C. ANDERSEN.

WRENCH.

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1,074,594.

Patented Oct. 7, 1913.

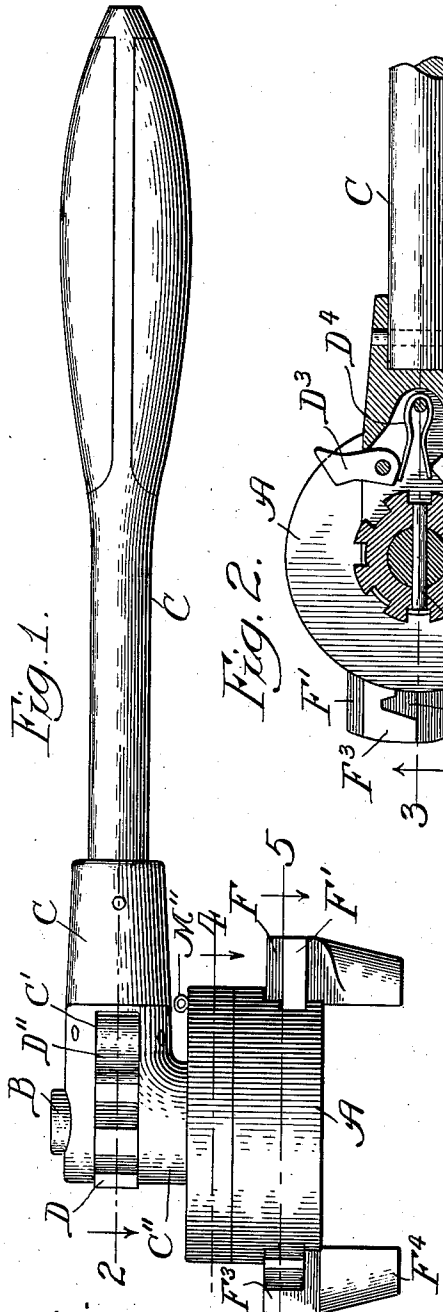


Fig. 1.

Fig. 2.

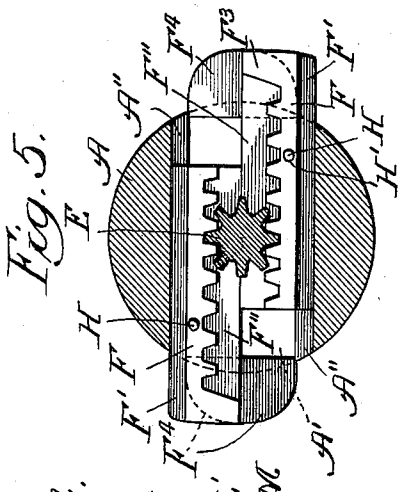


Fig. 5.

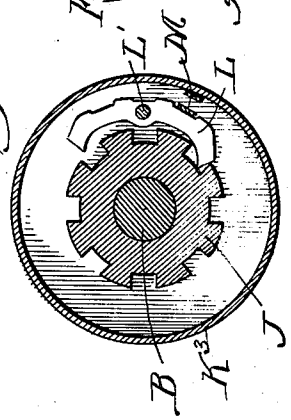


Fig. 4.

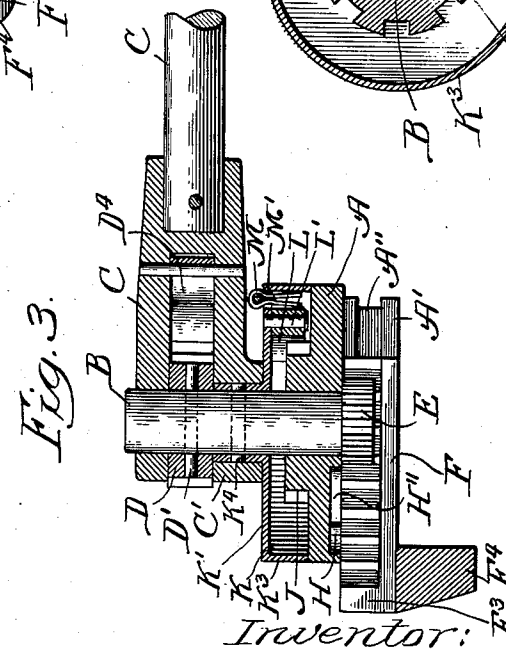


Fig. 3.

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UNITED STATES PATENT OFFICE.

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WRENCH.

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To all whom it may concern:

Be it known that I, CHRISTIAN ANDERSEN, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Wrenches, of which the following is a specification, such as will enable others skilled in the art to make and use the same.

My invention relates to improvements in ratchet wrenches, and more particularly to improved means for changing and adjusting the gage of the jaws and holding the same in place when the wrench is in use.

One of the objects of my invention is to provide automatic means for closing the jaws of a wrench upon the object to be turned by simply revolving the handle in the usual way for the ordinary operation of a wrench.

A further object is to provide for automatic opening of the jaws by a similar but reverse operation.

Another object is to operatively connect the jaws and handle of the wrench by suitable mechanism in such a way so as to automatically force the jaws toward each other against the object to be turned when the handle is revolved in a certain direction, and to open the jaws in like manner when the handle is revolved in the opposite direction.

A still further object is to provide additionally for at times holding a wrench having these characteristics closed on the object to be turned when the movement is reversed, as in unscrewing a nut.

My invention will be more fully understood by reference to the accompanying drawings forming a part of this specification, and showing a preferred embodiment of my invention.

Figure 1 is a side elevation of a complete wrench with the jaws opened; Fig. 2 is a top plan view of the head of the wrench with the upper part shown in horizontal section along the line 2 of Fig. 1; Fig. 3 is a vertical axial section through the head along the line 3 of Fig. 2; Fig. 4 is a transverse section of the head along the line 4 of Fig. 1; and Fig. 5 is a transverse section of the head along the line 5 of Fig. 1.

In all of the figures like parts are represented by like characters of reference.

I provide a head A rotatably mounted on a short laterally projecting shaft B, journaled at its upper end to the outer end of a handle C in transverse position with respect thereto. The said handle is of ordinary construction, and is of such length as gives sufficient leverage for conveniently turning the wrench against all ordinary resistances to be overcome.

For controlling the operating relation between the handle C and the shaft B, I provide a two-way ratchet mechanism, comprising a ratchet wheel D axially secured to the shaft B near its upper end by the transverse pin D′ and a pair of oppositely pointing pawls D″ pivoted to the handle C at opposite sides thereof. The said handle is provided with a longitudinal slot C′, extending back from the outer end sufficiently to receive and accommodate the said ratchet wheel D and pawls D″ and D^3. The said pawls are held by the spring D^4 independently of each other, in either opened or closed position as thrown by the operator. When both pawls are thrown into gear the shaft B is thereby substantially rigidly connected to the handle and turns synchronously therewith in either direction. When both of the pawls are thrown out of gear the handle may be turned independently of the shaft B and wheel D. When one or the other of the pawls alone is closed into gear the shaft may be rotated with the handle by turning the latter in the direction of the closed ratchet. A short laterally projecting collar C″ is formed on the inner side of the ratchet end of the handle to increase the size and strength of the bearing or journal which holds the shaft B and the upwardly projecting sleeve of a rotatable casing member G, hereinafter described.

The shaft B and wheel D are mounted upon the handle by first placing the wheel in position in the slot C′ and then inserting the shaft endwise from the under side. The pin D′ is then driven through the wheel and shaft and thereby securely locks them together.

On the lower end of the shaft B and preferably integral therewith, I provide a pinion E for operating the jaws as hereinafter described. Between the pinion E and the collar C′, I rotatably mount the head member A on the shaft B. I prefer to form the pinion large enough to hold the head in place, and assemble the head on the shaft by slipping the head A over the upper end thereof before mounting on the handle C.

I form the head A substantially flat and circular, or disk shaped, with an axial perforation for the shaft B and with a large central slot A across its under face to receive a pair of oppositely facing jaw racks F arranged to coöperate with the pinion E on opposite sides thereof. These racks are preferably similar in size and form and are provided with guide tongues F′ along their outer edges to fit in corresponding opposing guide grooves A″ in the sides of the head slot A′. On the under side of the racks I provide integral flanges F″ to overlap the pinion E and abut together at their inner edges in longitudinally slidable relation. At the outer end of each rack I prefer to form a transverse shoulder F^3 to close the end and increase the strength of the rack. These shoulders moreover serve to more rigidly support the gripping jaws F^4 which I provide on the outer or closed ends of the racks on their undersides to receive and engage any body to be turned as a nut or screw having a head adapted to be held by a wrench. I prefer to form these jaws wide enough to extend over both racks symmetrically as shown in Fig. 5.

The jaw racks F are assembled in the head A by inserting their open ends in opposite ends of the slot A′ and on opposite sides of the pinion E, care being taken that they both come into engagement with the pinion at the same time.

I provide simple means to prevent accidental escape of the racks from the head A when the jaws are opened to the full extent. When the racks are in place I drive stop pins H into holes H′ extending upward through the racks back of the teeth and registering with longitudinal slots H″ provided in the roof of the slot A′ to receive the ends of the pins. These coacting stop slots and pins may be positioned for various degrees of opening of the jaws, but I prefer to place a pin H near the center of each rack and to have the stop slots H″ extend nearly the full length of the head slot A′, but stopping short of the edge at each end.

Referring particularly to Fig. 5, it will be seen that the jaw racks are so arranged relative to each other and the pinion that when the latter is turned clockwise or right handedly, as in tightening a nut or screw, the head A remaining stationary, the jaws will be drawn together into close engagement with the object to be turned and upon further turning of the shaft and pinion, the head A and the said object will be turned therewith.

Obviously when the pinion is reversed the jaws will tend to open unless the head is free to turn. It is usually necessary, however, to force the reverse rotation of the head as in unscrewing a nut. I provide for this by means of a head and jaw controlling ratchet mechanism separate from the ratchet mechanism in the handle. For convenience and brevity I will designate the one as the head ratchet or lower ratchet, and the other as the handle ratchet or upper ratchet. I provide for mounting, protecting and operating the head ratchet as follows: Fixed on the upper side of the head A, and preferably integral therewith, I provide a ratchet wheel J having preferably the same number of teeth as the handle ratchet wheel D, said wheel J being considerably less in diameter than the head. Adjacent to the ratchet wheel J, and inclosing same, I provide an integral wheel casing K coaxial with the head and rotatably mounted on the shaft B independently of the head A, said casing comprising a radial web portion K′, fitting closely against the wheel J, an upwardly projecting bearing hub of sleeve K, fitting between the shaft B and the handle collar C″ and a thin protective rim or flange K^3 depending from the outer edge of the web K′ substantially flush with the cylindrical outer surface of the head and inclosing the head ratchet mechanism, but providing ample space for mounting a pawl between the flange and the wheel J.

I make the casing K co-rotatable with the shaft B by rigidly fastening them together by the pin K^4 before the shaft is mounted on the handle C.

I provide a two-way pawl L which I pivot on a downwardly projecting stud L′ set in the web K′ of the wheel casing K and positioned to coact with the teeth on the wheel J. For controlling the pawl L with respect to its engagement with the wheel J, I provide a spring M, mounted in a slot M′, preferably curved and concentric with the wheel J, said slot being long enough to permit sliding the spring M to bear on either of the opposite ends of the pawl L for reversing the same. The spring M may also be thrown into a neutral or nonoperative position at the center of the slot. The upper portion or handle M″ of the spring projects above the casing K far enough for convenient hand adjustment by the operator.

In order to protect the pinion E from unnecessary stress and possible fracture when any great amount of force needs be applied to the wrench in driving a nut or screw in the usual positive or right hand direction, I prefer to throw the head pawl into operative relation with the ratchet as shown in Fig. 4. Then in order to hold the jaws closed when rotation is reversed as in removing a nut or screw, I reverse the pawl so that it will turn the wheel J counterclockwise or in a left hand direction. Whenever the jaws are to be readjusted, the control spring M is moved to its middle position whereby the ratchet L is thrown entirely out of engagement with the wheel J, and the head is left

free to rotate on the shaft independently of the casing K, and the pinion E will move the racks to open or close the jaws at the will of the operator by rotating the head one way or the other on the shaft B.

While I have herein shown and particularly described a preferred embodiment of my invention, I do not wish to limit myself to the precise construction as herein shown and particularly described, as many modifications may be made by those who are skilled in the art without departing from the spirit of my invention.

Having thus described my invention I claim as new, and desire to secure by Letters Patent:

In a wrench, the combination of a shaft, a pinion at one end thereof, a handle mounted on the other end of the shaft, pawl and ratchet connections between said handle and shaft, a head provided with a transverse guiding groove rotatably mounted on said shaft, a pair of jaw-bearing racks slidably arranged in said groove in mesh with said pinion, a ratchet wheel formed on said head, a disk secured on said shaft above the head, and a pawl adapted to engage said ratchet wheel whereby the head is locked to the shaft.

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Witnesses:
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