

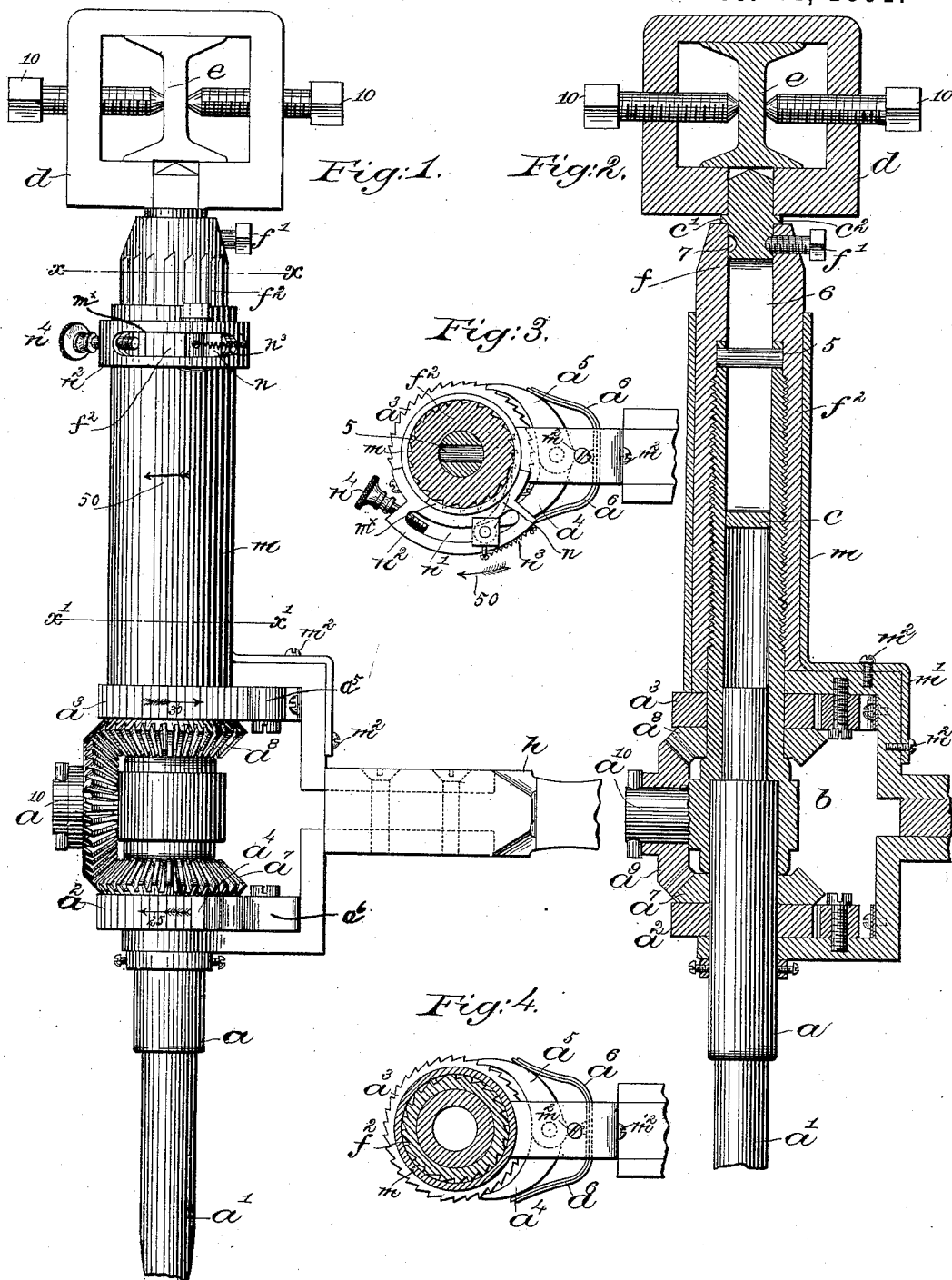
(No Model.)

J. F. McGRATH.  
RATCHET DRILL.

2 Sheets—Sheet 1.

No. 465,647.

Patented Dec. 22, 1891.



Witnesses.  
Fred S. Greenleaf.  
John H. Galligan

Inventor  
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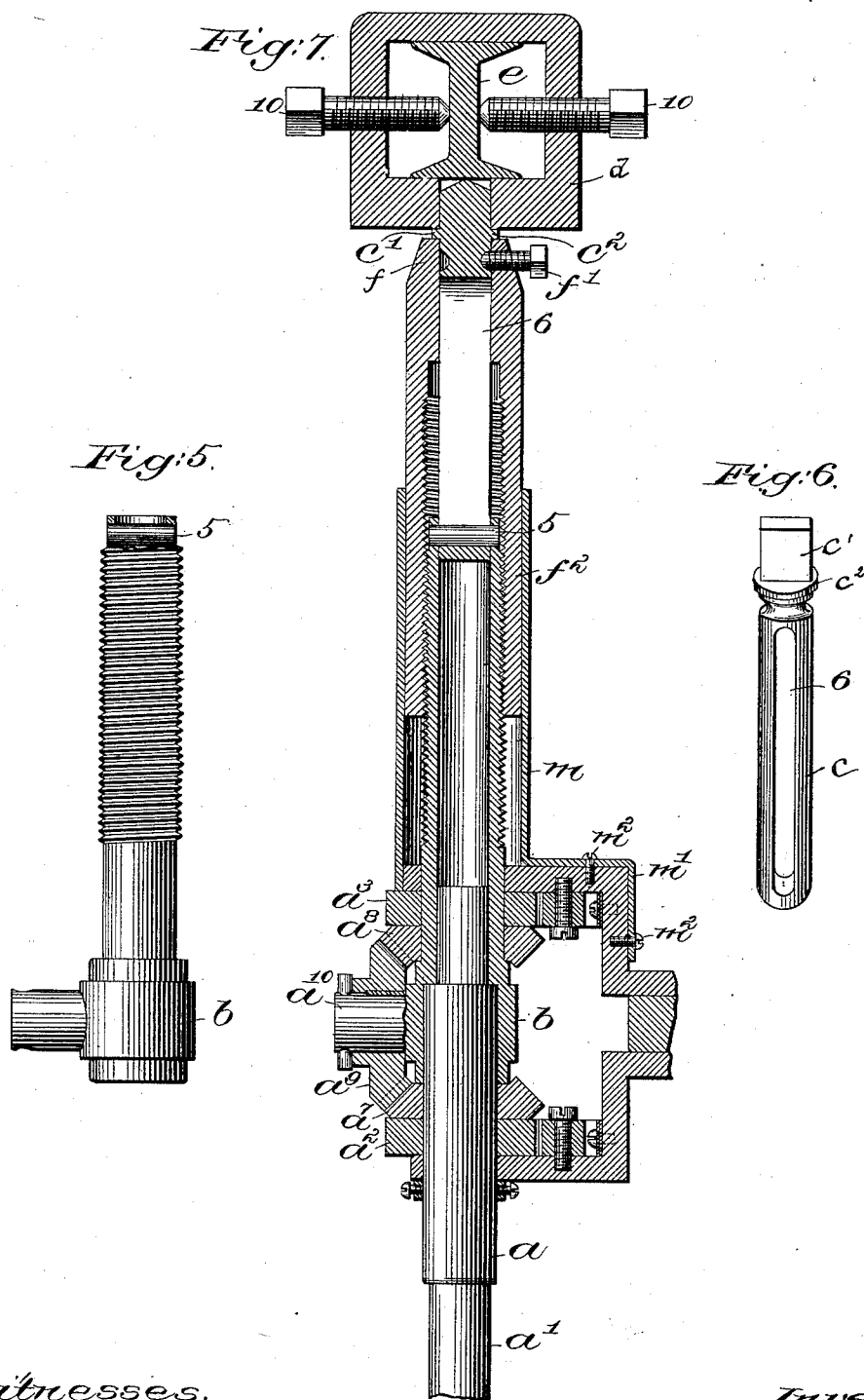
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# UNITED STATES PATENT OFFICE.

JOHN F. McGRATH, OF TAUNTON, MASSACHUSETTS.

## RATCHET-DRILL.

SPECIFICATION forming part of Letters Patent No. 465,647, dated December 22, 1891.

Application filed April 7, 1891. Serial No. 388,003. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. McGRATH, of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Ratchet-Drills, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve ratchet-drills of the class wherein the reciprocating movement of the operating lever or handle in either direction is utilized to turn the drill; and the invention also comprehends an automatic adjustable feed for the drill.

In accordance with this invention the drill-holder holding the drill is mounted to rotate in a hollow threaded shaft containing a longitudinally-movable spindle, which at its upper end rests either directly against the usual angle-iron or a support fixed to the work or against a suitable head-block or yoke carried thereby, and which also restrains the hollow shaft and spindle from rotation. An operating lever or handle is journaled about the drill-holder referred to, the lever carrying two oppositely-acting pawls, which engage two ratchet-tooth wheels, one of which is fast on the drill-holder and the other loose on the hollow shaft referred to, the ratchet-wheels having fast to them bevel-gears arranged facing each other and in mesh with a common intermediate bevel-gear loosely mounted on a laterally-extended stud on the hollow shaft. Movement of the operating-lever in either direction will cause one or the other of the pawls to engage its ratchet-wheel and act to turn the drill-holder and drill in one and the same direction. A sleeve is threaded upon the hollow threaded shaft referred to, which, when rotated about the said shaft, will act to move the same longitudinally to feed the drill to its work, the sleeve having longitudinally-cut ratchet-grooves in its outer surface, which are engaged by a pawl carried by a tube surrounding the sleeve and partially rotated by and with the reciprocation of the operating-lever. The engagement of the feed-pawl as the tube is rotated with the ratchet-grooves in the sleeve may be so adjusted as to give any desired feed to the drill.

One part of this invention therefore con-

sists in a drill-holder, a ratchet-wheel, and a bevel-wheel fast thereon, a tubular shaft in which the said drill-holder is mounted, having a ratchet-wheel and a bevel-wheel loose thereon, and an intermediate bevel-wheel in mesh with said bevel-wheels, combined with an operating-lever journaled about the said drill-holder and carrying the oppositely-acting pawls to engage said ratchet-wheels; also, in a support, a drill-holder, a tubular shaft in which the same is mounted, a sleeve threaded upon said tubular shaft and acting against said support and provided with longitudinal grooves, an operating-lever, and means controlled thereby to rotate said drill, combined with a tube surrounding said sleeve and made movable with said operating-lever, and a pawl carried by said tube to engage the grooves on said sleeve to rotate the same.

Other features of this invention will be hereinafter described, and pointed out in the claims.

Figure 1 represents in elevation a drill embodying this invention, a portion of the handle being broken off; Fig. 2, a vertical section of the same; Fig. 3, a cross-section taken on the dotted line  $xx$ , Fig. 1; Fig. 4, a similar section on the dotted line  $x'x'$ ; and Figs. 5, 6, and 7, details to be referred to.

Referring to the drawings, the drill-holder  $a$ , holding a drill  $a'$ , is mounted to rotate in the hollow shaft  $b$ , (shown separately in Fig. 5,) provided at its upper end with a transverse pin 5, which is extended through the longitudinal slot 6 in the vertically-movable spindle  $c$ , Fig. 6, within the shaft, the spindle at its upper end being provided with a square or other than round head  $c'$ , which enters a corresponding opening in the yoke or head-block  $d$ , fitted upon the usual angle-iron or support  $e$ , which is secured to the work, the yoke being provided with adjusting-screws 10, by means of which the yoke and head of the spindle  $c$  may be adjusted laterally to facilitate the placing of the drill in proper working position.

The drill-holder  $a$ , as represented, has fast upon it a ratchet-tooth wheel  $a^2$ , and a similar ratchet-wheel  $a^3$ , with its teeth facing in the opposite direction, is loosely mounted upon the hollow shaft  $b$ , (see Fig. 1,) the said ratchet-wheels being engaged by oppositely-

acting pawls  $a^4$   $a^5$ , (see Fig. 4,) pivoted on the forked end of the operating lever or handle  $h$ , loosely mounted about the drill-holder, as shown, the pawls being kept in engagement with their ratchet-wheels by suitable springs  $a^6$ , so that as the lever or handle  $h$  is moved back and forth the pawls will alternately engage their ratchet-wheels and turn them in opposite directions. The ratchet-wheels  $a^2$   $a^3$  have fast to them the bevel gear-wheels  $a^7$   $a^8$ , arranged facing each other and in mesh with the intermediate bevel-gear  $a^9$ , loosely mounted on the laterally-extended stud  $a^{10}$  on the lower end of the hollow shaft  $b$ , so that movement of either ratchet-wheel will transmit a corresponding opposite movement to the other ratchet-wheel through the intermediate gear.

Referring to Fig. 1, if the operating-handle is moved toward the left, as indicated by the arrow 25, the pawl  $a^4$  will engage the ratchet-wheel  $a^2$  and turn the drill-holder  $a$  and drill  $a'$  in the same direction, and upon the return or opposite movement of the lever, as indicated by the arrow 30, the pawl  $a^5$  will engage its ratchet-wheel  $a^3$ , turning it in that direction, and, acting through the fixed intermediate gear  $a^9$ , will act to turn the gear  $a^7$  and drill  $a'$  in the opposite direction, or as indicated by arrow 25, it being the same direction in which it was turned by the pawl  $a^4$ . A sleeve  $f$  (shown separately in Fig. 7) is run upon the threaded upper end of the hollow shaft  $b$ , which sleeve bears at its upper end against an annular shoulder  $c^2$  on the slotted spindle  $c$ , rotation of the sleeve with relation to the spindle acting to force the hollow shaft  $b$  out of the sleeve to feed the drill to its work, the sleeve being provided with a set-screw  $f'$ , which enters an annular groove in the slotted spindle  $c$  to hold the sleeve against the annular shoulder  $c^2$ , when the sleeve is rotated in the opposite direction to draw the hollow shaft and the drill carried thereby back again into the sleeve, as represented in Figs. 1 and 2. A series of longitudinal ratchet-grooves  $f^2$  on the sleeve  $f$  are engaged by a pawl  $n$  on the surrounding tube  $m$ , which latter, as represented, is secured to and made movable with the operating-lever  $h$  by means of an arm  $m'$  and screws  $m^2$ , the pawl engaging one or another of the grooves in the sleeve through a slot  $m^x$  in the tube  $m$  at each movement of the lever and tube, rotating the sleeve slightly to feed the drill, as described. As herein represented, the pawl  $n$  is pivoted in a circumferential slot  $n'$ , formed in a lug or projection  $n^2$ , (see Figs. 1 and 3,) the pawl being normally held at the front or right-hand end of the slot and in engagement with the grooves in the sleeve by a suitable spring  $n^3$ . An adjusting-screw  $n^4$  is provided at the opposite end of the slot. As the operating-lever moves the tube  $m$  to the left, as indicated by arrow 50, the pawl is drawn back over the grooves in the sleeve, and upon the return or opposite movement of the lever and tube the pawl drops into the first groove,

where it remains until the adjusting-screw strikes it and pushes it before it to the end of the movement, turning the sleeve with it a distance equal to the distance the pawl was moved by the adjusting-screw. As the lever and tube are again moved to the left the pawl remains stationary until struck by the front end of the slot, when it is carried back over the grooves to the end of the movement, where it remains to be again acted upon by the adjusting-screw upon the return movement to again feed the drill. The amount of feed is regulated by the amount of lost motion between the adjusting-screw  $n^4$  and the pawl  $n$ .

This invention is not limited to the particular construction shown, as the same may be varied.

Instead of the pawl-and-ratchet connections between the lever and drill-holder, I may employ any other well-known positive or friction clutch mechanism.

I claim—

1. A support, a drill-holder, a bevel-wheel fast thereon, a longitudinally-movable shaft in which the said drill-holder is mounted, having a bevel-wheel loose thereon, and an intermediate wheel carried by said shaft and in mesh with the said bevel-wheels, combined with an operating-lever journaled about the said drill-holder and carrying oppositely-acting clutch mechanisms to move said bevel-wheels, and a sleeve threaded on said shaft and acting against said support, to operate substantially as described.

2. A support, a drill-holder, a bevel-wheel fast thereon, a tubular shaft in which the said drill-holder is mounted, having a bevel-wheel loose thereon, and an intermediate wheel carried by said tubular shaft and in mesh with the said bevel-wheels, combined with an operating-lever journaled about the said drill-holder and carrying oppositely-acting clutch mechanisms to move said bevel-wheels, a slotted spindle in said tubular shaft acting against and restrained from rotation by said support, a pin extended through said slotted spindle, and a sleeve threaded on said hollow shaft and acting against said support, to operate substantially as described.

3. The combination, with a ratchet-drill, of the yoke or head  $d$ , the adjusting-screws 10, and a support for said yoke or head, substantially as described.

4. A support, a drill-holder, a tubular shaft in which the same is mounted, a sleeve threaded upon said tubular shaft and acting against said support and provided with longitudinal grooves, an operating-lever, and means controlled thereby to rotate said drill, combined with a tube surrounding said sleeve and made movable with said operating-lever, and a pawl carried by said tube to engage the grooves on said sleeve to rotate the same, to operate substantially as described.

5. A support, a drill-holder, a tubular shaft in which the same is mounted, a sleeve threaded upon said tubular shaft and acting against

said support and provided with longitudinal grooves, an operating-lever, and means controlled thereby to rotate said drill, combined with a tube surrounding said sleeve and made  
5 movable with said operating-lever, and provided with a projection having a slot, and a pawl pivoted in said slot and adapted to be acted upon by one end of the slot when the tube is rotated in one direction and by an-  
10 adjusting-screw when the tube is rotated in the opposite direction to engage the grooves on said sleeve to rotate the same, to operate substantially as described.

6. The drill-holder  $a$ , ratchet-wheel  $a^2$ , and  
15 bevel-wheel  $a^7$ , fast thereon, the tubular shaft  $b$ , the ratchet-wheel  $a^3$ , and bevel-wheel  $a^8$ , loose thereon, and the intermediate wheel  $a^9$ , combined with the lever  $h$  and pawls  $a^4$   $a^5$  to

engage said ratchet-wheels, to operate substantially as described. 20

7. The drill-holder  $a$ , ratchet-wheel  $a^2$ , and bevel-wheel  $a^7$ , fast thereon, the tubular shaft  $b$ , the ratchet-wheel  $a^3$ , and bevel-wheel  $a^8$ , loose thereon, and the intermediate wheel  $a^9$ , combined with the lever  $h$  and pawls  $a^4$   $a^5$  to  
25 engage said ratchet-wheels, the slotted spindle  $c$ , pin  $d$ , the sleeve  $f$ , tube  $m$ , and pawl  $n$ , all to operate substantially as described.

In testimony whereof I have signed my name to this specification in the presence of  
30 two subscribing witnesses.

JOHN F. McGRATH.

Witnesses:

JOHN H. GALLIGAN,  
ELISHA T. JACKSON.