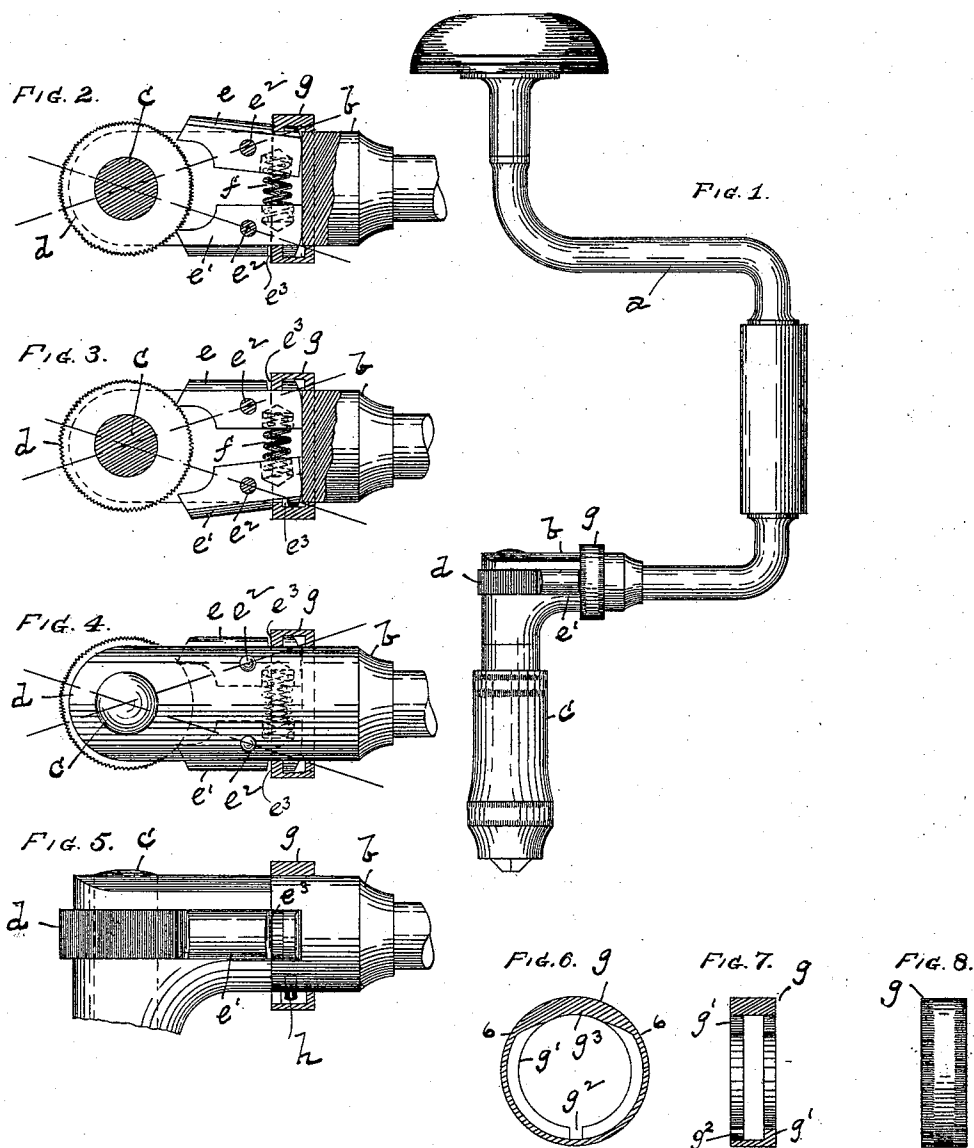


(No Model.)

G. L. HOLT.
RATCHET BRACE.

No. 468,911.

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GARDNER L. HOLT, OF SPRINGFIELD, MASSACHUSETTS.

RATCHET-BRACE.

SPECIFICATION forming part of Letters Patent No. 468,911, dated February 16, 1892.

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To all whom it may concern:

Be it known that I, GARDNER L. HOLT, of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Ratchet-Braces, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to that class of bit-braces known as "ratchet-braces," in which means are provided for causing the bit-carrying head to revolve with the brace in either direction, as may be desired; and the object of the invention is to improve the construction of such braces in such manner as to increase the strength of the engagement of the pawls with the ratchet, to prevent lost motion between said parts, and to augment the compactness and efficiency of the means for retracting the pawls.

To these ends my invention consists in the ratchet-brace constructed and operating as hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like letters designate like parts in the several views, Figure 1 is a side elevation of a ratchet-brace embodying my invention. Fig. 2 is a plan view, partly in section, showing one of the pawls in engagement with the ratchet. Fig. 3 is a similar view showing the opposite pawl in engagement with the ratchet. Fig. 4 is a plan view showing both pawls in engagement with the ratchet. Fig. 5 is a side elevation of the parts shown in Fig. 4, the pawl-retracting sleeve being shown in vertical section. Figs. 6, 7, and 8 are respectively a cross-section, vertical section, and side elevation of the pawl-retracting sleeve.

The letter *a* designates the body of the brace, which terminates at its lower end in hub *b*; *c*, the bit-carrying head, journaled at its upper end in said hub *b*, and *d* the ratchet-wheel located within a recess in hub *b* and rigidly secured to said head *c*, said wheel having its periphery knurled or milled to form shallow V-shaped teeth, as shown; also, located within the recess in hub *b* are the two pawls *e e'*, pivotally mounted substantially midway between their ends upon pins *e²*, whereby they are adapted to be moved to throw one end thereof into and out of engage-

ment with said ratchet-wheel. The outer ends of said pawls are beveled to form a point extending parallel with the teeth on the ratchet-wheel, and at their inner ends they are provided with sockets upon their adjacent sides to receive the ends of a coil-spring *f*, which presses said inner ends away from each other, and upon their outer sides with transverse grooves or recesses *e³* to receive the flange on the retracting-sleeve, as will be presently described. The spring *f* normally holds the outer ends of both of said pawls in engagement with the teeth of the ratchet-wheel, as represented in Fig. 4, in which position the bit is positively driven in both directions by the brace. The inner ends of the pawls are slightly rounded, as shown, and said ends normally bear lightly against the rear end wall of the recess in the hub *b*, so that while said pawls have freedom of movement upon their pivots whenever power is applied to the brace to overcome resistance of the bit the pressure upon the pawl or pawls is exerted directly by said wall of the recess in the hub, thereby taking the strain from the pins *e²* and forming a very strong and durable construction. The pivot-pins *e²*, moreover, are so located that the point at which either of the pawls engages the ratchet-wheel will lie but slightly outside of a straight line drawn between its pin *e²* and the center of the ratchet-wheel, which lines are represented by broken lines in Figs. 2, 3, and 4, and consequently the pressure exerted upon the pawl when power is applied to the brace tends to force its pointed end toward the bottom of the tooth of the ratchet-wheel, against which it bears and toward the center of said wheel in such manner as to increase the tightness of its hold upon the wheel and obviate all possibility of slipping. I thus secure an important advantage over constructions in which the pressure exerted against the ratchet-wheel by the pawl is tangential to the former, not only by way of increased security against slipping, but also by reason of the fact that I am enabled to employ a ratchet-wheel having very fine teeth and thereby prevent, practically, any lost motion between the pawls and wheel, a result which enables the brace to be successfully used in positions where but a slight movement of the crank is possible

and materially increasing its speed of operation in any position.

The means devised by me for retracting the pawls in opposition to the stress of spring f consists of a sleeve g , revolubly mounted upon hub b adjacent to the rear or inner ends of the pawls. Said sleeve is provided at each end with an inwardly-projecting annular flange g' , of which flanges the one at the rear end bears upon the hub b and the one at the front end enters the recesses e^3 in the outer side of the pawls, as shown, said latter flange having therein the notch or opening g^2 . The inner surface of the sleeve between said flanges is concentric for the greater portion of its length; but between the points 6 6 (see Fig. 6) it is formed into the cam-surface g^3 , which is located diametrically opposite to the notch g^2 . It will be obvious that a partial revolution can be imparted to said sleeve in either direction without affecting the pawls, and that by continuing said movement until the cam-surface g^3 is brought to bear against either of the pawls the rear end of the latter will be forced inwardly, thereby moving its front end outwardly and out of engagement with the ratchet-wheel. A stop-pin h , seated in hub b , projects between the flanges of said sleeve, and by engaging the cam-surface g^3 prevents the entire revolution of the sleeve. The periphery of the sleeve is preferably milled at its edges, as shown, to facilitate turning it. The flanges on the sleeve protect the interior of the latter from dirt, thus insuring the smooth and easy action of the cam-surface upon the pawls and preventing undue wear of said parts, and the flange at the front end also serves to retain the sleeve in its operative position by entering the recesses in the pawls without the aid of other devices. I thus avoid the use of stop-pins or other projecting means for preventing endwise movement of the sleeve, which, besides detracting from the appearance of the brace, are liable to injure the hands of the user. The sleeve is placed in position by forcing the outer ends of both pawls outwardly until their inner ends are moved within the circumferential plane of hub b and then moving the sleeve outwardly until its front flange overlies the recesses in said pawls, the notch g^2 in said flange permitting it to pass the stop-pin h , and finally releasing the outer ends of the pawls, whereupon spring f forces their inner ends away from each other to the position shown in the drawings. The cam-surface g^3 and the notch g^2 being oppositely located, as described, whenever said notch is in register with stop-pin h the rear ends of the pawls are in engagement with the front flange on the sleeve, so that accidental endwise movement of the sleeve is rendered impossible.

The operation of the ratchet-brace thus constructed will be obvious from the foregoing description. When the parts are in the position represented in Fig. 4, the crank of

the brace and head c will revolve in unison like those of an ordinary brace, while by turning sleeve g as far as it will go in either direction from the position shown in said figure either of the pawls can be moved to the position shown in Figs. 2 and 3, in which it is out of engagement with the ratchet-wheel, thus providing for a positive movement of the bit in but one direction.

The peculiar biting action of the pawls upon the ratchet-wheel hereinbefore described would effectually prevent slipping thereof upon said wheel if the surface of the latter were merely roughened slightly instead of being provided with teeth; but I prefer the construction shown, as it improves the appearance of the wheel and prevents uneven wear of the surface thereof by the pawls.

An important feature of the construction herein shown and described is the fact that the operating-cam and its stop are wholly concealed from view, thereby greatly augmenting the pleasing appearance of the brace and preventing said parts from being a source of injury and annoyance to the user of the tool. Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a ratchet-brace, the combination, with the bit-carrying head, of a ratchet-wheel rigidly-secured thereto, said wheel being provided with shallow-V-shaped teeth, two pawls pivoted at a point substantially midway between their ends to the frame of the brace and adapted to engage the teeth of said wheel at their front end, said pawls having in the outer side and near the rear end thereof a transverse groove or recess, a spring pressing the rear ends of said pawls in opposite directions, and a sleeve revolubly mounted upon the frame, said sleeve having at the front end thereof an inwardly-extending annular flange which projects within the grooves or recesses in said pawls and having upon its inner side a cam-surface adapted by its engagement with the rear end of either of said pawls to disengage the front end thereof from the ratchet-wheel, substantially as set forth.

2. In the ratchet-brace herein described, the combination, with the ratchet-wheel, the pivoted pawls, and the spring pressing the rear ends of said pawls in opposite directions, of a retracting-sleeve having at the ends thereof inwardly-extending annular flanges, one of which flanges enters a transverse groove or recess in the outer side and at the rear end of each of the pawls, said sleeve also having upon the inner side thereof between said flanges a cam-surface, substantially as described, and a fixed stop projecting between the flanges on said sleeve and adapted by its engagement with said cam-surface to limit the revolving movement of the sleeve, substantially as set forth.

3. The ratchet-brace herein described, comprising, in combination, the body portion a , terminating at its lower end in the recessed

hub *b*, bit-carrying head *c*, journaled at its upper end in said hub, ratchet-wheel *d*, rigidly secured to said head within the recess in said hub, pawls *ee'*, pivotally mounted within the recess in said hub, said pawls having their front ends adapted to engage said ratchet-wheel and having their rear ends abutting against the end wall of said recess, spring *f*, pressing the rear ends of said pawls away from each other, and retracting-sleeve *g*, arranged and operating substantially as and for the purpose set forth.

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Witnesses:

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