

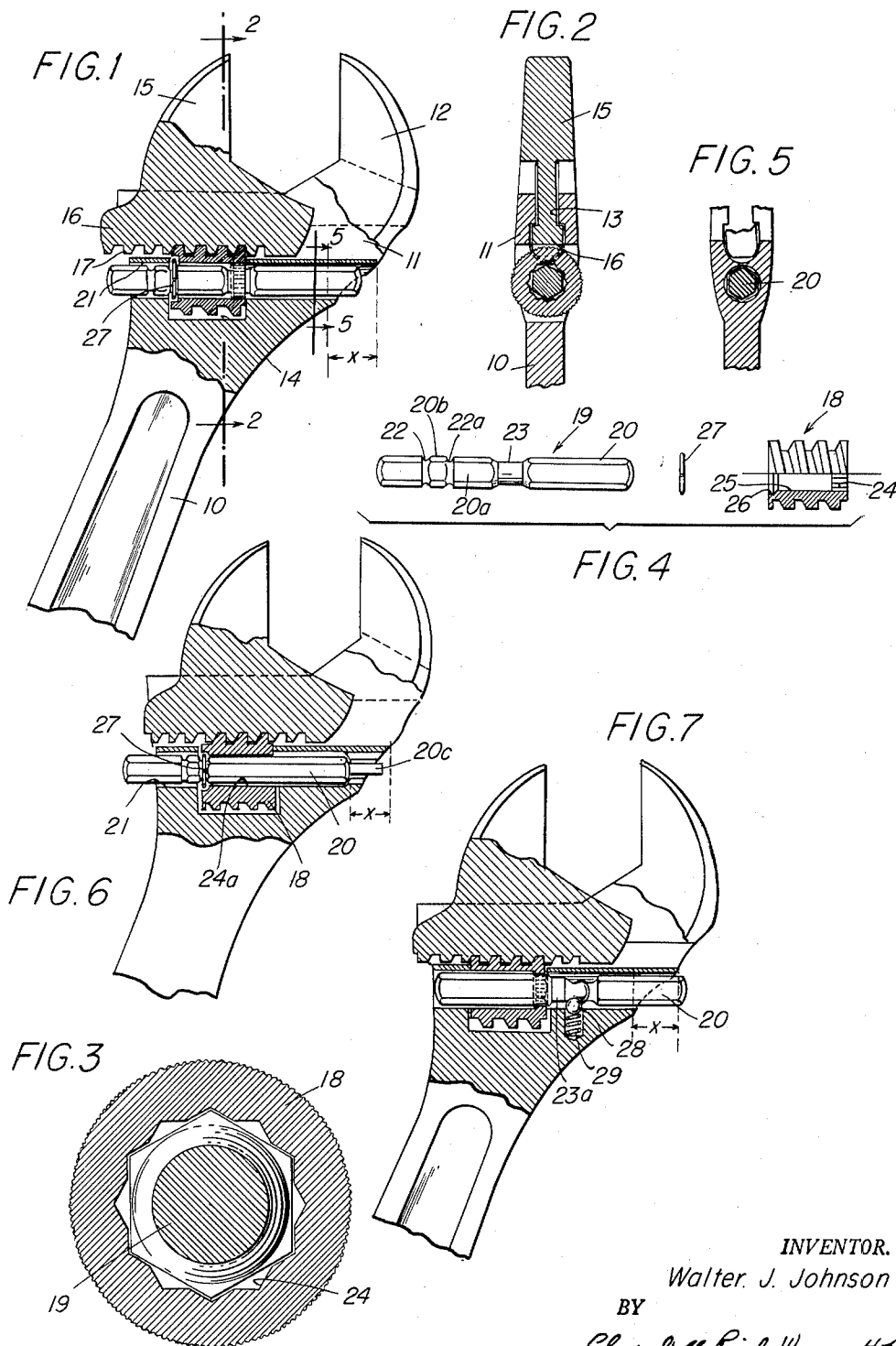
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OPEN END WRENCH LOCKING MEANS

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OPEN END WRENCH LOCKING MEANS

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The present invention relates to wrenches and aims to provide certain improvements therein.

Wrenches having relatively adjustable jaws and means for locking the jaws in fixed position have been long sought for by both user and manufacturer. Many such wrenches have been proposed but none of them, to my knowledge, has met with popular favor because they were unsound mechanically, too cumbersome in construction or required two hand operation for locking and releasing the jaws in use.

Accordingly, the primary object of the invention is to provide a wrench of the class set forth in which the shortcomings inherent in prior proposed wrenches as above set forth, are overcome. A further object is to provide a wrench of the class set forth in which the jaws may be quickly locked in adjusted position and released by a flick of the finger or thumb of the hand which holds the wrench. A still further object is to provide a wrench of the class described which is exceedingly simple in construction and operation and which may be manufactured and sold at a price not much higher than conventional wrenches lacking the locking feature.

The foregoing and other objects of the invention not specifically enumerated I accomplish by mounting the adjusting screw or worm of the wrench upon a slidable shaft which is adapted to be held in either of two adjustable limiting positions by spring means which also function to hold the wrench parts in assembled relation, the shaft and worm having cooperating, splined portions adapted in one limiting position of the shaft to hold the worm locked against rotation and in another limiting position to permit free rotation of the worm. Preferably the shaft is mounted in the head of the wrench and is adapted to project beyond the opposite sides of said head respectively when the shaft is held in one or the other of its two limiting positions, to be engageable by the finger or thumb of the hand which holds the wrench, for locking and releasing the jaws. The invention will be better understood from the detailed description which follows, when considered in connection with the accompanying drawings showing three embodiments, and wherein:

Figure 1 is a fragmentary elevation of the wrench embodying my invention, parts being broken away to better illustrate the novel features thereof.

Fig. 2 is a section taken along the plane of the line 2-2 of Fig. 1.

Fig. 3 is a view, on an enlarged scale, of a portion of Fig. 2 showing the relationship of the worm and shaft.

Fig. 4 is an exploded view of the shaft, the worm and the locking spring.

Fig. 5 is a section taken along the plane of the line 5-5 of Fig. 1.

Fig. 6 is a view similar to Fig. 1 showing another embodiment of the invention.

Fig. 7 is a view similar to Fig. 1 showing still another embodiment of the invention.

Referring first to Figs. 1 to 5 of the drawings, the wrench of the present invention comprises a handle 10

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provided with a head 11 having an integral jaw 12, the top of the head being formed with a guide channel 13 of inverted T-shape in transverse cross-section and being also formed with a rectangular opening 14 which intersects the head of the T of the guide channel 13. Mounted for slidable movement in the guide channel 13 is a second jaw member 15 having an inverted T portion 16, the head of the T being formed with a rack 17. Mounted within the rectangular opening 14 in the head is a worm 18 in mesh with the teeth of the rack 17, the worm being supported on a shaft 19. The parts thus far described are conventional in open end wrenches and are merely illustrative of the type of wrench to which the invention is applicable.

According to the present invention I have provided novel means for locking the movable jaw in any desired adjusted position and for releasing said movable jaw when it is desired to provide a different adjustment of the wrench. The means which I have provided are disposed in the head of the wrench so as to be quickly operable by a flick of the finger or thumb of the hand which holds the wrench. To accomplish such quick locking and releasing of the movable jaw, the shaft 19 is slidably mounted in the head and has at least a portion 20 of its length splined or of regular polygonal form in transverse cross-section, herein shown as hexagonal, and the head 11 is formed with a bore or support 21 therethrough for said shaft, at least a portion of said bore, for example, at one end thereof as indicated at x, is of complementary form in transverse section to the portion of the shaft which extends therethrough. The shaft 19 is also formed in proximity to one end thereof with a pair of annular grooves 22 and 22a and with a portion of reduced diameter such as a wide annular groove 23, the function for which grooves will presently appear.

The worm 18 has a bore therethrough which, for at least a portion of its length, preferably at one end thereof, is in the shape of a polygon having a number of sides which is an integer multiple of the number of sides on the shaft 19 to provide a non-rotative engagement therewith, and a second portion 25 of the bore is of enlarged diameter to permit rotatable fit across the corners of the polygonal shaft. The open end of the bore 25 is counter-sunk as shown at 26 to accommodate a split spring ring 27 which has a normal diameter to engage within either of the annular grooves 22 or 22a. The shaft 19 is of a length somewhat greater than the width of the head 11 and the annular grooves 22 and 22a are so related to the head and to the worm when mounted in the head that, when the split ring 27 engages in the annular groove 22a, the left hand end of the shaft will project beyond the head and the annular groove 23 in the shaft will extend through the polygonal or splined bore 24 in the worm, as shown in Fig. 1. In said position the shaft will be held against rotation by virtue of the right hand end thereof engaging in the polygonal portion x of the bore 21 and the worm will be freely rotatable upon the shaft to move the jaw 15 into any adjusted relation to the fixed jaw 12.

When a desired adjustment of the movable jaw 15 has been obtained by rotation of the worm and while holding the wrench in the hand, the shaft 19 may be moved to the right against the tension of the spring 27 by a flick of the thumb or forefinger, depending upon the manner in which the wrench is held by the hand, whereupon said spring being locked against axial movement but capable of expansion, will ride over portion 20b of the shaft and will engage in the annular groove 22, and the polygonal portion 20a of the shaft will engage in the polygonal bore portion 24 of the worm to lock the worm against rotation and thereby hold the movable jaw in adjusted position. To release the movable jaw from locked position it is merely necessary to press upon the now projecting right hand end of the shaft to return the spring 27 into the

annular groove 22a. It will thus be seen that the shaft is manually movable to either of two limiting positions, in one said limiting position the worm being locked against rotation and in the other of said limiting position the worm is rotatable.

In the embodiment of my invention shown in Fig. 6 the head has a bore 21 similar in all respects to that of Fig. 1, except that the portion x is a polygon which preferably has a number of sides that is an integer multiple of the sides of the shaft, the worm 18 has a polygonal bore 24a extending therethrough, the shaft has a polygonal portion 20 complementary to the bore 24a and extending therethrough and has a reduced end 20c so that in the position of the shaft shown in Fig. 6, rotation of the worm also rotates the shaft upon which the worm is mounted. However, when the shaft is moved to the right so that the hexagonal portion 20 engages in the complementary polygonal portion x of the bore 21, the shaft will be locked against rotation, and with it the worm 18.

In the embodiment of my invention shown in Fig. 7 the means for locking the shaft in either of its two limiting positions is a ball 28 urged into engagement with the shaft by a spring 29. The worm in this embodiment is similar to the worm shown in Fig. 1, the parts being shown with a polygonal portion 20 of the shaft engaging in the polygonal bore of the worm to hold the latter against rotation. When the shaft is moved to the left, a reduced portion 23a of the shaft will engage within the polygonal bore of the worm to permit free rotation of the worm on the shaft.

In the various embodiments of the invention the yielding means, namely, the split spring 27 in Figs. 1 to 6 and the spring-pressed ball 28 in Fig. 7, serves to hold the shaft and the worm in assembled relation within the head.

While I have shown and described several embodiments of my invention, it is to be understood that I do not wish to be limited to the precise details of construction disclosed since these may be varied within the range of engineering or mechanical skill without departing from the spirit of my invention as hereinafter claimed.

What I claim is:

1. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack, a worm mounted in said head in engagement with said rack, a shaft supported in said head and upon which shaft said worm is mounted, said shaft being manually slidable in said worm and in said head, and yielding means within said head cooperating with said shaft for holding the shaft in either of two limiting positions, in one of said limiting positions the worm being locked against rotation and in said other limiting position the worm being rotatable.

2. A wrench according to claim 1 wherein the shaft is formed with two axially spaced peripheral grooves for cooperating with the yielding means.

3. A wrench according to claim 1 wherein the shaft for at least a portion of its length is splined, and at least a portion of the shaft support in said head is splined for registry with the splined portion of the shaft.

4. A wrench according to claim 1 wherein the shaft for at least a portion of its length is of regular polygonal shape in transverse section and the worm has an axial bore, a portion of the length of which in transverse section has the form of a regular polygon having a number of sides which is an integer multiple of the number of sides on the polygonal shaft.

5. A wrench according to claim 1 wherein the shaft for at least a portion of its length is of regular polygonal shape in transverse section and the head has an opening for supporting the shaft, said opening for at least a portion of its length in transverse section having the form of a regular polygon having a number of sides which is an integer multiple of the number of sides of the polygonal portion of the shaft.

6. A wrench according to claim 1 wherein the opposite ends of the shaft project through opposite sides of the head respectively when the shaft is held in one or the other of its two limiting positions.

7. A wrench comprising a head provided with a fixed jaw, a second jaw movable in said head and having a rack, a worm mounted in said head in engagement with said rack, a shaft supported in said head and upon which shaft said worm is mounted, said shaft being manually slidable in said worm and in said head, the shaft for at least a portion of its length being splined, the worm having an axial bore, at least a portion of which is splined for registry with the splined portion of the shaft and the shaft supporting portion of the head being at least splined in part, the splining on said parts being so related that in one position of the shaft splined portions thereof are in registry with both the splined portion in the head and the splined portion in the bore of the worm, and in another position of the shaft, the worm is rotatable, and yielding means within the head cooperating with the shaft for holding the shaft in its respective positions.

8. A wrench according to claim 7 wherein the yielding means also acts to retain the shaft and the worm in assembled relation within the head.

9. A wrench according to claim 7 wherein when a splined portion on the shaft and one splined portion on the head are in registry, the worm is rotatable on the shaft.

10. A wrench according to claim 7 wherein when a splined portion on the shaft and one splined portion on the head are in registry, the worm is locked against rotation.

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