

(No Model.)

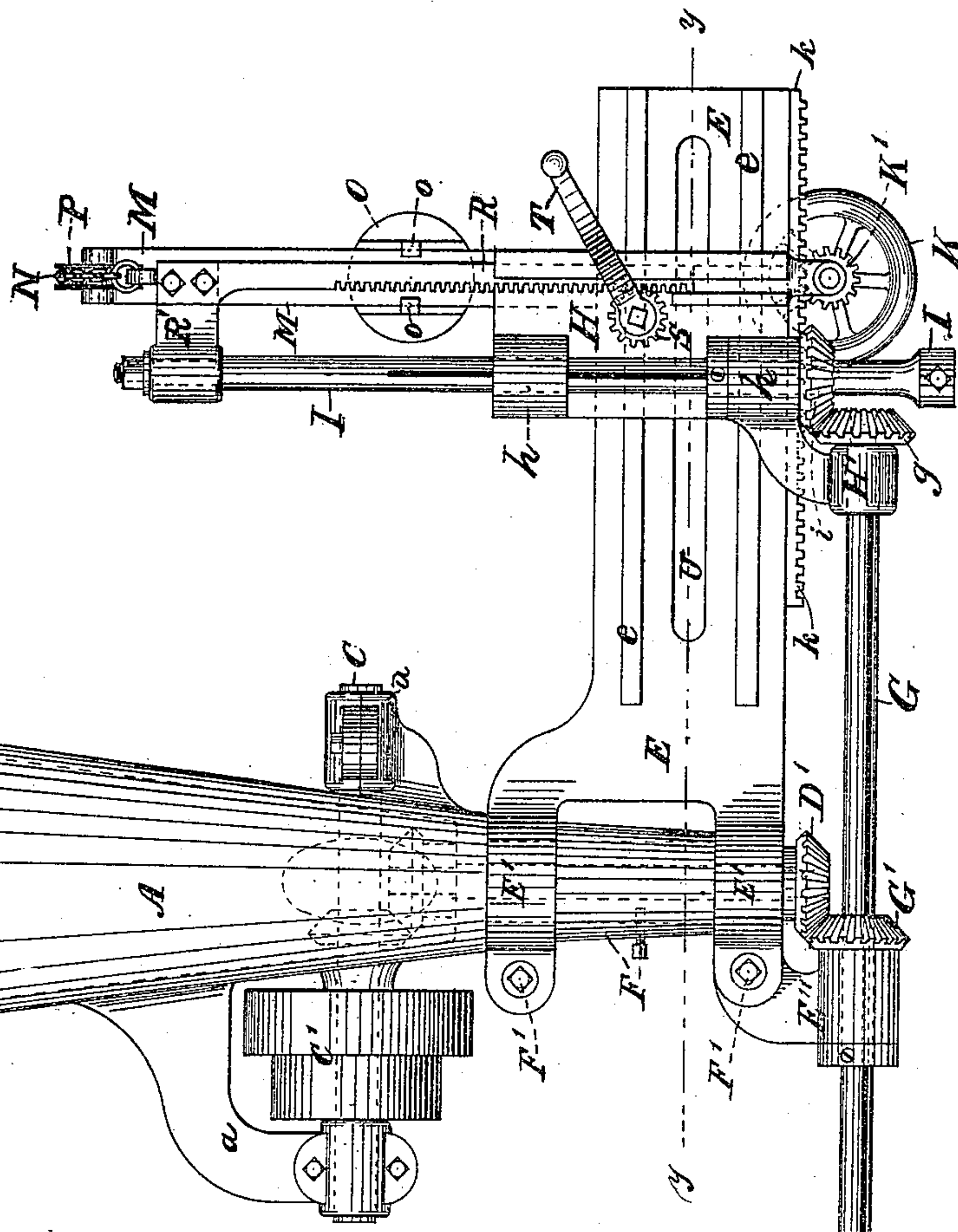
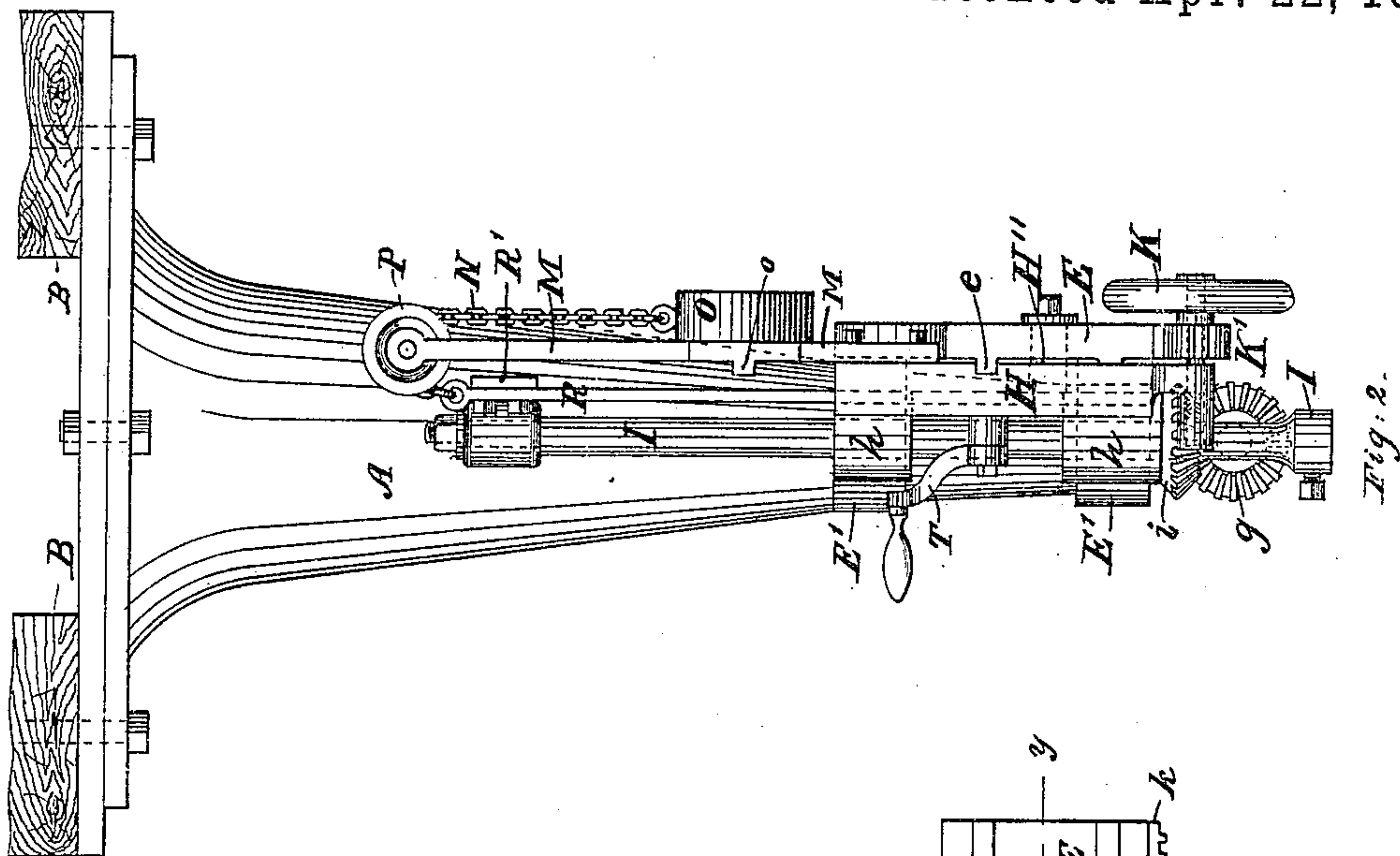
2 Sheets—Sheet 1.

E. F. GORDON & H. HOBBS.

SUSPENDED DRILLING MACHINE.

No. 297,383.

Patented Apr. 22, 1884.



Witnesses.

J. O. Bishop.
E. A. Phelps.

Inventors

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their attorney.

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2 Sheets—Sheet 2.

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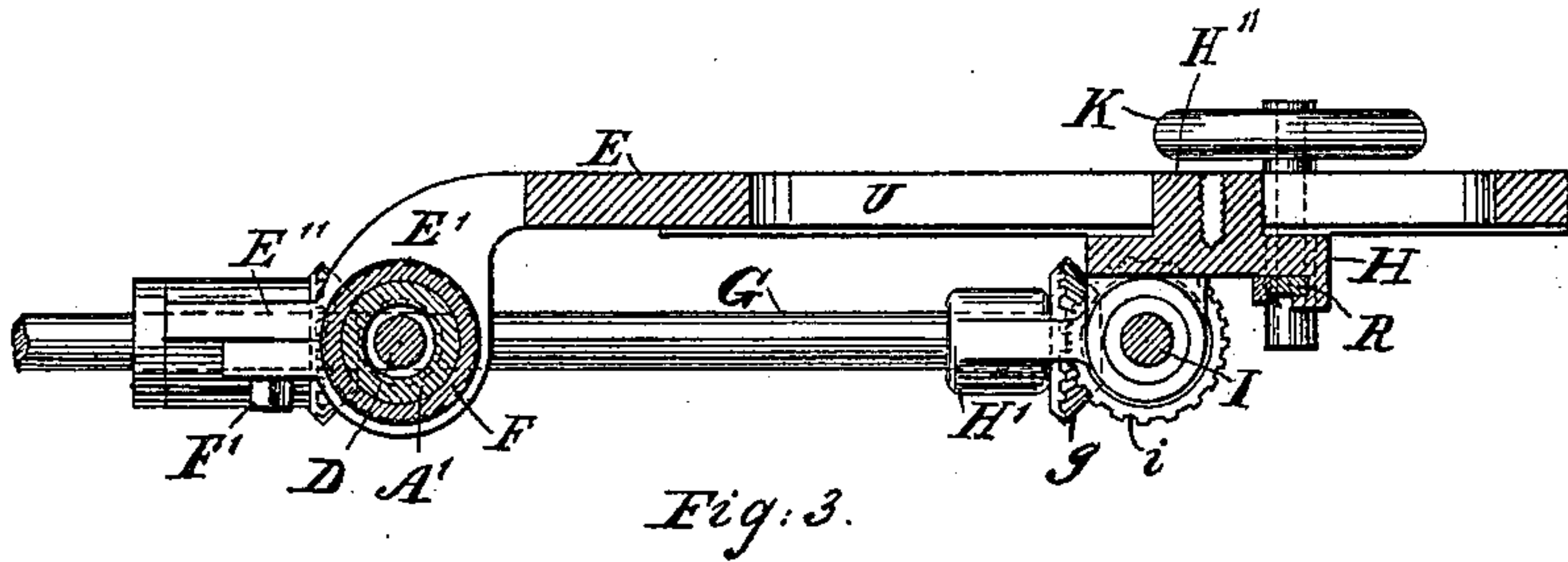


Fig. 3.

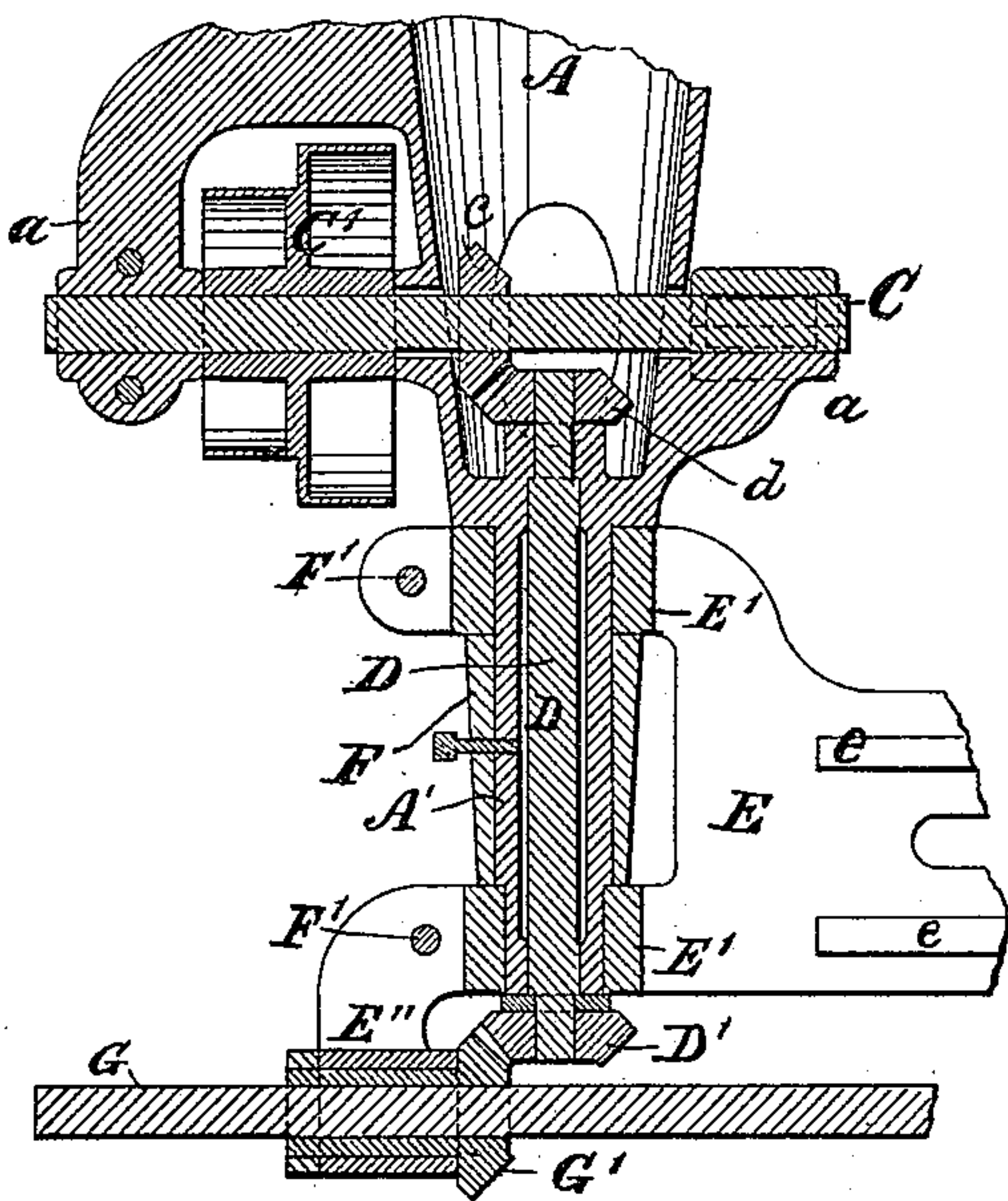


Fig. 4.

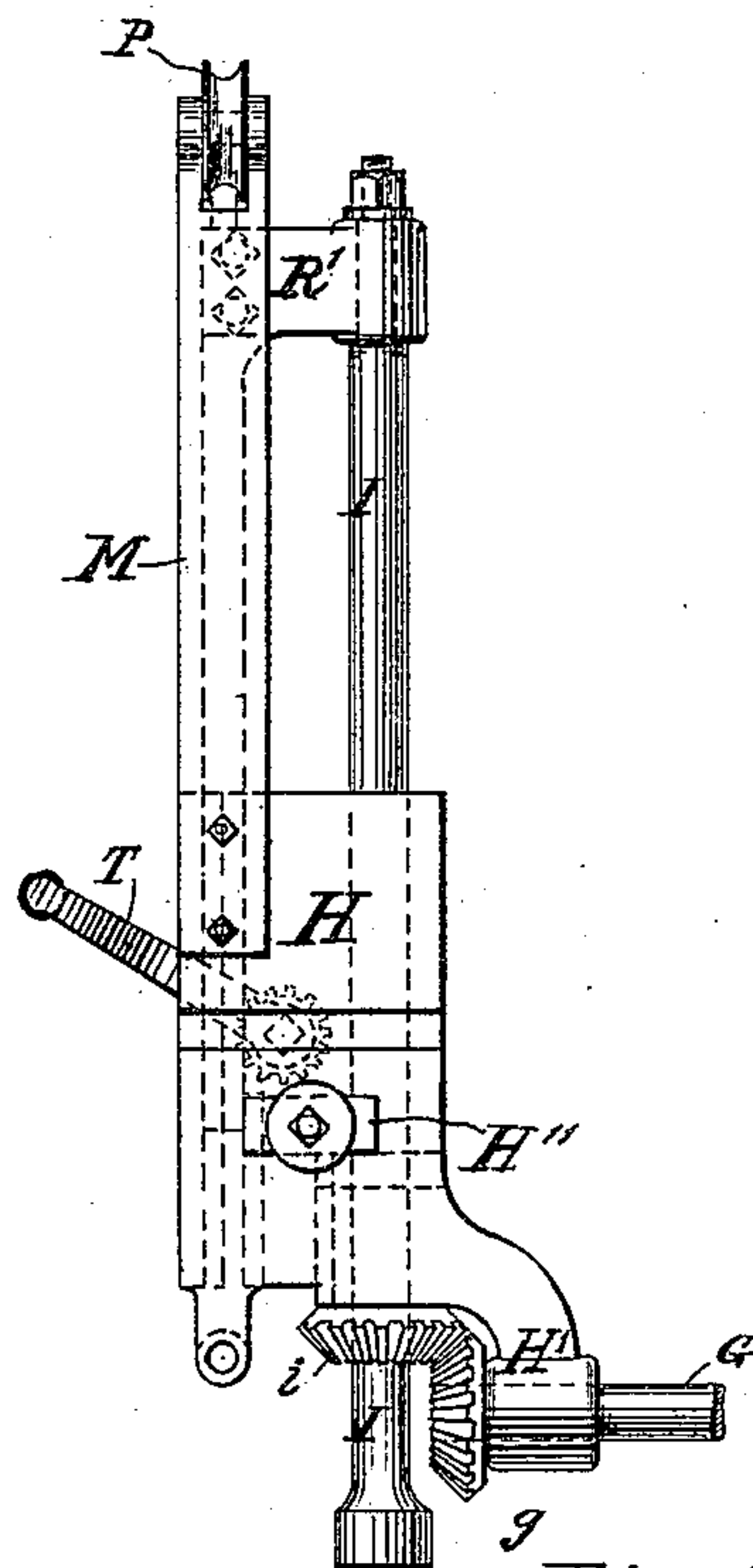


Fig. 5.

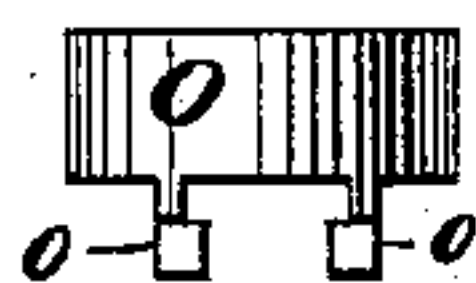


Fig. 6.

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UNITED STATES PATENT OFFICE.

EDWARD F. GORDON AND HORATIO HOBBS, OF CONCORD, N. H.

SUSPENDED DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 297,383, dated April 22, 1884.

Application filed July 26, 1883. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. GORDON and HORATIO HOBBS, citizens of the United States, residing at Concord, in the county of Merrimac and State of New Hampshire, have invented certain new and useful Improvements in Suspended Drilling-Machines; and I do hereby declare that the same are fully described in the following specification and illustrated in the accompanying drawings.

The object of this invention is to provide a suspended drilling-machine—that is, a machine projecting downwardly from the ceiling or timbers overhead, leaving the entire floor-space beneath it free for occupancy by any work, however bulky, on which the machine is to operate, said machine being furnished with a radial arm or frame adapted to swing entirely around the central shaft and carrying the sliding head and geared drill-stock adjustable up and down and toward and from the central shaft, so as to bring the tool to bear upon any part of the work lying within the entire circle, except immediately beneath the central portion of the hanger. The hanger or depending body of the machine is preferably a hollow casting supporting in fixed bearings a short horizontal counter-shaft connected by bevel-gears with a vertical central shaft, which, by similar gearing at its lower end, gives rotation to a sliding horizontal shaft, which in turn, by like means, actuates the rotary and vertically moving drill.

Our invention consists in the devices and combinations of devices set forth in the appended claims.

In the drawings, Figure 1 is a side view of the machine suspended and in position for use. Fig. 2 is an end or edge view of the same. Fig. 3 is a horizontal section on the line *y y*, Fig. 1. Fig. 4 is a vertical central section of the lower part of Fig. 1. Fig. 5 represents the sliding head which carries the drill, showing the side opposite to that seen in Fig. 1, with the chain and balance-weight removed; and Fig. 6 is a top view of said weight.

The hollow hanger A, shown in Figs. 1, 2, and 4, is bolted to the beam B, and oblique braces may be furnished, if required, for special steadiness. The counter-shaft C passes horizontally through the hanger, and has its bear-

ings in projections *a a*. The counter-shaft carries suitable speed-pulleys, C', and within the hanger a bevel-gear, *c*, meshes with another, *d*, on a vertical shaft, D, which has its bearings centrally in the hanger A. (See Fig. 4.) When the hanger is hollow, an opening adjoining the counter-shaft is desirable for access to the gearing within. The hanger may, however, be of skeleton form with advantage. The lower part, A', of the hanger is cylindrical and occupies the upper and lower bearings, E', of the swinging frame E, which is free to revolve thereon, when desired, entirely around the hanger and the inclosed shaft D. This frame is held up in its position by a nut at the bottom of the hanger, or by a sleeve, F, secured by a set-screw to the part A', or by other suitable means adapted to sustain the frame and drilling mechanism upon the cylindrical part of the suspended hanger without obstructing their rotation thereon in a horizontal plane. A set-screw may also fix, temporarily, the position of the swinging frame in any direction radially from the hanger, should it be desired. The drawings represent bolts and nuts F' by which the bearings E' may be tightened on the part A'. A projection, E'', from the bottom of the frame E, near its axis, forms one bearing for the horizontal shaft G, which is splined, so that it may slide lengthwise through, but must revolve with, the bevel-gear G', mounted on it and meshing with a gear, D', at the lower end of the shaft D. The other bearing for the shaft G is in a projection, H', formed at the bottom of the sliding head H, which head also furnishes bearings at *h* for the vertical drill-stock or shaft I. The bearings H' and *h* are so located that the bevel-gears *g* and *i* on the shafts G and I will mesh together. The swinging arm or frame E, as best shown in Fig. 3, extends in a vertical plane at one side of and parallel to that of the shafts G and I, to facilitate the movement of the sliding head H, which is grooved to fit upon ribs *e* of the frame, and has a projection, H'', with an enlarged head or collar extending through a long slot, U, in said frame. The movement of the head and connected parts toward and from the hanger A may be effected directly by hand, or by the hand-wheel K, and its pinion K', meshing with the rack *k*, shown on the lower edge of the frame.

The head H has a standard, M, formed with or bolted firmly to it with a pulley, P, at its top, over which runs a rope or chain, N, having at one end a counterbalance-weight, O, held by wings o, so as to slide vertically up and down the standard M. The other end of the chain is secured to a vertical rack-bar, R, adapted to move up and down in a recess in the head, and having a short arm, R', engaging by a shoulder and nut with the upper end of the revolving drill-stock I. The sliding rack-bar R R' engages by its teeth with a pinion, S, mounted on the head H, and furnished with a hand-wheel or crank, T, by which the rack and drill may be raised or lowered. The drill-stock I is splined, as denoted in Fig. 1, so that while free to move vertically through, it must continually revolve with the bevel-gear i.

Under the arrangement above described provision is made for continuous rotation of the drill, reamer, or other tool inserted in the base of the stock I, for raising the tool freely and lowering it with force sufficient to accomplish its work, for moving the drill and the head or carriage upon which it is mounted radially toward and from the hanger which supports the entire mechanism from above and for swinging the frame and parts borne upon it entirely around said hanger in horizontal plane. We thus provide a most efficient machine having greater capacity, economy, and convenience than any with which we are acquainted, enabling us, for instance, to bore a large number of holes over a widely-extended annular area without moving the work, and with certainty that the axes of all the holes will be parallel. By moving the material to be operated upon relatively to the machine, any part of a casting or other substance, however large, is brought within the capacity of the machine, and directly beneath it.

We expressly disclaim drilling-machines of the character shown in English Patent No. 2,056, A. D. 1872, which stand upon a bed or floor and project upwardly therefrom, thus occupying the floor-space beneath the machine, which, by our invention, is left free for

the work being operated upon. In our machine the drill-carrying frame swings in a horizontal plane entirely around the vertical cylindrical part of the suspended hanger, to bring the tool to bear upon the work placed between the machine and the floor.

We make no claim to the described drilling mechanism by itself independent of the hanger by which it is suspended for complete rotation; neither do we limit ourselves to the details of construction of such mechanism, nor to the specific means shown for actuating it, since other well-known forms of apparatus for those purposes may be employed with our peculiar hanger without departing from the spirit of our invention.

We claim as our invention—

1. In a drilling-machine, a vertically-suspended hanger adapted to support the drilling apparatus from the beams above it, and provided with a cylindrical portion around which said apparatus may be revolved, in combination with an arm or frame adapted to swing entirely around said hanger, a sliding head mounted for radial movement on said frame, a tool-stock having a vertical movement on said head, and a connected system of shafts and gearing, for the purposes set forth.

2. The depending hanger A, with its vertical cylindrical portion A', and supporting nut or sleeve F, and the vertical shaft D, adapted to revolve therein, in combination with a radial frame swinging in a horizontal plane around the hanger, a tool-carrying head arranged to move lengthwise of the frame, a horizontal shaft having bearings in said frame and head, and a tool-stock having a fixed and a sliding bearing carried on such head, said shafts being connected by bevel-gears, substantially as and for the purpose set forth.

In testimony whereof we hereto affix our signatures in presence of two witnesses.

EDWARD F. GORDON.
HORATIO HOBBS.

Witnesses:

NATHL. E. MARTIN,
GEORGE S. LOCKE.