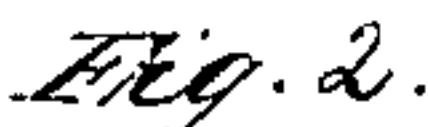


French.

Patented Aug. 21, 1855.



UNITED STATES PATENT OFFICE.

JOHN D. DALE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED WRENCH.

Specification forming part of Letters Patent No. **13,456**, dated August 21, 1855.

To all whom it may concern:

Be it known that I, JOHN D. DALE, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Ratchet-Wrenches, whereby they are adapted to the purposes of turning round, square, or other formed nuts and bolts and drills or other tools, called "Dale's Adjustable Reversible Ratchet-Wrench;" and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a top or bird's-eye view of the improved wrench arranged to turn a nut or bolt, grasped by the same to the right. Fig. 2 is a view of the under part of the same. Fig. 3 is a vertical longitudinal section of same. Fig. 4 is a top view of the adjustable jaws, lower ratchet-wheel rim, and the circular end of the wrench surrounding the same. Fig. 5 represents the circular plate confined between the ratchet-wheels and the helical thread or worm on its lower surfaces.

Where the same letters occur in the several figures they indicate corresponding parts.

The nature of this invention and improvement consists in combining in the wrench adjustable jaws capable of grasping square, round, or other formed nuts, bolts, or other objects of a like nature, with ratchet-wheels notched in a reverse direction, and a series of parts for giving motion to said ratchet-wheels and jaws, either to the right or left, at the will of the operator, from the end of the handle of the main body of the wrench and with an increased leverage without moving said main body of the wrench, in such a manner as to cause the said nut, bolt, or drill or other object to be turned the required extent without disengaging the jaws from the grasp of the same, simply by the vibratory movement of a lever or handle arranged above the wrench-handle and capable of being worked (where the nut or bolt or other object to be turned is difficult of access) where the ordinary wrench could not be operated.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The main body A of the wrench is cast in one piece, with a handle at one end for fitting and holding it in its proper relation to the ob-

ject to be grasped and turned, and a circular space at its opposite enlarged end for the insertion of the circular rim B of the lower ratchet-wheel B', which exactly fits therein, the upper surface of said ratchet-wheel, outside the rim, resting against the lower surface of the enlarged part of the wrench, and the upper edge of the rim being on a line with its upper surface, so as to cause the lower surface of the upper ratchet-wheel B² outside the rim, when it is screwed to said rim, to rest on the upper surface of the enlarged part of the wrench, and thus enable the said rim B, with the wheels B' B² attached, to be confined and turned within the space in the wrench.

A slot G is formed in the lower ratchet-wheel B', extending across the same from one side of the inner periphery of the rim B to the opposite side, the edges of which enter grooves in the sides of the adjustable jaws D, which extend above and below the slot, their lower part being enlarged for increasing their strength, and shaped in the form of right-angled triangles on the portion of their lower parts next each other for the purpose of keeping these right-angled surfaces square with each other, no matter how far from or near to each other the jaws may be situated. Their upper portions are made convex and concave on their outer and inner sides, and have curved cogs or lips D' projecting from their upper surfaces, two cogs or lips being formed near the outer and inner sides of one and one cog or lip nearer the middle of the other, which cogs or lips enter helical grooves formed by a correspondingly-shaped thread or worm E on the lower surface of a circular plate E', confined between the upper surfaces of the jaws D and the lower surface of the upper ratchet-wheel B², inside the rim B, its periphery exactly fitting within the rim and having circular or other formed thumb and finger holds E² for turning the same, so as to draw the jaws nearer to or farther from each other through the agency of the thread or worm E, operating on the cogs or lips D' in the grooves between the same.

A circular opening is formed in the main body of the wrench, between the circular space before mentioned and handle of the same, in which is inserted from either the top or under parts, as the direction it is designed to turn the jaws will determine, a circular hub F, ex-

actly fitting therein and having a flange at its upper part, which rests against the surfaces of the wrench A around said opening, on the sides of which flange are formed wings or ears projecting the required distance therefrom to allow the attachment by pins, around which they move loosely, of two curved pawls G G', one of which G is attached to the ear or wing nearest the ratchet-wheel B², and curved around the periphery almost concentric with the same and notched at its end to somewhat resemble a bill-hook tooth for the purpose of engaging with the notches in the periphery of the ratchet-wheel, against which it is constantly pressed by a curved spring H, secured to the side of the wrench, whose flexible end is provided with a bar H', secured at right angles to the end of the said spring and projecting sufficiently far from the edges of the same as to press upon said pawl G, whether it is arranged upon the upper or lower part of the wrench, to engage with the corresponding upper and lower ratchet-wheels B' B², said bar H' having projections at its end against which the surface of the pawl H rests for keeping it at all times in its proper relation to the notches of said ratchet-wheel B². Another pawl G' is attached in a similar manner to the other wing or ear nearest the handle of the wrench, which pawl extends to and engages with the notches on the periphery of the ratchet-wheel B' on the opposite side to that on which the first-mentioned pawl G is situated, being constantly pressed against the same by a spring H², secured to the side of the wrench opposite to that on which the other spring H' is fastened, and in every respect similar in form and action to the same.

The flanged and winged hub F, to which the pawls G G' are attached in the manner just stated, is held within its opening by springs I, fastened in countersinks in its periphery and having notches on the outer parts of their lower ends, the outer surfaces of the notches tapering or inclining to the lower ends of the springs, so as to allow said springs to be pressed within the countersinks in the hub by the inclined surfaces of the notches pressing against the periphery of the opening in which the hub is placed when being inserted in the same, and the shoulders formed by the notches projecting sufficiently far from the sides of the springs to hold the hub firmly in its place by bearing on the lower surface of the wrench around the edge of the opening in which the hub turns, opposite the surface on which the flange of the hub rests when said hub is placed in its proper position and the springs are extended.

The flanged and winged hub F receives a vibratory motion by means of a lever or handle K, extending outward toward the handle of the wrench and secured to the end of a shaft L at its inner end, extending at right angles from the same, and made polygonal or square at its opposite end to correspond with the opening in the center of the said flanged

or winged hub, in which it is inserted in such a manner as to enable said hub to be vibrated in its opening by a corresponding vibratory movement of the outer end of said lever or handle K. The end of the pawl G is curved on its edge next the ratchet-wheel, so as to allow the notch on the same to slide over the notches or teeth of the ratchet-wheel in its movement toward the back part of the wrench and cause its abrupt edge to engage with the corresponding projecting parts of the notches or teeth of the ratchet-wheel when drawn forward and turn the same, and the end of the other pawl G' is so formed as to cause it to press against the said abrupt edges of the notches or teeth of the ratchet-wheel in its back movement and move the ratchet-wheel with it and slip over the same when drawn forward.

The operation of this wrench is as follows: When it is designed to grasp and turn a nut, bolt, or other object of a like nature to the right, the flanged and winged hub F is inserted in its opening from the upper side, as represented in Fig. 1, and the jaws D are made to firmly grasp the nut, bolt, or other object by turning the circular plate E', with the worm E on its lower surface, to the left. A vibratory motion is then given to the end of the lever or handle K by either hand, while the handle of the wrench A is held in the other hand of the operator, which causes the flanged or winged hub F to move in a corresponding manner and to alternately move the ends of the pawls G G' against the corresponding abrupt edges of the notches or teeth of the ratchet-wheel B² and over the inclined portions of said notches or teeth in their backward and forward motions over the same in such a manner as to give said ratchet-wheel B² a continuous motion, and with it the jaws D and nut or other object grasped between the same, with a power proportionate with the increased leverage derived from the handle or lever K and the parts operated by it.

In case it is desired to turn the jaws D with a nut, bolt, or other object embraced by the same in a reverse direction, (to the left,) the pawls G G' are disengaged from the right-angled notched bars H' of the springs H, and the notches or projections on the flexible ends of the springs I are pressed in the countersinks in the periphery of the flanged or winged hub F, so as to disengage them from contact with the under surface of the wrench, and the said flanged or winged hub, with its pawls attached, is withdrawn from its openings in the main body of the wrench and again inserted in the said opening from the opposite or lower part of the wrench in an inverted position and held therein by the notches of the springs I, resting on the upper surface around the edge of the opening in the same manner that they did against the lower surface around said edge before being withdrawn, with the pawls inside the lower part of notched bars H' on the springs H, by which

their ends are pressed against the notches or teeth in the periphery of the lower ratchet-wheel B', which notches or teeth, being in a reverse position to those on the upper ratchet-wheel B², and thus made to conform with the reversed position of the pawls G G', and the flanged and winged hub F will be operated upon alternately by the pawls as their ends are pushed forward and back by the vibratory movement of the hub and lever or handle K, whose shaft L is inserted in the center opening of the same, and a continuous motion to the left will be given to the jaws D and the nut, bolt, or other object embraced by the same.

Instead of operating the ratchet-wheels by the lever or handle K, the said lever or handle may be detached from the flanged or winged hub F and the wings of said hub be allowed to turn against the edges *a* or projections on the side of the main body of the wrench between which they are situated, and by vibrating the handle of the wrench the pawls G G' will be caused to alternately act against the abrupt edges of the notches or teeth of the ratchet-wheels and slip back over the inclined surfaces of the same in such a manner as to give a continuous movement to the ratchet-wheels and jaws and the nut or bolt or other object grasped by the same by the vibratory movement of the wrench-handle, the direction in which the ratchet-wheel

and jaws and the object grasped by the same move being reversed in this case by reversing the position of the flanged and winged hub F, and the pawls attached in the same manner and by the same rule as that observed when the lever or handle K is employed, as described in the foregoing.

This wrench may be used for turning drills or other tools, the spindle passing through the openings in the center of the ratchet-wheels B' B² and circular plate E' and grasped firmly by the jaws D in the manner before described.

Having thus described this improved adjustable reversible wrench, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination of the reversible flanged and winged hub F and pawls G G' with the upper and lower ratchet-wheels B' B², constructed and operated as described.

2. The combination of the angular jaws D and worm-plate E', or their equivalent, with the upper and lower ratchet-wheels B' B², and the mechanism for giving them a continuous motion either to the right or left, constructed and operating as described.

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Witnesses:

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