LATERALLY ADJUSTABLE JAW TYPE SOCKET WRENCH

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This invention relates to improvements in socket wrenches having laterally adjustable jaws and keys for the handle thereof.

The principal object of this invention is the provision of a unitary adjustable socket wrench that can be adjusted to fit polygonal, or square nuts of various sizes.

A further object is the provision of an improved key for use with socket wrenches.

A further object is the provision of a key having laterally adjustable jaws, wherein the adjustable jaws may be set to fit a nut of predetermined size and having locking means to hold the adjustable jaws at the desired setting, even though great pressure is exerted upon the socket wrench by a wrench.

A further object is the provision of a key for use with socket wrenches, having associated therewith indicating means whereby to set the adjustable jaws of the socket wrench to fit a nut of predetermined size.

A further object is the provision of a key specially designed to receive an extension on the handle thereof and having means thereon to releasably hold the socket wrench on one end of the key so that by placing the key in the socket and adding an extension to the handle of the key, the socket wrench may be positioned in places which are not normally easily accessible, the spacing of the adjustable jaws of the wrench adjusted to fit the size of a nut, the key removed from the socket wrench and a wrench placed in the fitting provided in the socket wrench for unscrewing the nut located in the difficult position.

Other objects and advantages of this invention will be apparent during the course of the following detailed description, taken in connection with the accompanying drawings, forming a part of this specification and in which drawings:

Fig. 1 is a side elevation of the improved socket wrench with its jaws closed to its minimum size and with the improved key inserted therein.

Fig. 2 is a sectional view thereof taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a bottom plan view of the socket wrench with its jaws adjusted to a minimum size.

Fig. 4 is a side elevation of the socket wrench with its jaws opened to their maximum size and showing by dot and dash lines a conventional wrench socketed therein.

Figs. 5 and 6 are top and bottom plan views, respectively, of the jaws of the socket wrench opened to their maximum size.

Figs. 7 and 8 are cross sectional views taken substantially on the line 7—7 and 8—8, respectively, of Fig. 5.

Figs. 9 and 10 are cross sectional views taken substantially on the line 9—9 and 10—10, respectively, of Fig. 8.

Fig. 11 is a perspective view of the socket wrench as a part of the locking means for the adjustable jaws of the socket wrench.

Fig. 12 is a cross sectional view of the new key taken substantially through the center of the key.

Fig. 13 is a cross sectional view taken substantially on the line 14—14 of Fig. 12.

Fig. 15 is an enlarged cross sectional view taken substantially on the line 15—15 of Fig. 12.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, and wherein similar reference characters designate corresponding parts throughout the several views, A designates an improved socket wrench having adjustable jaws; B an improved key to be used in conjunction therewith, and C a wrench to be used in manipulating the socket wrench.

The socket A comprises a main body portion 20, having a central socket 21 therein for receiving a key or a wrench, and being centrally apertured at its lowermost portion as at 22 for receiving locking means 23 and a rack and pinion arrangement 24 which supports adjustable jaws 25 and 26.

The central socket 21 is preferably of a polygonal shape to facilitate the turning of the socket wrench. A slot 22 extending downwardly through a portion of one side of the socket 21 is provided for centering of the key, the purpose of which will be subsequently described.

The lower central aperture 22 is preferably beveled inwardly at its uppermost portion at 27 and opens into the socket 21.

At the inwardly beveled portion 27 are provided teeth 30 which cooperate with the locking means 23.

In the drawings I have shown the locking means as being provided with thirty-six teeth which I have found to be a satisfactory number.

The locking means 23 preferably comprises a beveled gear 32 and a spring 40.

The beveled gear 32 is preferably provided with annular teeth 31 which mesh with the teeth 30.

The gear 32 is also provided with an upper central indentation 35, the purpose of which will be subsequently described.

Projecting centrally through the gear 32 is a shaft 36 the upper portion of which is of polygonal cross section, such as square and the lower portion of which is cylindrical as at 37.

The upper portion of one of the pointed sides of the polygonal shaped sections is flattened as at 38 and extends above the uppermost surface of the gear 32 for a purpose to be subsequently described.

Abutting the gear 32 is a spring 40 which is made of some material having a great degree of elasticity such as spring steel.

The spring 40 is preferably made so that it is originally of somewhat elliptical shape and is flattened under compression as will be subsequently described.

At opposite sides of the spring 40 are squared openings 42 and 43 which allow the spring to be placed upon the squared shaft 36 immediately beneath the gear 32.

Disposed below the spring 40 on the shaft 36 is a pinion 50 which meshes with racks 51 and 52 which are attached to adjustable jaws 25 and 26 respectively.

A plate 55 is attached to the main body portion 20 as by screws 56 and 57.

The plate 55 has a central socket 58 for receiving the cylindrical end 37 of the shaft 36.

The sides of the plate 55 are tapered inwardly as at 60 and 61 and support the racks 51 and 52 in channels 62 and 63 which are cut in the main body portion 20.

The pinion 50 is mounted upon the polygonal portion of the shaft 36 and has teeth 70 which engage the teeth 71 and 72 of the racks 51 and 52 in movement thereto upon rotation of the shaft 36 as will be subsequently described.

The adjustable jaws 25 and 26 are attached to or integral with and depend downwardly from the racks 51 and 52.

The outer peripheries of the adjustable jaws 25 and 26 are of a substantially truncated conical shape as at 75 and 76.

The inner surfaces of the adjustable jaws 25 and 26 are angularly cut as at 77 and 78 and
have one side thereof beveled as at 79 and 80 respectively in order to allow the jaws to be adjusted to a relatively small size.

When the socket wrench is assembled the racks 51 and 52 are inserted into channels 62 and 63 of the main body portion 20. The pinion 50, the spring 40 and the gear 32 are then placed on the polygonal portion of the shaft 36 and the same is inserted into the lower central aperture 22 of the main body portion 20 so that the teeth 31 of the gear 32 enmesh with the teeth 30 of the body 20 and with the teeth 70 of the pinion 50 meshing with the teeth 71 and 72 of the racks 51 and 52. The lower plate 55 is then fitted onto the cylindrical portion 37 of the shaft 36 and attached to the main body portion 20, thus rendering the rack and pinion assembly immobile.

The key B is composed of a main frame 92 of the same size and shape as the socket 21 of the main body portion 20 of the socket wrench. The frame 92 has at one side thereof a lug or projection 81 of the same shape and size as the slot 21' of the main body portion 20. At one of the sides of the frame 92 is socketed as at 83 a ball 82. The ball 82 is urged outwardly by a spring 84 attached to the side of the frame 92.

A plate 85 is provided on the top of the frame portion 92 and extending beyond the edges thereof. The top plate 85 is centrally drilled as at 86 to rotateably receive a central shaft 87. I have shown the central shaft 87 as consisting of an upper portion 85 and a lower portion 89, although it will be obvious that a one piece shaft would be equally applicable. The lower portion 89 of the central shaft 87 is socketed into the upper portion 88 as at 90 and is secured therein by a pin 91. The lower shaft portion 89 is enlarged at its lowermost end and forms a socket 93 which is of the same size and shape as the upper portion of the central shaft 36 of the socket wrench. The socket 93 has one portion thereof flattened as at 94 which is identical to the flattened side 38 of the central shaft 36 of the socket wrench.

The upper portion 88 of the central shaft 87 has an indicating member 95 attached thereto as by a set screw 96. This indicating member 95 has a pointer 97 thereon which cooperates with indicia 98 engraved or otherwise applied on the upper surface of the plate member 95. In Fig. 2 I have shown the indicia 98 as consisting of long and short lines, whereas in actual practice instead of the long and short lines fractions such as 1/4", 3/8", 5/8", 1/2", 3/4" and 1", will be disposed thereabout which will indicate the size of the nut or bolt heads which the jaws of the socket wrench are set to fit.

A transverse hole 100 is drilled through the upper portion 88 of the central shaft 87 through which a handle 101 may be inserted for the turning of the rotatable shaft 87.

In Fig. 13 I have shown an extension member 105 attached to the upper shaft portion 88. The extension member 105 has a socket 109 at one end thereof which receives the upper end of the shaft portion 88. A pin 110 is then placed through the extension member 105 and through the drilled hole 100 after the handle 101 has been removed therefrom. The handle 101 is inserted into a drilled hole 111 at the upper portion of the extension member 105.

The A and the key B cooperatively act together as follows.

The frame member 92 of the key B is inserted into the socket 21 in the main body portion 20 of the socket wrench. A lug or projection 81 is aligned with the slot 21' thus enabling a full insertion of the key into the socket 21. The ball member 82 will be forced against one side of the socket 21 and will act to hold the key in the socket. The central shaft 87 is turned until the flattened side 94 of the socket 93 aligns with the flattened side 38 of the shaft 36 and the shaft 36 then fits into the socket 93. When these two flattened sides 38 and 94 about one another the indicating member 95 will have its pointer 97 pointing to the indicia 98 which will mark the size of nut that the adjustable jaws 25 and 26 will fit. Pressure is then exerted upon the central shaft 87 forcing the socket 93 into the depression 35 and into contact with the gear 32. The teeth 31 of the gear 32 are pressed out of engagement with the teeth 30 of the main body portion 20 compressing the spring 40. The central shaft 87 is then rotated transmitting motion to the shaft 36 and then to the pinion 50. The teeth 70 of the pinion 50 coact with the teeth 71 and at 72 of the racks 51 and 52 respectively thereby opening or closing the adjustable jaws, depending upon the direction of rotation, to the desired size as indicated by the indicating means 95. The racks 51 and 52 have flattened portions 71' and 72' at one end thereof and flattened portions 71" and 72" at the other end thereof which act as stops for the pinion 50 thus preventing the rotation of the pinion to such an extent that the racks 51 and 52 will be disengaged from the pinion 50.

When the correct or desired size of the adjustable jaws 25 and 26 have been reached the pressure on the central shaft 87 is released and the spring member 40 will force the gear 32 upwardly so that the teeth 31 thereof enmesh with the teeth 30 of the main body portion 20 thus rigidly securing the adjustable jaws in their set position. The key member 95 is then removed from the socket 21 and a wrench C as shown in Figure 4 is inserted therein and the socket wrench manipulated.

Various changes may be made in the form of the invention herein shown and described without departing from the spirit of the invention or the scope of the claims.

I claim:

1. The combination of a socket wrench having a main body portion, adjustable jaws supported by said main body portion, means for initial relative spacing of the said adjustable jaws, means for securely locking said adjustable jaws in a fixed position with respect to said main body portion subsequent to the initial relative spacing thereof, means whereby the said socket wrench may be manipulated, and a key, said key having a frame susceptible of fitted engagement with the main body portion of said socket wrench, a shaft rotatably mounted in said frame, means for the cooperating engagement of said frame with the means for initial relative spacing of the adjustable jaws, means for engaging and disengaging the locking means of said adjustable jaw, and indicating means whereby the relative spacing of the adjustable jaws may be set.

2. The combination of a socket wrench comprising a main body portion, adjustable jaws supported by said main body portion, racks carried by said adjustable jaws, a shaft supported pinion mounted in said main body portion meshing with said racks for initial relative spacing of said adjustable jaws, a spring loaded toothed locking clutch member mounted upon said shaft, teeth in the main body portion which intermesh with the teeth of the locking clutch securely locking the adjustable jaws in a fixed position with respect to the said main body portion subsequent to the initial relative spacing thereof, and means whereby the said socket wrench may be manipulated, and a key, said key having a frame susceptible of fitted engagement with the main body portion of said socket wrench, a shaft rotatably mounted in said frame, indicating means mounted upon said shaft cooperating with indicia upon said frame, said shaft having at its lowermost end a socket for interfitting engagement with the shaft of the socket wrench whereby to rotate said last mentioned shaft, the outer periphery of said socket being
so shaped as to provide means whereby when pressure is exerted upon the shaft of the key the spring loaded locking clutch is released and the adjustable jaws may be relatively moved with respect to each other to a predetermined setting which will be indicated by the said indicating means.

3. A socket wrench comprising a main body portion, adjustable jaws supported by said main body portion, racks rigid with said adjustable jaws, a shaft supported pinion mounted in said main body portion meshing with said racks for initial relative spacing of said adjustable jaws, a spring loaded toothed locking clutch mounted upon said shaft, teeth carried by the main body portion which intermesh with the teeth of the locking clutch securely locking the adjustable jaws in a fixed position with respect to the said main body portion subsequent to the initial relative spacing thereof, and means whereby the said socket wrench may be manipulated.

4. A key for use with a socket wrench having a main body portion, adjustable jaws supported by said main body portion, means for initial relative spacing of the said adjustable jaws, means for securely locking said adjustable jaws in a fixed position with respect to said main body portion subsequent to the initial relative spacing thereof, means whereby the said socket wrench may be manipulated, said key comprising a frame, a shaft rotatably mounted in said frame, means for detachably connecting said frame with the said main body portion of the socket wrench, means for the cooperating engagement of said shaft with the said first mentioned means for initial relative spacing of the said adjustable jaws, and indicating means whereby the relative spacing of the adjustable jaws may be preset.

5. A key as specified in claim 4 wherein said frame interfits into the main body portion of the socket wrench.

6. A key as specified in claim 4 wherein the lowermost portion of the rotatably mounted shaft of the key cooperates with the means for the initial spacing of the adjustable jaws and said indicating means is mounted on said shaft whereby the relative spacing of the adjustable jaws may be determined.

7. A socket wrench comprising a main body portion, adjustable jaws supported by said main body portion, means for the initial relative spacing of the said adjustable jaws, and a spring loaded toothed locking clutch the teeth of which intermesh with teeth carried by said main body portion for securely locking said adjustable jaws in a fixed position with respect to said main body portion subsequent to the initial relative spacing thereof.

8. A socket wrench comprising a main body portion, adjustable jaws supported by said main body portion, said adjustable jaws comprising two mating elements the outer peripheries of which are of a substantially truncated conical form, the inner surfaces of which are angularly cut and one side of each is beveled whereby to be adaptable to fit nuts of varying sizes, means for the initial relative spacing of the said adjustable jaws, and means for securely locking said adjustable jaws in a fixed position with respect to said main body portion subsequent to the initial relative spacing thereof.

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