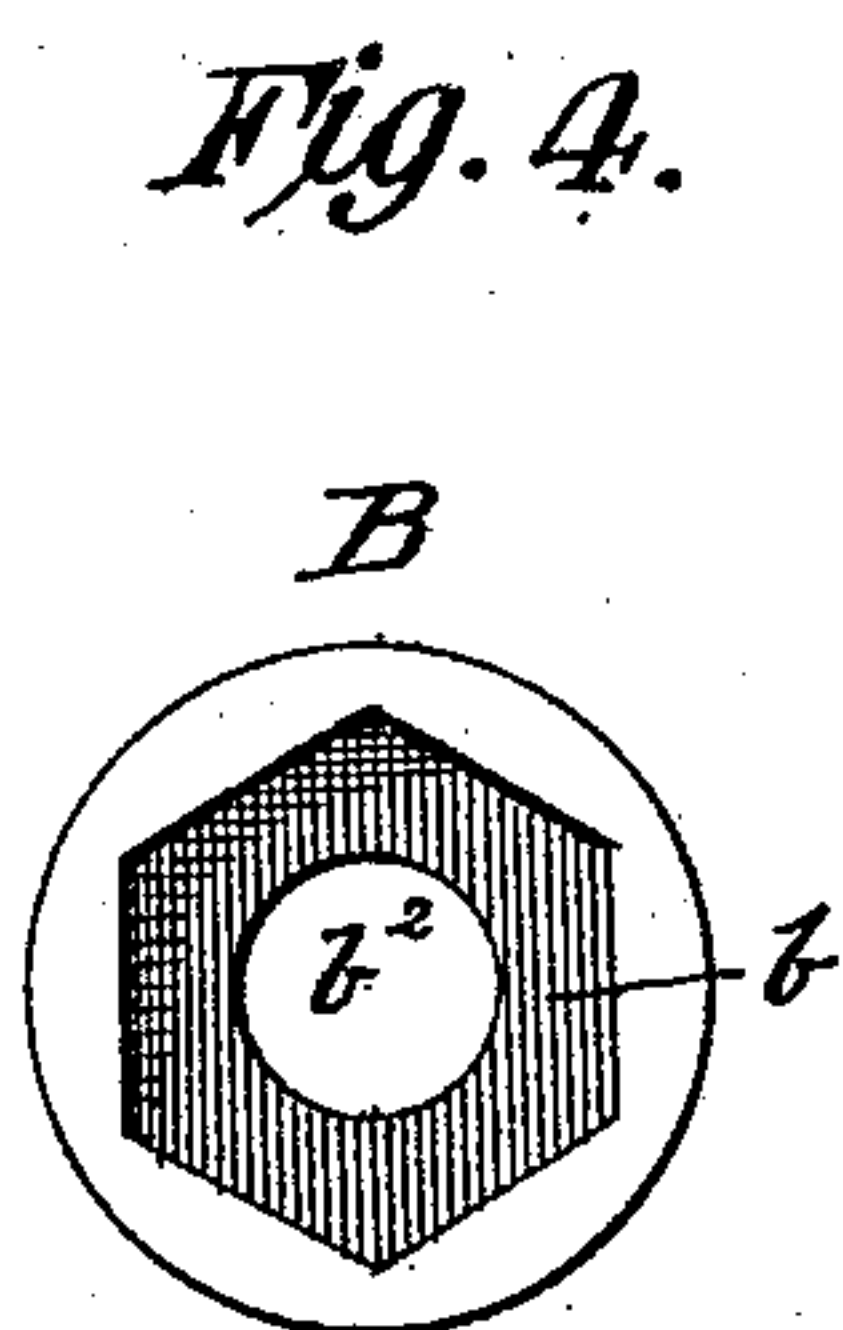
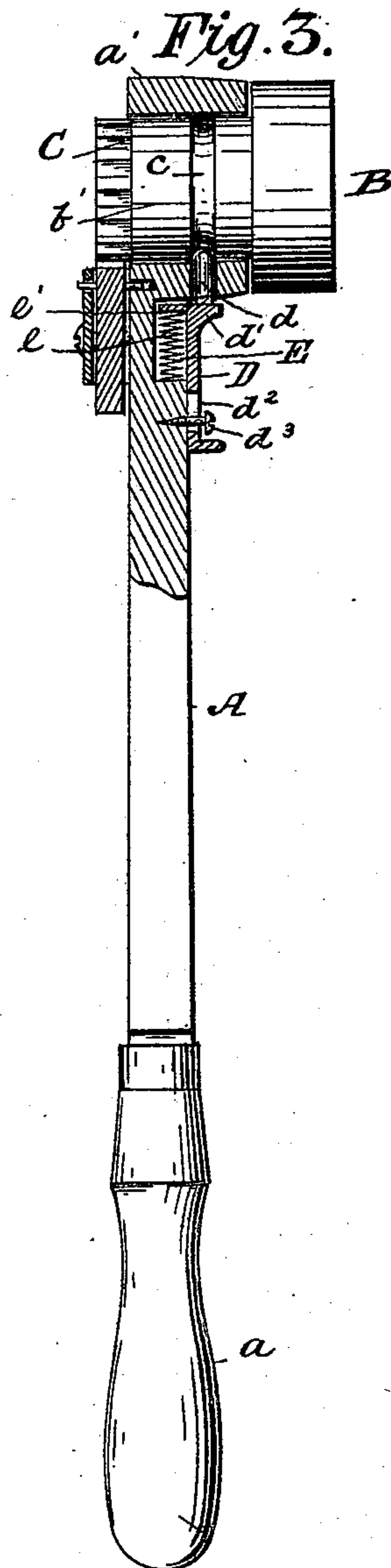
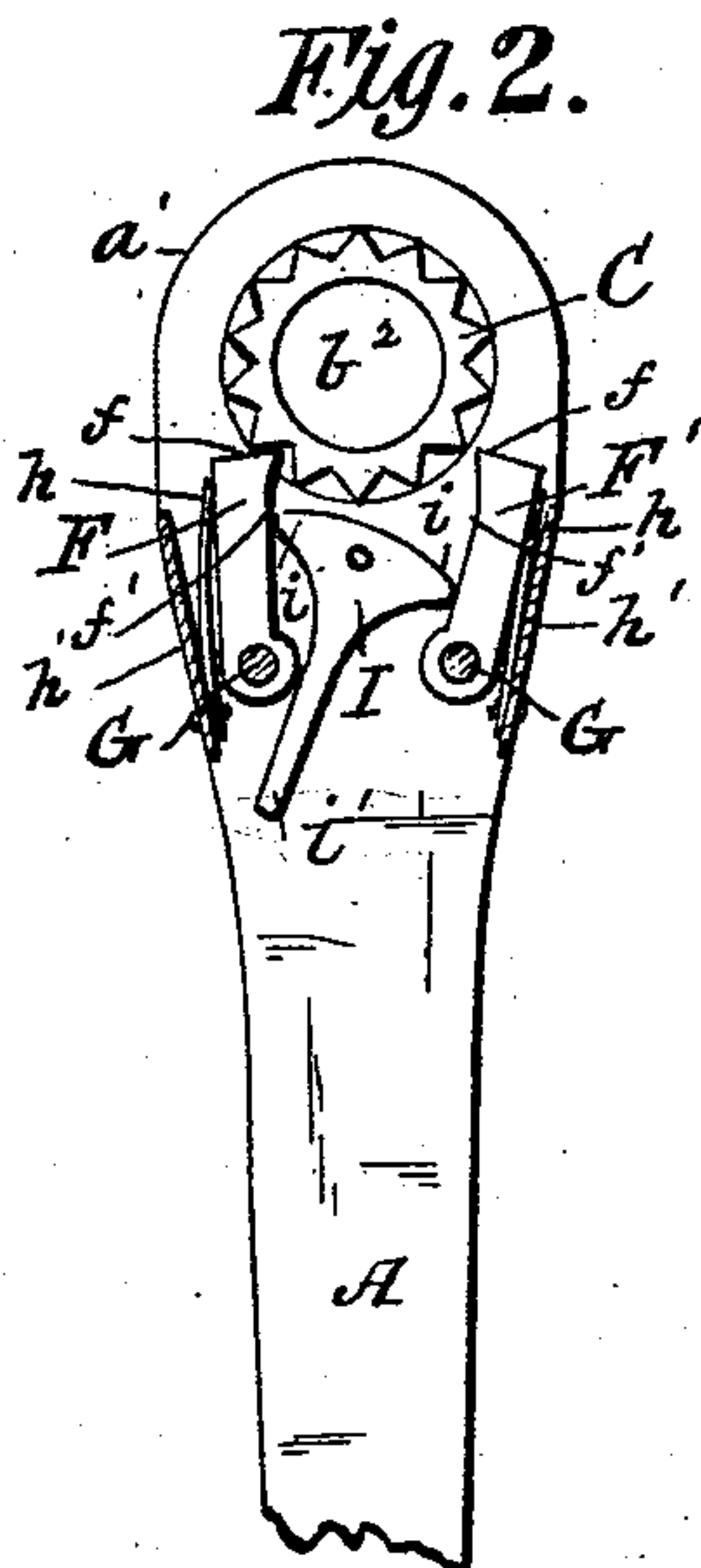
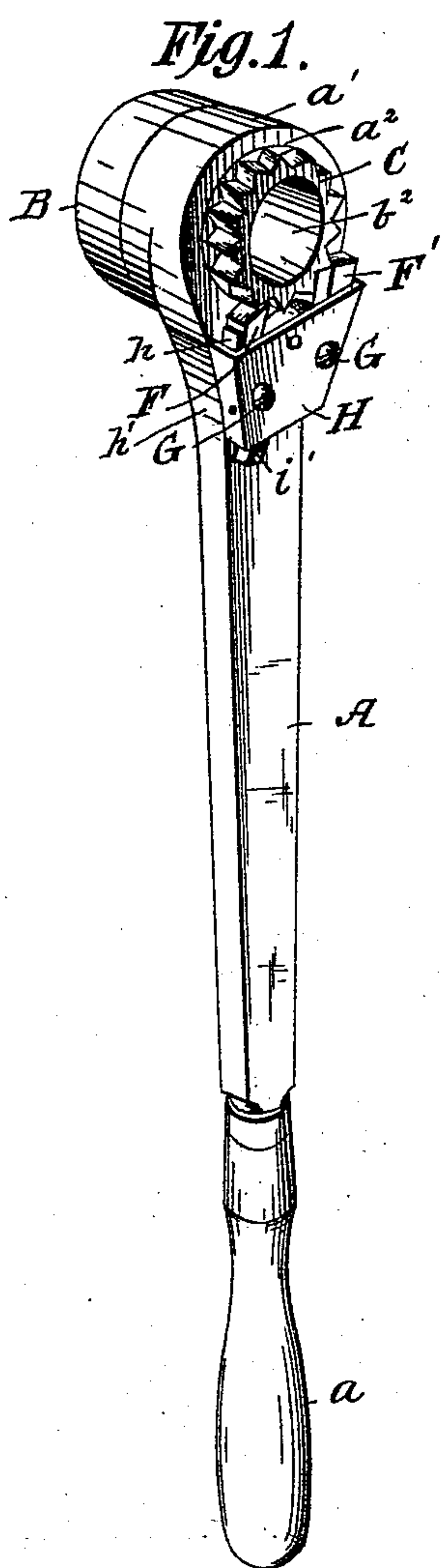


(No Model.)

F. S. THRING.  
WRENCH.

No. 455,133.

Patented June 30, 1891.



Witnesses  
Sam<sup>l</sup> R. Turner.  
L. Mather.

Inventor  
Frederick S. Thring  
By his Attorney  
Geo. G. Schroeder

# UNITED STATES PATENT OFFICE.

FREDRICK SAMUEL THRING, OF NEW YORK, N. Y.

## WRENCH.

SPECIFICATION forming part of Letters Patent No. 455,133, dated June 30, 1891.

Application filed October 9, 1890. Serial No. 367,547. (No model.)

*To all whom it may concern:*

Be it known that I, FREDRICK SAMUEL THRING, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Wrenches; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The invention relates to improvements in ratchet-wrenches, pertaining particularly to reversible wrenches of that class; and it consists in the construction, arrangement, and novel combination of parts hereinafter described, and illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the accompanying drawings, in which similar letters of reference designate similar parts—

Figure 1 represents a perspective view of a reversible ratchet-wrench embodying the invention. Fig. 2 represents a rear view thereof with the boxing covering the pawls removed. Fig. 3 represents a central longitudinal section of the inner end of the wrench to show the construction of the locking device for the detachable rotatory head, the said head not being in section. Fig. 4 represents a face view of the detachable rotatory head.

Referring to the drawings by letter, A designates the shank of the wrench, provided at its outer end with a rounded handle  $a$  for the convenience of the workman. The said shank A is flat from front to rear and its inner end is rounded and provided with a cylindrical boss  $a'$ , through which and the corresponding part of the rounded end of the shank extends the central transverse opening  $a^2$ , serving a purpose hereinafter explained.

B designates the detachable rotatory wrench-head, preferably cylindrical in shape, provided with a recess  $b$  in its front to fit over a nut of corresponding size and contour,

and having the projection  $b'$  standing centrally from its rear and fitting snugly into the opening  $a^2$  in the shank and boss thereof. The said projection is provided with a central longitudinal bore  $b^2$ , circular in cross-section, and has formed on its rear or outer end, which projects outside of the opening  $a^2$  in the shank-head, the circular or ring ratchet C, which has its teeth properly shaped to engage pawls on opposite sides in opposite directions, as in all reversible ratchet-wrenches.  $c$  is a circumferential groove made in the projection  $b'$  at a proper position to engage the joints of the latch of the locking device, hereinafter described.

It is evident from the foregoing description and from the fact that the wrench-head is detachable that similar heads having recesses  $c$  suitable to fit nuts of different sizes and shapes may be attached to the wrench-shank.

The locking device prevents the detachment of the rotatory head from the shank, and its construction is as follows: D is a latch or latching-bolt resting centrally and longitudinally on the front surface of the shank A, with its rounded inner end  $d$  projecting through a suitable opening in the adjoining part of the boss  $a'$  into the opening  $a^2$  and engaging in the circumferential groove  $c$  of the projection  $b'$ , in order to prevent the head B being withdrawn from the shank. The said end  $d$  is prevented from passing too far in and binding the head B by the shoulder  $d'$ , that engages against the outer surface of the boss  $a'$ . The latch D is held to the shank by means of the longitudinal slot  $d^2$  in said latch and the set-screw  $d^3$  passing through said slot and engaging in a threaded recess in the shank, so that when the latch is drawn outward and the said screw turned up the latch will be held from engagement and the head B can be detached from the wrench-shank.

The latch D is forced into engagement with the groove  $c$  by the following means: E is a longitudinal recess in the front of the wrench-shank adjoining said latch, and  $e$  is a spring, preferably a coiled spring, seated in said recess, with its outer end bearing against the outer shoulder of said recess, while its inner end bears against a projection  $e'$ , standing



from the latch into the recess, and forces the latch into engagement.

The means of reversing the action of the wrench are as follows:  $F F'$  are two similar  
5 pawls situated on opposite sides of the ratchets  $C$  on the rear side of the shank  $A$  and provided with similar joints or heads  $f f$ , arranged to engage said ratchet in opposite directions. The said pawls have concave inner or facing edges  $f' f'$  and are pivoted at  
10 their outer ends upon the screws  $c$ , that pass through openings in the outer plate of the casing  $E$  and engage in suitable threaded recesses in the shank. Each pawl has bearing upon its outer edge near its engaging end  
15 the inner end of a spring  $h$ , the outer end of which is secured to the corresponding side  $h'$  of the casing  $E$ , so that the said springs act to force the corresponding pawls into engagement  
20 ment with the ratchet  $C$ .

$I$  is a segmental cam pivoted in its central line or longitudinal axis on a pin that has bearings on the outer plate of the casing  $H$  and in the shank  $A$ . The said cam has at  
25 equal distances on each side of its pivot the rounded joints  $i i$ , that are arranged to bear against the corresponding concave inner edges  $f' f'$  of the pawls  $F F'$ , and is provided with a frontward-projecting arm  $i'$ , that extends  
30 outward from the casing  $H$  and by means of which the cam  $I$  can have its position reversed.

The operation of the pawls and cam  $I$  is as follows: When the cam  $I$  has its arm  $i'$   
35 turned toward the pawl  $F$ , the corresponding joint  $i$  of said cam disengages from said pawl, and the corresponding spring  $h$  forces said pawl into engagement with the ratchet  $C$ , while the opposite point of the cam forces  
40 the pawl  $F'$  out of engagement with the ratchet against the pressure of the spring  $h$  on the same side, so that the revoluble head  $B$  can be turned in one direction. By reversing the position of the cam by means of its  
45 arm  $i'$  the pawl  $F'$  can be engaged and the pawl  $F$  disengaged, and the head  $B$  can then be turned in the opposite direction.

Having described my invention, I claim—

1. In a wrench, the combination, with the  
50 shank thereof, of a detachable rotatory wrench-head having in its front or face a recess to fit over a nut, and means, substantially as described, whereby the head can be locked to the wrench-shank without permitting the rotation of said head, substantially  
55 as specified.

2. In a wrench, the combination, with the wrench-shank having a transverse circular opening in its inner end, and a detachable  
50 rotatory wrench-head provided with a projection arranged to fit and turn in said opening and having a circumferential groove at a suitable point, of a latch attached to the wrench-shank and having a point arranged  
65 to engage in said groove and a spring to force said latch into engagement, substantially as specified.

3. The combination, with the wrench-shank and the detachable rotatory wrench-head having a circumferential groove in its projection  
70 within the opening in the said shank, of the latch having a joint to engage within said groove and a longitudinal slot, and the set-screw passing through said slot and engaging in a threaded recess in the shank, whereby the  
75 latch may be moved and held out of engagement, substantially as specified.

4. In a wrench, the combination, with the shank and the rotatory head turning in an opening in the said shank and having a  
80 ratchet formed upon its end extended beyond the back or rear of the shank, of the similar opposite pawls engaging the ratchet in opposite directions, the springs to force said pawls into engagement, and the cam pivoted between  
85 said pawls and having opposite lateral points, which when the cam is turned on its pivot move one pawl out of engagement with the ratchet and permit the opposite pawl to be engaged by its corresponding spring, sub-  
90 stantially as specified.

5. In a reversible ratchet-wrench, the combination, with the shank, the rotatory wrench-head, and the ratchet formed on the rear end of the projection of said head outside of said  
95 shank, of the similar opposite pawls  $F F'$ , having the heads  $f$  to engage the ratchet in opposite directions, the springs  $h h$  to force said pawls into engagement, and the segmental cam  $I$ , having the joints  $i i$  at equal  
100 distances on each side of its pivoted point, and the arms  $i'$ , by means of which the said cam may be reversed and thereby reverse the action of the wrench, substantially as specified.  
105

In testimony whereof I affix my signature in presence of two witnesses.

FREDRICK SAMUEL THRING.

Witnesses:

H. C. COPELAND,  
I. J. AUERBACH.