

W. D. MORRISON.
WRENCH.
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1,306,553.

Patented June 10, 1919.

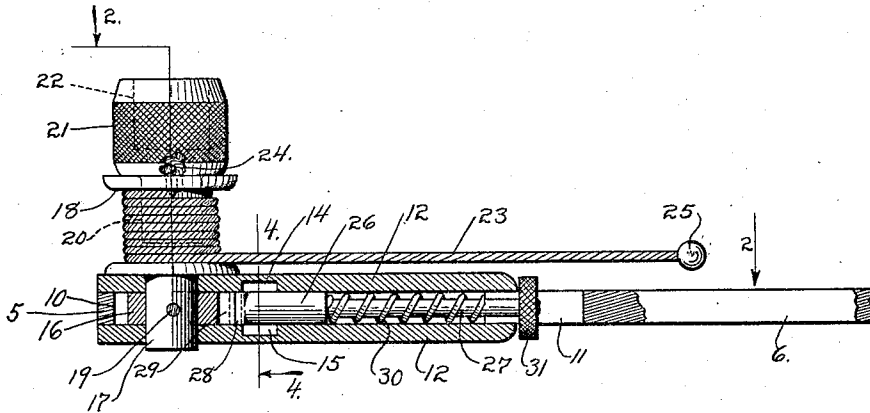


Fig. 1.

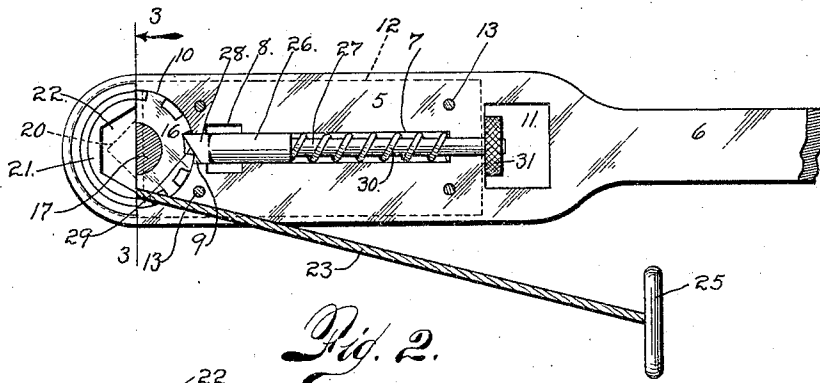


Fig. 2.

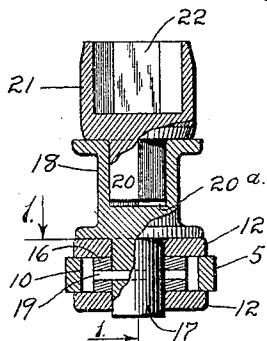


Fig. 3.

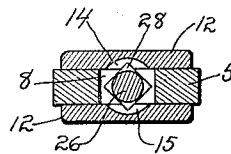


Fig. 4.

Witnesses
John B. Wade.

Inventor
William D. Morrison.
by *Wickinson & Givsta*
his Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM D. MORRISON, OF DENVER, COLORADO.

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To all whom it may concern:

Be it known that I, WILLIAM D. MORRISON, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Wrenches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention embodies novel improvements in wrenches, and particularly relates to those types which are of an angular-line construction, inasmuch as the work-engaging jaws, or their equivalent, project at an angle to the transverse plane of the tool base or handle.

The broad aims of the invention are primarily to provide such a wrench, which is not only strong in construction, simple in assembly and operation, and durable and efficient in action, while comparatively inexpensive to manufacture, but also one whereby wrenching operations may be the more facily accomplished under all general conditions, and greatly accelerated especially where the work to be engaged is positioned in restricted spaces, thus increasing the efficiency of the wrench to a maximum degree both in point of easy manipulation and rapidity of action.

Merely by way of emphasizing the great utility of my improvements, attention may be directed to the almost inaccessible nuts for the coupling bolts, strapping a connecting rod with a crank, in the crank base of an automobile engine for instance, although it will be obvious that the limits of use of the improved tool is not so restricted, as it may be very satisfactorily employed in many and varied relations. Also, it may be said at the outset that, while for simplicity of description and brevity I shall merely refer to nuts as the work to be engaged, the invention is equally applicable for use with headed bolts, whether of a stud-bolt type or otherwise, or in fact in any analogous relation.

Other objects and advantages of the detailed construction, assembly and functioning of the several elements will be so clearly apparent, as incidental to the following description, that it would be only undesirable surplusage to further refer to them initially.

With these prefacing general statements, the invention resides in the novel combination and arrangement of parts as hereinafter disclosed and more succinctly set forth in the appended claims, and for a more complete conception thereof reference will now be had to the accompanying drawings, illustrating a practical embodiment of the improvements, in which drawings—

Figure 1 is an assembled view of my improved wrench, partly in side elevation and partly in longitudinal section, the section being indicated by the line 1—1 of Fig. 3; Fig. 2 is a plan view, partly broken away as indicated by the section line 2—2 of Fig. 1; Fig. 3 is a vertical cross-sectional view, taken in the plane of the line 3—3 of Fig. 2; and Fig. 4 is a vertical cross-sectional view, through the casing head of the tool, along the line 4—4 of Fig. 1.

5 designates an intermediate element of the casing head of the wrench, which element is shown in the form of an elongated rectangular flat base member, or main body portion, terminating in a handle portion of any suitable construction, contour and length.

The member 5 is formed with the central longitudinal slot 7, the width of which is slightly increased to provide a clearance space 8, proximate to its outer end, and thence continues as the short terminal slot 9, which in turn merges into the circular aperture 10, a further suitable aperture 11 being located proximate to but out of communication with the opposite end of said elongated slot 7, and the whole arrangement functioning as a partial housing for certain mechanically associated elements later referred to.

12 designates upper and lower covering plates for the intermediate member 5, to which they are secured in any suitable way, as by screws, bolts or rivets, indicated at 13. These plates are of similar proportions and design, and are provided with opposed depressions 14 and 15, respectively, or otherwise formed recesses on their inner faces, which are adapted for registration with the widened opening 8, thus completing the clearance space aforesaid.

16 designates a ratchet wheel, disposed within the circular aperture or annular strap-housing 10, which ratchet wheel is suitably toothed peripherally and is cen-

trally apertured to receive the stud spindle 17 of a reel or drum 18, the said upper and lower casing plates 12 being also apertured to journal said stud spindle, which latter 5 may be fixedly secured to rotate with said ratchet wheel as by a keying pin 19.

The work engaging means is superposed upon the drum head, and obviously may be of any well-known structure, adapted to 10 adjustably or directly fit the particular nut or bolt head to be wrenched.

In actual practice, however, I prefer to hollow out the upper portion of the barrel of the drum to provide a socketing seat 20^a 15 for detachably receiving a squared lug 20, formed integrally with, or otherwise connected to, the base of a chuck member 21, which latter is in turn socketed, as at 22, for the reception of a correspondingly 20 shaped nut. This permits of the employment of a set of individual chucks, which positively engage the work, without the serious disadvantages of less positive adjustable jaws in restricted spaces, while at the 25 same time allowing for a desired substantial range of operations relatively to nuts of varying forms and sizes.

Suitable means are provided for rotating the chuck 21 independently of the ratcheting mechanism and the wrench handle, while the 30 latter holds the chuck up against the nut.

Such a means is designated by the flexible cord 23, or an equivalent flexible element, secured at one end 24 to the drum and at its 35 free end provided with a hand grip 25, the said cord being adapted to be wound around the drum barrel in reverse directions, dependent upon whether the nut is to be removed from its bolt or screwed home thereon. 40 The drawings show it wound in position for the latter operation.

The ratchet dog control comprises a cylindrical body member 26, having a reduced cylindrical shank 27 projecting from one 45 end and at its other end terminating in a squared head 28, having a beveled face 29 forming a pawl co-acting with the toothed periphery of the ratchet wheel 16. The pawl is normally held up against the ratchet teeth 50 with the usual retractile pressure, illustrated by the controlling spring 30 coiled around the shank 27 in the relation shown, but the specific general construction of this whole controlling mechanism has its own merits, 55 and its particular mounting provides for a reversible pawl arrangement of effective and compact disposition.

The cylindrical body member 26 and its shank 27 extends within the slot 7, the former also slidably bearing upon the opposed casing plates 12, while the far end of the shank 27 projects into the squared aperture 11, and supports a milled operating wheel 31 60 for substantially withdrawing and reversing the pawl element, all of which will be more

fully set forth in the following description of operations.

Operation.

When a nut is to be screwed home, the 70 flexible cable is wound around the barrel of the drum 18 in the direction indicated in the drawings, with the ratchet pawl correspondingly set as shown, and this would be the case regardless of the actual disposition of 75 the bolt.

To be more explicit, however, we will assume that the bolt is downwardly directed, whereupon, with a nut resting in the socket 22 of an appropriately fitting chuck member, the tool would be supported in the position shown in Fig. 1, and hence the nut may be held up directly against the starting threads of the bolt. This not only guards 80 against the serious inconvenience of the nut being probably released and dropped into some inaccessible place, but also serves as a positive centering means therefor. 85

When so centered and positively held, therefore, upon a steady and rapid pull on 90 the cable 23, manually or otherwise, the unwinding of the latter will cause a greatly accelerated rotation of the drum and supported chuck member, compared to a slow ratcheting action, and hence the nut is 95 speedily threaded up the bolt to a position where the final tightening power is to be applied, whereupon it may then be ratcheted home securely by a very few movements of the wrench handle, substantially as a continuous action, without the removal of the 100 wrench from the time of applying it to the work until the latter has been satisfactorily accomplished.

During the rotation of the chuck independently of the ratcheting action, it will be obvious that the beveled face of the retractile pawl rides over the peripheral teeth of the ratchet wheel with but trifling sliding resistance, but even this slight resistance 110 may be avoided in some instances, if desired, by withdrawing and holding the pawl latched, in a disengaged relation to the ratchet teeth, which will briefly be referred to later. 115

Also, it may be conveniently stated at this point that the cable 23 performs another important function.

In attempting to apply a ratcheting action to a nut, when the latter is still freely loose 120 on its threads, or has not yet begun a firm binding grip, the nut is not infrequently rotated back from its immediately advanced position by the reverse swing of the wrench handle, the resistance being insufficient to 125 overcome that of the spring-controlled pawl, so that in effect a step is made forward with an equivalent motion back again, and hence, temporarily at least, there is no effective advance motion until the nut finally begins to 130

bind. It is a question just how long that may continue, but being all lost motion it is obviously very objectionable. However, by holding the cable 23 taut, it provides an anchoring means against a backward rotation of the drum 18, and hence for the ratchet wheel also to which it is attached, necessitating the pawl's receding movement over the ratchet teeth.

Thus far I have simply referred to the operation of threading a nut on its bolt for screwing the former home, but it is thought that it will be clearly seen that a nut may be just as speedily threaded off its bolt, by an exact reversal of the method of operation. To do this, however, the cable must be wound around the drum in the opposite direction to that shown, and likewise the operative position of the ratchet-dog must be reversed, in the accomplishment of which latter, the particular slotted formation of the intermediate base supporting member 5 has its own peculiar functioning, which will now be referred to.

Gripping the milled wheel 31 between the thumb and forefinger, the former may be moved rearwardly in the aperture 11, thus withdrawing the ratchet-dog element, against the tension of the spring 30, until the squared head 28 will have receded into the widened slot 8. A half turn of the milled wheel, in either direction, will then reverse the operative position of the ratchet-dog, the partial rotation of the squared head thereof being allowed for by the clearance space formed by the widened slot 8 and the registering recesses 14 and 15 of the casing plates, as will be evident from Fig. 4. Upon releasing the milled wheel, the spring 30 will return the ratchet-dog again into operative association with the ratchet wheel, but in the reversed position desired.

When the ratchet-dog head is back in the clearance space, if only a quarter turn or a trifle less is made, it may be held latched in that position, out of operative engagement with the ratchet wheel, so that the latter with the chuck may be rotated, as previously referred to, without even the frictional resistance of the otherwise engaging ratchet-dog. This may be found quite expedient where the work is in the open, but ordinarily might not be desirable as it would probably necessitate the removal of the wrench from its work to accomplish the adjustment.

While I have thus made a full and complete disclosure of a practical embodiment of my improvements, obviously minor modifications might be made without departing from the underlying principles of the invention, and it will be understood, therefore, that I do not limit myself necessarily to the exact details as illustrated and described, excepting as they may come within the purview of the ensuing claims, when fairly in-

terpreted in the light of the specifications and understood equivalents.

What I do claim, as patentably novel, is:—

1. In tools of the character set forth, consisting of a base member suitably supporting a handle and a ratchet wheel associated with a ratchet-dog; in combination with a drum coupled with said ratchet wheel to rotatably co-act therewith; work-engaging means carried by said drum; and flexible means adapted to be so coiled around said drum as to impart rotary motion thereto, upon unwinding, independently of the co-acting ratcheting movement of said drum, substantially as described.

2. In tools of the character set forth, consisting of a base member suitably supporting a handle and a ratchet wheel associated with a ratchet-dog; in combination with a drum coupled with said ratchet wheel to rotatably co-act therewith; a socketed nut-receiving chuck carried by said drum; and flexible means adapted to be so coiled around said drum as to impart rotary motion thereto, upon unwinding, independently of the co-acting ratcheting movements thereof, substantially as described.

3. In tools of the character set forth, consisting of a base member suitably supporting a handle and a ratchet wheel associated with a reversible ratchet-dog; in combination with a drum coupled with said ratchet wheel to rotatably co-act therewith; a detachably mounted socketed nut-receiving chuck carried by said drum; and flexible means adapted to be so coiled around said drum as to impart rotary motion thereto, upon unwinding, independently of the co-acting ratcheting movements thereof, substantially as described.

4. In tools of the character set forth, the combination with a base member, having a suitable handle and formed with a longitudinal slot merging into a circular aperture, the said slot being slightly widened to provide a clearance space adjacent said circular aperture; of a ratchet wheel mounted in said circular aperture; a drum coupled with said ratchet wheel to rotatably co-act therewith; work-engaging means carried by said drum; a spring controlled retractile element disposed in said slot and providing a ratchet-dog tooth operatively associated with said ratchet wheel and clearance space; means for withdrawing and reversing said retractile element; and flexible means adapted to be so coiled around said drum as to impart rotary motion thereto, upon unwinding, independently of the co-acting ratcheting movements thereof, substantially as described.

5. In tools of the character set forth, the combination with a base member, having a suitable handle and formed with a longitudinal slot merging into a circular aperture,

the said slot being slightly widened to provide a clearance space adjacent said circular aperture; of a centrally apertured ratchet wheel mounted in said circular aperture; 5 upper and lower covering plates for said base member having recesses registering with said clearance space, and the upper plate being apertured to aline with the aperture of said ratchet wheel; a spring controlled retractile element disposed in said 10 slot and providing a ratchet-dog tooth operatively associated with said ratchet wheel and clearance space; means for withdrawing and reversing said retractile element; a drum 15 mounted over said upper covering plate and

having a stud spindle extending, through the aperture thereof, into fixed relation within the aperture of said ratchet wheel; work engaging means carried by said drum to rotatably coast therewith and with said 20 ratchet wheel; and flexible means adapted to be so coiled around said drum as to impart rotary motion thereto, upon unwinding, independently of the coasting ratcheting movements thereof, substantially as described. 25

In testimony whereof, I affix my signature.

WILLIAM D. MORRISON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."