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DOUBLE-ACTING POWER-WRENCH FOR PUTTING ON AND TAKING OFF NUTS AND THE LIKE

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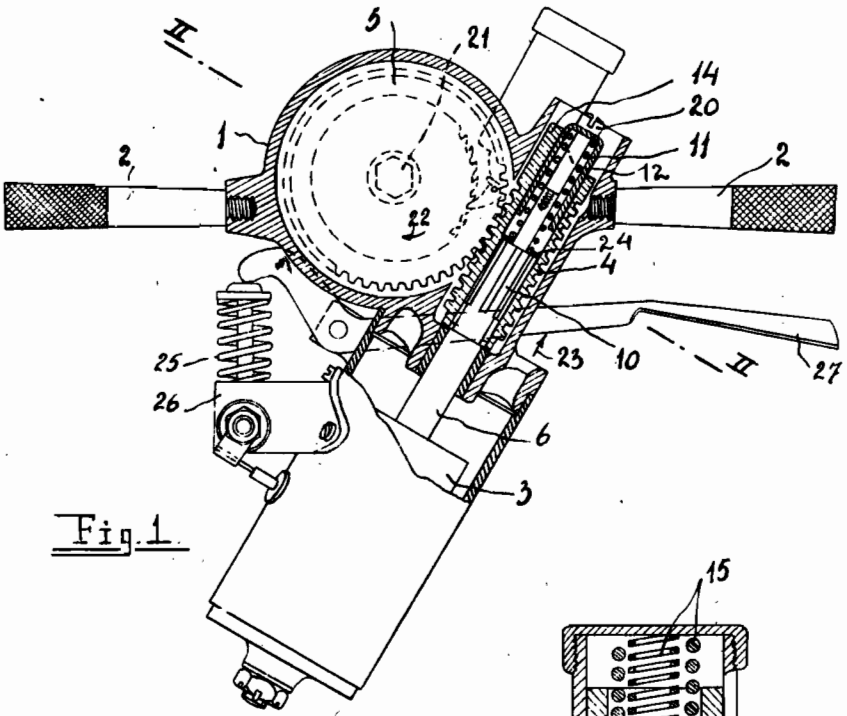

Fig. 1.

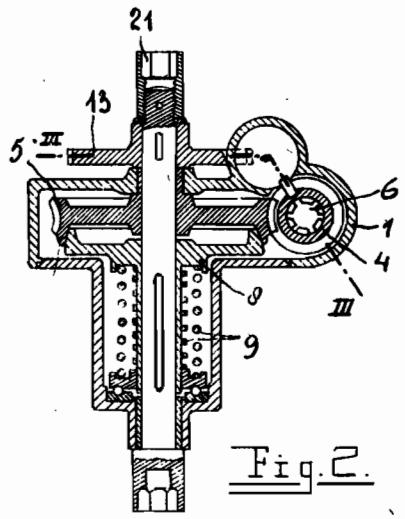

Fig. 2.

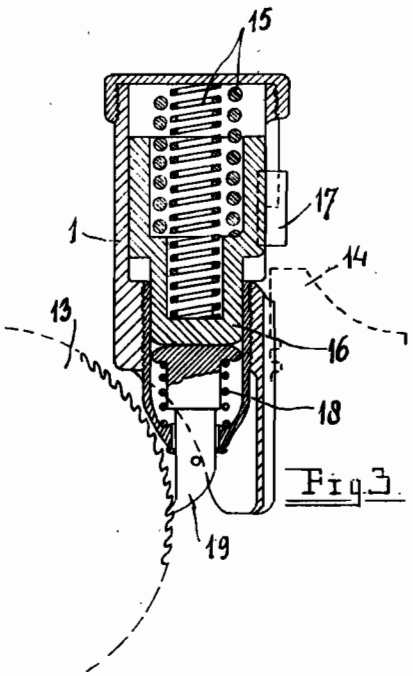

Fig. 3.

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DOUBLE - ACTING POWER - WRENCH FOR PUTTING ON AND TAKING OFF NUTS AND THE LIKE

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The invention relates to a mechanically driven tool, particularly adapted for putting on and taking off nuts and the like, said tool being provided with a worm and wormwheel and a friction clutch.

Herewith use is made of a reduction gear and of means for connecting tools for turning nuts and screws in one direction or the other.

With the well-known tools of this type use is made of the rotating torque of a force acting on same for unscrewing or screwing on nuts or screws, the body force of the operator mostly being utilised with pulls or hammer blows for the final tightening or loosening of nuts or screws. Notwithstanding this drawback these kinds of tools have found a field of employment with mass products, machines, air planes, etc.

In repair shops and especially when repairing autocars on the public road these tools, however, have found no acceptance in the interchanging of the wheels and the tightening and loosening of nuts, above all things because mostly metal surfaces are concerned which are deformed by weather influences, so that the nuts cannot be taken off even with greatest effort.

It is the aim of the invention to facilitate the tightening or loosening of nuts. According to the invention this is attained in that the friction clutch is arranged concentrically about the axis of the worm wheel and that the worm can be displaced lengthwise on the driving shaft and that the worm forms an integral part with an axial cam which on rotation intermittently puts a spring under pression said spring acting upon a pawl, which exerts a percussion action on the nut via a ratchet wheel.

The initial loosening of nuts which have become stuck or thread bound as well as the tightening of nuts is consequently left to a percussion mechanism which is in direct connection with the transmission gear of the tool and therefore forms an integral part with same, in such a way, that this percussion mechanism exerts an additional action always when and only when the resistance against loosening or tightening of the nut or screw is higher than a definite and accurately adjustable rotation torque. Consequently the percussion action commences and ends automatically. By this means besides the great advantage is obtained that the rotation torque and the force to be delivered by the motor can by very futile, since the unscrewing of nuts already loosened requires only a fraction of the force which would be required else. The electromotor consequently may be chosen much smaller. Especially with a motor-car accident it is of importance that the weight of the tool be small so that it may be manipulated with ease. At the same time it is attained that the starter battery which has to deliver current for the motor is spared and remains fit for use for the subsequent re-starting of the car.

With the tool according to the U. S. patent specification No. 2,119,968 it is true that the rod 17 exerts a tangential force, but this cannot be considered a percussion force, since the rod is reciprocated regularly. The tooth wheel 35 (and thus the nut) consequently is rotated intermittently, but not with a percussion force.

The drawings will further elucidate the invention.

Fig. 1 is a cross sectional view of the tool according to the invention.

Fig. 2 is a cross section according to the line II—II of Fig. 1.

Fig. 3 is a cross section according to the line III—III of Fig. 2 and indicates how the percussion mechanism exerts its action through the intermediary of a resilient pawl.

The casing 1, preferably made of light metal, is carried by the handles 2. The casing encloses all details and also the motor 3 which may be manufactured for a voltage of 6 volt and consequently can be easily connected to the starter battery.

The motor acts on a worm wheel 5 meshing a worm 4. The worm is displaceably mounted by a key 10. The worm wheel 5 forms integral connections with the clutch part 7. The other part 8 of the clutch is pressed against the part 7 by means of a spring or springs 9.

The worm shaft 6 is continuously pressed towards the motor by a spring 11 via a disc 24, but owing to the key 10 it is allowed to make a slight axial displacement.

In order to limit the stroke of the worm (instead of exclusively by the compression of the spring) a sleeve 12 is held on the terminal end of the shaft 6 by the screw bolt 20.

The end face of the worm shaft 6 is not-flat and has the shape of an axial cam 14. By means of a spring or springs 15 the percussion mechanism is pushed downwardly. In its most downward position (limited by a stop) the nose 17 of the percussion mechanism 16 rests against the highest edge of the cam 14 in the normal compressed position of the worm shaft.

Below the percussion mechanism 16 a pawl 19 is mounted, which is pushed upwardly by a spiral spring 18. The plate spring 20 pushes the pawl 19 against the teeth of the ratchet wheel

13. The turning tool (the monkey-spanner) is attached in a recess 21 of the pawl wheel 13.

The switch 26 is acted upon by the hand lever 24, which is held out of operation by the coil spring 25.

The action of the tool is as follows:

If for instance the nut to be loosened is not too tight, the motor rotates the nut in the normal way via worm 4, worm wheel 5, clutch 7, 8 and ratchet wheel 13, the latter rotating in the direction of the arrow 22. If the resistance against loosening, however, is too great, the clutch parts commence to slip along another. The worm wheel 5 is then braked off, owing to which the threads of the worm 4 act on those of the worm wheel in such a way that the worm shaft 6 is displaced in the direction of the arrow 23 over some distance. Owing to the irregular shape of the cam 14 the percussion mechanism is lifted each time, after which it suddenly falls from the greatest height of the cam 14 and is pushed downwardly with force by the spring 15. The lower end of the percussion mechanism 16 strikes on the head of the pawl 19, which endeavours to shift the ratchet wheel 13 over one tooth. At the retrogressive movement of the percussion mechanism the pawl 19 is brought back to its normal position by the spring 18.

In this way, besides the normal rotation motion, a comparatively strong percussion action is intermittently exerted on the nut.

The tool is so light and simple in construction that for instance when the current-lead is intempted it can be easily manipulated by hand.

If the tool has to turn a nut in the other direction (consequently when tightening) it is only necessary to turn the tool about its vertical axis. The right hand handle is then taken in the left hand.

It be observed that the unequal rotation torque (here obtained by a percussion action) can also be obtained in another way, e. g. by utilizing an excentric.

The tool is adapted par excellence for use with motor cars with which a low voltage motor can be connected to the starter battery. By connecting a loose key or a monkey spanner with the gear driven by the motor shaft, it is possible to easily tighten or loosen the nuts of wheels or the like. Owing to the small dimensions of the tool it can be taken along without objection in the motor car and driven by the current of the battery of the car. Consequently to the driver, especially the gentleman-driver, it offers a great facility if it is necessary to interchange the wheels or the like on the way. The tool can also be used for driving the crick or doing similar work. It is only necessary to take the tool in the hand, to connect it to the battery and to connect the turning tool to the gear.

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