July 28, 1953 G. A. LINDBERG 2,646,966

POWER OPERATED WRENCH

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Fig. 1

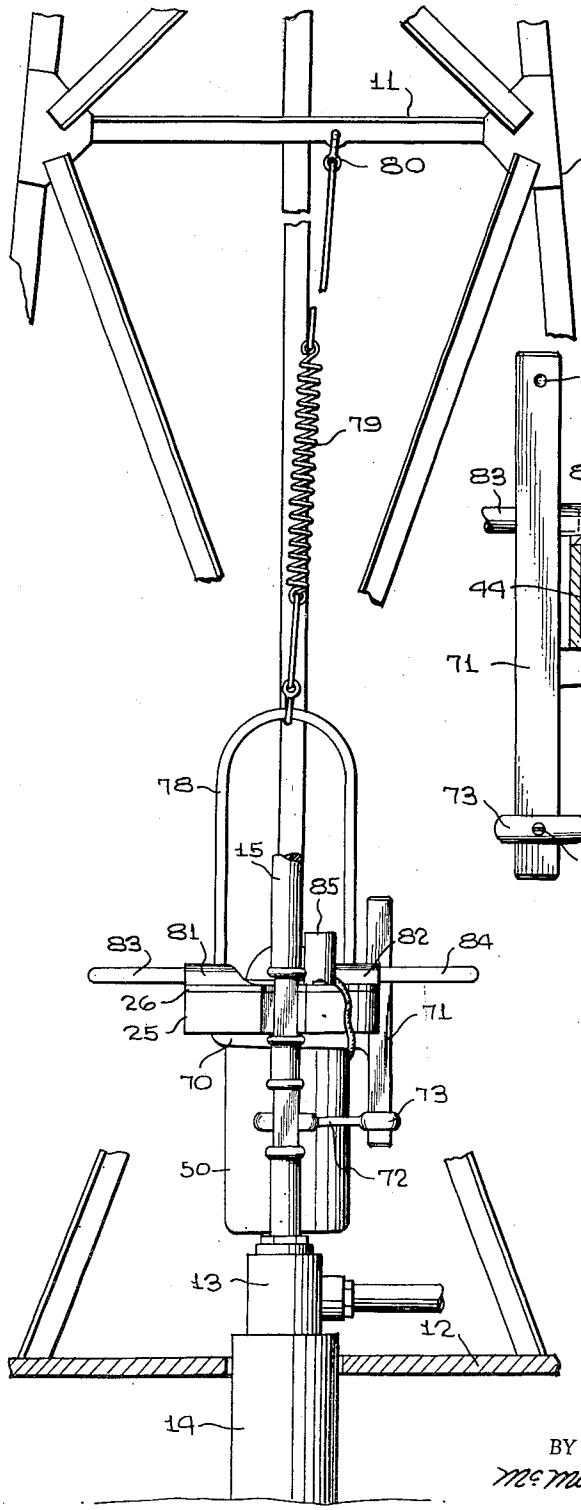


Fig. 5

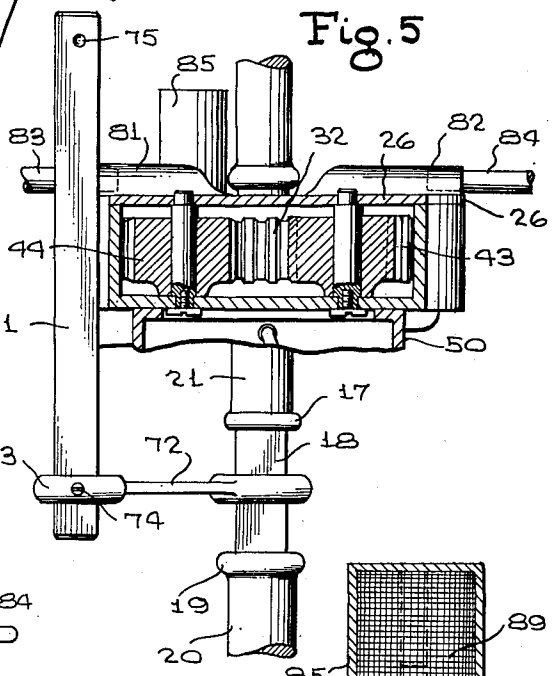
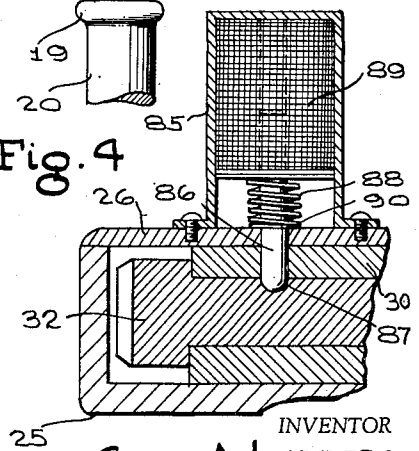


Fig. 4



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Fig. 2

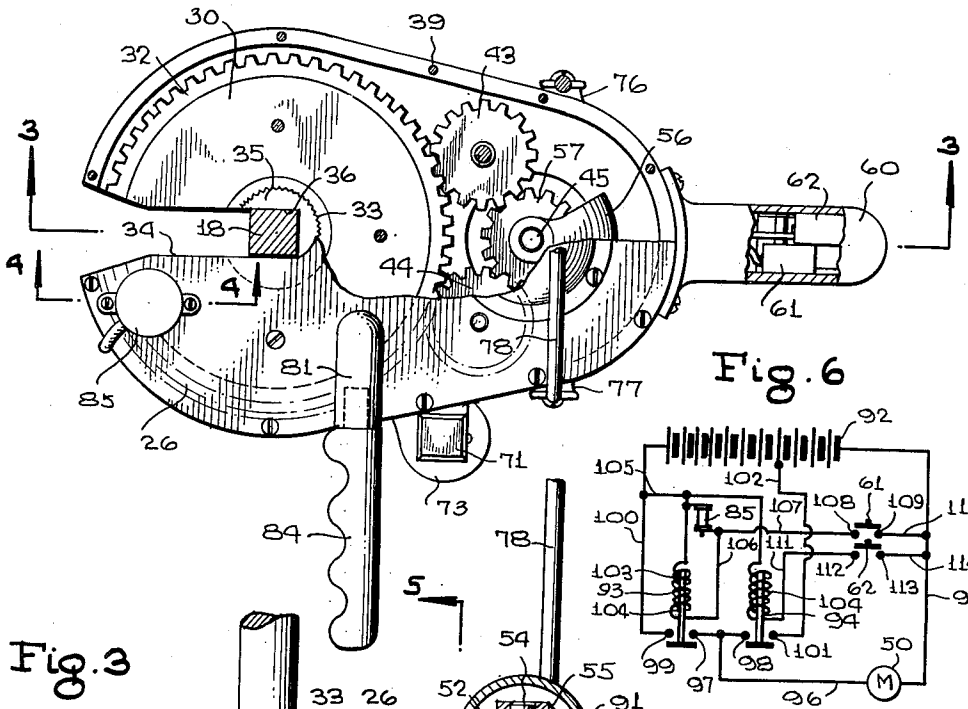
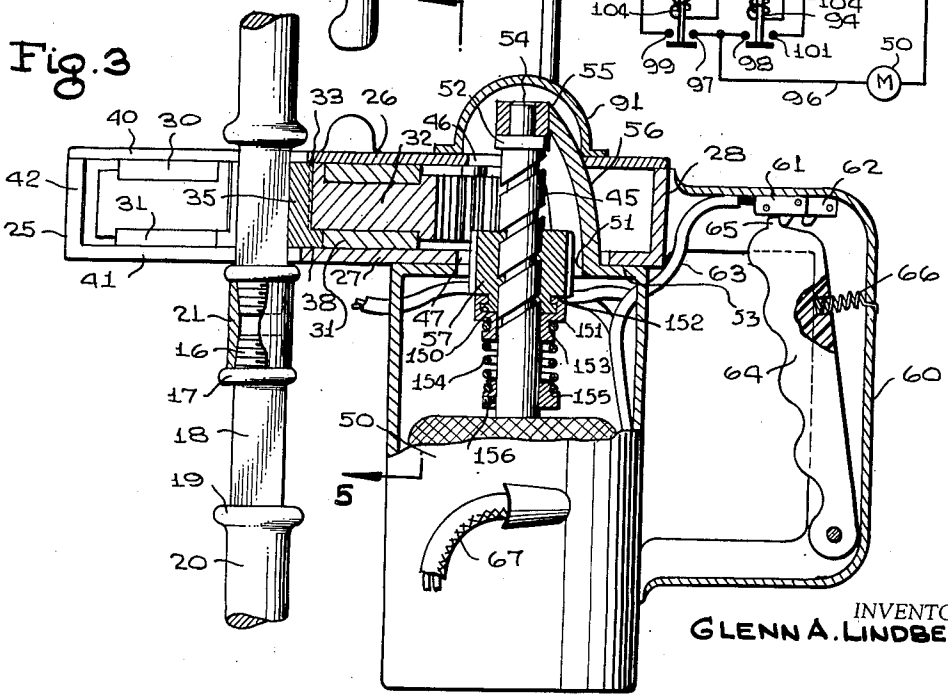


Fig. 6

Fig. 3



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Fig. 7

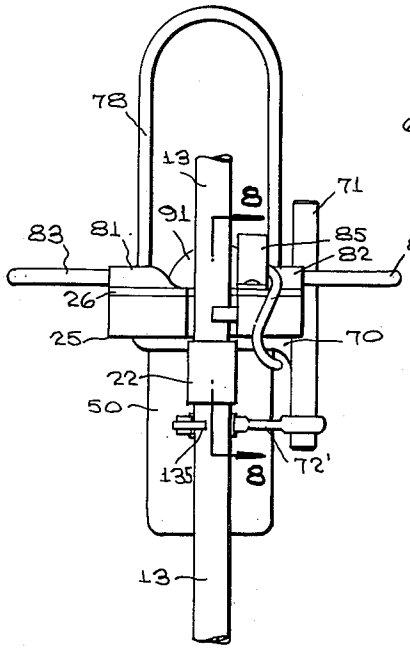


Fig. 8

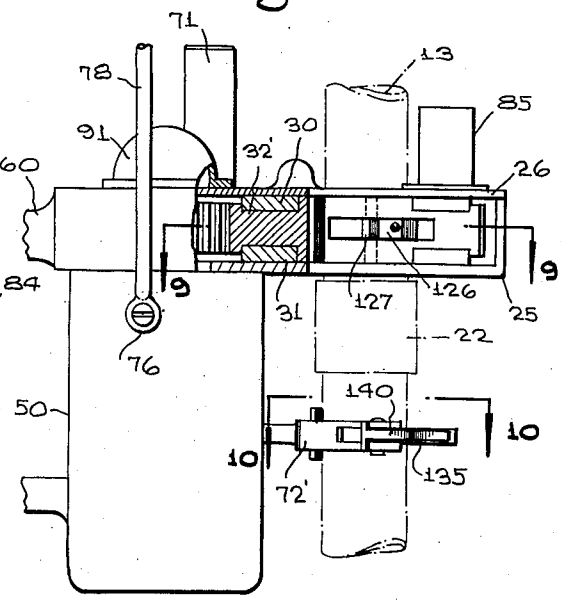


Fig. 9

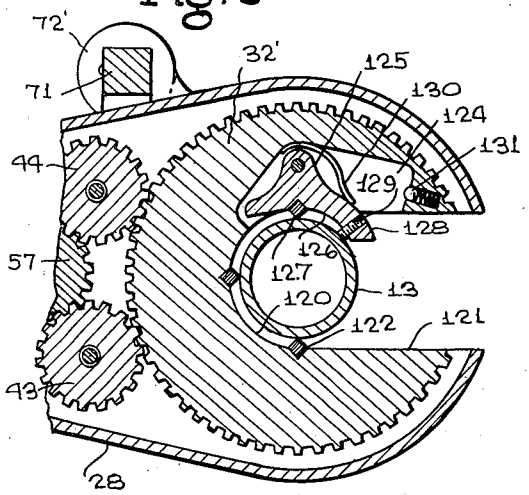
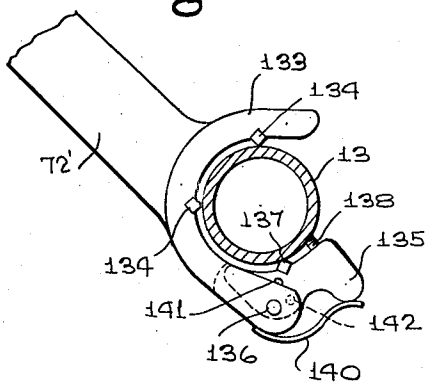


Fig. 10



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POWER-OPERATED WRENCH

Glenn A. Lindberg, Cut Bank, Mont.

Application December 11, 1951, Serial No. 260,991

5 Claims. (Cl. 255—35)

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This invention relates to power operated wrenches, and more particularly to a power operated wrench for coupling and uncoupling oil well sucker rods and tubing.

It is among the objects of the invention to provide an improved power operated wrench which is readily portable and can be suspended from a well derrick or other supporting structure adjacent a well sucker rod or tubing string while in use; which imparts a series of impacts to a sucker rod or tubing section engaged thereby to loosen the screw-thread connection between adjacent rod or tubing sections; which can be used to couple or uncouple rod or tube sections by simply inverting the wrench from one operation to the other; which has means releasably holding the wrench in open position for application of the wrench to a rod or tubing section; which holds one tube or rod section stationary while applying rotational impacts to an adjacent section; and which is simple and durable in construction, economical to manufacture, and positive and effective in operation.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings, wherein:

Figure 1 is a somewhat diagrammatic illustration of a well rig including a sucker rod and showing in side elevation a power operated wrench illustrative of the invention suspended from the well derrick and operatively engaged with the sucker rod;

Figure 2 is a top plan view of the wrench, a portion being broken away to better illustrate the construction thereof;

Figure 3 is a cross-sectional view on the line 3—3 of Figure 2;

Figure 4 is a fragmentary cross-sectional view on an enlarged scale on the line 4—4 of Figure 2;

Figure 5 is a fragmentary cross-sectional view on the line 5—5 of Figure 3;

Figure 6 is a wiring diagram for the wrench when operated by an electric motor;

Figure 7 is a side elevational view of a power operated wrench similar to that illustrated in Figures 1, 2 and 3, but modified to operate on well tubing rather than sucker rod sections;

Figure 8 is a cross-sectional view on an enlarged scale on the line 8—8 of Figure 7;

Figure 9 is a fragmentary cross-sectional view on the line 9—9 of Figure 8; and

Figure 10 is a fragmentary cross-sectional view on the line 10—10 of Figure 8.

With continued reference to the drawings, the

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well rig illustrated in Figure 1 comprises an oil well derrick 10 of well known construction having a cross brace 11 spaced above the well platform 12. A well tubing string 13 extends from the upper end of the casing 14 through the platform 12 and a sucker rod assembly 15 extends longitudinally of the tubing string 13 and out of the upper end of the tubing string. The lower end of the sucker rod is connected to an oil pump, not illustrated, in a manner well known to the art, and the upper end of the rod is connected to a rod-reciprocating member, such as a walking beam, also not illustrated, but well known to the art.

The sucker rod 15 comprises a plurality of sections joined together in end-to-end relationship. As is particularly illustrated in Figure 3, each section of the sucker rod has at each end thereof a tapered, screw-threaded portion 16, an annular bead 17 at the inner end of the screw-threaded portion 16, a squared portion 18 at the side of the annular bead 17 remote from the screw-threaded portion 16, an annular bead 19 at the end of the squared portion 18 remote from the annular bead 17, and the intermediate portion 20 of the rod extends from the annular bead 19 away from the squared portion 18 and is usually of circular cross-sectional shape. Two adjacent rod sections are coupled together in end-to-end relationship by having the screw-threaded portions 16 at their adjacent ends threaded into the respectively opposite ends of a coupling sleeve or collar 21 which is slightly inwardly tapered from each end and provided in each end with screw-threads engaging the screw-threads on the end portions of the rod sections. The sections of the well tubing 13 are provided with external screw-threads at each end and are secured together by having their adjacent ends threaded into the respectively opposite ends of internally screw-threaded coupling sleeves or collars 22, as is particularly illustrated in Figure 7.

In the case of both the sucker rod sections and the well tubing sections, two adjacent sections are threaded into the associated coupling collar by rotating the sections in respectively opposite directions or by holding one section stationary while rotating the other and are uncoupled in the same manner by reversely rotating the movable section.

As the construction of well rigs including the well tubing or flow pipe and the pump sucker rod is well known to the art and constitute no part of the present invention, it is considered that a more detailed illustration and description

of the well rig is unnecessary for the purposes of the present disclosure.

The present invention is primarily concerned with a power operated wrench for coupling and uncoupling sucker rod or well tubing sections, and such a wrench has been shown in two slightly modified arrangements in the accompanying drawings.

The wrench illustrated in Figures 1 to 6, inclusive, comprises a flat, hollow housing 25 of somewhat elliptical shape having top and bottom walls 26 and 27 disposed in spaced apart and substantially parallel relationship to each other, and a side wall 28 having arcuately rounded end portions of substantially semicircular extent and straight side portions interconnecting the ends of the arcuately curved end portions.

Bearings rings 30 and 31 are disposed against the inner side of the top wall 26 and bottom wall 27 of the housing, respectively, substantially concentric with the center of curvature of one end of the side wall 28 of the housing and a main gear 32 is disposed between and journaled on these bearing rings for rotation in the housing. This gear 32 has a centrally located bore or aperture 33 provided with longitudinally extending splines or serrations, and has a notch 34 extending from the aperture 33 to the periphery of the gear. The notch 34 has substantially parallel side surfaces spaced apart a distance slightly greater than the thickness of the squared portions 18 of the sucker rod, these side surfaces being outwardly inclined near the periphery of the gear, as is particularly illustrated in Figure 2, to facilitate passing of the squared portions of sucker rods into the notch in the gear.

A jaw element 35 having longitudinally extending serrations or splines on its outer surface and of generally cylindrical shape is inserted into the bore 33 of the gear 32 and has a notch 36 therein of substantially the same size and shape as the size and shape of the cross-sectional area of the squared portion 18 of the sucker rod.

The insert jaw 35 has at its end adjacent the bottom wall 27 of the housing an outwardly extending annular flange 38 which closely fits the inner edge of the bottom bearing ring 31.

The top wall 26 of the housing is detachably secured to the side wall by suitable means, such as the screws 39, extending through apertures in the marginal portion of the top wall and threaded into tapped holes in the top edge of the side wall, so that the gear 32 can be removed from the housing upon removal of the top wall 26. The insert 35 can be removed from the gear when the latter is removed from the housing, and different inserts may be placed in the gear to accommodate the wrench to varying sizes of the squared portions of sucker rods.

The top and bottom walls 26 and 27 of the housing are provided with notches 40 and 41 which are in alignment with each other and register with the notch 34 in the gear 32 when the gear is in a predetermined rotational position relative to the housing, as illustrated in Figure 2, and the side wall 28 is provided with an opening 42 in alignment with the outer ends of the notches 40 and 41 in the top and bottom walls of the housing.

Idler gears 43 and 44 are journaled in the housing between the gear 32 and the end of the housing remote from the opening 42, and these idler gears mesh with the main gear 32 at spaced apart locations around the main gear, the distance between the locations at which the idler gears mesh with the main gear being greater than the width of the outer end of the slot 34 in the main gear, so that at least one of the idler gears will always be in mesh with the peripheral teeth on the main gear 32.

A screw shaft 45 extends through apertures 46 and 47 in the top and bottom walls 26 and 27 of the housing, which apertures are substantially concentric with the center of curvature of the end of the side wall 28 of the housing remote from the main gear 32.

In the arrangement illustrated, an electric motor 50 is secured at one end to the bottom wall 27 of the housing 25 and the motor housing has in its end wall 53 adjacent the bottom wall of the housing an opening 51 registering with the opening 47 in the bottom wall 27. The screw shaft 45 is connected at one end to the adjacent end of the shaft of the motor 50, or, if desired, may be made continuous with the motor shaft and journaled in the housing of the electric motor.

A stop collar 52 is provided on the screw shaft 45 one at the end thereof remote from the motor.

Outwardly of the stop collar 52 the screw shaft is provided with an arbor 54 of reduced diameter journaled in a bearing 55 supported in the outer end of a hood-shaped brace 56 which extends transversely of the thickness of the housing 25 and is joined at its other end to the housing of the motor 50 at the end of the motor housing adjacent the wrench housing 25.

A drive gear 57, having a screw-threaded bore extending coaxially therethrough, is threaded onto the screw shaft 45 and meshes with both of the idler gears 43 and 44. This gear 57 is movable longitudinally relative to the idler gears 43 and 44, and remains in mesh with these gears at all times.

A U-shaped handle 60 is connected at one end to the side wall 28 of the housing 25 and is connected at its other end to the housing of the motor 50, and switches 61 and 62 are mounted in the handle 60 in tandem relationship to each other and connected to the motor 50 by conduits, as indicated at 63. A grip lever 64 is pivotally mounted at one end in the handle 60 at the end of the handle remote from switches 61 and 62 and carries at its end adjacent the switches a projection or dog 65 for successively operating the switches 61 and 62 when the grip member is moved toward the intermediate portion of the handle. A compression spring 66, disposed between the intermediate portion of the handle 60 and the grip member 64, resiliently urges the grip member away from the intermediate portion of the handle and to a non-operating position relative to the switches 61 and 62, the switches being operated by manually moving the grip member toward the intermediate portion of the handle against the force of the spring 66.

Power is supplied to the motor through a suitable extension cord 67, and it is to be understood that while an electric motor has been illustrated and hereinabove described for operating the wrench, a hydraulic or pneumatic motor of known construction may be substituted for the electric motor, if desired, without in any way exceeding the scope of the invention.

With the arrangement illustrated, when one of the switches 61 or 62 is closed to energize the motor 50, the screw shaft 45 will be rotated, and the gear 57 will be threaded outwardly along the screw shaft until it strikes the stop collar 52. This sudden termination of relative movement

between the gear and the screw shaft causes the inertia of the rotatable armature of the motor 50 to deliver an impact to the gear 57 and from this gear through the idler gears 43 and 44 to the main gear 32. As soon as the impact has been delivered to the main gear 32, the grip member 64 is released to open the motor controlling switch and discontinue the application of power from the motor to the wrench gears. The gear 57 is provided at its end adjacent the motor 50 with an annular groove 150 in a skirt portion of the gear and an annular collar 151 has at one end an inwardly directed annular flange 152 rotatably received in the groove 150 in gear 57 and at its other end an annular external groove 153.

A coiled tension spring 154 surrounds the motor shaft and has one end coil secured in the groove 153 of collar 151 and its other end coil secured in an annular external groove 155 in a second collar 156 secured on motor shaft 45 at a location spaced along the shaft from collar 151.

If the main gear 32 is engaged with an object to be rotated, such as a well sucker rod, and this object is not substantially rotated by the first impact delivered to the main gear 32 incident to the impact of the gear 57 against the stop collar 52, upon release of the grip member 64 to open the motor controlling switch, spring 154, which is stretched when gear 57 moves along shaft 45 to stop collar 52, contracts and returns gear 57 along shaft 45 to the end of the screw-threaded portion of this shaft adjacent the motor 50. If the motor controlling switch is now reclosed, a second impact will be delivered to the gear 32 and the impacts may be repeated until the sucker rod joint is freed and the portion of the sucker rod engaged in the main gear 32 caused to rotate. As soon as the joint has been freed, the motor controlling switch may be maintained closed until the sucker rod joint has been completely unthreaded.

A bracket 70 is secured to or formed integrally with the bottom wall 27 of the housing, and projects laterally from the housing intermediate the length of one of the straight portions of the side wall 28. A post 71 of noncircular and preferably square cross-sectional shape extends through the bracket 70 and is secured to the bracket adjacent the mid-length location of the post, the post being formed integrally with the bracket, if desired.

The post 71 is disposed substantially perpendicular to the planes of the top and bottom walls of the housing 25, and a back-up wrench 72 is detachably secured at one end to the post 71 and is provided at its other end with spaced apart jaws which receive a squared portion 18 of the sucker rod adjacent the squared portion received in the main gear 32 of the french, so that, when an upper sucker rod section is being turned by the wrench to couple or uncouple it from the adjacent lower section, the lower section is held against rotational movement by the back-up wrench 72.

In the arrangement illustrated, the back-up wrench 72 is provided at its end adjacent the post 71 with an eye formation 73 having a square hole therein through which the post extends and is provided with a spring pressed ball detent assembly 74 which engages in a depression, as indicated at 75, in the post to releasably secure the back-up wrench in operative position on the post 71.

Lugs 76 and 77 are provided on side wall 28 of the housing, and are aligned transversely of the

housing near the end of the latter to which the handle 60 is attached. A U-shaped bail 78 is pivotally connected at its ends to lugs 76 and 77 and a coil tension spring 79 is connected at one end to bail 78 at the end of the bail remote from housing 25 and is connected at its other end to a hook 80 which is adapted to engage a support, such as the crossbar 11 of well derrick 10, to suspend the wrench in operative position adjacent the sucker rod of the well.

Handle sockets 81 and 82 are provided on the upper side of the top wall 26 of the housing one at each side of the latter, and open to the opposite side of the housing adjacent the mid-length location thereof. Handles 83 and 84 are secured each at one end in the sockets 81 and 82, respectively, and project outwardly from the respectively opposite sides of the housing substantially perpendicular to the longitudinal center line of the housing.

With this arrangement, the wrench can be used in its upright position, as illustrated in Figure 3, for uncoupling adjacent sucker rod sections and can be inverted in the bail 78 and used in its inverted position for coupling adjacent sucker rod sections as a sucker rod is being run in the well.

A dome-shaped cover 91 is secured to the top wall 26 of the housing in covering relationship to the opening 46 and the bearing 55 to protect the gears from dust and other foreign matter.

When the wrench is inverted, the back-up component 72 is, of course, moved from one end to the other end of the post 71, so that it will provide the same function in the inverted as in the upright position of the wrench.

A small solenoid 85 is mounted on the top wall 26 of the housing 25 above the main gear 32 and has a movable armature 86 projecting through registering apertures in the top wall 26 of the housing and the upper bearing ring 30 and provided with a rounded end 87. The gear 32 is provided with a rounded depression at a location therearound, such that when the rounded end of the armature 86 is in the rounded depression in the gear, the gear is releasably held in a rotational position in the housing, such that the notch 34 in the gear registers with the openings 39, 40 and 41 in the top, bottom and side walls of the housing. A compression spring 88 surrounds the armature 86 between the bottom end of the solenoid coil 89 and an abutment washer 90 secured on the armature to resiliently urge the armature into engagement in the depression in the gear and the coil 89 of the solenoid is connected through the switches 61 and 62 with the energizing circuit for the motor 50 so that the armature of the solenoid is automatically moved out of engagement with the gear 32 whenever the motor is energized. A manually releasable latch may be substituted for the solenoid operated latch, as described above, without in any way exceeding the scope of the invention.

A wiring diagram for the motor and the solenoid 85 is illustrated in Figure 6, and includes a source of electrical energy, such as a battery or auto transformer 92 and relay switches 93 and 94 in addition to the manually operated switches 61 and 62, the solenoid 85 and the motor 50.

The motor 50 is connected at one side to one end of the battery 92 by a conductor 95, and is connected at its other side by a conductor 96 to one contact 97 of the relay switch 93 and to one contact 98 of the relay switch 94. The

other contact 99 of the relay switch 93 is connected by a conductor 100 to the other end of the battery 92, and the other contact 101 of the relay switch 94 is connected to the battery 92 between the ends of the battery by a conductor 102, so that, when the relay switch 93 is closed, the motor is operated at full speed and when the relay switch 94 is closed, the motor is operated at a slow speed.

The coils 103 and 104 of the relay switches 93 and 94 are both connected, each at one end, by a conductor 105 to the conductor 100 and the end of the battery remote from that to which the motor is connected by the conductor 95. The other end of the coil 103 is connected by conductors 106 and 107 to one contact 108 of the manually operated switch 61, the other contact 109 of which is connected by a conductor 110 to the conductor 95, so that, when the switch 61 is closed, the coil 103 will be energized to close the relay switch 93. The other end of the coil 104 of the relay switch 94 is connected by a conductor 111 to one contact 112 of the manually operated switch 62 and the other contact 113 of this switch is connected by a conductor 114 to the conductor 95, so that when the switch 62 is closed, the coil 104 will be energized, closing the relay switch 94.

The solenoid 85 is connected between the conductors 105 and 107 in parallel with the relay switch coil 103, so that it will be energized whenever the relay switch 93 is closed.

With this arrangement, the motor can be operated at full speed or at low speed by selectively closing the manually operated switches 61 and 62.

In the modified form of the arrangement illustrated in Figures 7 to 10, inclusive, the construction of the wrench is the same as that described above, except that the main gear 32 and the back-up wrench 72' are modified to engage tube sections instead of the sucker rod sections illustrated and described in connection with the form of the wrench shown in Figures 1 to 6, inclusive.

In the modified arrangement, the main gear 32' is provided with a central aperture 120 and a notch 121 leading from this central aperture to the periphery of the gear, the central aperture having a semicylindrical shape at the inner end of the notch, and the notch having a width somewhat greater than the outside diameter of the tube sections to be received therein.

The gear 32' is provided in the central aperture thereof with angularly spaced apart, longitudinally extending notches and tube-engaging elements 122 of rectangular cross-sectional shape are seated one in each of these notches and secured to the gear. At one side of the notch 121 the gear is provided with a recess 124 and a dog 125 is pivotally mounted in the recess 124 and has a partly cylindrical surface 126 facing the opening in the gear and provided with a longitudinally extending groove receiving a tube-engaging element 127 of rectangular cross-sectional shape. The dog includes a finger portion 128 extending from the tube-engaging element 127 into the notch 121 and provided near its distal end with a tapped hole receiving a set screw 129 which is adapted to bear against the outer surface of a tube section 19 received in the wrench to limit the pressure between the tube-engaging elements 122 and 127 and the tube.

A leaf spring 130 is disposed within the recess 24 and engaged between the gear and the dog 126 to resiliently urge the dog into engagement with a tube section 13 received in the gear, and a ball detent 131 is mounted in the gear at one end of the recess 124 and engages the distal end of the finger portion 128 of the dog to releasably hold the dog in retracted position while a tube section is being moved through the notch 121 into the opening 120 in the gear.

With this arrangement, the dog is first released in retracted position and the wrench is then moved into engagement with a tube section adjacent a connecting sleeve or collar 22 on the tube string. As the tube section moves into the opening in the gear, it trips the dog 125, so that the dog moves away from the ball detent 131 and the set screw 129 approaches the outer surface of the tube section, the tube-engaging elements 122 and 127 being brought into firm engagement with the outer surface of the tube section. Now, as the gear 32' is rotated, the element 127 is moved slightly toward the tube section, forcing the element and the element 22 to bite into the outer surface of the tube section and provide a firm grip between the gear and the tube section, this biting action being limited by contact of the set screw 129 with the outer surface of the tube section.

The back-up wrench 72' of this form of the invention has at its end remote from the post 71 a jaw formation 133 shaped to receive a tube section 13 therein, and engages a tube string adjacent the lower end of a connecting collar 22 when the gear 32' engages the tube string adjacent the upper end of such a collar.

The jaw formation 133 of the back-up wrench 72' has a partly cylindrical inner surface and an opening through which the tube section enters the jaw formation and is provided in its inner surface with grooves extending longitudinally of the inner surface at angularly spaced apart locations. Tube section-engaging elements 134 of square or rectangular cross-sectional shape are mounted one in each of these grooves and secured to the jaw formation 133 in a manner to present a sharp edge for engagement with the outer surface of the tube section 13.

A dog 135 is pivotally mounted on the jaw formation 133 at one end of the latter by a pivot pin 136 and carries a tube-engaging element 137 similar to the elements 134. At its distal end the dog 135 carries a set screw 138 which is engageable with the outer surface of a tube section received in the jaw formation 133 to limit the pressure between the elements 134 and 137 and an associated tube section, and a leaf spring 140 is mounted on the jaw formation 33 adjacent the pivot pin 136 and engages the dog 135 to urge the latter toward a tube section 13 received in the jaw formation.

In this case, the dog 135 is releasably latched in retracted position by a ball detent 141 carried by the dog and engageable in a recess 142 provided in the portion of the jaw formation 133 to which the dog is pivoted, this latch being released by the pressure of the tube section against the inner end portion of the dog as a tube section is inserted into the jaw formation 133 of the back-up wrench component. As the gear 32' tends to turn one of the sections of the tube spring, the back-up wrench 72' engaging the adjacent section holds such adjacent section against rotation, so that the coupling between the two adjacent sections can be threaded together or apart, depending on the position of the wrench.

Various modifications of the wrench, such as

increasing or decreasing the weight and strength thereof, providing a reduction gear between the motor and the screw shaft and modifying the wiring circuit to provide only a slow speed operation, may be made, if desired, without in any way exceeding the scope of the invention.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. A power operated wrench comprising a housing, a first gear rotatably mounted in said housing and having a radially disposed notch extending from the periphery to the center thereof for receiving an object to be turned by said wrench, said housing having an opening therein registering with the notch in said gear when said gear is in a predetermined rotational position relative to said housing, idler gears rotatably mounted in said housing and meshing with said first gear at spaced apart locations therearound, a second gear disposed in said housing and meshing with said idler gears, said second gear having a screw-threaded bore extending coaxially therethrough and being longitudinally movable relative to said idler gears, a screw shaft journaled in said housing and threaded through the bore of said second gear, a stop on said screw shaft limiting movements of said second gear longitudinally thereof, and a motor mounted on said housing and drivingly connected to said screw shaft, said second gear being movable along said screw shaft from said motor to said stop to deliver an impact through said idler gears to said first gear when it engages said stop, and spring means connected to said second gear moving the latter away from said stop after delivery of the impact.

2. A power operated wrench comprising a housing, a first gear rotatably mounted in said housing and having a radially disposed notch extending from the periphery to the center thereof for receiving an object to be turned by said wrench, said housing having an opening therein registering with the notch in said gear when said gear is in a predetermined rotational position relative to said housing, idler gears rotatably mounted in said housing and meshing with said first gear at spaced apart locations therearound, a second gear disposed in said housing and meshing with said idler gears, said second gear having a screw-threaded bore extending coaxially therethrough and being longitudinally movable relative to said idler gears, a screw shaft journaled in said housing and threaded through the bore of said second gear, a stop on said screw shaft limiting movements of said second gear longitudinally thereof, a motor mounted on said housing and drivingly connected to said screw shaft, said second gear being movable along said screw shaft from said motor to said stop to deliver an impact through said idler gears to said first gear when it engages said stop and being movable from said stop after delivery of the impact, and means mounted on said housing and engaging said first gear releasably latching the latter in a rotational position relative to said housing such that the notch in said first gear is in registry with the opening in said housing.

3. A power operated wrench comprising a housing, a main gear rotatably mounted in said housing and having a radially disposed notch extending from the periphery to the center thereof for receiving an object to be turned by said wrench, said housing having an opening therein registering with the notch in said gear when said gear is in a predetermined rotational position relative to said housing, a motor mounted on said housing, means in said housing connecting said motor to said main gear and effective to deliver rotational impacts to said main gear upon operation of said motor, a post mounted on said housing and extending to respectively opposite sides of the latter, and a back-up wrench detachably mounted on said post and engageable with an object at a location spaced from said first gear to hold the object engaged thereby stationary while the object engaged by said first gear is rotated relative to the object engaged by said back-up wrench, said back-up wrench being selectively mountable on said post adjacent either end of the latter.

4. A power operated wrench comprising a housing, a main gear rotatably mounted in said housing and having a radially disposed notch extending from the periphery to the center thereof for receiving an object to be turned by said wrench, said housing having an opening therein registering with the notch in said gear when said gear is in a predetermined rotational position relative to said housing, a motor mounted on said housing, means in said housing drivingly connecting said motor to said main gear and imparting rotational impacts to said main gear upon operation of said motor, said main gear having a cavity therein opening into said notch, at least one work engaging element mounted on said main gear and presenting a sharp edge directed inwardly of said notch within the inner end portion of said notch at a location spaced from said cavity, a dog pivotally mounted on said gear within said cavity and at one side of said notch and having a finger extending into the notch in said gear, a work piece-engaging element mounted in said dog and presenting a sharp edge at the side of said dog adjacent the notch in said gear, a spring connected between said dog and said gear resiliently urging said dog inwardly of said notch, and a set screw carried by said dog adjacent the distal end of the finger thereof for engaging a work piece extending through said notch and engaged by said work piece engaging elements to limit the pressure between said work piece-engaging elements and the work piece engaged thereby.

5. A power operated wrench comprising a housing, a main gear rotatably mounted in said housing and having a radially disposed notch extending from the periphery to the center thereof for receiving an object to be turned by said wrench, said housing having an opening therein registering with the notch in said gear when said gear is in a predetermined rotational position relative to said housing, a motor mounted on said housing, means in said housing drivingly connecting said motor to said main gear and imparting rotational impacts to said main gear upon operation of said motor, a post mounted on said housing and extending to respectively opposite sides of the latter, and a back-up wrench detachably mounted on said post and engageable with an object at a location spaced from said main gear to hold the ob-

ject engaged thereby stationary while the object engaged by said main gear is rotated relative to the object engaged by said back-up wrench, said back-up wrench being selectively mountable on said post adjacent either end of the latter and having at its end remote from said post a rounded jaw formation adapted to receive a work piece of circular cross-sectional shape and having at least one work piece-engaging element mounted therein and presenting a sharp edge within said jaw formation, a dog pivotally mounted on said back-up wrench at the outer end of one side of said jaw formation, a work piece-engaging element carried by said dog and presenting a sharp edge inwardly of said jaw formation, a spring connected between said jaw formation and said dog resiliently urging said dog in a direction to engage the work piece-engaging element carried thereby with a work piece received in said jaw formation, and a set screw carried by said dog and engageable with a work piece in said jaw formation to limit the pressure between said work piece-engaging elements and a work piece engaged thereby.

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