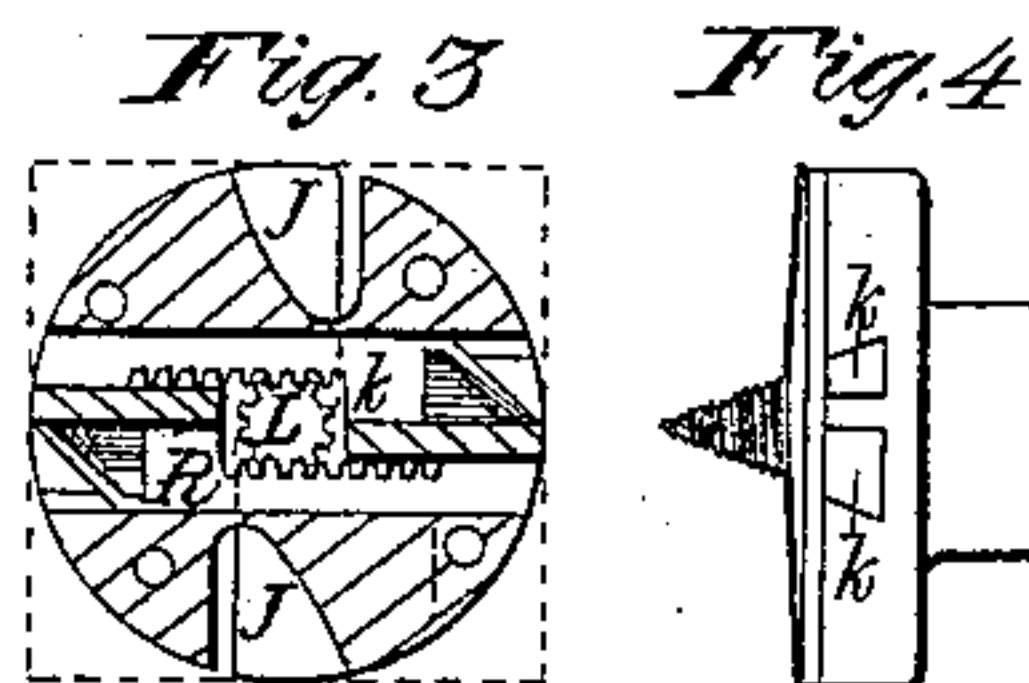
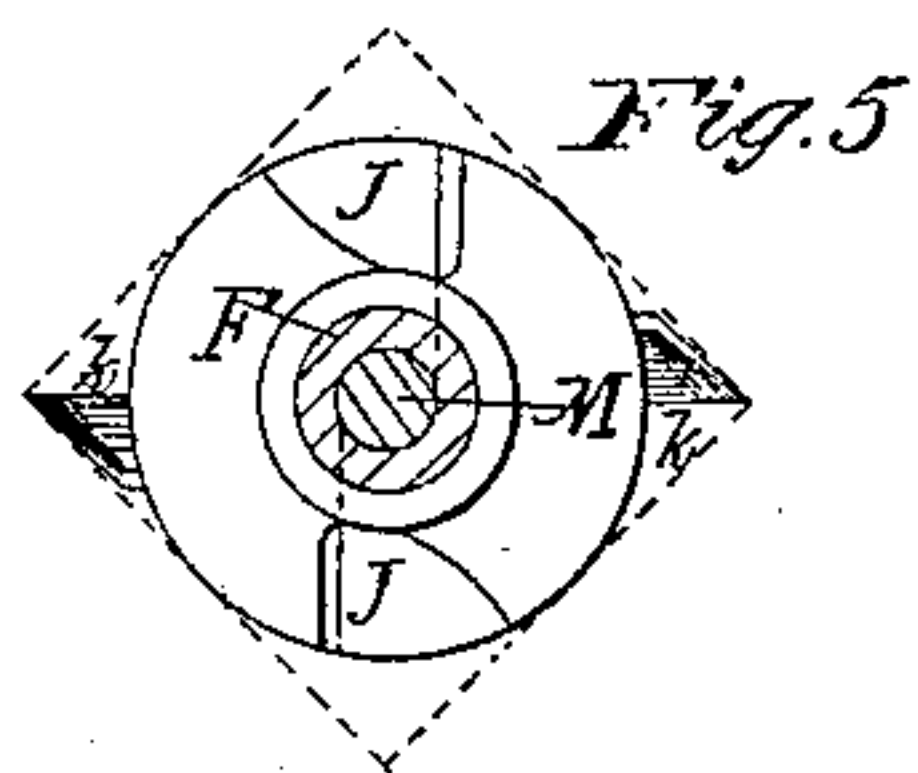
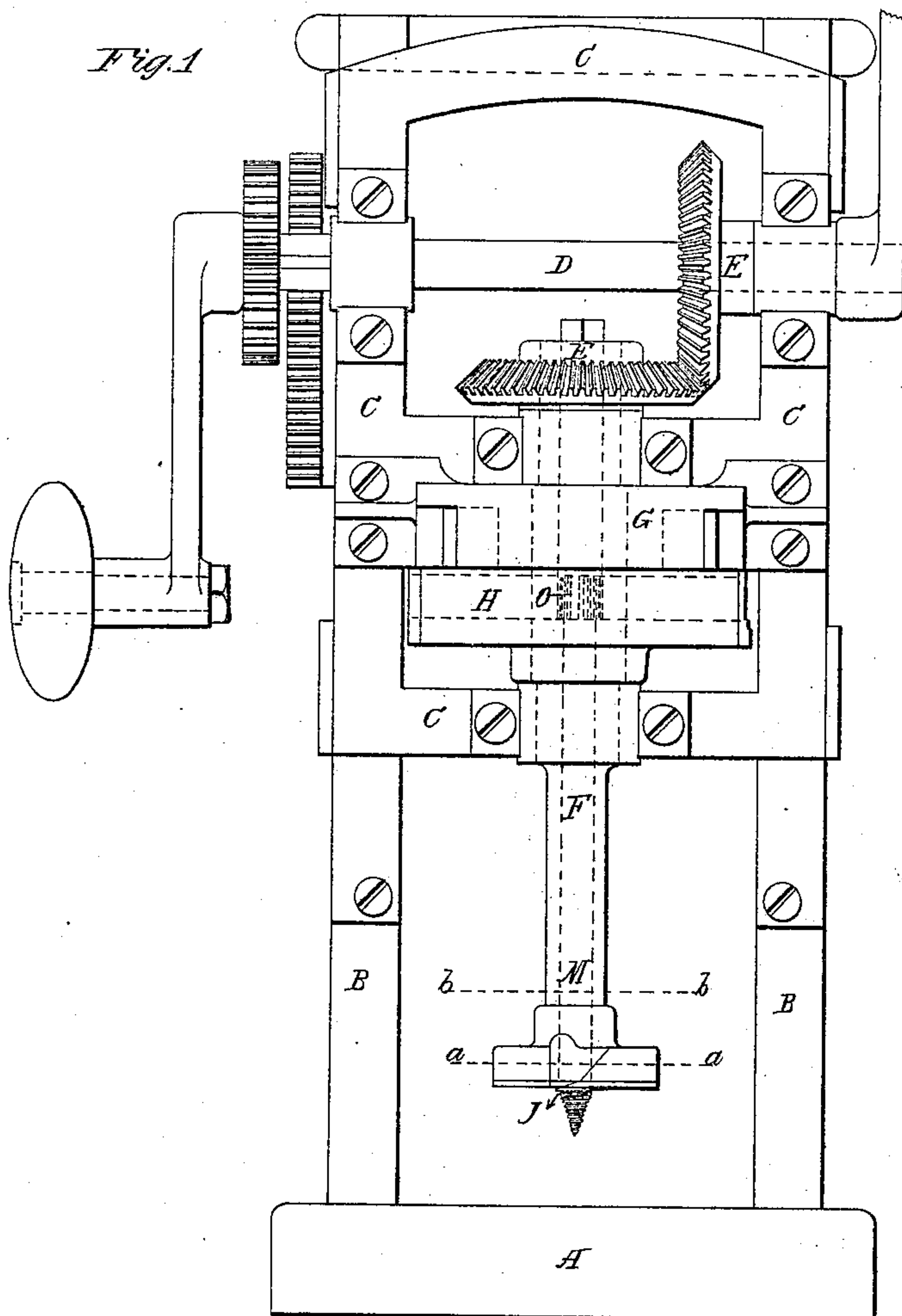


25 Sheets, Sheet 1.

*B. Merritt, Jr.,
Boring Wood.*

N^o 42,863.

Patented May 24, 1864.



Witnesses:
D. H. Priest
H. L. Hayford

Inventor:
Benjamin Merritt Jr.

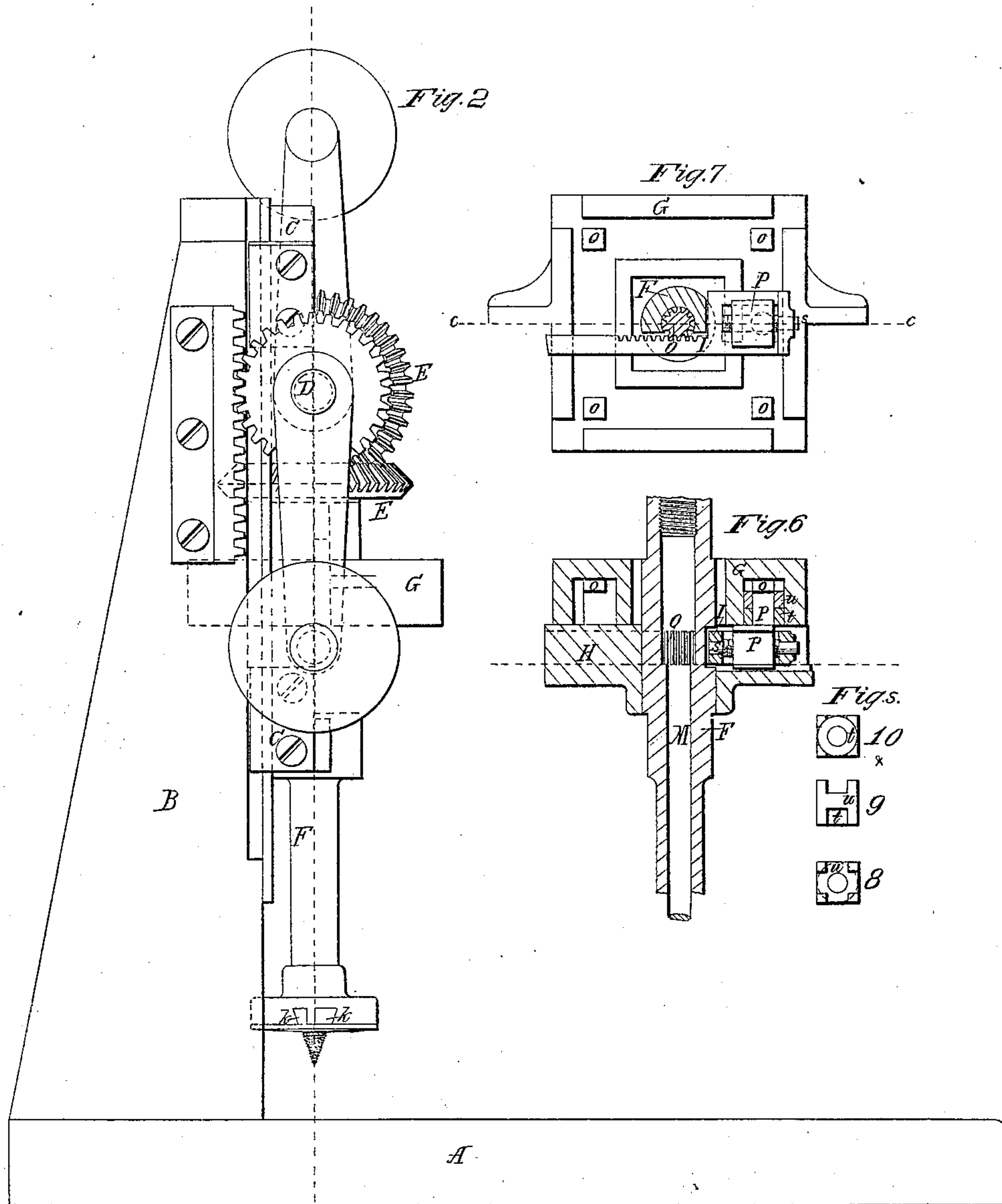
B. Merritt, Jr.,

2 Sheets, Sheet 2.

Boring Wood.

N^o 42,863.

Patented May 24, 1864.



Witnesses:

D. H. Priest

H. L. Hayford

Inventor:

Benjamin Merritt Jr.

UNITED STATES PATENT OFFICE.

BENJAMIN MERRITT, JR., OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR BORING ANGULAR HOLES.

Specification forming part of Letters Patent No. 42,863, dated May 24, 1864.

To all whom it may concern:

Be it known that I, BENJAMIN MERRITT, Jr., of Newtown, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Machinery for Cutting, Drilling, or Boring Angular Holes; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a machine constructed in accordance with my invention, showing the same attached to an ordinary carpenter's boring-tool and arranged for boring square holes. Fig. 2 is a side elevation of the same. Fig. 3 is a section through cutter-head on line *a a*, Fig. 1. Fig. 4 is a side view of the cutter-head. Fig. 5 is a section on line *b b*, Fig. 1, showing the reciprocating cutters thrown out so that the distance from point to point of cutters is just equal to the diagonal distance from corner to corner of the square to be cut, as indicated by red lines. Fig. 6 is a vertical section through cam on line *c c* in Fig. 7. Fig. 7 is a plan of under side of cam, showing the rack and cam-block. Figs. 8, 9, and 10 are views of the cam truck and block.

In the following description similar letters refer to similar parts.

A is the foundation-plate, upon which are erected vertical standards B B, and on the latter slides up and down the sliding frame C. D is the crank-shaft; and E E are bevel or miter gears, through which the motion of the crank-shaft is conveyed to the auger-stock F. A cam, G, having on its under side a path of the form of the hole to be cut, (in this instance a perfect rectangle,) and in each corner of the path a small stud, *o*, is firmly bolted to the sliding frame C. A box or bearing, H, containing the rack I, is keyed firmly to the auger-stock F, necessarily rotating with it. The rack I is provided with a sliding block and pin, *p*, adjustable by means of the screws *s*, as shown in Figs. 6 and 7. The pin *p* is mounted by a friction-truck, *t*, and block *u*. (Seen in detail at Figs. 8, 9, and 10.) Both the friction truck and block are fitted to the path of the cam G, the block having two grooves cut at right angles with respect to each other in the upper side, so as to accu-

ately fit the projections *o* in the path of the cam G.

The object of the grooves in the block and the projections in the cam is to insure the traveling of the axis of the truck and block in a direct line from corner to corner of the cam.

To the bottom of the cutter-head are attached, by means of screws, fixed rotary cutters J, and reciprocating rotary cutters K K are arranged in guides traversing the said cutter-head, the pinion L on the lower end of the shaft M operating upon rack-teeth in the side of the cutter K K to move them out and in.

The operation of my machine is as follows: The apparatus being in the position shown in the drawings, the friction-truck *t* and block *u* will be in the position shown in Fig. 7. Now, if the crank be turned, the auger-stock will be turned, and also the rack-box H, carrying the rack I, and, as the friction truck and block cannot travel in a concentric circle, but must move in a direction tangent thereto, it is clear that the rack must be moved endwise, and, its teeth gearing with the pinion O on the upper end of the shaft M, the latter will be rotated. The lower pinion, L, of this shaft will actuate the cutters K K to move out of the cutter-head until the friction-truck shall have reached the extreme corner of the cam-path, when the reciprocating cutters have attained the position shown in Fig. 5. The friction-truck will be forced by the continued rotary motion of the rack I and the rectangular form of the cam to move in a line at right angles to that in which it has been moving and approach the concentric circle, to which its line of motion is tangent. This change of motion will cause the reciprocating cutters to return to their original positions, and thus produce the cutting of a perfect right angle. Now, if the operation be continued through a complete revolution of the auger-stock, a complete square will be cut. If it were desirable to cut or bore holes with more sides than four—such as hexagons or octagons, for example—the shape of the cam-path must correspond to the desired shape.

From the above it will be observed that the reciprocating cutters which cut the hole to the required form are actuated in their reciprocating travel by the cam, so that by modi-

fyng the shape of the cam according to the intended sectional area of the hole any form of hole may be cut, whether regular or irregular, and whether the outline is composed of straight or curved lines.

Having thus described my invention, I claim—

1. Cutting or boring holes of any sectional area desired by means of rotary cutters, reciprocating to and from their axes of rotation, substantially as set forth.

2. Combining with the expansible rotary cutters a fixed pattern-cam, actuating the said cutters to reciprocate in their rotary travel, substantially in the manner and for the purposes set forth.

3. The combination, with the reciprocating rotary cutters and cam, as described, of fixed rotary cutters to cut the bulk of the wood or other material out of a circle inscribed in the area of the hole to be cut.

4. The arrangement in the axis of the cutter-head, and in combination with the reciprocating rotary cutters, of a screw-tug.

5. The combination of racks with the rotary cutters, and operating the same by means of a pinion on the end of a shaft, which in its

turn is rotated back and forth by means of a rack gearing with a pinion on the same shaft, as set forth.

6. In combination with the reciprocating rotary cutters, operated as described, the revolving hollow shaft inclosing the pinion-shaft, the said hollow shaft carrying in a suitable slide box or bearing the rack which operates the pinion-shaft, as set forth.

7. The arrangement, in combination with the hollow main shaft, pinion-shaft, and its operating-rack, of the stationary cam, so that on rotary motion being imparted to the hollow shaft the rack shall both be rotated with it and reciprocated in accordance with the conformation of the cam.

8. The general combination and arrangement of the machine or apparatus for cutting square or other regular or irregular shaped holes, substantially as herein described.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

BENJ. MERRITT, JR.

Witnesses:

F. B. WEBSTER,
L. L. TOWER.