April 2, 1957 H. L. FISH 2,787,180

OPEN END RATCHET WRENCHES

Original Filed April 27, 1945 3 Sheets-Sheet 1

Fig. 1.

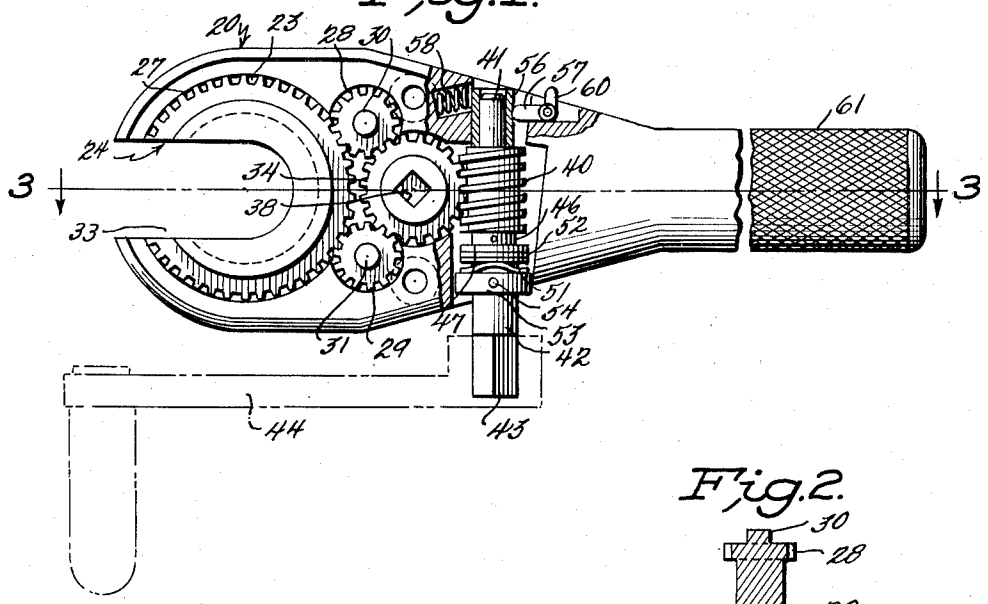


Fig. 2.

Fig. 3.

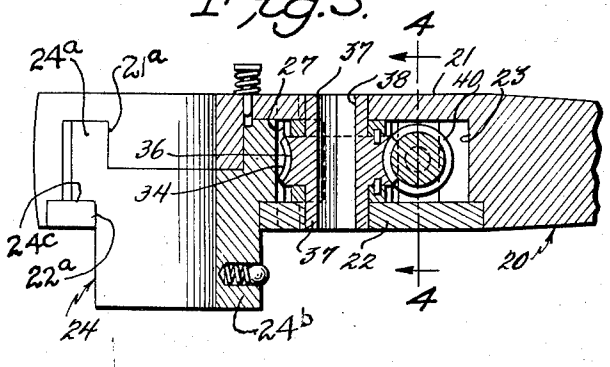
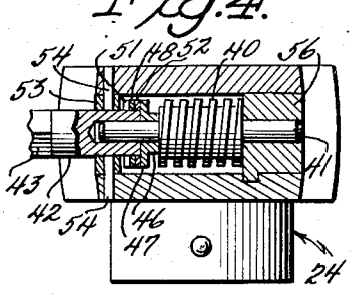


Fig. 4.



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Fig. 5.

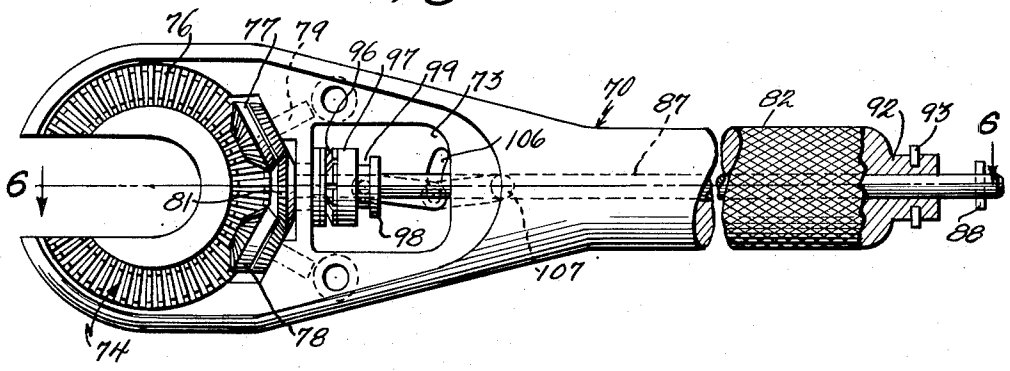
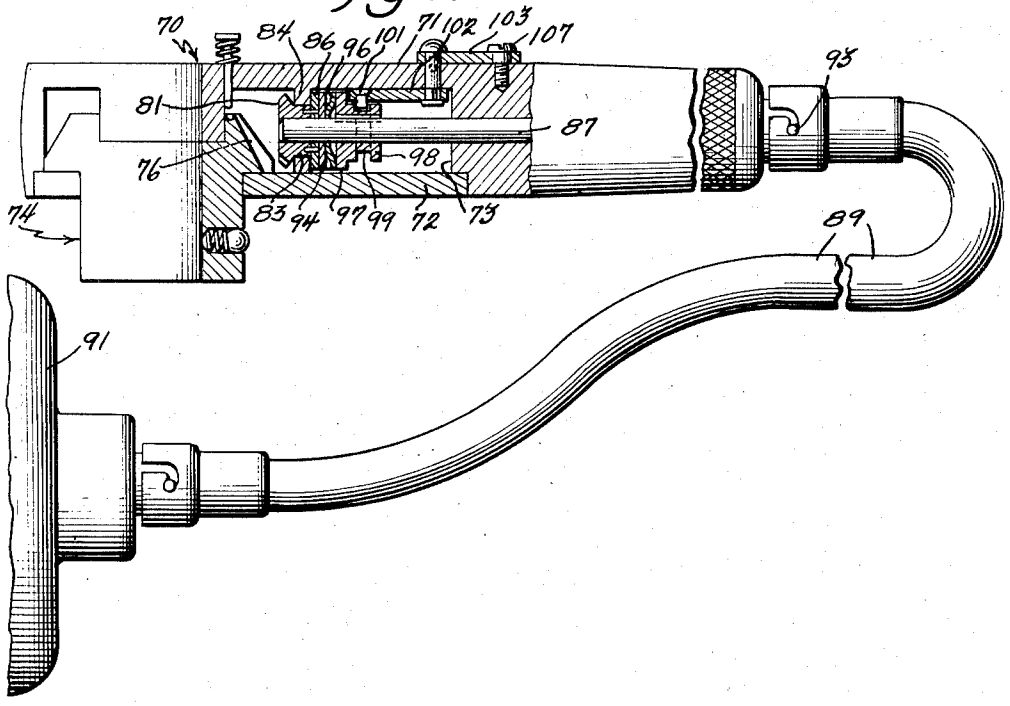


Fig. 6.



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Fig. 7.

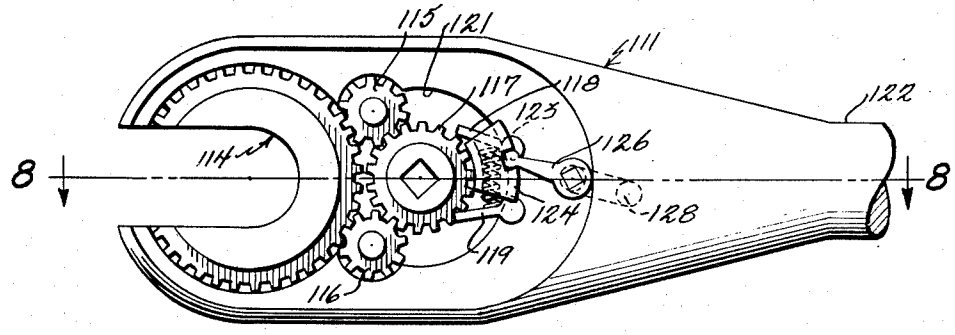


Fig. 8.

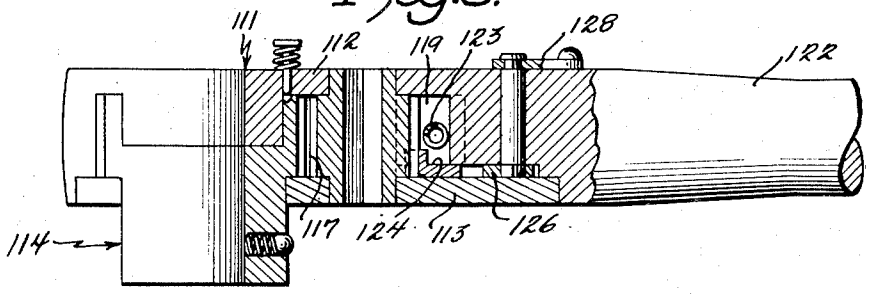
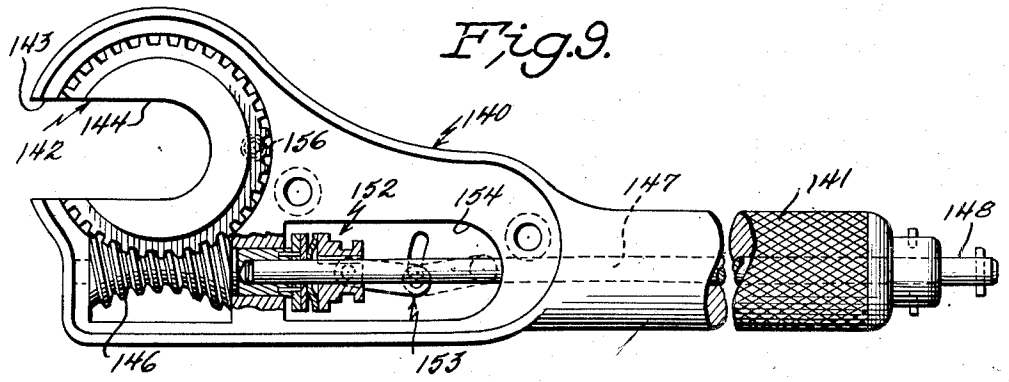


Fig. 9.



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United States Patent Office 2,787,180 Patented Apr. 2, 1957

2,787,180

OPEN END RATCHET WRENCHES

Herbert L. Fish, Inglewood, Calif., assignor, by mesne assignments, to Thomas P. Walker, Los Angeles, Calif., as trustee

Original application April 27, 1945, Serial No. 590,577, now Patent No. 2,578,686, dated December 18, 1951. Divided and this application December 11, 1951, Serial No. 261,103

30 Claims. (Cl. 81—57)

This invention relates to wrenches and more particularly to open end ratchet wrenches of the socket type.

This application is a division of my parent application Serial No. 590,577, filed April 27, 1945, now Patent No. 2,578,686, entitled Split Ratchet Socket Wrench.

Wrenches of this general type are known in the art and are usually characterized by a number of undesirable features which limit their utility. Among these features are a lack of compactness rendering them impractical in limited working spaces; a lack of reversibility, an insufficiently rugged construction making them vulnerable to excessive spreading under heavy loads to which this type of wrench is often subjected; a general cumbersomeness in use rendering them unpopular with mechanics, and an unnecessarily high initial cost which prohibits sales success on the open highly competitive market.

Accordingly the chief object of the present invention is to provide a wrench construction which will obviate the foregoing disadvantages characterizing known structures.

One object of my invention is to provide split socket wrench means which may be used satisfactorily for turning a plurality of B nuts or the like each of a different size or shape from the others.

An important object of my invention is the provision of a wrench for turning nuts and like devices which is operated by power while the handle of the wrench is held stationary.

Another object of my invention is to provide a power driven wrench for operatively turning threaded nuts which has a safeguard against stripping the threads of the nut.

A further object is to provide a wrench for turning nuts and the like by hand while the wrench is held stationary.

Another object is to provide a stationary wrench operated by hand power which can exert a powerful turning force on a nut or the like.

Other objects and advantages of my invention will appear as the description proceeds.

In the drawings:

Fig. 1 is a side view broken away in part to show one form of wrench embodying my invention.

Fig. 2 is a detail of one of the gears in Figure 1.

Fig. 3 is a bottom view broken away in part of the structure of Fig. 1 taken on the line 3—3 of Fig. 1.

Fig. 4 is a side view broken away in part of a slip clutch which forms an element of the structure of Fig. 3 as seen on the line 4—4 of Fig. 3.

Fig. 5 is a side view partly diagrammatic and partly broken away of a modified form of the invention.

Fig. 6 is a bottom view broken away in part of the structure of Fig. 5 as seen on the line 6—6 of Fig. 5.

Fig. 7 is a side view broken away in part of another form of the invention.

Fig. 8 is a bottom view broken away in part of the structure of Fig. 7 as seen on the line 8—8 of Fig. 7.

Fig. 9 is a side view broken away in part of another form of wrench embodying my invention.

To attain that object of my invention which is the provision of a split socket wrench with which B nuts in a line of pipe may be turned without oscillating the wrench handle whatever, a form of my invention illustrated in Figures 1 to 4, inclusive, may be employed. A slotted body portion 20 of this form of wrench may have an integral cover plate element 21 and removable cover plate element 22 which cover plate elements may be of like construction, except as is hereinafter described, as the cover plates 103 and 104 of my parent application. Between the cover plates 21 and 22 is a cavity 23 in which is rotatably mounted a slotted socket carrying member 24 which may be of the same construction as the parent socket carrying member 108 except as will be presently explained. In the entire peripheral curved surface of the member 24 are cut spur gear teeth 27.

To mesh with these teeth, are mounted two spur gears 28 and 29 on shafts 30 and 31 suitably journaled in the cover plates 21 and 22 and spaced apart a distance exceeding the width of a slot 33 in the member 24. Mounted for operative engagement with both of the gears 28 and 29 is a drive gear 34, which preferably includes a body element 36 in which the teeth are cut, and two coaxial integral stub shaft elements 37, one at each end of the body. These stub shafts are journaled in holes in the cover plates 21 and 22. Extending through the stub shafts 37 and the body 36 coaxial therewith is a square hole 38 for receiving a squared end of a suitable crank arm tool (not shown) of well known construction for turning the gear 34 speedily when such is desired.

As explained in my said parent patent, one of the important features of the invention resides in the compact and rugged bearing support of the rotatable hub and socket carrying member. In all forms of the invention illustrated in the present application, it will be seen that the driving head and the driven hub are designed with complementary circular grooves and flanges which when nested, provide a maximum of both lateral and axial bearing support between the transverse planes defining the axial limits of the toothed portion of the hub.

For example, in Fig. 3, the upper end of the socket carrying hub 24 forms an upstanding circular flange 24*a* which is nested in a complementary circular groove 21*a* formed in the inner face of the fixed cover 21. The lower end of the hub is reduced in diameter and forms a socket carrying element 24*b* which extends through and is rotatably supported by a bearing opening 22*a* in the removable cover 22, with the shoulder 24*c* resting on the boundary of the opening.

The drive gear 34 and the intermediate gears 30 and 31 also lie between these same transverse planes so that the driven hub 24 and particularly the toothed portion 27 thereof, is afforded a maximum of support within the area which is subjected to the greatest stress.

It will be apparent from the remaining figures of the drawings that this same principle of bearing support is followed in all forms of the invention.

To enable a large size of socket (not shown) in the member 27 to be turned against heavy resistance of a rusted B nut, for example, the following described means may be provided: A worm 40 having threads for cooperative driving engagement with the gear 34 may be mounted loosely in the cavity on a shaft 41 having an end portion extending out from the body 20 on which may be mounted loosely a hollow shaft extension 42 having a squared end portion 43 for having attached thereto a hand crank device 44 of well known construction. The extension 42 may be held on the shaft 41 by any suitable means of well known construction. For transmitting power from the

crank 44 to the worm 40 the latter may have an integral stub shaft extension 46 to the outer end of which is an integral flange 47. Between a flange 48 on the inner end of the shaft extension 42 and the flange 47 may be disposed a friction drive device of well known construction which may include a spring member 51 and a suitable frictional power transmitting disc 52.

To enable the worm 40 to be rendered ineffective to prevent speedy operation of the socket carrying member the lower end (as viewed in Figure 1) of the worm may be pivoted to be swung away from the gear 34 by the following means: A collar member 53 secured on the shaft extension 42 is pivoted on two pins 54 journaled in the cover plates 21 and 22. The right end (as viewed in Figure 4) of the shaft 41 is mounted in a movable block member 56 disposed snugly between the cover plates 20 and 21 and is held firmly in a position to dispose the worm 40 in cooperative driving relation to the gear 34 by a bell crank control member 57 which holds the gear in operative position against the action of a spring 58. An arm 60 of the bell crank member extends outwardly of the body 20 to be operated manually. To limit the swinging movement of the worm 40 by the spring 58 and the block 56 the rear end of the cavity 23 may be constructed as shown in Figure 1.

It can be seen that by making the hand crank device 44 and a wrench handle 61 of suitable lengths, one in relation to the other, a person can conveniently hold the handle of the wrench body stationary with one hand while he operates the wrench with the other hand.

To accomplish that object of my invention which is the provision of a power driven split socket wrench, an embodiment of my invention as is illustrated in Figures 5 and 6 may be employed. A slotted wrench body 70 may have an integral cover plate portion 71 and a removable cover plate 72 enclosing a cavity 73 in which may be mounted a slotted rotatable socket carrying member 74 which may be of the same construction and mounting except as is hereinafter described, as the socket carrying member 24. Bevel gear teeth 76 are cut in all of the curved periphery of the member 74. Two bevel gear members 77 and 78 are each mounted on pintles 79 fast in the body 70 between the cover plates 71 and 72 so that gear teeth on the forward sides of these gear members mesh with the gear teeth 76 on the member 74. In the rear faces of the gear members 77 and 78 are cut bevel gear teeth with which mesh bevel gear teeth in a drive gear 81, the axis of which coincides with the long axis of a handle 82 integrally joined to the body 70. The gear 81 is integrally joined to a hollow stub shaft 83 the rear end of which projects rearwardly from an integral wall element 84 of the body 70 in the cavity 73. An apertured flange member 86 is pinned to the rear end of the shaft 83. The latter and the flange 86 are mounted loosely on the forward end of a shaft 87 which extends rearwardly through a lengthwise hole in the handle 82 and projects outwardly from the end of the handle. The projecting portion of the shaft 87 has a pin 88 therethrough for a connection of well known construction with a flexible shaft 89 which may be driven by an electric motor 91, or other suitable prime mover. An outer end portion 92 of the handle 82 is reduced in diameter and arranged with pin members 93 for cooperation in a well known way with the flexible shaft connection. Should a B nut (not shown) being turned by the motor driven wrench of Figure 5 be screwed up fast to the end of its travel, an excessive strain might result in the threads of the B nut, for example, if substantially the full power of the motor 91 has to be resisted by the threads at the moment they stop their operative turning movement. To prevent excessive strains in such an event on the B nut threads and any part of the wrench, I provide a slip clutch device between the shaft 87 and the gear 81. A friction disc 94 of well known construction is pressed against the flange 86 by a slip clutch spring member 96 of well known construction.

The spring 96 is ordinarily forced against the disc 94 by a collar 97 integrally joined to a sleeve 98 having a keyed slidable mounting on the shaft 87 to be rotatable therewith and movable lengthwise thereon. For pressing the collar 97 up against the spring 96, the sleeve 98 is made for receiving a shaft yoke member 99 of well known construction in which is fastened a pin 101.

Fastened loosely about the pin 101 is the forward end of one strut or leg 102 of a toggle-like device having another strut 103, one end of which is pivotally fastened to the rear end of the strut 102 by a pivot pin 104 which extends outwardly through an arcuate slot 106. The strut 103 is positioned against the outside face of the integral cover plate 71. The rear end of the strut 103 is pivoted about a screw 107 in the body 70. As can be seen by inspection of Figures 4 and 5, this construction provides a positive so-called broken-back toggle lock for maintaining the slip clutch means of the Figure 4 form of the wrench in operative condition.

To release the connection between the motor 91 and the socket carrying member 74 for turning the latter manually, it is only necessary to press on the head of the pin 104 and swing the toggle upwardly (as viewed in Figure 5).

In Figures 7 and 8 there is illustrated a form my invention may take which has certain advantageous features presently to appear. In this form, the construction of a slotted body 111 with an integral cover plate 112 and a removable cover plate 113, a slotted, toothed socket carrying member 114, and spaced apart spur gears 115 and 116 may be the same as disclosed hereinbefore for similar parts which enter into the construction of the Figure 1 form of my invention, except for a slight change in the form of the body 111 to be explained hereinafter.

For driving the spur gears 115 and 116, a gear 117 may be provided which has gear teeth which mesh with the teeth of the spur gears and which are drivenly engaged by two pawls 118 and 119 which may be of substantially the same construction and have a pinless mounting in a wall of a cavity 121 of approximately the same construction as is disclosed hereinbefore for the pawls of the Figure 17 parent form of my invention except as will presently appear. The pawls 118 and 119 are each mounted on opposite sides of the center line of the wrench and wrench handle 122. A pull spring 123 having one end fastened to one pawl and the other end to the opposite pawl, tends to move the pawls into operative engagement with the teeth of the gear 117.

To provide for only one pawl at a time to engage with the gear 117, a shift yoke device 124 may be provided and be of approximately the same operation and construction except to be narrower than the shift yoke of the Figure 17 parent form of my invention. For selectively moving the yoke 124, a lever device including a lever 126, a shaft 127 and another lever 128 outside the cavity 121 may be provided and be of substantially the same construction and operation as the corresponding elements of the Figure 17 parent form of my invention.

The gear 117 may be of approximately the same construction and mounting as the gear 34 and have a square recess axially positioned through it for receiving a speed wrench tool (not shown) of well known construction for operating the wrench when, for example, it is inconvenient to operate it by oscillating the handle 122 and rotating the socket carrying member 114 step by step.

In Figure 9, there is illustrated a form of wrench which embodies my invention and which is especially suitable for use where an extra strong torque force is required, for example, to start a nut that is "frozen," i. e., stuck very tightly on a pipe because of rust or other causes. In this form of wrench, a body 140 may have mounted thereon at one side of the center line of a handle 141 a socket carrying rotatable member 142. The mounting of the

member **141** may be substantially the same in construction as is described hereinbefore for the member 110 of the Figure 17 parent form of my invention except as is explained hereinafter. The body **140** may have a slot **143** at its forward side and the member may have a slot **144** of equal width made for aligning with the slot **143**. In the curved portion of the member **141** are provided gear teeth constructed for operative driven engagement by a worm **146** mounted at the side of the member **142** with its axis in coaxial relation to a shaft **147** mounted in the handle **141** and having one end portion 148 extend outwardly from the rear end of the handle for a connection (not illustrated) with a source of power. The shaft end portion **148** and the adjacent end portion of the handle **141** may be of the same construction as similar parts of the Figure 6 form of wrench described hereinabove. As a safeguard against stripping the threads of a B nut or the like when turning it by power applied through the worm **146**, this worm may be driven through a slip clutch or friction drive device generally designated in Figure 9 as **152** and being of substantially the same construction as the slip clutch drive described hereinbefore in connection with the form of my invention shown in Figures 5 and 6. Also, the slip clutch drive device **152** may be rendered inoperative by a manually operable toggle control device generally designated as **153** which may be of substantially the same construction and operated like the toggle device shown in connection with the wrench illustrated in Figures 5 and 6. The slip clutch device **152** and the toggle device **153** are disposed in a rearwardly positioned chamber of a cavity **154** in the body **140** which cavity chamber may be enclosed by a cover plate (not shown) fastened by screws to the body.

A device for stopping the rotation of the socket carrying member when the slots **143** and **144** are in alignment and such is desirable, a stop pin device generally designated as **156** may be of the same construction and operated like the pin 160 shown as an element of the wrench illustrated in Figure 16 of my parent application.

Although I have herein shown and described my invention in which I have conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of my 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.

I claim:

1. A socket wrench comprising a driving head having a recess opening onto one face thereof, the one wall of said recess having a circular hub receiving opening, a circular driven hub bounded by a series of peripheral teeth, mounted for coaxial rotation in said opening, a removable cover closing said recess, one end of said hub having a longitudinally extending circular coaxial flange, a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the inner face of one of the walls of said recess having a circular bearing groove, coaxial with the hub and rotatably nesting said flange, said nested flange and groove lying between transverse planes defining the axial limits of the toothed periphery of the hub, a coaxial bearing opening in the other cover adjacent said shoulder, for rotatably supporting said socket carrying extension, at least one drive gear in said recess, lying between said transverse planes and having teeth arranged for complementary engagement with the teeth of said hub, and means for rotating said driving gear.

2. An open-end socket wrench comprising a driving head having a circular hub receiving opening and an axial slot extending outwardly from the opening to the periphery of the head, a circular driven hub bounded by a series of peripheral teeth, mounted for rotation in the head, coaxially with the opening, a fixed cover integral with the head, closing one side of said opening, a removable cover closing the opposite side of the opening, one end of said hub having a longitudinally extending circular coaxial flange, a circular coaxial socket carrying extension on the opposite end of said hub, forming a radial shoulder thereon, the inner face of one of said covers having a circular bearing groove, coaxial with the hub and rotatably nesting said flange, said nested flange and the groove lying between transverse planes defining the axial limits of the toothed periphery of the hub, a coaxial bearing opening in the other cover adjacent said shoulder, for rotatably supporting said socket carrying extension, each of said covers having an axial slot registering with the slot in said head and said hub and socket supporting extension having contiguous slots extending the length thereof and registering with said first-named slots in one rotative position of said hub, a cavity in said head opposite the periphery of said circular opening, at least one drive gear in said cavity, lying between said transverse planes and having teeth arranged for complementary engagement with the teeth of said hub, and means for rotating said driving gear.

3. A socket wrench as claimed in claim 1, including a main driving gear and two intermediate driving gears, located in said recess and a power source connected to said main gear.

4. A socket wrench as claimed in claim 3, wherein said driving gears comprise a spur and worm gear system, the power source being connected to said worm gear.

5. A socket wrench as claimed in claim 3, wherein said driving gears comprise a spur and worm gear system, the power source being connected to said worm gear, and means for disengaging the worm gear, to enable hand operation of the spur gears.

6. A socket wrench as claimed in claim 3, including a slip clutch between the power source and main driving gear.

7. A socket wrench as claimed in claim 1 wherein said driving gear comprises a tangential worm gear, engaging the peripheral teeth of said hub, and a drive shaft directly connected to said worm gear.

8. In an open end ratchet wrench, a driving head having a circular opening therein and an axial slot extending outwardly from the opening to the periphery of the head; a hub member mounted for rotation in the head coaxially with the opening; an annular flange coaxially formed on said member at one end thereof; a circular extension formed on the opposite end of said member and providing a radial shoulder thereon, said head having a circular groove coaxial with the axis of rotation of the head nesting said flange; a plate secured to the head and engaging said shoulder, said plate having an opening receiving said extension and a side opening slot aligned with the slot in the head, said hub member having a side opening slot extending the length thereof and through said flange and extension and registering with the first named slots in one rotative position of said member; a plurality of teeth formed about said flange; means mounted within said head, including means engaged with said teeth, adapted when actuated to rotatably drive said driven member; and a single driven means mounted within said head adapted to be driven by an external power source and operatively interconnected with said last named drive means for actuating the same.

9. A wrench of the type described, comprising: a driving head having a recess formed in the one face thereof; the one wall of said recess having a circular opening leading to the opposite face of said head and an axial slot extending outwardly from said opening to the periphery of said head; a hub member mounted for rotation in the head coaxially with said opening and formed with a slot alignable with the slot in said head; an annular flange coaxially formed about said hub member, said head having annular wall means engageable and coacting with said flange for supporting and guiding said hub member during rotation thereof; a plate secured to said head for closing said recess and presenting wall

means engageable with said flange for augmenting the support and guiding action of said coacting flange and annular wall means; a plurality of teeth formed about said flange; drive means mounted within the recess of said body member engaging and coacting with the teeth of said flange and adapted when actuated to forcibly rotate said hub member relative to said body member; and a single driven means adapted to operatively interconnect an external power means and said last named drive means for actuating the same to rotatably drive said hub member.

10. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of peripheral teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange, the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; and means cooperative with said peripheral teeth to drive said hub, said cooperative means including a gear shiftable between an effective driving position and a release position to free said hub for rapid manual rotation independently of the shiftable gear.

11. A socket wrench as set forth in claim 10 in which said shiftable gear is a worm gear; and which includes a bearing for said worm gear, said bearing being movable to shift the worm gear to its release position.

12. A socket wrench as set forth in claim 11 in which said bearing is a pivotally mounted bearing collar.

13. A socket wrench as set forth in claim 10 which includes manually releasable latch means to hold said shiftable gear in its effective driving position.

14. A socket wrench as set forth in claim 13 which includes spring means urging said shiftable gear towards its release position.

15. A socket wrench as set forth in claim 10 in which said cooperative means includes: two gears engaging said peripheral teeth of said hub; a third gear in mesh with said two gears; and a worm gear, said worm gear being shiftable into and out of mesh with said third gear.

16. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of peripheral teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange, the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; means cooperative with said peripheral teeth to drive said hub, said cooperative means including a gear shiftable between an effective driving position and a release position to free said hub for rapid manual rotation independently of the shiftable gear; and means including a friction clutch to actuate said shiftable gear.

17. A socket wrench as set forth in claim 16 in which said shiftable gear is a worm gear on a shiftable shaft; and in which said friction clutch is on said shiftable shaft.

18. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of peripheral teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange, the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; means cooperative with said peripheral teeth to drive said hub; and means including a friction clutch to actuate said cooperative means.

19. A socket wrench as set forth in claim 18 which includes means to releasably hold said friction clutch disengaged.

20. A socket wrench as set forth in claim 18 which includes manually operable means to control said clutch, said control means including a toggle linkage movable past center to hold the clutch engaged.

21. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of bevel teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange; the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; a handle unitary with said driving head; bevel gear means engaging said bevel teeth to drive said hub; and means including a shaft extending through said handle longitudinally thereof to connect said bevel gear means with a power source.

22. A socket wrench as set forth in claim 21 in which said connecting means includes a friction clutch.

23. A socket wrench as set forth in claim 22 in which at least a portion of said friction clutch is on said shaft.

24. A socket wrench as set forth in claim 22 which includes means to releasably hold said friction clutch disengaged.

25. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of peripheral teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange, the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; and means cooperative with said teeth to drive said hub, said cooperative means including a toothed rotary means and pawl means carried by said driving head in actuating engagement with said rotary means.

26. A socket wrench as set forth in claim 25 which includes: two pawls to actuate said rotary means in opposite directions; spring means to urge said pawls into actuating engagement with said rotary means; and means to hold said two pawls selectively out of engagement with said rotary means.

27. A socket wrench comprising: a driving head having a recess therein with a circularly curved peripheral

wall and with two walls at opposite ends of the recess, one of said end walls being removable for access to the recess; a circular driven hub having a circular series of peripheral teeth and mounted for coaxial rotation in said recess, one end of said hub having a longitudinally extending circular coaxial flange, the inner face of one of said end walls of said recess having a circular bearing groove coaxial with the hub and rotatably nesting said flange; a circular coaxial socket carrying extension on the opposite end of said hub forming a radial shoulder thereon, the other of said end walls of the recess having a bearing opening coaxially of the recess adjacent said shoulder for rotatably supporting said socket carrying extension; a worm gear positioned tangentially of said hub in engagement with the teeth thereof; a handle unitary with said driving head and aligned longitudinally with the axis of said worm gear; and means to connect said worm gear with a power source, said connecting means including a shaft operatively connected with said worm gear and extending through said handle longitudinally thereof.

28. A socket wrench as set forth in claim 27 in which said means to connect the worm gear with a power source includes a friction clutch.

29. A socket wrench as set forth in claim 28 in which said friction clutch includes a clutch element on said shaft.

30. A socket wrench as set forth in claim 28 which includes means to releasably hold said clutch disengaged.

References Cited in the file of this patent

UNITED STATES PATENTS

735,134	McLean	Aug. 4, 1903
1,536,157	Slack	May 5, 1925
1,802,210	Kinser	Apr. 21, 1931
2,305,624	Lange et al.	Dec. 22, 1942
2,366,859	Koza	Jan. 9, 1945
2,481,578	Dixon	Sept. 13, 1949
2,556,536	Harris	June 12, 1951
2,558,897	Akins	July 3, 1951