

(No Model.)

C. M. SMITH.
APPARATUS FOR BORING AND TUBING WELLS.

No. 570,513.

Patented Nov. 3, 1896.

Fig. 1.

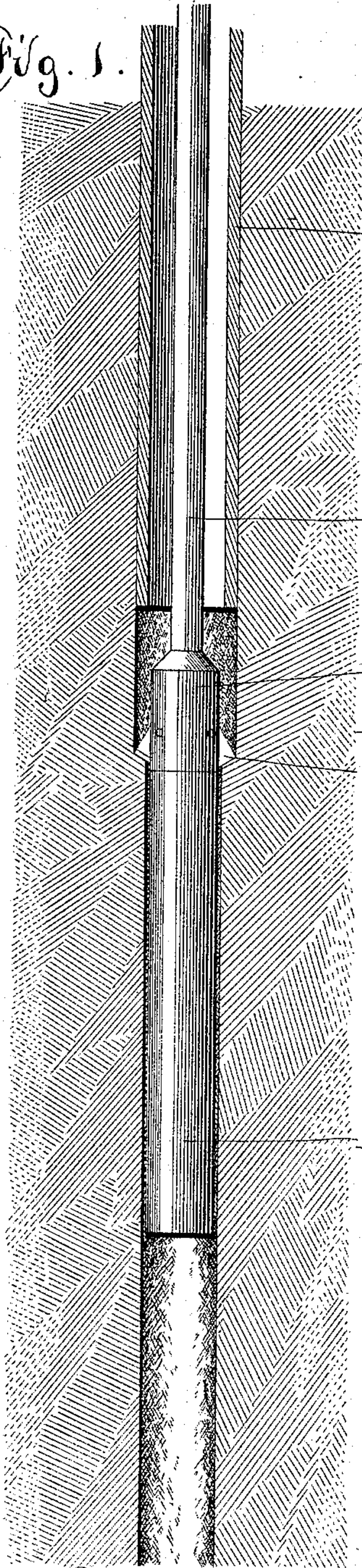


Fig. 2.

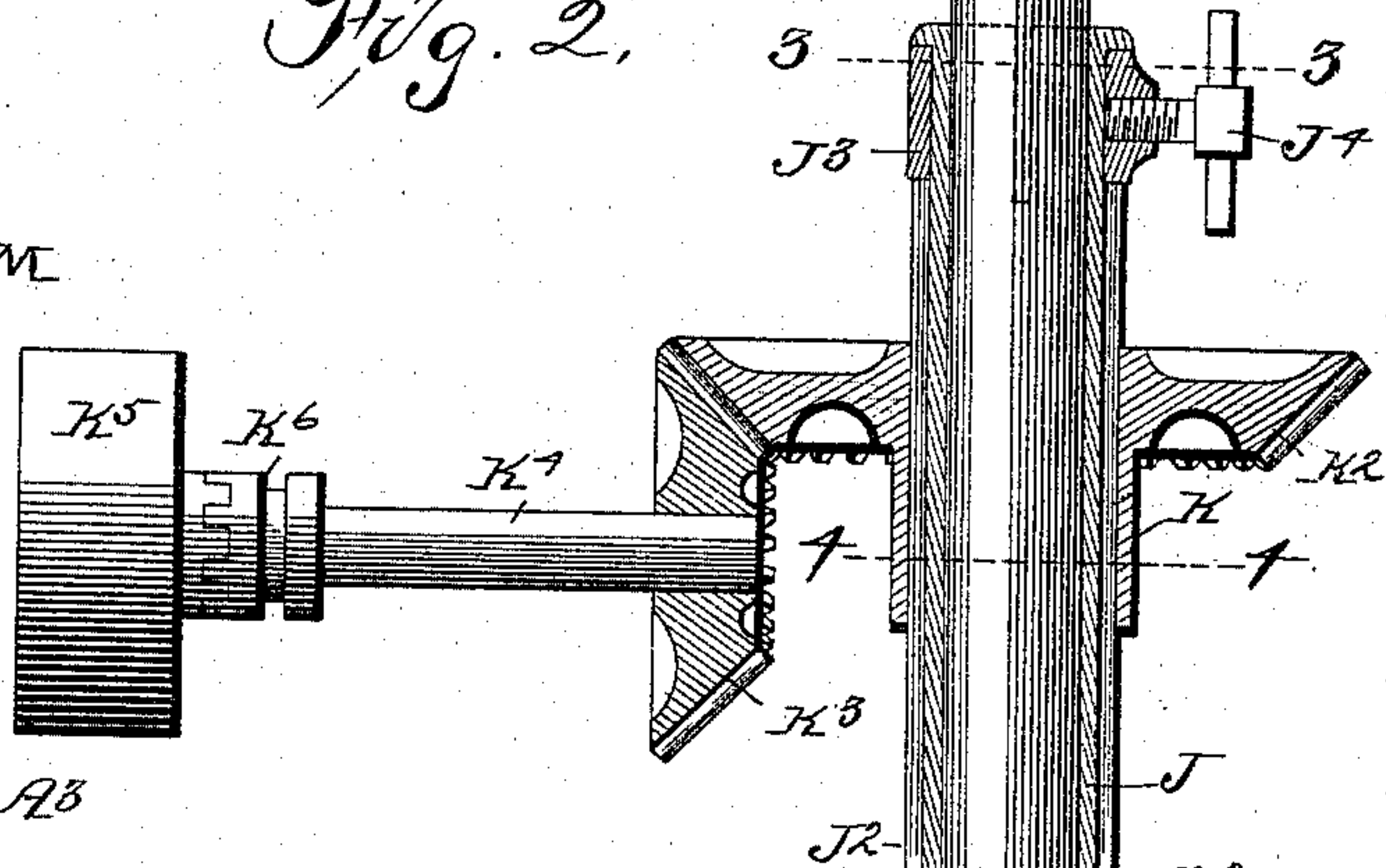


Fig. 3.

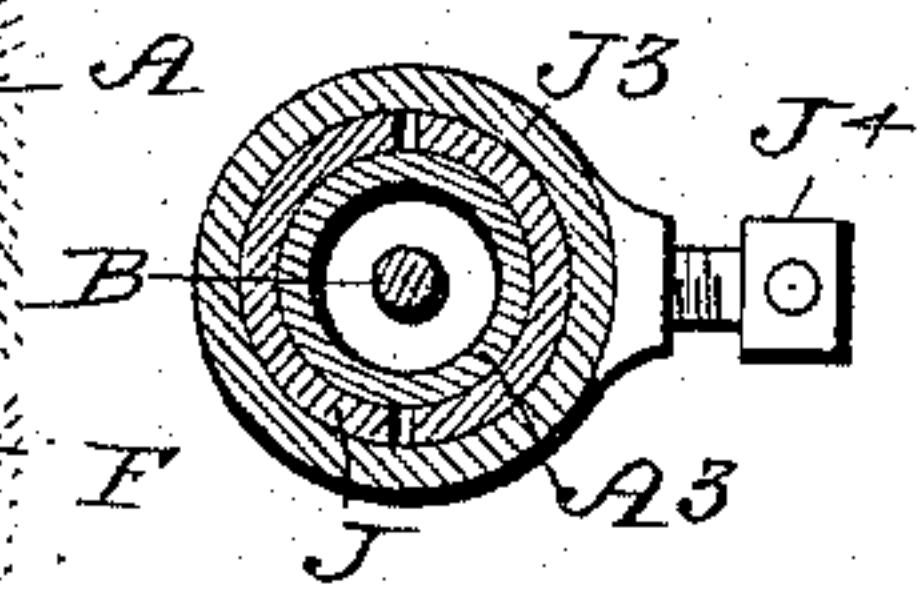


Fig. 4.

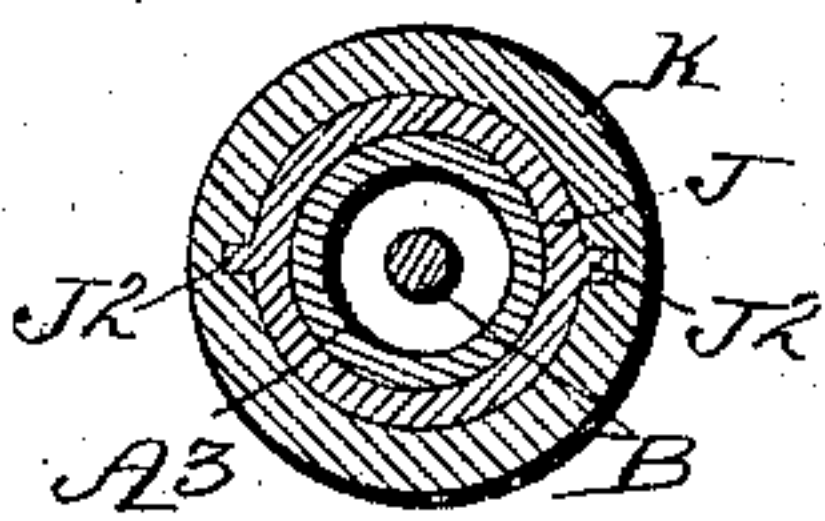
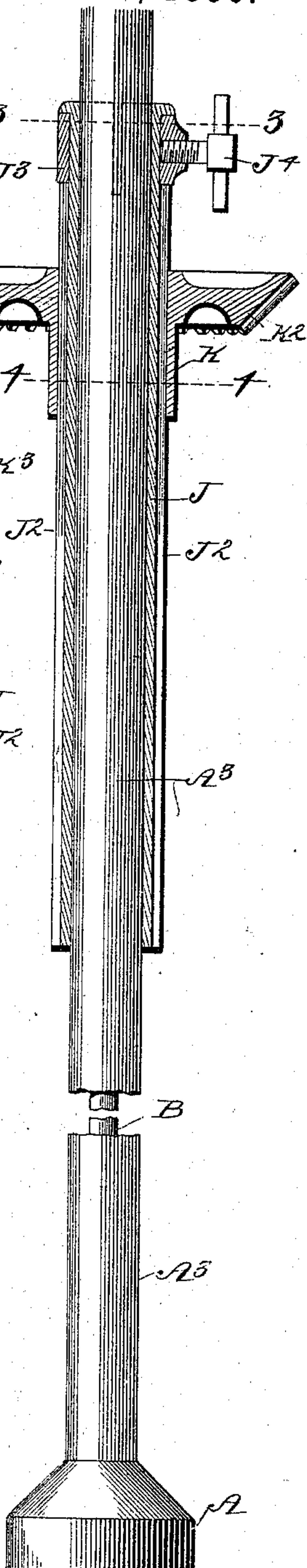
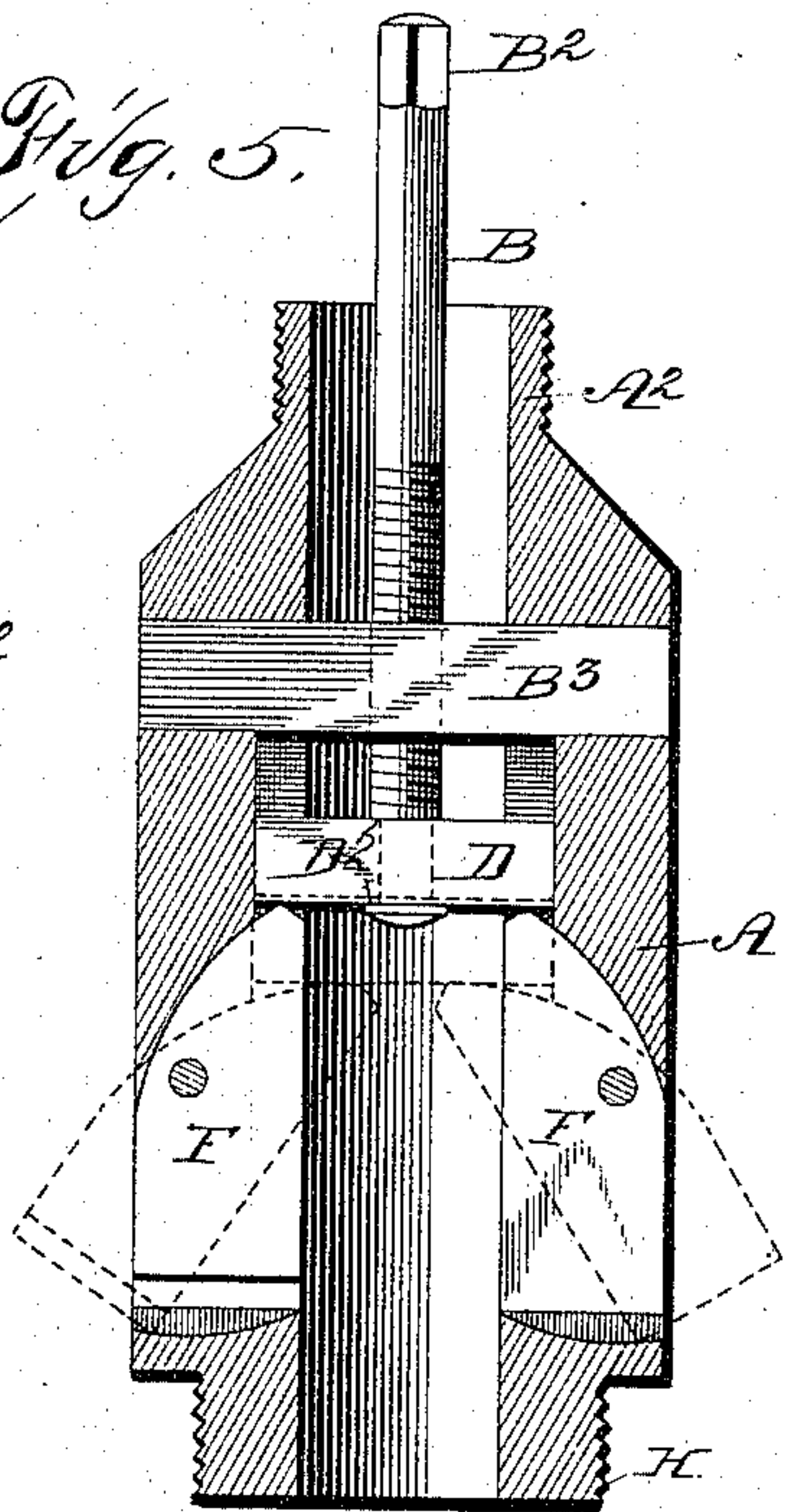


Fig. 5.



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UNITED STATES PATENT OFFICE.

CYRUS M. SMITH, OF LAKE CITY, IOWA.

APPARATUS FOR BORING AND TUBING WELLS.

SPECIFICATION forming part of Letters Patent No. 570,513, dated November 3, 1896.

Application filed March 23, 1896. Serial No. 584,569. (No model.)

To all whom it may concern:

Be it known that I, CYRUS M. SMITH, a citizen of the United States of America, residing at Lake City, in the county of Calhoun, in the State of Iowa, have invented a new and useful Apparatus for Boring and Tubing Wells, of which the following is a specification.

My object is to provide means specially adapted for tubing oil-wells in such a manner that when the bore passes through strata containing water and reaches oil-bearing strata a tube can be extended to the bottom of the bore and the oil-bearing strata, as required, to prevent water from entering the tube—a desideratum of great importance in view of the fact that when water enters the bottom of the tube it interferes with the flow of the oil into the tube as required to rise in the well.

My invention consists in certain details of construction, arrangement, and combination of parts, as hereinafter set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a well in section with the reaming device in position and well-tubing placed in the upper end of the well to follow the reamer. Fig. 2 shows a sectional view of the upper end of the pipe to which the reamer is connected and the means for rotating same. Fig. 3 shows a transverse section through the line 3 3 of Fig. 2. Fig. 4 shows a transverse section through the line 4 4 of Fig. 2. Fig. 5 shows an enlarged vertical sectional view of the reaming-tool, in which is shown a section of a rotatable rod having an angular top end adapted to be coupled to a rod when extended down from the top of the bore, as indicated in Fig. 2.

Referring to the accompanying drawings, the reference-letter A is used to indicate the body of the reaming device. It is cylindrical in shape and at its top is a contracted screw-threaded extension A², to which the tube A³ is screwed.

B is a rod having an angular top B² extended through a screw-seat B³, fixed in the top portion of the body or cylinder A. Grooves extending downward in the bore of the cylinder from the said screw-seat admit the ends of a block D to slide up and down therein. The rod B is rotatably connected at its lower

end with said block. Slots in the cylinder extend downward and radially from the block D, and a cutter F is pivoted in each slot. The upper outer corners of the cutters are inclined or curved and adapted to fit the inclined top surfaces of the slots.

When the block D is lowered, by rotating the rod B the cam-surfaces of the curved outer corners of the cutters F will be engaged by the under surface of the block as required to force the lower ends of the cutters outward, as indicated by dotted lines in Fig. 5 and as required to operate the cutting edges that extend across their bottom ends.

It is obvious that when the block D is raised the cutters will enter the cylinder again as required to lift the cylinder up through the well-tube.

H indicates a contracted screw-threaded extension on the lower end of the cylinder, to which a tube H² is screwed. This pipe serves the function of keeping the reamer concentrically in the well. It also allows the pipe H² to be removed, so the bore can be enlarged close to the bottom in such a manner that the bottom of the bore will be practically concave. The cutters F (indicated by dotted lines in Fig. 5) show the inwardly and downwardly inclined bottom of the enlarged bore, such as the bottom of the tube will engage as it descends. The circumferential inward taper of the bottom of the bore thus produced will aid in retaining the tube concentric with the bore and cause it to lodge and rest solidly upon the bottom of the bore as required in casing off water from oil in oil-wells.

The cylinder is supported in the well and rotated by means of the tube A³, and when it is desired to extend or withdraw the cutters F a rod or key having an angular opening in its lower end, designed to engage the top of the rod B², is passed downwardly through this tube and then turned in the desired direction.

I have provided the following mechanism for rotating the reamer:

J indicates a tube-section, preferably about five feet in length and provided with longitudinal feathers J² and a collar J³ at its top. This collar has a set-screw J⁴ seated therein to engage a tube on the interior of the collar J³. A sleeve K, having grooves to receive said feathers J², is slidingly mounted

on the tube J and has a bevel-gear K^2 formed on or fixed thereto. This is driven by means of a mating-gear K^3 on a shaft K^4 , which shaft is provided with a belt-wheel K^5 and a clutch K^6 , by which the belt-wheel may be thrown out of gear with the shaft K^4 .

M indicates the well tubing or lining, preferably made of metal sections of the same diameter as the opening made by the reamer. They are placed in the well, one section at a time, the gearing devices being detached to permit this.

In practical use, after the well has been bored, the tube-section H^2 is placed on the lower end of the reaming device and the tube A^3 screwed to its top. The cutters of the reamer are then extended and the tube-section I placed over the tube A^3 and secured thereto. The shaft is then rotated and motion transmitted therefrom to the reamer. The tube H^2 on its lower end serves to keep the reamer concentrically within the well. The well-tube M is then forced into the well and is pressed downwardly, one section at a time, as the reamer progresses, the driving mechanism being removed to permit this.

After the bore is enlarged and cased to near its bottom I withdraw the reamer and remove the tube H^2 and then return the reamer to the bore and enlarge the bore and concave its bottom as required to center and fix the bottom end of the tubular casing in the bottom of the bore.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent of the United States therefor, is—

1. A reamer adapted to enlarge and tube a bore from top to bottom, comprising a cylinder having screws at its ends for detachably connecting tube-sections therewith, a screw-

seat fixed in the top portion of the cylinder, grooves in the inside of the cylinder extending downward from the screw-seat, a sliding block fitted in said grooves, radial slots extending downward and outward through the cylinder below said grooves, a rod having an angular top and a screw-threaded portion extended through said screw-seat and rotatably connected with the sliding block, cutters having curved outer corners at their top ends and cutting edges across their bottom ends pivoted in said slots, arranged and combined to operate in the manner set forth, for the purposes stated.

2. An apparatus for tubing a well, comprising a reamer adapted to enlarge and tube a bore from top to bottom, comprising a cylinder having screws at its ends for detachably connecting tube-sections therewith, a screw-seat fixed in the top portion of the cylinder, grooves in the inside of the cylinder extending downward from the screw-seat, a sliding block fitted in said grooves, radial slots extending downward and outward through the cylinder below said grooves, a rod having an angular top and a screw-threaded portion extended through said screw-seat and rotatably connected with the sliding block, cutters having curved outer corners at their top ends and cutting edges across their bottom ends pivoted in said slots, a tube adapted to be detachably attached to the bottom of said cylinder, a tube adapted to be attached to the top of said cylinder and mechanism for rotating said tube and cylinder, all arranged and combined to operate in the manner set forth for the purposes stated.

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Witnesses:

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