United States Patent

Thomasian

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[54] WRENCH

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Related U.S. Application Data

[63] Continuation of Ser. No. 799,458, Feb. 14, 1969, abandoned.

[52] U.S. Cl. 81/52.4, 81/58.3

[51] Int. Cl. B25b 13/00, B25b

[58] Field of Search ..... 81/52.4, 58.1, 58.3, 58.4, 81/60 T

[56] **References Cited**

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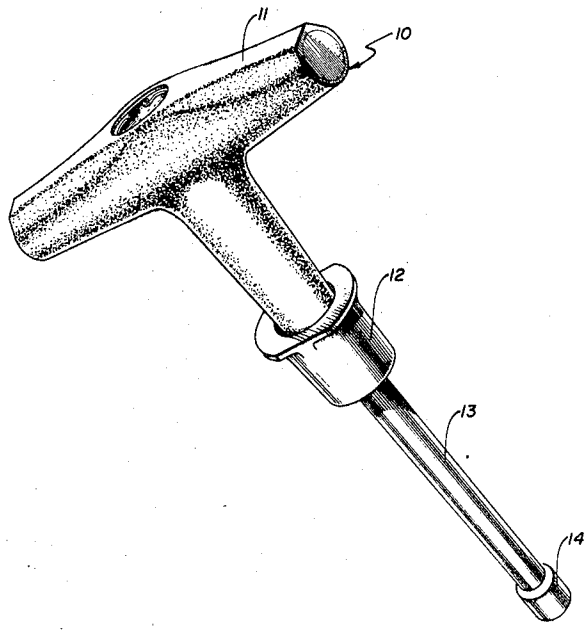
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[57] **ABSTRACT**

In general, this invention relates to a limited-torque ratchet wrench and, more particularly, to such a wrench having means for selectively nullifying the ratcheting effect.

6 Claims, 2 Drawing Figures



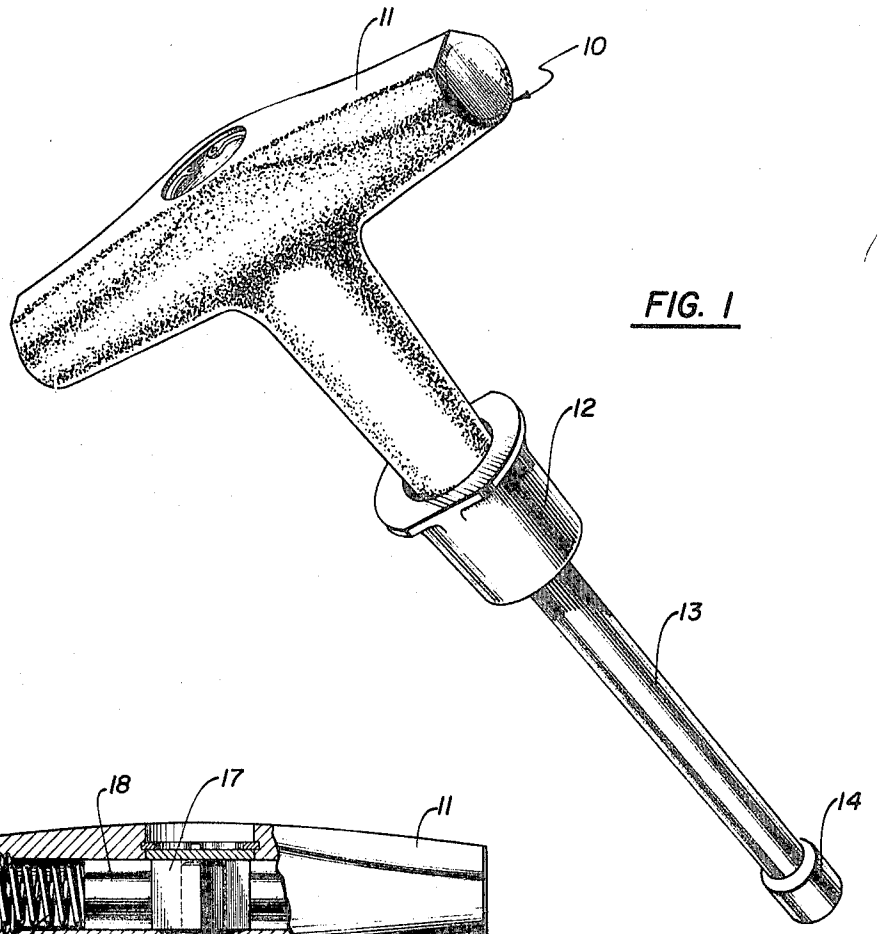


FIG. 1

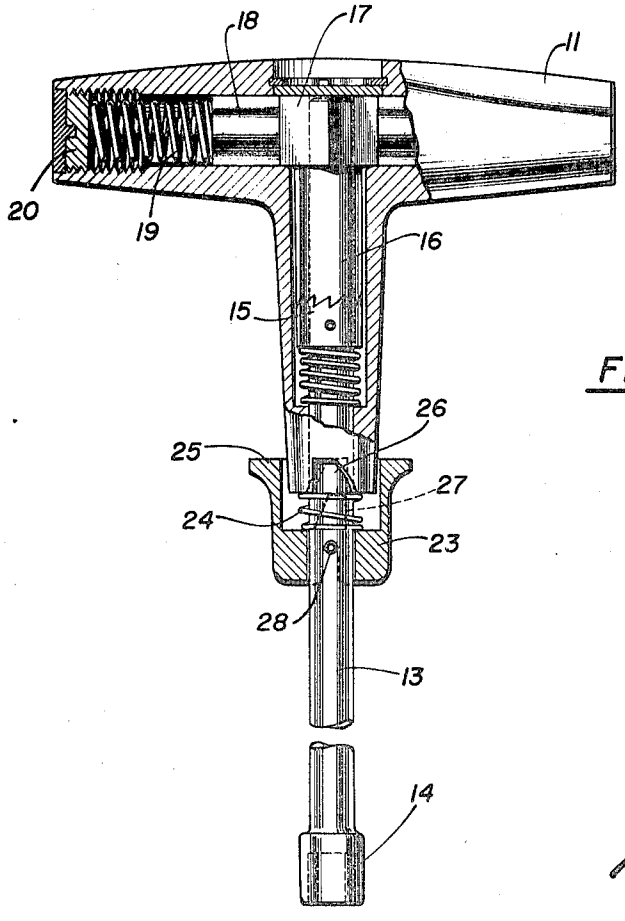


FIG. 2

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WRENCH

This application is a continuation of Ser. No. 799,458, filed Feb. 14, 1969, now abandoned.

BACKGROUND OF THE INVENTION

T-handled wrenches having positive but torque-limited drive when turned in one direction and slip when turned in the other direction have long been used for many years to tighten screw-type fasteners. The industrial importance of this type of tool has resulted in designs for one-way ratcheted, torque-limiting wrenches of reasonable cost and sturdy construction. These designs are, however, basically "one-way"; that is, they operate effectively to tighten, but it is obvious that many applications require reversing the ratchet to loosen the fastener. It is known to those skilled in the art that the introduction of a two-way ratchet device causes synergistic increases in the cost and in durability problems, thus throwing the economic balance against bringing such a tool to a given job. The alternative to this variable ratchet is a device which simply overrides the slip mechanism of the ratchet. This might be accomplished by simply running a pin through the handle and drive shaft. Such a mechanism, though simple, introduces many problems to the operator and, most importantly, also overrides the torque-limiting feature of the wrench, which could accidentally defeat the whole purpose of the tool. Anyone who has experienced the frustration of breaking off the head of a bolt which is threaded into, say, an engine block, and the difficulties involved in repairing such damage, can readily understand the significance of this drawback. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a torque-limited ratcheting wrench having a loosening member which overrides the slip action of the ratchet, but does not override the torque-limited positive drive action, thus allowing the tool to be used to loosen the screw-type fasteners while still maintaining the torque-limited safety device in the tighten direction, in case of accidental wrong turn.

Another object of this invention is the provision of a torque-limited ratcheting wrench which has a slip action override mechanism and which can be operated entirely with one hand.

A further object of the present invention is the provision of a torque-limited ratcheting wrench having a slip override mechanism which is integral with the tool and is held securely and remotely when not in use, thus eliminating a readily lost and unnecessary element which might interfere with normal operation.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

SUMMARY OF THE INVENTION

In general, the present invention consists of a T-shaped handle, a drive shaft and engaging device, rotatably mounted in the leg of the "T" and extending from it, and a ratcheting mechanism between the handle and the shaft that causes positive drive when the handle is turned in a first direction and slip action when the handle is turned in a second direction. A torque-limiting mechanism is provided to limit the positive drive torque to a preset value. A loosening collar, which is concentrically and slidably mounted on the shaft and rotates with the shaft, is engageable with the handle to form a second ratchet mechanism which causes positive drive in said second direction and slip in the first direction, with an overall result of positive drive in the second direction and torque-limited drive in the first direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 shows a perspective view of the invention, and

FIG. 2 shows a cutaway view of the working mechanisms of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a perspective view of a wrench **10**, including a T-handle **11**, a loosening collar **12**, a main shaft **13**, and an engaging socket **14**.

FIG. 2 shows the internal construction of a wrench with a preferred embodiment of the loosening member or collar. The main drive train consists of the engaging socket **14**, the main shaft **13**, the lower crown **15** (which is concentric and rotates with the shaft), and an upper crown **16** which is concentric and rotates independently of the shaft and has at its upper end a polygon **17**. The torque-limiting connection between the polygon and the handle **11** consists of a plunger **18** which is biased against the polygon by a spring **19**, the bias being adjustable by use of a screw **20**. This bias is the basis for torque limitation. The primary ratcheting mechanism exists as the teeth between the crowns and, as such, is well understood by those familiar with the art. Thus far, a wrench has been described for tightening a bolt, so that rotation of the handle in a clockwise or first direction causes positive but torque-limited drive action, and rotation in the counterclockwise or second direction causes a slip action, i.e., no rotation of the main shaft.

An important element of the invention is the loosening collar **23** which is concentrically, slidably, but nonrotatably mounted on the shaft by means of a pin **28**. The collar is concentric with the leg of the wrench and is held away from the handle by a spring **24**. Along the upper periphery is a flange **25**. The lower end of the handle leg has notches **26**, and the inside of the collar has teeth **27** which act together to form a secondary ratchet system when they are engaged by the lifting of the collar. This secondary ratchet works in the opposite direction to the primary ratchet in the handle, but is normally held inactive by the spring **24**.

The wrench is, therefore, capable of two modes of operation. To tighten a screw-type fastener, the operator grasps the handle and engages the fastener with the engaging socket **14**. The primary ratchet transforms reciprocating rotation by the operator into uni-directional tightening or first direction rotation. Should the operator wish to loosen a fastener, he must cause a second direction rotation of the shaft. Obviously, there is no provision in the primary ratchet for this. It is accomplished by the operator lifting the loosening collar **23** with two fingers of the operating hand into engagement with the handle, thus activating the secondary ratchet. In this way, a positive, second-direction drive is caused by second direction rotation of the handle. The important factor in first-direction rotation of the handle is still the torque-limited positive drive which protects the fastener, if the operator should accidentally use the wrong rotation in the initial phase of loosening the fastener.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

The invention having been thus described, what is claimed as new and desired to secure by Letters Patent is:

1. A wrench comprising
   a. a main shaft, having an element located at one end for engaging a screw-type fastener,
   b. a torque handle mounted on the opposite end of the shaft,
   c. a ratchet mechanism between the shaft and the handle, causing a positive drive action when the wrench is turned in a first direction of rotation, and a slip action in the second direction,
   d. a torque-limiting device to cause termination of the positive drive action in the first direction, if the torque exceeds a predetermined value, and

e. a loosening means operable on occasion to override the slip action, thus permitting positive drive action in the second direction of rotation, and means on said loosening means operative, if the operator rotates the handle in the said second direction with the loosening means engaged, to cause said loosening means to feed along the shaft into a normal inoperative position.

2. A wrench as recited in claim 1, wherein the loosening means is connected to the shaft so that they rotate together and is capable of similarly and simultaneously engaging the handle.

3. A wrench as recited in claim 2, wherein the loosening means consists of a collar which is concentrically, slidably, but nonrotatably mounted on the shaft and has means for engaging the handle so that the collar and the handle rotate together, the collar being held away from said handle until the operator desires to cause positive drive action in the second direction, at which time the collar is brought into engagement with the handle thus causing rotation of the shaft, collar, and handle together.

4. A wrench as recited in claim 3, wherein the said means for engaging the collar and the handle consists of a plurality of complementary teeth.

5. A wrench as recited in claim 1 configured to form a secondary ratchet operation in the opposite direction of the primary ratchet.

6. A wrench as recited in claim 1, wherein the loosening means is selectively movable by the operator from a first, normal position lengthwise of the shaft to a second position where the said positive drive action takes place and wherein, if the operator rotates the handle in the said second direction while the loosening means is in the said second position, it will automatically move back to the said first position.

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