June 21, 1955 A. J. BRAME 2,711,111

POWER OPERATED RATCHET WRENCH

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Fig. 1.

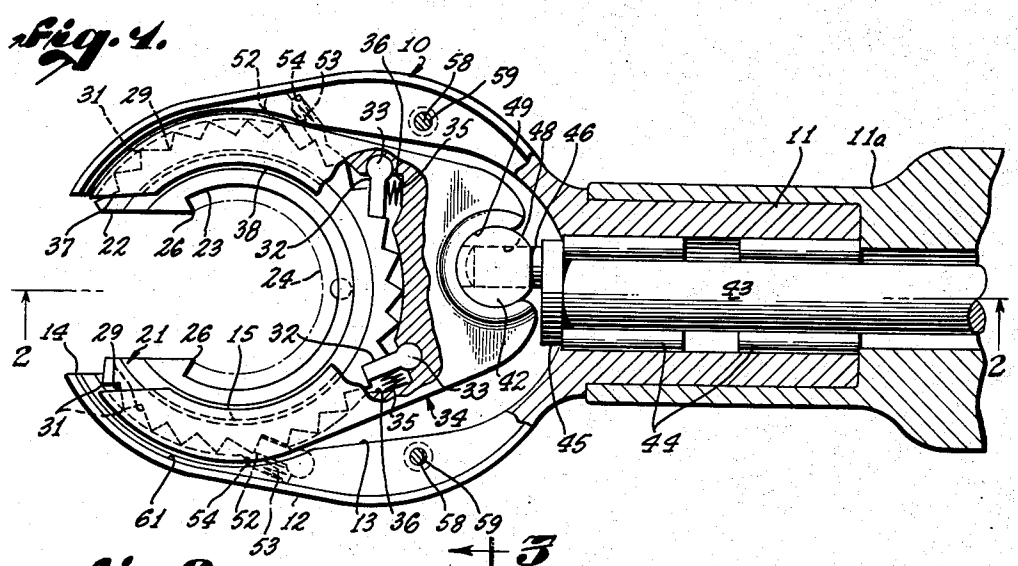


Fig. 2.

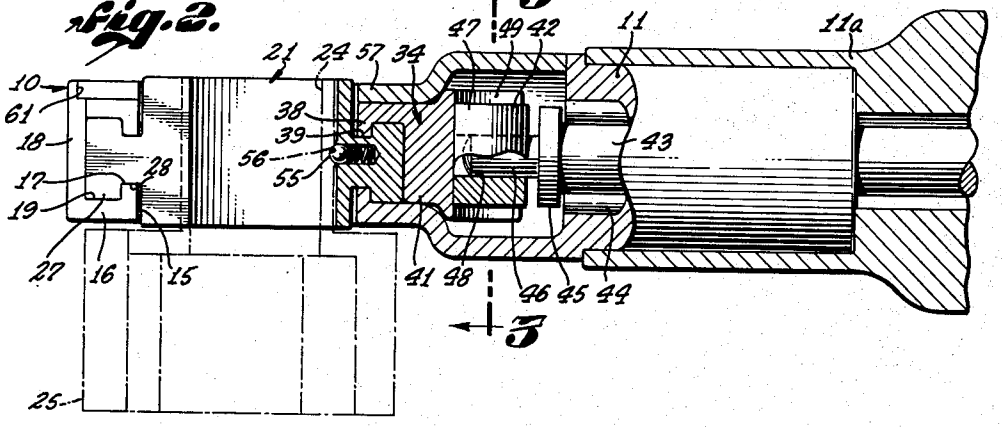
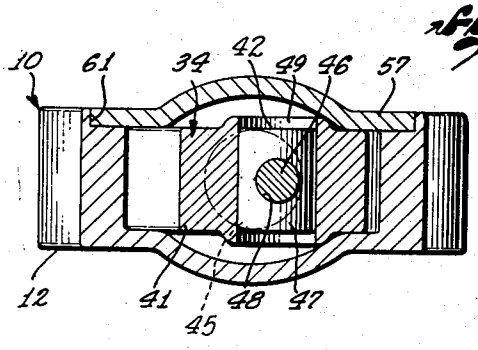


Fig. 3.



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Fig. 4.

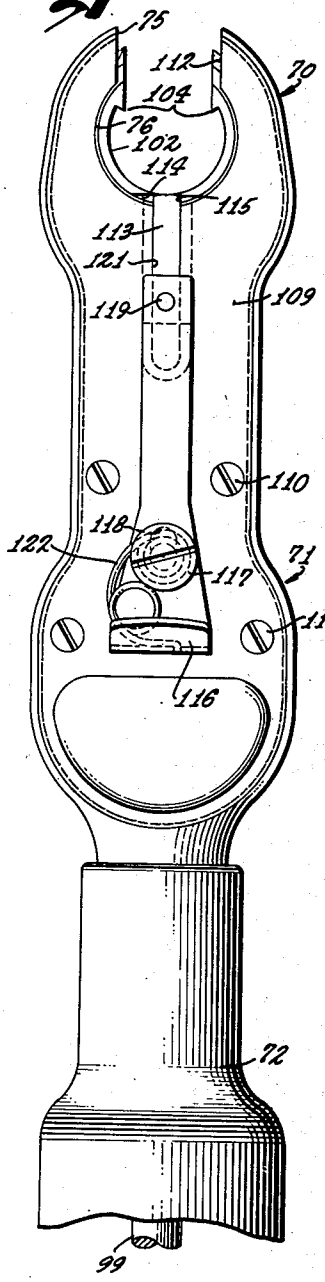


Fig. 5.

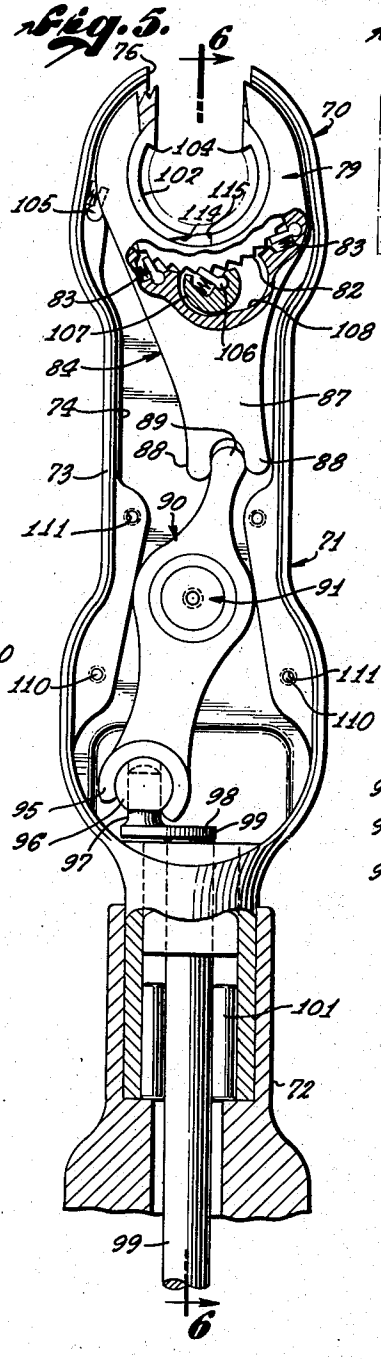
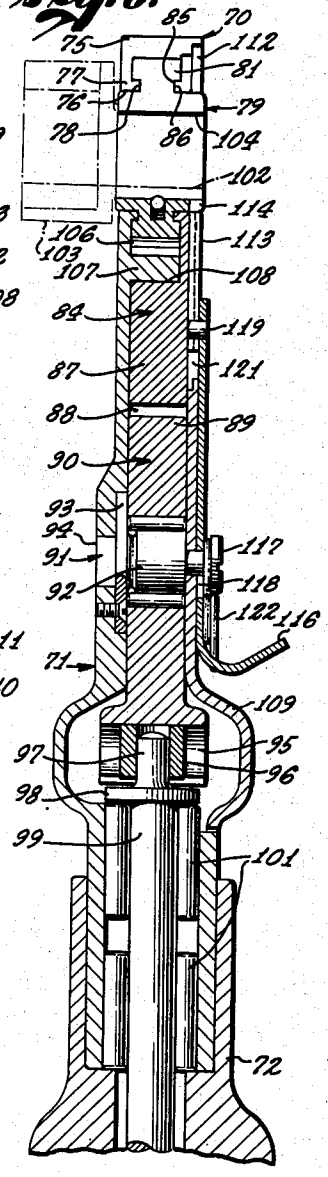


Fig. 6.



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United States Patent Office 2,711,111
Patented June 21, 1955

2,711,111

POWER OPERATED RATCHET WRENCH

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Application July 29, 1953, Serial No. 371,063

10 Claims. (Cl. 81—58.2)

This invention relates to power operated wrenches and more particularly to a power operated wrench of the split socket type such as shown in my co-pending application, Ser. No. 313,728.

Power operated wrenches of different types have been heretofore proposed, but have not been universally adopted for several reasons. Such wrenches as have been proposed have been either of the closed or boxed type and coulding not be moved laterally over the member to be turned or, if of the open end type, have been either too bulky for the closest types of work encountered or were susceptible to deformation under heavy loads.

A further criticism of prior power driven wrenches has been raised by many users in that the drive means for actuating the member engageable with the element to be turned has not been positive in action or broke down under high stresses to which this type of tool is often subjected.

The power wrench of the present invention, in the broadest aspects thereof, comprises a universally adjustable wrench having a head member of small compass, but yet of high strength to provide a socket retaining member which is light in weight but yet capable of withstanding the unusually high stresses to which, as above mentioned, this type of tool is often subjected. The socket retaining member is rotatably driven by a ratchet and pawl drive means which coacts with the head member to mount and support the socket retaining member, as well as to reinforce the same in all positions thereof during use of the wrench.

The ratchet and pawl drive means of the wrench of the present invention is one which will take relatively high loadings and the load capacity is not limited to the shear strength of the means used to pivotally mount the pawls. The drive means is such that a high force positive drive is converted into a relatively high torque couple in the socket retaining member.

The pawl and ratchet drive means is actuated from an external power source of any conventional type capable of producing a rotary force which serves through a transmission means to operate in timed relation the pawl and ratchet drive for the socket retaining member. The drive means is not only positive in action, but is capable of converting the positive drive into a relatively high torque couple throughout a long service life.

To insure the positive drive, the transmission means is such as to actuate the drive in the alternate directions necessary to produce the required torque couple in the socket retaining member. In other words, no resilient return means, which might fail or deteriorate in use, are used to actuate the drive. Thus the service life of the wrench of the present invention is prolonged and with little or no maintenance expenditures under normal uses.

In one embodiment of the ratchet drive, a pair of pawls are pivotally secured to a carrier member which coacts with the head to mount and support the socket retaining member and to reinforce this member in all rotative positions of adjustment thereof. The carrier is arcuately moved to bring about the desired timed relation of the

drive through an eccentric cam element engageable with follower means forming a part of the pawl carrier. This cam element is driven from a rotary shaft and through the follower means of the carrier arcuately moves the latter in the alternate directions necessary to produce the torque couple in the socket mounting member.

In another embodiment of the wrench herein illustrated, the carrier member of the transmission means is actuated to produce the positive drive by a mechanism amplifying the output of the power source. This amplifying mechanism includes a lever means provided with a cam element engageable with the carrier to arcuately move the latter in the alternate directions necessary to produce the torque couple in the socket mounting member. The amplifying mechanism of the transmission means in no way complicates the operative elements of the wrench and all stresses created by this mechanism are taken by the body element of the wrench.

The external power means used to actuate the wrench forms no part of the present invention and may be any conventional power source desired. In the illustrated embodiments of the wrench herein shown this power source is preferably one which will rotatably drive a shaft which forms a part of the transmission means for actuating the pawl and ratchet drive.

Other features and advantages of the present invention will be hereinafter apparent from the following description, particularly when taken in connection with the accompanying drawing, in which

Figure 1 is a view partly in section and partly in elevation of one embodiment of the wrench of the present invention;

Figure 2 is a section taken along line 2—2 of Figure 1;

Figure 3 is a section taken along line 3—3 of Figure 2;

Figure 4 is a top plan view of a modified form of the wrench of the present invention;

Figure 5 is a view partly in elevation and partly in section of the embodiment of the wrench shown in Figure 5; and

Figure 6 is a section taken along line 6—6 of Figure 5.

The wrench of the present invention, and more particularly the embodiment of Figures 1 through 3, comprises a head element 10 generally oval in cross sectional shape and a support element 11 for mounting a handle, a portion of which is shown at 11*a*. The support element 11 preferably is formed integral with a body member 12 forming a part of the head element 10, although, if desired, this element can be formed separate from the body member 12 and assembled therewith.

The body member 12, in the illustrated embodiment of this form of the wrench of the present invention, is formed as a casting presenting a concavity 13 for receiving the operative members of the wrench. A slot 14 opens into the concavity at the one end of the body member, as best seen in Figure 1, and the inner end of the slot is enlarged to form a circular opening or bore 15 extending through the body member 12. The wall 16 of the body member 12 is formed with an arcuate flange 17 inwardly extending and concentric with the bore 15. This flange, as shown in Figure 2, coacts throughout the extent thereof with the wall 18 of the body member 12 to form an annular groove 19 concentric with the flange 17 and consequently the bore 15 of the body member 12.

Rotatably mounted within the bore 15 is a hub or ratchet member 21 formed with a slot 22 of a width substantially equal to the width of the slot 14 and communicating with a longitudinally extending bore presenting an arcuate internal wall surface 23. The hub or ratchet member 21 forms a socket member retaining means for the surface 23 thereof is adapted to engage the complementary surface of a shank 24 of a selected socket member 25. The surface 23 terminates at the

opposite edges of the slot 22 in driving elements 26, each formed with a radially extending driving face adapted to facewisely engage a complementary face of the shank 24 of the socket member mounted to the wrench. As should now be seen, rotation of the hub 21 through the inter-engagement of the faces of the driving elements 26 and the shank 24 will rotatably drive the socket member 25.

The hub or ratchet member 21 is formed, as best seen in Figure 2, with an annular shoulder or flange 27 complementary to the groove 19 of the body member. The hub is also provided with an annular groove 28 which receives the flange 17 of the wall 16 of the body member. It will thus be seen that the inter-nested flange and groove assembly just described mounts and supports the hub 21 for rotative movement about an axis coincident with the longitudinal axis of the bore 15. The inter-engaging walls of the flanges and grooves not only guide the hub during this rotative movement, but, as will be hereinafter more fully explained, also reinforces the hub against stresses encountered in the use of the wrench.

The flange 27 of the hub 21 is provided with full-width notch-like grooves 29 and teeth 31 circumferentially spaced about the entire unslotted periphery of the flange 27. The grooves 29 and teeth 31 extend in a direction parallel to the longitudinal axis of the bore 15 and form a part of the transmission means of the wrench of the present invention. The teeth 31 are engaged by a plurality of pawls, at least a pair of which are indicated by the reference character 32. The pawls 32 are formed with terminal portions 33, generally cylindrical in shape, each received within bores formed in a carrier 34 mounted within the concavity 13 for arcuate movement about an axis coincident with the longitudinal axis of the bore 15.

The pawls 32 are normally urged into engagement with the teeth 31 by coil springs 35 received within small recesses 36 formed in the carrier 34 adjacent the bores receiving the terminal portions 33 of the pawls. It will be seen that the orientation of the pawls 32 is such that rotation of the hub is permitted in only one direction. In order to reverse the direction of effective rotation of the hub and, therefore, of the socket member 25, it is necessary, as will be later understood, to merely reverse the relative position of the socket 25 mounted to the hub 21.

The carrier 34 is formed with a slot 37 of a width substantially equal to the width of the slot 14 and this slot is enlarged at the inner end thereof to form a circular opening defined by an arcuate flange 38 which is slidably received within an annular groove 39 formed in the hub 21 at the root portion of the flange 26 opposite to the groove 28. It will thus be seen that the flange 38 of the carrier 34 also acts to support and guide the hub member 21 and thus coacts with the flanges 17 and 26 to reinforce the hub 21 in all rotative positions of adjustment thereof.

The carrier 34 is also formed with a large arcuate flange 41 depending from the portion thereof opposite to the slot 37, the one edge face of which bears against and engages the inner surface of the wall 16 of the body member 12. This flange acts to properly space the carrier 34 within the concavity 13 and positions the carrier 20 as to insure the desired coaction with the hub 21.

It should now be seen that by arcuately moving the carrier 34 in alternate directions, the pawls 32 will rotatively drive the hub 21 and consequently the socket member 25 mounted thereto. In the illustrated embodiment of the wrench now being described, this alternate movement of the carrier 34 is effected through an eccentric cam 42 carried at the one end of a rotary shaft 43 coaxially mounted within the handle element 11 by suitable bearing members 44. Fixed to the inner end face of the shaft 43 is a small plate 45 which carries a projecting pin 46 mounted eccentric to the axis of rotation of the shaft 43. The cam 42, here shown as a hardened rod-like element presenting an external cylindrical surface 47, is formed with a blind bore 48 slidably receiving the pin 46. Thus the pin 46 mounts the cam 42 to the shaft 43 for movement in a circular path about a center fixed by the shaft 43. The cam 42 is operatively connected to the carrier 34 by its reception in a follower member 49 comprising a bearing element presenting an external cylindrical wall surface partially embracing the cam 42.

The follower member 49 has a longitudinal extent greater than the length of the cam 42 and is formed with a slot passing the pin 46. As the shaft 43 is rotatably driven to move the pin 46 in its circular path concentric with the shaft 43, the cam 42 reciprocally moves within the follower member and also moves arcuately about an axis coincident with the longitudinal axis of the follower member. This compound movement of the cam produces, as should now be seen, arcuate movement of the carrier 34 in alternate directions to bring about the intermittent drive action of the pawls 32 engaged with the teeth 31 of the hub 21.

The transmission means formed by the cam 42 and its operative connection with the follower member 49 positively moves the carrier 34 intermittently about a center coincident with the axis of the bore 15. The drive of the carrier is, therefore, positive in action and does not depend upon any resilient elements for effecting return movement of the carrier after it has been moved to one of its alternate positions by the cam. The operative connection between the carrier and the cam, because of the large surface contact engaged, gives a long service life and does not present any high pressure areas subject to extensive wear.

To hold the hub 21 against inadvertent return movement by the frictional drag of the pawls 32, as they freely ratchet over the teeth 31, a pair of holding pawls 52 are pivotally mounted to the body member 12 and these pawls are normally engaged with the teeth 31 under the urging of the springs 53 seated within the recess 54 formed in the body member 12. The pawls 52 will act to hold the hub against rotative movement in a direction opposite to the drive movement produced by the pawls 32 as the carrier 34 is moved through the action of the cam 42. The pawls 52, as should now be appreciated, are merely holding pawls and will freely ratchet as the hub is driven by the pawls 32, yet are effective to hold the hub against movement as the carrier moves the pawls 32 in their inoperative cycle of the drive.

As above explained the pawls 32 are so oriented as to drive the hub 21 in but one direction and with the socket mounted as shown in Figures 1 and 2 the socket would be driven in a clockwise direction as viewed in Figure 1. To reverse the drive of the socket 25, it is only necessary to slidably disengage the shank 24 of the socket 25 from the hub 21 and then remount the shank in the opposite side of the hub from that illustrated in Figure 2.

To hold the shank 24 in either of the two positions on the hub 21 some friction detent means, such as the spring pressed ball detent 55, may be employed. To increase the holding action of the detent a groove 56 may be formed about the shank 24 for receiving the ball 55 when the shank 24 is properly mounted in either of the two positions on the hub 21.

The operative parts of the wrench are held in the concavity 13 by a face plate 57 mounted to the body member by mounting screws 58 passed through openings in the plate 57 and threadedly engaged in tapped bores 59 formed in the thickened wall portion of the body member 12. This thickened wall portion is formed with a shoulder 61 which extends forwardly to the slot 14 and forms a face against which the cover plate 57 is clamped as the screws 58 are tightened. The cover plate

57 is formed, as shown, with a circular opening for passing the one end of the hub member 21 and this opening communicates with a slot which as shown in Figure 1 registers with the slots formed in the hub and body member.

The plate 57 acts merely as a cover element and carries little, if any, stress during the use of the wrench. Actually the only forces taken by this plate are those forces which would be carried thereinto through longitudinal movement of the hub 21. The body member 12 takes, therefore, substantially all of the forces induced in the wrench in use and these forces are transmitted from the hub into the body member 12 through the interengaging flange and groove assembly hereinabove described. Torsional forces applied through the socket member are taken in part by the pawl carrier 34 through the action of the flanges 38 and 41 and this carrier, in addition to its coaction as a part of the transmission means, also serves to reinforce the hub 21 in the use of the wrench.

It should now be seen that the wrench of the present invention, although the over-all dimension is maintained at a minimum, nevertheless is capable of taking extremely high stresses. All high stress loadings have been eliminated through the inter-engaging flange and groove assemblies and the particular transmission means used to transmit the high torque couple to the socket member.

Although it has not been heretofore mentioned, the shaft 43 can be driven by any suitable external source of power such as an electric motor, a pneumatic system, or even hand driven through a suitable hand crank and gear train.

There is shown in Figures 4 through 6 a modified form of the wrench of the present invention which differs from the earlier described embodiment principally in the provision of a means for increasing the torque couple in the socket member. This embodiment of the wrench comprises a head element 70 and a support element 71 for mounting a handle 72, the element 71 being formed preferably as an integral part of the body member 73 of the head element 70. The body member 73 is elongated as compared to the body member of the previously described embodiment, but like the body member 12 is formed with a concavity indicated at 74, for receiving the operative members of the wrench. A slot 75 opens into the body member and the inner end of this slot is enlarged to form a circular opening or bore 76 extending through the transverse wall of the body member. The body member carries an arcuate flange 77 concentric with the opening 76, which flange is slidably mounted within an arcuate groove 78 of a slotted hub member 79 substantially identical to the hub member 21 of the first described embodiment of the wrench. The hub 79 is provided with an annular flange 81 complementary to an arcuate groove formed in part by the flange 77, as clearly illustrated in Figure 6.

It will be again seen that this embodiment of the wrench also includes the internested flange and groove assembly for rotatably supporting the hub 79 and for reinforcing the hub as it is rotatably driven in the use of the wrench.

The flange 81 of the hub 79 is also provided with equally spaced teeth 82 which are circumferentially spaced about the entire unslotted periphery of the flange. In this form of the invention the teeth 82 are engaged by a pair of spring pressed pawls 83, identical to the pawls of the first described form of the wrench, pivotally mounted in a carrier 84. The carrier 84 acts through an inturned arcuate flange 85 engaged in a groove 86 formed in the flange 81 to guide and reinforce the hub 79 in the same manner as did the carrier 34. The carrier 84 is formed with a slot opening into a circular opening identical to the slot and opening of the carrier 34 and terminates at the inner end in a spacer member 87 having a thickness substantially equal to the depth of

the concavity 74. The lower face of this spacer member facewisely engages the inner surface of the transverse wall of the body member 73 and acts to properly mount the carrier 84 within the head element 70.

The carrier 84 is bifurcated at its inner end as clearly shown in Figure 5 to form a pair of spaced follower elements 88 adapted to engage a cam 89 formed on the one arm of a lever member 90 which is pivotally mounted intermediate its ends by a bearing assembly 91 including stationary journal 92 carried by a plate 93 fixed in a recess formed in the transverse wall of the body member 73. Although the plate 93 is held in the recess by the fastening elements shown in Figure 6, these fastening elements carry no shear loads for the plate 93 is formed with a relatively short, high strength shear member 94 which is mounted in an aperture formed in the transverse wall of the body member 73. It will be seen that the member 94 will take the shear loads created by the rocking movement of the member 90 as it is alternately moved to actuate the carrier 84 to produce the intermittent drive of the hub 79.

The lever member 90, at the end opposite to the cam 89, is fitted with a bearing member 95 identical to the bearing or follower member 49 of the previously described embodiment of the wrench. This bearing element receives a cylindrical cam element 96 into a transverse bore of which is fitted a pin 97. The pin is carried by a plate 98 eccentrically mounted to the end of a shaft 99 rotatably supported through bearing assemblies 101 coaxially with the handle supporting element 71. The action of the transmission means formed by the plate 98, pin 97, cam 96 and bearing 95 is identical to the action of the transmission means previousiy described and as this action should now be clearly understood, it will not again be described.

It should now be seen that as the shaft 99 is rotated the lever element 90 will be alternately swung about its pivot to arcuately move in alternate directions the carrier 84 through the coaction of the cam 89 and the follower elements 88 of the carrier. As the carrier 84 is arcuately moved in a clockwise direction, as viewed in Figure 5, the pawls 83 engaged with the teeth 82 drive the hub 79 in a clockwise direction. This rotational drive is transmitted to the hub 102 of the socket 103 through the engagement of the drive elements 104 of the hub with the drive facer of the shank of a socket as in the previously described form of the invention.

It will be seen that the lever member 90 acts to amplify the forces created as the shaft 99 is rotated. This is so for the moment arm formed by the longitudinal extent of the lever member 90 between the follower bearing 95 and the pivot axis established by the journal 92 is greater than the arm formed by the extent between this axis and the cam 89. It should also be seen that by varying the ratios of the lengths of the moment arms it is possible to change the amount of amplification of the force induced into the carrier 84.

To prevent return movement of the hub 79, as the pawls 83 drag over the teeth 82 on the return movement of the carrier 84, holding pawls 105 and 106 are provided. Pawl 105 as clearly shown in Figure 5 is mounted to the one wall of the body member 73, while pawl 106 is mounted to a boss 107 upstanding from the transverse wall of the body member 73. The carrier 84 is formed with an elongate slot 108 to provide clearance for the boss 107 as the carrier is arcuately moved in the use of the wrench. Both pawls 105 and 106 are spring urged into engagement with the teeth 82 and are operative to prevent movement of the hub in a counterclockwise direction under the frictional drag of the pawls 83 as the carrier is moved toward its position of Figure 5.

A closure plate 109 is mounted to the body member 73, to complete the head element 71 of the wrench, by a plurality of machine screws or similar fasteners 110

threaded into tapped bores **111** formed in the body member **73**. This closure plate **109**, like the closure plate **57** of the earlier described embodiment, is formed with a slot **112**, substantially registering with the slots of the body member **73** and carrier **84**, and a circular opening passing the one end of the hub **79**.

In this embodiment of the wrench the plate **109** mounts a detent finger **113** slidably received in a groove formed in the inner face of the plate **109**. The detent finger **113** is adapted to be slidably moved to engage in a notch **114** formed in the hub **79** to lock the hub against rotation in a position in which the slot of the hub is substantially aligned with the registering slots of the body member **73**, carrier **84** and the plate **109**.

The notch **114**, as best shown in Figure 5, gradually increases in width from the outer periphery of the hub to present a radially extending shoulder **115** which forms a stop limiting movement of the hub when engaged with the extending end of the detent finger **113**. The detent finger **113** is longitudinally moved in the groove through an actuator **116** slidably mounted to the exterior face of the plate **109** by a fastener **117** passed through a slot **118** and anchored to the journal **93** of the bearing assembly **92**.

The actuator **116** also carries a pin **119** which projects through a slot **121** formed in the cover plate **109** and is secured to the detent finger **113** by any means desired. The slots **118** and **121** are longitudinally aligned, as clearly shown in Figure 4, and serve as guide means for the actuator **116** as it is moved to extend the detent finger **113** into engagement with the hub for reception in the notch **114** and engagement with the stop shoulder **115**.

If desired a small torsional spring **122** may be interconnected between the actuator **116** and the fastener **117** to normally urge the actuator downwardly, as viewed in Figure 6, to position the detent finger **113** in an inoperative position relative to the hub **79**. The spring **122**, however, will permit the actuator to be moved upwardly, as viewed in Figure 6, to extend the detent finger **113** for reception in the notch **114** and engagement with the stop shoulder **115**.

The detent and actuator assembly just described serves, as should now be understood, as a means for "parking" the hub and socket secured thereto in a position in which the slots are substantially aligned so that the wrench can be moved laterally over a B nut or the like securing a tubular member.

Although not shown some clutch release means would be provided between the external power source and the shaft **99** for disengaging the shaft **99** from the power source when the detent finger **113** was moved into engagement with the stop shoulder **115**. This clutch release mechanism could be one which could be manually operated at the time the user of the wrench actuated the detent finger **113** to "park" the hub in the position above described.

Obviously if a closed end wrench of the general type shown in my co-pending application Ser. No. 313,727, was desired, there would be no need for any "parking" mechanism such as just described. This is so for in such wrenches no slots would be provided in the housing and hub member as in the illustrated embodiment of the present invention.

It should be further understood that the present invention may also be embodied in a closed end wrench in which no replaceable nut engaging socket was necessary, for it would be possible to form the hub itself with a hex opening for receiving the nut or other member to be turned. It is possible to convert each of the embodiments of the wrench herein illustrated into a box or closed end wrench by merely removing the hub, after the pawl carrier has been lifted from the recess, and substituting a hub peripherally formed with ratchet teeth and in which there is formed a bore hexagonal in cross section.

As the pawl carrier and hub are each removable from the recess by merely lifting the same upwardly, the operation of interchanging hubs is a relatively simple one and requires no tools other than a screw driver for removing the fastening elements holding the cover plate to the housing.

Although the now preferred embodiments of the present invention have been shown and described herein, it is to be understood that the invention is not to be limited thereto, for it is susceptible to changes in form and detail within the scope of the appended claims.

I claim:

1. A wrench of the type described, comprising: a head having a work receiving opening; a socket retaining member; support means for mounting said member on said head for rotative movement; means for replaceably mounting a nut engaging socket to said member for rotative movement therewith; an annular series of ratchet teeth formed on said member; a pair of pawls; a carrier member at least partially circumscribing said member and engaged therewith thereby to reinforce said member; said carrier member being mounted for oscillatory movement on said head in an arcuate path concentric with said annular series of ratchet teeth; means for pivotally mounting said pawls to said carrier for engagement with said ratchet teeth; a shaft rotatably supported by said head and adapted to be driven from an external power source; and transmission means operatively interconnecting said shaft and said carrier member for arcuately driving the latter in alternate directions as said shaft is rotatably driven to cause said pawls engaged with said ratchet teeth to intermittently rotate said socket retaining member and the socket mounted thereto.

2. A wrench of the type described, comprising: a head; a hub; means carried by said hub and interengaging with means on said head for supporting said hub on said head for rotative movement; an annular series of ratchet teeth formed on said hub; pawl means; a pawl carrier; means partially carried by said head and partially carried by said hub coacting with means on said carrier for mounting the latter for oscillatory movement in a path concentric with said annular series of ratchet teeth, said mounting means coacting with said interengaging means to reinforce said hub during rotation thereof; means for pivotally mounting said pawl means to said carrier; resilient means holding said pawl means in engagement with said ratchet teeth; an eccentric rotary cam mounted on said housing and engaging said carrier; and shaft means adapted to be connected to a power source for rotating said cam whereby said carrier is arcuately moved in alternate directions to cause said pawl means, engaged with said ratchet teeth, to rotatably drive said hub.

3. A wrench of the type described, comprising: a head; a socket retaining member; support means for mounting said member on said head for rotative movement; means for replaceably mounting a nut engaging socket to said member for rotative movement therewith; an annular series of ratchet teeth formed on said member; a pair of pawls; a carrier member means mounting said carrier member on said retaining member for oscillatory movement relative to said head in an arcuate path concentric with said annular series of ratchet teeth, said mounting means including interfitting flange and groove means mutually reinforcing said retaining member; means for pivotally mounting said pawls to said carrier for engagement with said ratchet teeth; transmission means operatively connected to said carrier member for arcuately driving the same in alternate directions to cause said pawls engaged with said ratchet teeth as said carrier member is driven in one of said alternate directions to rotatably drive said socket retaining member and the socket mounted thereto; and pawl means carried by said housing and engageable with said teeth for holding said socket retaining member against movement

as said carrier member is driven in the other of said alternate directions.

4. A wrench of the type described, comprising: a head; a hub; means carried by said hub and interengaging with means of said head for mounting and supporting said hub on said head for rotative movement; an annular series of ratchet teeth formed on said hub; a pair of pawl means; a pawl carrier element; means for mounting said element for arcuate movement on said hub in a path concentric with said annular series of ratchet teeth; means for pivotally mounting said pawl means to said carrier element; resilient means holding said pawl means in engagement with said ratchet teeth; cam follower means spacedly carried by said element; an eccentric rotary cam mounted on said head and engaging said follower means; and means, including shaft means adapted to be rotatably driven from an external power source, for rotating said cam whereby said carrier element is arcuately driven to cause said pawl means, engaged with the ratchet teeth, to rotatably drive said hub.

5. A wrench, comprising: a housing having a work-receiving opening; a hub element having concentric grooves on opposite faces thereof; flange means carried by said housing and received within one of said grooves for mounting said hub to said housing for rotative movement; means forming a driving connection between a replaceable nut engaging socket and said hub whereby said socket is rotatably driven with said hub; a plurality of ratchet teeth circumferentially formed about said hub concentric with said grooves; a pawl carrier; flange means carried by said pawl carrier and received within the other of said grooves for mounting said carrier to said hub element for arcuate movement in a path substantially concentric with said ratchet teeth; a pair of pawl means carried by said pawl carrier spaced circumferentially of said hub and engageable with said teeth; and means, including means adapted to be connected to an external power source, for positively driving said pawl carrier in alternate directions for intermittently engaging said pawl means with said teeth to drive said hub and the socket mounted thereto.

6. A wrench, comprising: a housing having internal wall means presenting a recess, with the one wall means thereof formed with a circular opening; a hub element mounted for rotation in said recess coaxially with said opening; flange means coaxially carried by said hub and having concentric grooves at opposite sides thereof; arcuate flange means extending about said opening and slidably received within one of said grooves for guiding rotational movement of said hub; a plurality of ratchet teeth circumferentially formed about said flange means concentric with said grooves; a pair of pawls; a pawl carrier; flange means carried by said pawl carrier and slidably received within the other of said grooves for mounting said carrier within said recess for arcuate movement in a path concentric with said ratchet teeth; means mounting said pawls to said carrier for engagement with said ratchet teeth; a rotary cam mounted eccentrically within said recess; spaced follower means formed on said carrier and engaged with said cam on opposite sides thereof; and means for rotating said cam to alternately urge said followers in opposite directions whereby said carrier is arcuately moved in alternate directions to cause said pawls engaged with the ratchet teeth to intermittently drive said hub element and the nut engaging socket mounted thereto.

7. A wrench, comprising: a housing formed with a circular opening; a hub element mounted for rotation on said housing coaxially with said circular opening; a circular coaxial flange carried by said hub and presenting concentric grooves at opposite sides thereof; flange means carried by said housing extending about said circular opening and slidably received within one of said grooves for guiding rotational movement of said hub; a plurality of ratchet teeth circumferentially formed on said coaxial flange; a pair of pawls; a pawl carrier; flange means carried by said pawl carrier and slidably received in the other of said grooves for mounting said carrier to said hub element for arcuate movement in a path concentric with said ratchet teeth; means for pivotally mounting said pawls to said carrier for engagement with said ratchet teeth; and transmission means for driving said carrier in alternate directions including a rotor mounted eccentrically within said recess and engaged between spaced follower means formed on said carrier whereby rotation of said rotor arcuately moves said carrier in alternate directions to cause said pawls engaged with the ratchet teeth to intermittently drive said hub element and the nut engaging socket mounted thereto.

8. A wrench, comprising: a housing having internal wall means presenting a recess, with the one wall means thereof formed with a circular opening; a hub element mounted for rotation in said recess coaxially with said circular opening; a circular coaxial flange carried by said hub element and presenting concentric grooves at opposite sides thereof; flange means carried by said wall means arcuately extending about said circular opening and slidably received within one of said grooves for guiding movement of said hub element during rotation of the same; a plurality of ratchet teeth circumferentially formed on said coaxial flange concentric with said grooves; a pair of pawls; a pawl carrier; flange means carried by said pawl carrier and slidably received within the other of said grooves for mounting said carrier for arcuate movement in a path concentric with said ratchet teeth; means for pivotally mounting said pawls to said carrier for engagement with said ratchet teeth; an eccentric rotary cam mounted within said recess; spaced follower means formed on said carrier and engaged with said cam; means for rotating said cam whereby said carrier is arcuately moved in alternate directions to cause said pawls engaged with the ratchet teeth to intermittently drive said hub element and the nut engaging socket mounted thereto; and means fixed to said housing for closing said recess and engaged with said pawl carrier for holding the flange means thereof in said one groove and for holding said hub element against movement disengaging the flange means of said housing from the other of said grooves.

9. A wrench of the type described, comprising: a head having an opening therethrough; a hub element; guide means carried by said hub element and coacting with guide means formed internally of said head for mounting and supporting said hub element on said head for rotative movement; an annular series of ratchet teeth circumferentially formed about said hub; a carrier member; means coaxially formed on said hub element and interengaging with means coaxially formed on said carrier member for mounting and supporting said carrier member within said housing for arcuate movement in a path substantially concentric with said ratchet teeth; at least one pawl pivotally carried by said carrier member and spring biased into engagement with said teeth; means, including means for arcuately moving said carrier member in alternate directions, for intermittently engaging said pawl with said ratchet teeth as said carrier member is moved in one direction to intermittently drive said hub element; and at least one pawl pivotally mounted within said head and spring biased into engagement with said ratchet teeth for holding said hub element against rotation as said carrier member is moved in the other direction.

10. A wrench of the type described, comprising: a head having an opening therethrough; a hub element; guide means carried by said hub element and coacting with guide means formed internally of said head for mounting and supporting said hub element on said head for rotative movement; an annular series of ratchet teeth circumferentially formed about said hub; a carrier member; means coaxially formed on said hub element and

interengaging with means coaxially formed on said carrier member for mounting and supporting said carrier member within said housing for arcuate movement in a path substantially concentric with said ratchet teeth, the last named interengaging means coacting with said guide means for reinforcing said hub element in all rotative positions thereof relative to said head; at least one pawl pivotally carried by said carrier member and spring biased into engagement with said teeth; cam follower means formed on said carrier member; an eccentric rotary cam mounted on said head and engaging said follower means; means including shaft means adapted to be rotatably driven from an external power source, for rotating said cam whereby said carrier member is arcuately moved in opposite directions to cause said pawl to intermittently drive said hub element as said carrier member is moved in one

direction; and at least one pawl pivotally mounted within said head and spring biased into engagement with said ratchet teeth for holding said hub element against rotation as said carrier member is moved in the other direction.

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