M. ROBERTS.

POWER WRENCH.

APPLICATION FILED AUG. 14, 1920.

1,437,017.

Patented Nov. 28, 1922.

2 SHEETS—SHEET 1.

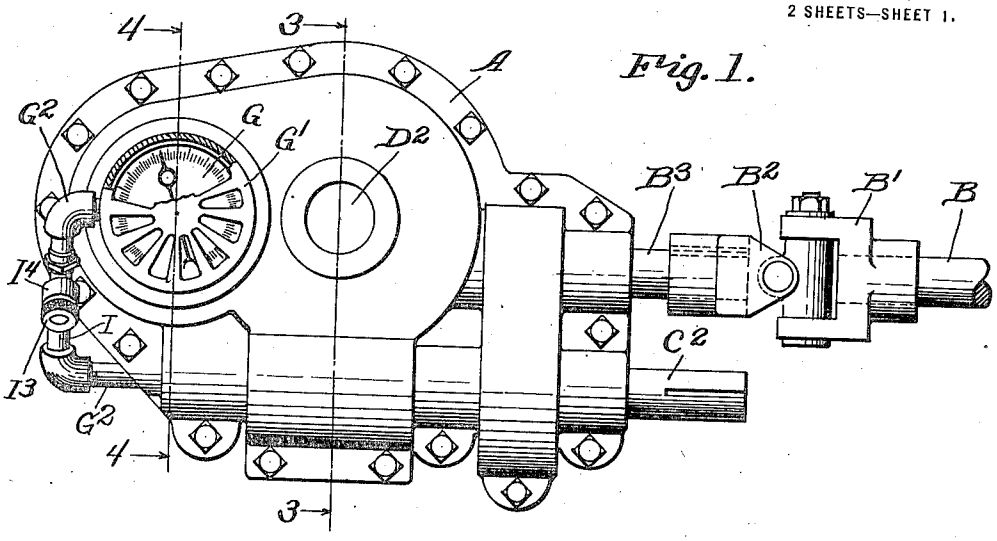

Fig. 1.

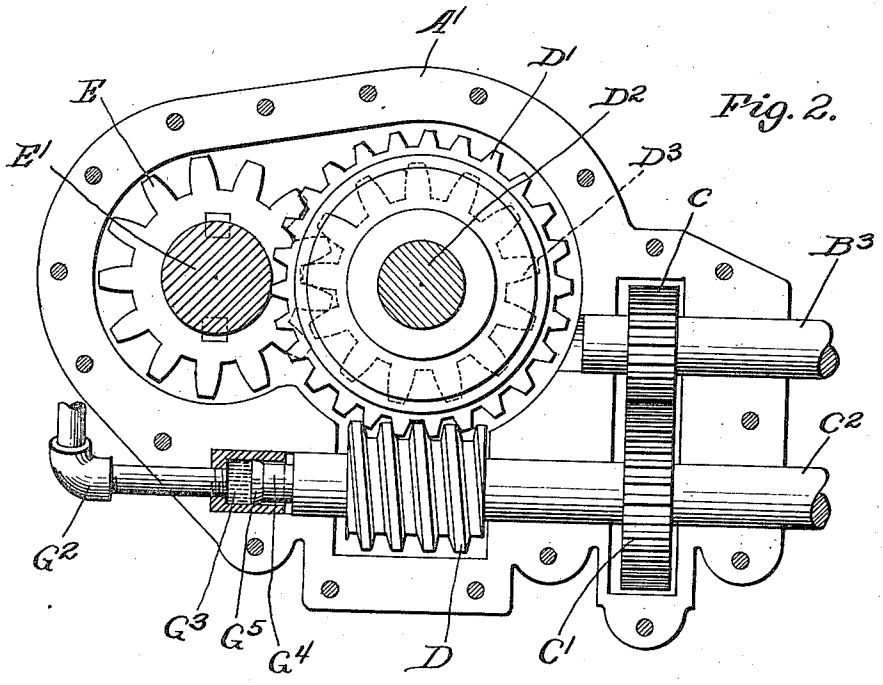

Fig. 2.

Witness

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2 SHEETS—SHEET 2.

Fig. 3.

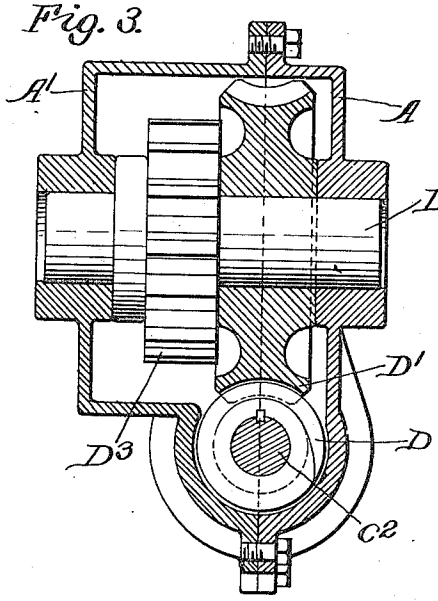


Fig. 5.

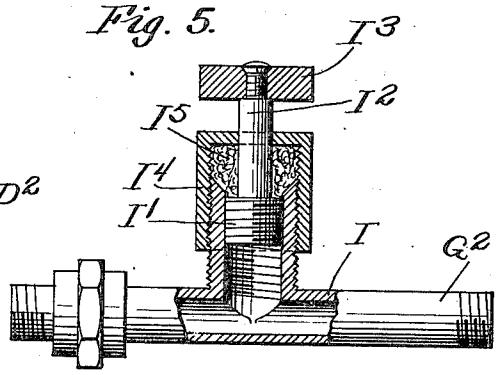
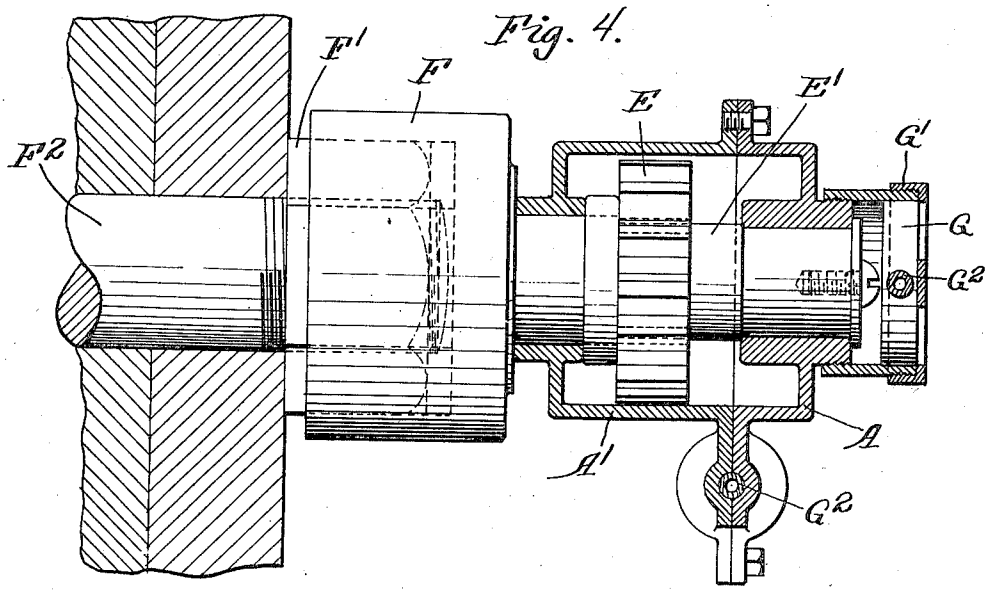


Fig. 4.



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UNITED STATES PATENT OFFICE.

MARK ROBERTS, OF CHICAGO HEIGHTS, ILLINOIS.

POWER WRENCH.

Application filed August 14, 1920. Serial No. 403,451.

To all whom it may concern:

Be it known that I, MARK ROBERTS, a citizen of the United States, residing at Chicago Heights, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Power Wrenches, of which the following is a specification.

This invention relates to wrenches and has for one object to provide a geared wrench by means of which the torque which can be applied to a nut and the like by one man is greatly increased. It has for another object to provide a power wrench which can be driven by an electric motor or any other suitable power source. It has for another object to provide a visible gauge by means of which the operator can at all times tell exactly the power which is being exerted upon the nut. Other objects will appear from time to time throughout the specifications and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a plan view of the wrench complete;

Figure 2 is a plan view of the interior of the wrench with one side cover removed;

Figure 3 is a vertical section along the line 3—3 of Figure 1;

Figure 4 is a vertical section along line 4—4 of Figure 1, showing the wrench in use;

Figure 5 is a detail of the initial pressure device.

Like parts are indicated by like characters throughout.

The wrench mechanism is enclosed in a two part casing which is made up of the parts A and A′ which are bolted or fastened together in any suitable manner. B is a power shaft to which the operating force is applied, whether it be by hand or mechanically, as for example by a motor. This shaft is splined into the fork connection B′ which is attached to the fork connection B^2 splined on the wrench shaft B^3; thus the power shaft is connected to the wrench shaft by a universal joint. It will of course be understood that any other form of universal joint may be substituted for the one here shown, or it might be entirely dispensed with. The wrench shaft B^3 is journalled in the casing AA′ and carries upon it the pinion C in mesh with the gear wheel C′ which is keyed upon the shaft C^2. The shaft C^2 has fastened upon it the worm D in mesh with worm wheel D′ which is mounted upon the jack shaft D^2. Also mounted on the jack shaft D^2 is the gear wheel D^3 in mesh with the gear E mounted upon the shaft E′ which is journalled in the casing AA′. On one end of the shaft E′ is secured the working head or connection F adapted to engage and hold the nut F′ upon the bolt F^2. G is a pressure gauge mounted upon the casing AA′ provided with the protecting cover G′; it is connected by means of the pressure line G^2 with the chamber G^3 which is filled with oil. Within this chamber is the plunger G^4 which is secured to the end of the shaft C^2 and carries on its end a leather packing ring G^5.

When the wrench is in use, the shaft C^2 tends to creep forward and the plunger G^4 is forced forward into the oil filled chamber G^3; thus a pressure is created, and the force is shown upon the gauge G. By means of this arrangement the operator is able to tell just what power is being applied to the nut, and is thus prevented from applying such an excessive power as would strip the bolt or cause other damages.

In order to provide an initial pressure in the gauge, the device shown in detail in Figure 5 is used. It is located in the pressure line between the gauge G and the chamber G^3 and comprises the T connection I, which is screw threaded about its upper exterior and interior surfaces. The head I′ is screw threaded and located inside of the connection I. It is permanently secured to the stem I^2 which has fixed to its upper end, the thumb nut I^3. The parts are held in the position shown by the gland I^4 and leakage is prevented by the packing I^5.

When the wrench is first put in operation the pressure system including the chamber G^3 and the connection G^2 is filled with oil. The thumb nut I^3 is then operated sufficiently to force down the head I′ and to create an initial pressure which will be shown in the gauge.

Wherever in the specifications and claims the expression "power shaft" is used, the shaft to which power is applied is meant. Wherever the expression "working shaft" is used the shaft carrying the working head is meant.

Although I have shown an operative form of my invention still many changes both in

size, shape and arrangement of parts might be made without departing from the spirit of my invention.

The shaft B has been referred to as the power shaft and the shaft B^3 has been referred to as the wrench shaft. Where power is applied by hand, the shaft B and coupling B′ and B^2 might not be used and the power to be applied directly to the shaft B^3, which might therefore be called a power shaft. The working head F may or may not be made integral with the shaft E′ on which it is mounted. Other connections may be used with the working head F, so as to make it adaptable for use with a variety of differently sized nuts, or an extension connection may be used and many such changes may be made to suit the work upon which the wrench is being used.

For certain purposes, as for example, where it is necessary to turn down a nut a long way before the tightening pressure need be applied, the shaft C^2 may be turned directly and will rotate the wrench twice as fast as the shaft B^3.

When the wrench is in operation the casing is held against rotation with relation to the work. This may be done in any suitable manner.

The use and operation of this invention are as follows:

When the parts are assembled as in Figure 1, the chamber is filled with oil and an initial pressure is created as above indicated. The operating head of the wrench is then placed about a nut or some other member which it is desired to turn; the wrench shaft is then turned either by hand or by mechanical means and thus through the gearing of the wrench power is applied to the nut and it is turned by means of the gearing shown. One man can exert upon a nut a tremendous pressure and can accomplish work requiring the combined efforts of a number of men. When mechanical power is used the pressure of many tons can be created. During all of the working operations the operator has before him the pressure gauge and is constantly informed as to the pressure which is applied to the nut and so can avoid the use of an excessive pressure, which would break the nut, strip the bolt, or otherwise damage the work in question.

I claim:

1. In a wrench a power shaft and a working shaft a connection between them adapted to rotate the working shaft in response to the rotation of the power shaft and a pressure gauge connected to said wrench and adapted to show the force applied through it said gauge outside of and independent from the power transmission mechanism.

2. In a wrench a power shaft and a working shaft a connection between them adapted to rotate the working shaft in response to the rotation of the power shaft, said connection adapted to rotate said working shaft at a different speed from that of said power shaft, and a pressure gauge connected to said wrench and adapted to show the force applied through it said gauge outside of and independent from the power transmission mechanism.

3. In a wrench a power shaft and a working shaft a connection between them adapted to rotate the working shaft in response to the rotation of the power shaft, said connection adapted to rotate said working shaft at a different speed from that of said power shaft, and to increase the torque of said working shaft, and a pressure gauge connected to said wrench and adapted to show the force which is applied through it said gauge outside of and independent from the power transmission mechanism.

4. In a wrench a power shaft, a working shaft and gearing connecting them and adapted to rotate the working shaft at a speed different from that of the power shaft and to increase the torque of the working shaft and a pressure gauge adapted to show the power applied through said wrench said gauge outside of and independent from the power transmission mechanism.

5. In a wrench a power shaft, a working shaft gearing connecting them and adapted to rotate the working shaft at a speed different from that of the power shaft and to increase the torque of the working shaft one member of said gearing adapted to move laterally and a pressure gauge adapted to show the power applied through said wrench, said pressure gauge operating responsive to the lateral movement of a part of said gearing.

6. In a wrench a power shaft, a working shaft and gearing connecting them and adapted to rotate the working shaft at a speed different from that of the power shaft and to increase the torque of the working shaft and a pressure gauge adapted to show the power applied through said wrench, said working shaft at an angle to said power shaft.

7. In a wrench a power shaft, a working shaft and gearing connecting them and adapted to rotate the working shaft at a speed different from that of the power shaft and to increase the torque of the working shaft one member of said gearing adapted to move laterally and a pressure gauge adapted to show the power applied through said wrench said pressure gauge operating responsive to the lateral movement of a part of said gearing, said working shaft at an angle to said power shaft.

8. In a geared wrench a power shaft and a working shaft said working shaft in com-

bination with a train of gears for driving said shaft responsive to the motion of said power shaft, said train of gears including a worm and worm wheel, and pressure gauge adapted to show the power transmitted through said wrench.

9. In a geared wrench a power shaft and a working shaft said working shaft in combination with a train of gears for driving said shaft responsive to the motion of said power shaft, said train of gears including a worm and worm wheel, and pressure gauge adapted to show the power transmitted through said wrench, said pressure gauge operating in response to the lateral movement of said worm.

10. A geared wrench comprising a working shaft a power shaft a pair of jack shafts one of them being driven from said power shaft, a worm on said first jack shaft driving a worm wheel upon the second jack shaft at right angles to the first a pinion upon said second jack shaft in and a pinion upon said working shaft in mesh therewith, and a work engaging means upon one end of said working shaft, and pressure gauge adapted to show the power transmitted through said wrench.

11. A geared wrench comprising a working shaft a power shaft a pair of jack shafts one of them being driven from said power shaft, a worm on said first jack shaft driving a worm wheel upon the second jack shaft at right angles to the first, a pinion upon said second jack shaft in and a pinion upon said working shaft in mesh therewith, and a work engaging means upon end of said working shaft, and pressure gauge adapted to show the power transmitted through said wrench, operating responsively to the lateral movement of said first jack shaft.

12 A geared wrench including a member adapted to have a lateral movement and a fluid pressure system including a pressure gauge, one part of said pressure system connected to said laterally moving member, said pressure gauge adapted to show the force which is applied through said wrench.

13. A power wrench including a member having a lateral movement, a fluid pressure system, a fluid within and filling said system, a projection on said member and lying within a part of said fluid pressure system, adapted to respond to the lateral movement of said member to compress said fluid and a pressure gauge in said fluid pressure system and adapted to show the force applied through said wrench.

14. A geared wrench including a member adapted to have lateral movement and a fluid pressure system including a pressure gauge, one part of said pressure system, connected to said laterally moving member, and a pressure gauge adapted to show the force which is applied through said gear, and an auxiliary means within said pressure system adapted to create an initial pressure therein.

15. A power wrench including a member having a lateral movement, a fluid pressure system a fluid within and filling said system, a projection on said member and lying within a part of said fluid pressure system, adapted to respond to the lateral movement of said member to compress said fluid and a pressure gauge in said fluid pressure system and adapted to show the force applied through said wrench and an auxiliary means within said pressure system adapted to create an initial pressure therein.

16. A geared wrench including a member adapted to have a lateral movement and a fluid pressure system including a pressure gauge, one part of said pressure system connected to said laterally moving member, and a pressure gauge adapted to show the force which is applied through said member, and an auxiliary means within said pressure system adapted to create an initial pressure therein, said means comprising a part adapted to be forced into the said pressure system.

17. A power wrench including a member having a lateral movement, a fluid pressure system a fluid within and filling said system a projection on said member and lying within a part of said fluid pressure system adapted to respond to the lateral movement of said member to compress said fluid and a pressure gauge in said fluid pressure system and adapted to show the force applied through said member and an auxiliary means within said pressure system adapted to create an initial pressure therein, said means comprising a part adapted to be forced into said pressure system.

Signed at Chicago, county of Cook, and State of Illinois, this 11th day of August, 1920.

MARK ROBERTS.