

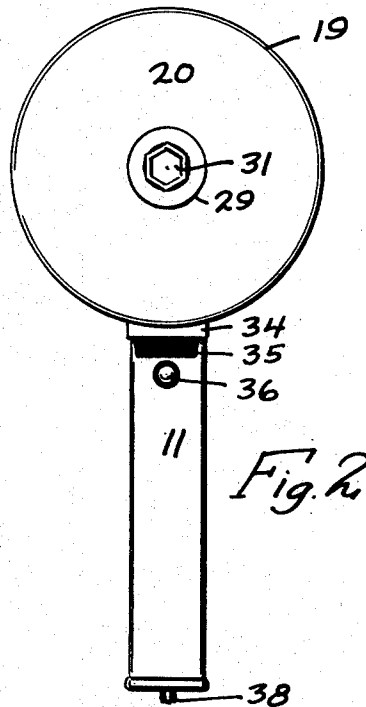
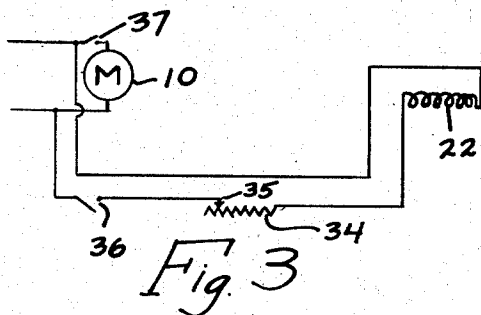
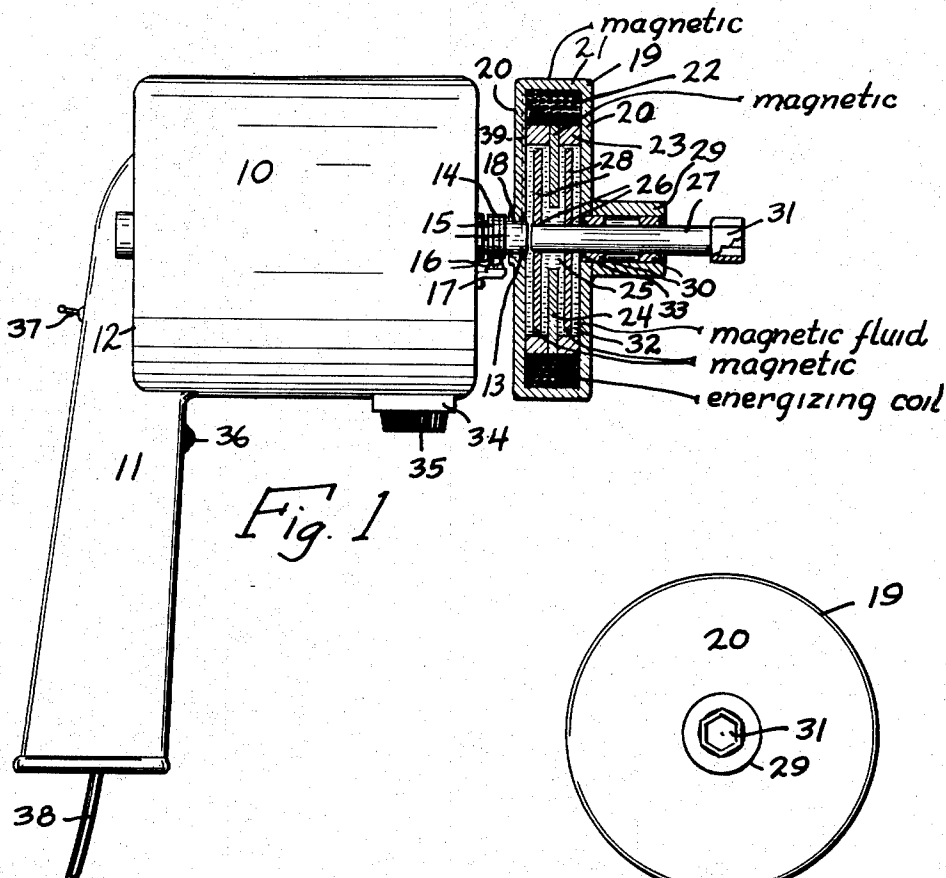
Aug. 24, 1954

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2,687,054

MAGNETIC FLUID VARIABLE TORQUE WRENCH

Filed Sept. 4, 1951



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UNITED STATES PATENT OFFICE

2,687,054

MAGNETIC FLUID VARIABLE TORQUE
WRENCH

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Application September 4, 1951, Serial No. 244,956

3 Claims. (Cl. 81-52.4)

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My invention relates to a torque wrench.

An object of my invention is to provide a torque wrench which will apply torque to a nut by means of a suitable motor, and whereby a certain member interposed between the motor and the wrench unit itself will cause slippage when the nut is tightened to a predetermined torque.

A further object of my invention is to provide a torque wrench which can be varied as to torque by means of a convenient attachment which can be regulated easily by the operator.

A further object of my invention is to provide an arrangement which is electrically operated, and which is compact in structure.

With these and other objects in view, my invention consists in the construction, arrangement, and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of the torque wrench with the magnetic fluid drive portion being shown in cross section,

Figure 2 is a forward view of Figure 1, and

Figure 3 is a schematic view of the electrical circuit.

My invention contemplates the provision of a torque wrench in which the principle of the magnetic fluid drive is employed, so that the operation of the wrench will be smooth, and also so that after the wrench performs the operation of tightening the nut to a pre-set torque, the wrench portion will cease its rotation without affecting the motor in any way, and whereby the wrench can be relatively quickly placed on succeeding nuts or bolt heads, after the magnetomotive force is removed by a suitable switch.

I have used the character 10 to designate an electric motor, the character 11 indicating a pistol grip type of handle which is suitably secured to the electric motor at 12. The motor 10 drives the non-magnetic shaft 13, and mounted upon the shaft 13 is an insulating band 14 to which are attached the conducting rings 15 with which rings are engaged the small brushes 16 secured to the brush-holder 17.

Rigidly secured at 18 to the forward end of the shaft 13 is the circular magnetic casing 19 having the spaced walls 20 and annular portion 21, and wound within the casing 19 are the insulated wire turns 22.

Attached within the casing 19 are the brass inserts 23, such inserts preventing short-circuiting of the magnetic circuit, and attached between

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the inserts is the magnetic disc 24 having an opening at 25.

Securely attached at 26 to a further non-magnetic shaft 27 are a pair of spaced magnetic discs 28 which are also spaced a slight distance from the walls 20 and the member 24.

Attached to the forward wall 20 is a non-magnetic boss 29 having the bearings 30 for journalling the shaft 27, and attached to the shaft 27 is a wrench socket 31 of the proper size and shape for the hexagon nut which is to be tightened, it being understood that any shape of socket 31 can be employed, it also being understood that a variety of socket shapes can be attached in any suitable manner to the shaft 27.

Contained in the casing 19 is the magnetic fluid 32 which is preferably composed of oil having finely divided magnetic particles, such as iron, suspended therein. Any type of oil seal can be employed such as an oil ring indicated by the character 33.

The character 34 indicates a resistance which can be variably adjusted by means of the knob 35, the character 36 indicating a switch which can be mounted in the member 11, the character 37 indicating a further switch connected to the motor circuit, the relation of all such switches, etc. being shown clearly in Figure 3.

The character 38 indicates the lead passing to the necessary source of electrical energy for operating the motor and the electro-magnet.

It will now be noted that when the switch 37 is actuated, the motor 10 will be driven, which will drive the shaft 13 and which will also rotate the entire casing 19. As soon as the switch 36 is actuated, which switch can be in the form of a push-button, the electro-magnetic coil 22 will be actuated, thereby energizing the magnetic circuit which will pass about through the casing portions 19 and thence through the discs 24 and 28 to cause a positive magnetic binding attraction through the fluid 32 so that as a result, the rotation of the casing 19 will also rotate the discs 28 and the shaft 27, so that the socket 31, when engaged with the nut, will tighten the nut quickly. As soon as the nut is tightened sufficiently to a pre-set torque, slippage will occur between the discs and fluid so that the motor 10 can still rotate without injury. The switch 36 or button, can be then released, opening the circuit to the coils 22, so that when the socket 31 is removed from the nut, it will already be stationary, whereby the socket 31 can then be placed on the next nut, and the button 36 pressed inwardly, whereby the tightening operation will proceed as before.

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It should be understood that the rings 15 and brushes 16 are suitably connected in the circuit shown in Figure 3 to pass the current to the coils 22, the leads of which can pass through the opening 39 in the casing 19. By adjusting the variable resistor at 34 by means of the member 35, the operator can set the wrench to perform at a predetermined torque for the necessary purpose.

It will now be noted that I have provided all of the various advantages mentioned in the objects of my invention, it being understood that slight variations in the same can be made without departing from the spirit of my invention.

Some changes may be made in the construction and arrangement of the parts of my invention without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. A variable torque wrench comprising a driven shaft, a casing attached to said shaft, said casing containing a magnetic fluid therein, said casing further including magnetic portions, a further shaft rotatable in said casing, magnetic discs attached to said further shaft whereby rotation of said casing will cause a binding magnetic action between said magnetic casing portions and said discs to thereby rotate said further shaft, a nut-engaging member attached to said further shaft, means for electrically energizing said casing magnetic portions including a coil wound in said casing, means for electrically energizing said coil including an electric circuit passing thereto, a switch in said circuit whereby the magnetic circuit can be broken when desired, means for varying the electrical input to said coil including a variable resistor interposed in the coil circuit, said casing magnetic portions including a centrally positioned further disc, said discs being spaced from said further disc.

2. A variable torque wrench comprising a driven shaft, a casing attached to said shaft, said casing containing a magnetic fluid therein, said casing further including magnetic portions, a further shaft rotatable in said casing, magnetic discs attached to said further shaft

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whereby rotation of said casing will cause a binding magnetic action between said magnetic casing portions and said discs to thereby rotate said further shaft, a nut-engaging member attached to said further shaft, means for electrically energizing said casing magnetic portions including a coil wound in said casing, means for electrically energizing said coil including an electric circuit passing thereto, a switch in said circuit whereby the magnetic circuit can be broken when desired, means for varying the electrical input to said coil.

3. A variable torque wrench comprising a driven shaft, a casing attached to said shaft, said casing containing a magnetic fluid therein, said casing further including annular magnetic portions, a further shaft rotatable in said casing, annular magnetic members attached to said further shaft, said annular magnetic members being positioned between said magnetic portions whereby rotation of said casing will cause a binding magnetic attraction between said magnetic portions and said annular magnetic members to thereby rotate said further shaft, a nut-engaging member attached to said further shaft, electric circuit means for electrically energizing said magnetic portions of said casing, said energizing means including a coil wound in said casing, electric means for energizing said coil, said circuit means including a switch whereby the magnetic circuit can be broken when desired, and means for varying the electrical input to said coil.

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