(No Model.)

P. A. WHITNEY.

RATCHET DRILL.

No. 329,986. Patented Nov. 10, 1885.

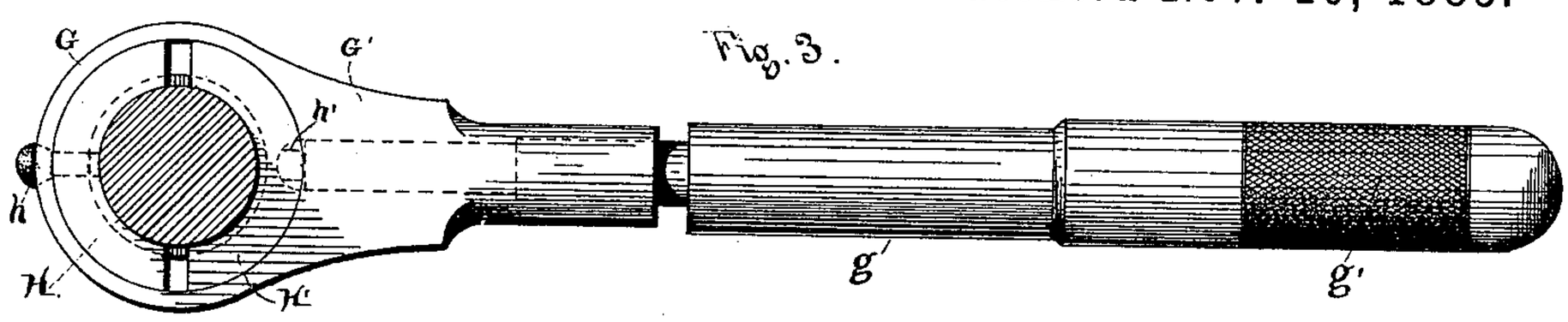

Fig. 3.

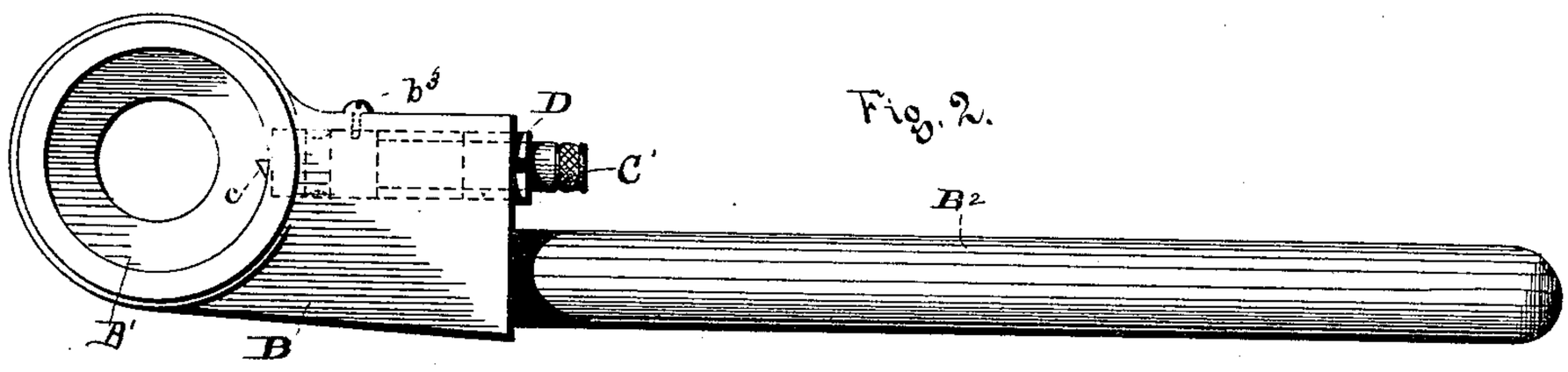

Fig. 2.

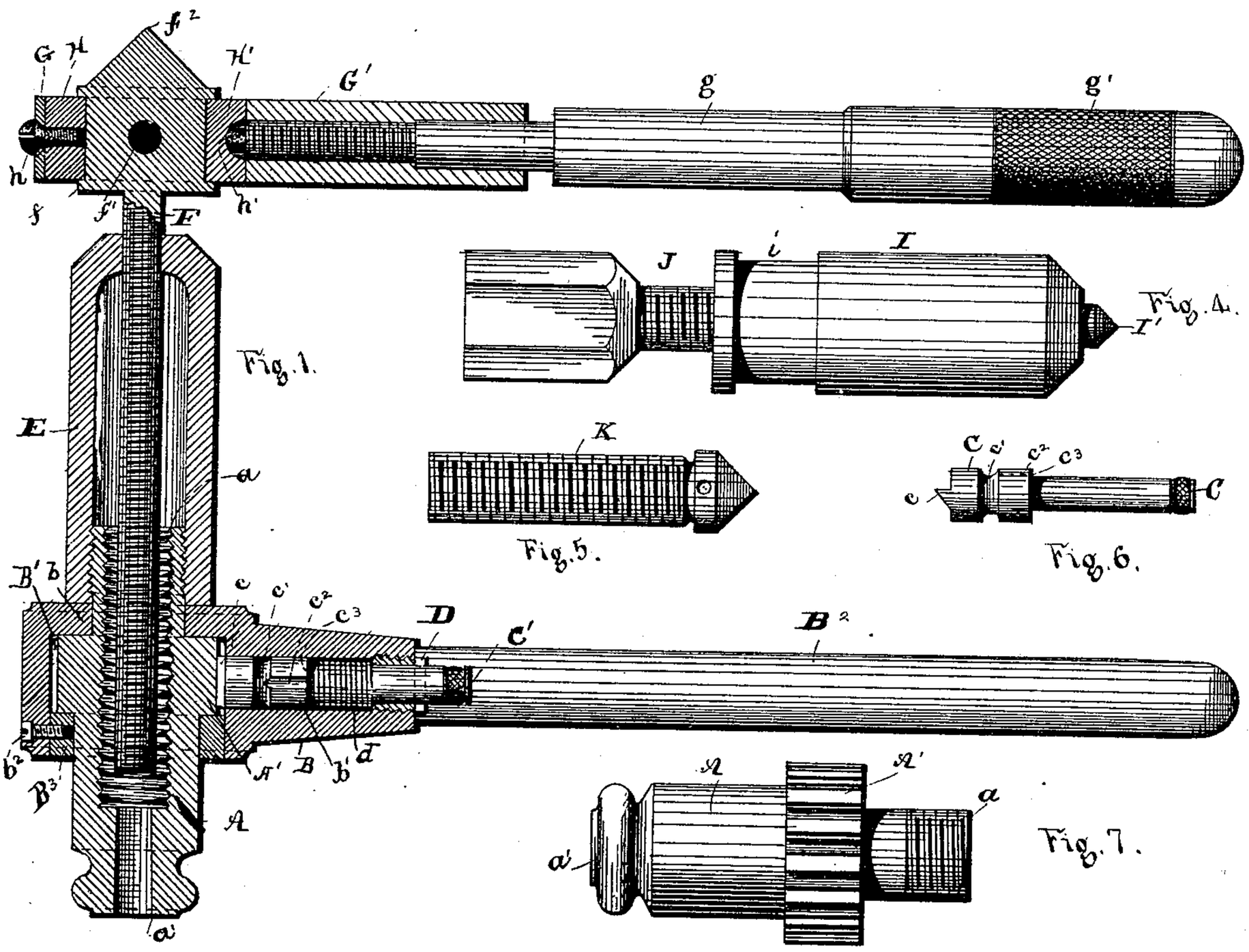

Fig. 1.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Witnesses:
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UNITED STATES PATENT OFFICE.

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RATCHET-DRILL.

SPECIFICATION forming part of Letters Patent No. 329,986, dated November 10, 1885.

Application filed February 14, 1885. Serial No. 155,881. (No model.)

To all whom it may concern:

Be it known that I, PARDON A. WHITNEY, of Chagrin Falls, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ratchet-Drills; and I do hereby 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 pertains to make and use the same.

My invention relates to improvements in ratchet-drills, the object being to provide a friction-feed for such drills. A further object is to provide a ratchet-wheel with square teeth, a reversible dog for engaging the same, the dog and teeth set radially, and a hand-et tangentially to the ratchet-wheel.

My invention also consists in the details of construction hereinafter described.

In the accompanying drawings, Figure 1 is an elevation in section of my improved ratchet-drill. Fig. 2 is a plan view of the drill, lever, and head. Fig. 3 is a plan view of the friction-feed mechanism. Figs. 4 and 5 are elevations, the one of a feed-screw and sleeve and the other of a short feed-screw. Fig. 6 is an elevation of the ratchet-dog detached from the head. Fig. is 7 a side elevation of the drill-spindle.

A represents a hollow spindle, provided with a ratchet-wheel, A′, with square teeth set radially. The bore of the spindle from the end *a* to some distance inward is threaded, while at the opposite end, *a′*, the orifice is made square, forming a socket for the shank of the drill, and may flare outward, (more or less,) if preferred. The end *a* is also threaded on the outside for attaching the sleeves, as hereinafter shown.

B is the lever-head, with a lateral bore, B′, that fits loosely over the ratchet-wheel, and an internal flange, *b*, the smaller bore of which fits the spindle above the ratchet. In assembling the parts the end *a* of the spindle is passed up through the chamber B′ and through the head or flange *b* until the ratchet-wheel is in the chamber B′ and next to the said flange *b*. A ring, B^3, is slipped over the end *a′* of the spindle and brought next to the ratchet-wheel, the periphery of the ring fitting snugly in the bore B′, where it is secured by one or more screws, b^2. A lever, B^2, is attached to or made integral with the part B, as may be preferred, and is set tangentially with the ratchet-wheel. A bore, *b′*, about parallel with the axis of the lever, leads from the outside into the chamber B′, about on a radial line therewith. In this bore *b′* operates the spring dog or detent C. The larger end or head of the dog has a tongue, *c*, on the face, the flat side of which in intended to be radial with the ratchet-wheel, and is adapted to engage the teeth of the wheel, while the rear side of the tongue is oblique to the face, and is snubbed back when the dog moves in one direction. About midway of the head of the dog is an annular groove, *c′*, and on opposite sides are longitudinal grooves c^2, of about the same shape and depth as the groove *c′*, and leading from the latter to the shoulder c^3. Beyond this shoulder the dog is reduced in size, forming a stem that is milled on the outer end at C′, so that the stem and dog may be easily revolved with the fingers. A hollow plug, D, fits the stem and screws into the outer end of the bore *b′*. Between the inner end of this plug and the shoulder c^3 operates the spiral spring *d*, that presses the dog to an engagement with the ratchet-wheel. A small screw, b^3, passes through the wall of the bore *b′*, and the point projects inside, so as to enter one of the grooves c^2, and the arrangement of parts is such that the flat side of the tongue *c* of the dog will engage the teeth of the ratchet-wheel in one direction or the other, according to which one of the grooves c^2 the point of the screw b^3 is operating in. By drawing outward on the stem C′ until the point of the screw b^3 has entered the groove *c′* the dog may be revolved and the tongue *c* made to face in the direction that it is desired to move the ratchet-wheel; or the dog may be left with the screw b^3 in the groove *c′*, between the grooves c^2 and c^3, in which case the dog will be held back from an engagement with the ratchet-wheel.

E is a sleeve that has an enlarged threaded bore at one end, and screws on over the end *a* of the spindle A. The smaller and longer portion of the bore is threaded to engage the screw F, that has a large head, usually of about the same diameter as the sleeve. This head is provided with a broad shallow flat-bottomed annular groove, *f*, and lateral holes *f′*, and a

hardened steel point, f^2, for holding the drill. The holes f' are for turning or holding from turning the screw F, as in ordinary ratchet-wheels, and are only used when the friction-feed is not in position. The groove f is a part of a friction-feed, that is as follows:

H and H′ are sections of a ring, each a trifle less than a half-circle, and fitting snugly into the groove f. A strap, G, is bored to fit over these sections, leaving them, however, free to revolve in the groove f. A small screw, h, passes through a hole in the strap and screws into a suitable threaded hole in the section H, and holds it against the strap. The strap terminates on one side in a shank, G′, that has a threaded bore, into which is screwed one end of the lever g, the point thereof entering a shallow hole, h', drilled in the periphery of the section H′, by means of which and of the screw h the strap G is held in place on the ring sections, and the latter are of course confined in the groove f. The outer and enlarged end of the lever g at g' is milled, so that by grasping it by hand or with the thumb and finger the lever may be revolved with considerable force.

In operating the drill (that is, of course, turned by means of the lever B^2 and ratchet-wheel and mechanism aforesaid) the friction between the threads of the screw F and the engaging-threads of the sleeve E would cause the screw, if left free, to turn with the sleeve. If the lever g is screwed in, it presses the section H toward the section H′. The two are made to grasp the head of the screw until the friction at this point overcomes the aforesaid friction between the screw-threads and holds the screw from turning. The arrangement of parts is such that when this occurs the continued movement of the sleeve turns it off of the screw or unscrews it, and this of course presses the drill to the work or feeds it. This increase of pressure on the drill of course increases the pressure and friction between the threads of the screw and sleeve that would soon become so great that it would overbalance the friction on the feed, and would cause the screw again to revolve with the sleeve. The drill, continuing to advance in the work, soon reduces the pressure and friction on the screw, so that the friction-feed is again operative.

The foregoing is intended to serve only as an illustration, for in practice it is found that the screw is not stopped, but only retarded, so that it revolves more slowly than the sleeve, and the result is that a constant and regular feed is had, greater or less, according to the pressure applied to the sections by screwing in the lever g.

It is well known to those familiar with drilling that the feed should vary according to the size of the drill, and should also vary (more or less) according to peculiarities, such as toughness, hardness, &c., of the metal to be drilled. From the great number of drills differing in size that are in use, and from the variety of work to be done, it is obvious that a great variety of feeds are required. If the feed is too light, the drill will do little more than scrape the work, advancing very slowly and wearing off the cutting-edge of the drill very fast. If the feed is slightly increased, the drill is made to cut rather than scrape; but it cuts the chips too fine—that is, it makes perhaps two or three, or more, cuts where it should make but one cut in advancing a given distance, and under such circumstances the work progresses slowly and the drill soon requires sharpening. When a feed is applied about as heavy as the drill will stand, the work is done with dispatch, and a hole may be drilled, perhaps two or three times as far, without resharpening the drill, as could be done with a light feed. The defect in the ordinary hand-feed—such as would be had when the holes f were used—is that the feed is irregular. If the feed is too great, the drill is inevitably broken.

The operator will usually turn out the screw until he thinks he has secured a sufficient pressure on the drill, and will then operate the drill for a time without changing the screw. Under such conditions the pressure on the drill varies so much that the drilling progresses slowly and the drill is liable to be broken by an overpressure.

An automatic feed that will give the desired pressure on the drill constantly and uniform will produce much better results than the ordinary hand-feed; but the range of feed required is so great that a feeding device the mechanism of which can be changed almost indifferentially, as would be necessary, would be complicated, cumbersome, and expensive. The friction device shown, on the contrary, is extremely simple and inexpensive, and all possible grades of feed may be had, from highest to lowest, within the range of feed adapted to such a device, and when the friction device is once set it will continue to give an absolutely uniform feed.

In various kinds of work—for instance, in boiler-making—holes are sometimes to be drilled in places that are difficult of access, and where the lever g could not be operative when attached to the head of the screw. In such cases the sleeve is unscrewed and laid aside, and in place thereof a screw with an enlarged end containing a socket and internal thread is screwed onto the end of the spindle. With this is used a sleeve, I, which has internal threads to engage the screw J, and has a pointed end, I′, and an annular groove, i, that is a fac simile of the groove f. The friction device is removed from the screw F and placed in position on the sleeve, the sections H and H′ fitting into the groove i. This brings the lever g near to the lever B^2, and although in this latter position it is not so convenient for general use, it can be operated in a limited space—in fact a place can usually be found for it where there is room for the hand of the operator in working the lever

B². To operate a drill in a still narrower space, the friction device and attachments are laid aside.

It will be observed that the spindle A is short, and a short drill may be placed thereon. A short screw, K, is provided, that screws into the spindle, the head of the screw being provided, in the usual manner, with lateral holes in the head, and a pin or other tool may be inserted in these holes for feeding the drill.

What I claim is—

1. In a ratchet-drill, a lever-head inclosing the ratchet-wheel, a lever connected therewith arranged tangentially with the ratchet-wheel, and a spring-dog operating in a socket of the head and arranged radially with the ratchet-wheel, substantially as set forth.

2. In a ratchet-drill, the combination, with a socket or head inclosing the ratchet-wheel, and a lever arranged tangentially with the ratchet-wheel, of a spring-dog set radially with the socket, with an annular groove and longitudinal grooves on the dog, and a point engaging the same, by means of which the dog may be reversed or held from contact with the ratchet-wheel, substantially as set forth.

3. In a ratchet-drill, a friction-feed arranged to feed the drill automatically with greater or less feed, according to the pressure applied to the friction mechanism, substantially as set forth.

4. In a ratchet-drill, the combination, with an annular friction-surface on the feed mechanism, of ring-sections arranged to embrace such friction-surface, and mechanism, preferably as shown, for regulating the pressure on the ring-sections, substantially as set forth.

5. In a ratchet-drill, the combination, with an annular friction-groove on the feed mechanism, and screws or sleeves, as the case may be, of ring-sections to engage such grooves, a strap embracing said sections, and a screw-handle to regulate the pressure on the sections, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 11th day of February, 1885.

PARDON A. WHITNEY.

Witnesses:
PERRY H. SMITH,
A. E. SMITH.