses 52 is to provide clearance for proper operation of the external universal joint as will hereinafter become apparent.

The external universal joint comprises a ring member 54 which is sufficiently large in diameter to provide ample clearance between its internal diameter and the outer diameter of the outer drive shaft 22. The ring member 54 is provided with two bolts 56 and two bolts 57 extending inwardly through its outer periphery and secured to the ring member 54 by means of the four nuts 58. The bolts 56 and 57 act as pivots and are preferably spaced at 90° intervals and it is to be noted that the opposite pair 56 engage clearance holes 60 in the wall of the outer drive shaft 22 thereby allowing pivotal movement of the ring member 54 with respect to the outer drive shaft 22 through the imaginary axis passing through the bolts 56. The inner end of the other pair of bolts 57 engage the clearance holes 61 provided in the extended flanges 62 of the outer wrench socket 64. Engagement of the inner end of the bolts 57 in this manner allows pivotal movement of the outer wrench socket with respect to the ring member 54 through the imaginary axis passing through the center of the bolt members 57.

The outer wrench socket 64 is provided with a suitable sized and selected socket at its outer end 66 which in this case is sized to engage the locknut 16. The outer wrench socket 64 includes a bore 68 which allows for clearance as at 70 between it and the outer diameter of the inner wrench socket 48. By providing the clearance 70, the inner and outer wrench sockets 48 and 64 may be easily rotated one with respect to the other.

By the use of the external universal joint, just described, direct drive means are provided for the outer wrench socket 64 through the outer drive shaft 22. The outer drive shaft 22 may be easily rotated by engaging a standard wrench over the wrench flats 72 at its outer end.

In operation, the socket 50 of the inner wrench socket 48 is moved into engagement with the head 14 of the adjusting screw 12 and the socket 66 of the outer wrench socket 64 is simultaneously engaged with the locknut 16. The outer drive shaft 22 is then rotated by means of a suitable wrench engaging the wrench flats 72 in order to loosen the locknut 16 which thereby breaks the locking action between the internal threads of locknut 16 and the external threads of the adjusting screw 12 allowing rotation of the adjusting screw 12. The adjusting screw 12 may then be rotated to any desired position by merely rotating the handle 24 as desired. After moving the adjusting screw 12 to its new location, it is then again locked in place by rotating the outer drive shaft 22 oppositely from its previous rotation again by the use of the wrench flats 72 until such time as the locknut 16 is drawn into engagement with the lockwasher 18 and object 15 to again lock the adjusting screw 12 in its new location. The wrench is then withdrawn from the adjusting screw and locknut combination until such time as the wrench is again used to reset the adjusting screw.

While particular embodiments of the invention have been illustrated and described it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the invention and it is intended to cover in the appended claims all such changes and modifications that come within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A multiple socket wrench comprising coaxial inner and outer drive shafts, means for effecting rotation of said drive shafts, an inner and an outer universal joint drivingly connected to the inner and outer drive shafts respectively and inner and outer wrench sockets drivingly connected to the inner and outer universal joints respectively, whereby said wrench sockets are independently rotatable with respect to each other.

2. A multiple socket wrench having in combination an inner drive shaft, an outer drive shaft, said inner drive shaft being coaxial with said outer drive shaft, said outer drive shaft provided with sufficient internal clearance to allow rotation of the inner drive shaft with respect to the outer drive shaft, means for effecting rotation of said drive shafts, an inner universal joint including a pair of yokes and a block drivingly connected to the inner drive shaft, an outer universal joint including a ring member and a plurality of cooperating pivots drivingly connected to the outer drive shaft and a pair of coaxial wrench sockets drivingly connected to said inner and outer universal joints respectively, said wrench sockets being independently rotatable with respect to one another.

3. A double socket wrench having in combination an inner drive shaft, a handle connected to said inner drive shaft, an outer drive shaft having a bore providing a close clearance for said inner drive shaft at the handle end, said drive shafts being coaxial and rotatable with respect to one another, an enlarged bore at the other end of said outer drive shaft, a plurality of guide bushings secured to said inner drive shaft rotatable in said enlarged bore to maintain alignment of the drive shafts, an inner universal joint secured to said inner drive shaft including a yoke connected to said inner drive shaft, a block pivotally connected to said yoke, a second yoke connected to said block, an inner wrench socket pivotally connected to said second yoke, an outer universal joint including a ring member, a pair of bolts secured to said ring member to allow said ring member to pivot on said outer drive shaft, a second pair of bolts secured to said ring member engaging an outer wrench socket to allow said outer wrench socket to pivot with respect to said ring member, said outer wrench socket having an internal clearance for allowing rotation of said inner wrench socket within said outer wrench socket.

4. A double socket wrench having in combination an inner drive shaft, a handle connected to said inner drive shaft, an outer drive shaft, said inner drive shaft being coaxial with said outer drive shaft, said drive shafts being rotatable with respect to one another, said outer drive shaft having an enlarged bore at the end opposite the inner drive shaft handle, a pair of guide bushings secured to the inner drive shaft rotatable in the enlarged bore for maintaining alignment of the drive shafts, an inner universal joint including a pair of yokes and a block drivingly connected to the inner drive shaft, an outer universal joint including a ring member and a plurality of cooperating pivots drivingly connected to the outer drive shaft and a pair of independently rotatable and coaxially mounted inner and outer wrench sockets drivingly connecting said inner and outer universal joints respectively.

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