

(No Model.)

C. E. BILLINGS.
WRENCH.

No. 536,063.

Patented Mar. 19, 1895.

Fig. 1.

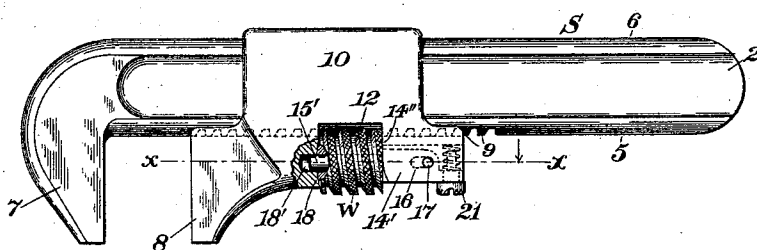


Fig. 2.

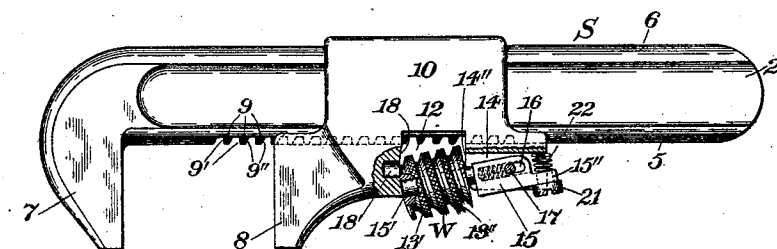


Fig. 3.

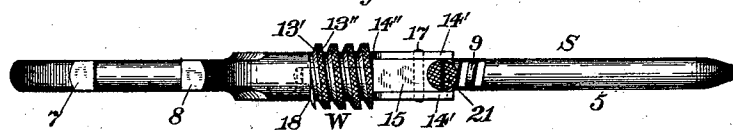


Fig. 4.

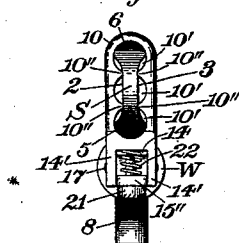
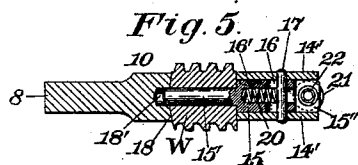


Fig. 5.



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UNITED STATES PATENT OFFICE.

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Application filed November 27, 1894. Serial No. 530,140. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BILLINGS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Wrenches, of which the following is a specification.

This invention relates to wrenches, and has for its object to furnish an improved tool of this general character, in which the movable jaw may be approximately adjusted upon the shank independently of the usual screw-threaded adjusting devices, and subsequently may be given a finer adjustment, by means of such coacting threaded members, to secure that exact positioning of the fixed and movable jaws, relatively to each other, necessary in a perfectly operative tool of this class; and in which also great rigidity and strength are combined with extreme lightness and simplicity and ease of manipulation.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation, partly in section, of a wrench constructed in accordance with my present invention, and showing the adjusting worm of the movable jaw in locked engagement with the rack upon the shank. Fig. 2 is a similar view, showing the worm out of engagement with the rack upon the shank and the movable jaw freely reciprocable upon such shank. Fig. 3 is an edge elevation, looking from the under side in Figs. 1 and 2. Fig. 4 is an end elevation, looking from the right hand in the preceding views. Fig. 5 is a longitudinal section in line $x-x$, Fig. 1, looking in the direction of the arrow.

Similar characters designate like parts in all of the figures.

According to my present invention, the shank or handle of the wrench is provided with a rack upon its inner, longer edge, or working-face, and a movable jaw, freely reciprocatory along said shank, is provided with an adjusting worm pivotally secured thereto and adapted to be brought into or thrown out of engagement with the aforesaid rack upon the shank, whereby the movable jaw may be brought quickly into an approximately adjusted position, relatively to the fixed jaw and the member to be engaged by the jaws of the wrench, when the worm is out of en-

gagement with said rack, and subsequently may be exactly adjusted, relatively to said fixed jaw and the member engaged between such movable and fixed jaws, when the worm is in engagement with the teeth of the rack upon the shank. I also provide in connection with the movable jaw and the worm carried thereby, means for normally maintaining the worm in engagement with the rack upon the handle of the wrench in one of its extreme positions, and for positively maintaining said worm out of engagement with the rack, in the other of such extreme positions, when disengaged from the rack, and thereby permitting the movable jaw to slide freely upon the handle of the wrench, and either to be adjusted approximately in position upon the shank or removed entirely therefrom.

In the preferred embodiment thereof, herein shown and described, the shank of the wrench, which is designated herein in a general way by S, is represented as formed of a single piece of bar-steel, channeled longitudinally upon its opposite faces for lightness of construction, while maintaining the necessary strength in the direction in which the strains from the jaws are transmitted. These channels are shown, at 2 and 3, as running from the end of the handle to a point close to the fixed jaw of the wrench, and preferably similar in outline and of equal depth, so that they form between them a reduced portion, or web, occupying a central position, and so that the strains received upon either of the head- or butt-portions, 5 and 6, of the shank will be transmitted substantially along the axial line connecting the same. The shank and the fixed jaw 7 are also shown as preferably of the same cross-section, as will be apparent by reference to Fig. 3. The inner edge or working face of the handle or shank is shown herein as carrying the threaded adjusting means usually formed upon the fixed member of tools of this general class. In the present case this adjusting means is shown as a rack, having obliquely-disposed teeth, 9, ranging transversely, relatively to the handle of the wrench. The planes of the forward sides or faces of these teeth are herein shown, at 9', as preferably perpendicular to the longitudinal axis of the wrench,

while the rearward faces of said teeth are shown, at 9'', as preferably sloping, or obliquely-disposed, relatively to said axis.

The movable jaw of the wrench is shown, at 8, as forming part of a traveler, which is mounted upon the handle S for reciprocation therealong. The main portion of said traveler is shown herein as a sleeve, 10, having a longitudinal bore or guide-way, which substantially coincides in outline with the cross-sectional outline of the shank of the wrench, so that said sleeve is held securely against rotative or lateral movement, the superfluous metal of the sleeve being preferably removed by a series of intersecting cylindrical bores, 10', which form the main bore of this sleeve. The longitudinally-ranging guides, 10'', intermediate of the cylindrical bores, 10', may serve as supports for securing additional strength of the traveler, transversely of the shank or handle S. The traveler 10 is also shown herein as having an open side or recess, formed by a rectangular cut-away portion, as seen at 12. This recess extends through the sleeve a sufficient distance to intersect the longitudinal bore of the sleeve 10, and within said recess a worm, such as W, is operatively mounted so that it can be readily engaged with or disengaged from the teeth 9 of the rack upon the shank. This worm is shown herein as having the faces of its thread formed oppositely to the faces of the teeth of said rack, so as to be capable of meshing therewith; that is to say, the faces, 13', of the thread, which are adjacent to the jaws of the wrench, are oblique to the axis of the tool when the worm is in mesh with the rack, while the faces, 13'', which are remote from said jaws, are perpendicular to said axis.

The rear end of the traveler, forward of, and adjacent to, the rack upon the shank, is shown herein as formed with a channel 14, the longitudinal walls of which are preferably parallel with the axis of the tool, and substantially in alignment with the corresponding lateral faces thereof, parallel guides or shoulders, 14', being formed by said channel and at each side thereof. These guides or shoulders are adapted to support between them, for pivotal movement, and to maintain in position a longitudinally-disposed worm-controlling carrier 15, which, in the form thereof herein illustrated, is shown as having a substantially rectangular rear or main portion, and a forwardly-projecting pin or stud 15', upon which the worm W is loosely mounted for rotation and reciprocation. The main body 15 of this carrier is also shown as slotted transversely, at 16, for the reception of a pivot-pin or rivet 17, upon which said carrier is mounted for oscillatory movement, and this transverse slot is intersected by a central, axially-disposed recess 16', beginning in the rear of, and extending forwardly of, said slot. The pivot-pin 17, upon which the carrier is adapted to oscillate, is shown as passing through the shoulders or lugs 14', and as adapted to hold

the carrier securely in place within the channel 12, and between the guide-walls of such shoulders, and in the plane of the jaws of the wrench, while permitting oscillatory movement of said carrier and a limited range of reciprocation, or sliding movement thereof, relatively to the pivot. The pin or stud 15' is also shown as adapted to be seated at its forward end, when the pivot-pin is contiguous to the rear wall of the slot 16, in the recess 18', which is longitudinally in alignment with the pivot, 17, and also longitudinally in parallelism with the axis of the wrench. The forward shoulder 18, positioning the recess 12, is shown as described by an arc of a circle struck from the pivot 17 as a center, and the forward end of the worm W is also shown as rounded to correspond, substantially, with the curvature of said shoulder or stop-wall 18, and to be freely oscillatory upon the pin, 15', and about the pivot 17, relatively to, and in contact with, such stop-wall. The rear shoulder or stop-wall 14'', which positions the worm at its rear end and bounds the rear side of the recess 12, is, or may be, approximately perpendicular to the axis of the tool, at its inner side, adjacent to the teeth 9 of the rack, but at its outer side is slightly curved rearwardly to permit the free swinging of the worm W, said worm having its rear end wall preferably perpendicular to its longitudinal axis.

A spring, 20, is shown herein as mounted within the longitudinal recess 16' of the carrier, and between the forward stop-wall thereof and the pivot-pin or rivet 17, and tends to normally hold the journal-pin 15', in the seat or recess 18' of the traveler, said spring being under compression. The carrier 15 is shown as formed at its rearward end with a projecting arm, 15'', which is transversely screw-threaded and is adapted to receive a set-screw, 21, having a shank which is preferably smooth for some distance adjacent to its point. A spiral spring, 22, is also shown as surrounding this portion of the shank of said screw, and as stopped between the rear wall of the channel 14, and the inner side of the arm 15'', so as to hold said arm normally away from the shank of the wrench, and thereby maintain the thread of the worm W in engagement with the teeth 9 of the rack. It will be understood that the compression of the springs 20 and 22 need not be very great, as but slight force is necessary to maintain the carrier in its forward position and in parallelism, in longitudinal direction, with the axis of the shank.

The manner of using my improved wrench will be obvious from the foregoing description. With the parts in the position shown in Fig. 1, when it is desired to grasp between the two jaws 7 and 8 a nut or similar member, the push-piece, or screw, 21, is pressed toward the shank by the thumb of the operator, and at the same time given a slight, backward movement, so that the forces of the two springs, which normally act in directions transverse to each other, will be overcome,

and the carrier will be drawn backward until the forward end of the stud or pin 15' is withdrawn from its seat 18', and thereupon the carrier and the worm are oscillated, about the pivot 17, to the position shown in Fig. 2, and the worm is released from engagement with the teeth of the rack. When so released, it will be evident that, the force of the compression-spring 20 will tend to hold the worm against the curved stop-wall 18 of the traveler, and said traveler and connected parts may then be moved at will to any desired point along the shank, and brought close up against the nut to be engaged between the two jaws. When so brought into position, the worm W, will be engaged again with the teeth of the rack, either by the removal of the thumb from the push-piece 21, or by positively forcing inward the worm itself. When the rack and the thread of the worm are re-engaged, the worm may be turned to exactly adjust the movable jaw and firmly grasp the nut or other member to be adjusted.

It will be apparent that, by the described construction and organization of the fixed and movable members of the wrench and their operating and adjusting devices, relatively to one another, a very simple and compact tool is formed, and one in which very great strength and durability are combined with extreme lightness; also that the movable and fixed jaws are capable of rapid and perfect adjustment relatively to each other, and that the necessity of adjusting the movable jaw from end to end of the shank by the slow process of rotating an adjusting nut, as is the case in most tools of this class, is obviated, and by a structure readily controllable by the thumb when held with one hand, thus insuring also perfection of manipulation.

Having thus described my invention, I claim—

1. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shaft and carrying the movable jaw of the wrench; a laterally and longitudinally - reciprocatory worm - carrier mounted upon said traveler and adapted to be retracted in both said directions for the disengagement of the worm from the rack; a worm rotatively mounted upon the carrier and movable thereby into and out of engagement with the teeth of the rack; means for normally locking said carrier with the worm in engagement with the rack, but adapted to release the same upon the longitudinal retraction of the carrier; and a stop-device for engaging and holding said carrier in its retracted position with the worm out of engagement with the rack, substantially as described.

2. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; an oscillatory-reciprocatory worm-carrier mounted upon

said traveler and adapted to be retracted upon the disengagement of the worm from the rack; a worm rotatively mounted upon the carrier and movable thereby into and out of engagement with the teeth of the rack; and a stop-wall contiguous in either of the extreme positions of the carrier to that end of said carrier which is remote from the center of oscillation thereof, and adapted for engaging and holding said carrier in either of said positions with the worm in engagement with or disengaged from the rack, substantially as described.

3. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; a reciprocatory worm-carrier mounted upon said traveler and normally in locked engagement therewith at both of its ends, but adapted to be released from engagement therewith at one of said ends; a spring for normally holding said carrier in such locked engagement with the traveler; and a worm rotatively mounted upon the carrier and normally in engagement with the teeth of said rack, substantially as described.

4. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; an oscillatory-reciprocatory worm-carrier mounted upon said traveler; a worm rotatively mounted upon the carrier and movable thereby into and out of engagement with the teeth of the rack; and means for normally maintaining the worm in engagement with said rack, but adapted to release the same upon the actuation of the carrier, substantially as described.

5. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; a spring-controlled oscillatory-reciprocatory worm-carrier mounted upon said traveler and normally in locked engagement with said traveler at both of its ends; a worm rotatively mounted upon the carrier and movable thereby into and out of engagement with the teeth of the rack; a push-piece in position and adapted for retracting and oscillating the carrier; and means in position and adapted for positively holding said carrier in its released position, and thereby maintaining the worm out of engagement with the rack, substantially as described.

6. In a wrench, the combination with a shank having a fixed jaw at one end and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; a transverse recess in said traveler and adjacent to the rack; a worm-carrier pivotally secured to the traveler at one side of the recess; a seat for the other end of said carrier at the opposite

side of said recess; a spring for normally maintaining said carrier in engagement with its seat in longitudinal direction; a spring for normally maintaining said carrier in longitudinal parallelism with the axis of the shank; a worm rotatively mounted upon the carrier, and in position and adapted to be stopped in longitudinal direction by the forward and rearward walls of the aforesaid transverse recess; and a push-piece disposed rearwardly of the pivot of the carrier, and adapted for retracting and oscillating the same to thereby disengage the worm from the teeth of the rack, substantially as described.

7. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; a transverse recess in one side of said traveler and adjacent to the rack, and having its stop-wall at one end thereof curved upon an arc struck from the pivot of the worm-carrier as a center, said stop-wall being adapted to engage and hold the free end of the worm-carrier when said carrier is swung upon its pivot; an oscillatory worm-carrier pivoted adjacent to the opposite stop-wall of said recess, and adapted for oscillation transversely across the same; a worm rotatively mounted upon said carrier within said recess, and having its end which is adjacent to the aforesaid curved stop-wall also curved to correspond therewith, whereby said worm is adapted to be oscillated freely within said recess; and means for normally maintaining the carrier in longitudinal parallelism with the axis of the shank and thereby maintaining the worm in engagement with the teeth of the rack, substantially as described.

8. In a wrench, the combination with a shank having a fixed jaw at one end, and a rack upon one face of said shank; of a traveler movable along said shank and carrying the movable jaw of the wrench; a transverse

recess in one side of said traveler and adjacent to the rack and having its forward stop-wall curved upon an arc struck from the pivot of the worm-carrier as a center, and adapted to engage and hold the free end of the worm-carrier when said carrier is swung upon its pivot; longitudinal guide-walls upon the traveler in the rear of said recess, and forming between them a guide-way; a worm-carrier longitudinally and transversely slotted adjacent to its rearward end, and carried in said guide-way, and maintained therein in the plane of the jaws of the wrench, and having a forwardly-extending journal-pin traversing the aforesaid transverse-recess; a pivot-pin passing transversely through said guide-walls, and through the transverse wall of said carrier, and fixed relatively to said guide-walls, and movable relatively to said carrier; a compression-spring interposed between said pivot-pin and the end wall of the longitudinal-recess of the carrier, and extending forwardly of said pivot-pin, and normally tending to maintain the forward end of the carrier in engagement with its seat; a longitudinal recess intersecting the curved wall of the aforesaid transverse recess of the traveler, and forming a seat for the forward end of the carrier, and in longitudinal alignment with the guide-way in the rear of said recess; a compression-spring interposed between the inner wall of the guide-way and the inner side of the rear end of the carrier, and normally adapted to maintain said carrier in longitudinal parallelism with the axis of the shank; and a worm rotatively mounted upon the carrier, and within the transverse recess in the traveler, and having its forward end curved to correspond with the forward stop-wall of said recess, whereby said worm is adapted to be oscillated freely within said recess, substantially as described.

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