2 Sheets--Sheet 1.

C. WITT & H. F. MOELLER.

Metal-Drilling Machines.

No. 156,618. Patented Nov. 3, 1874.

Fig. 1.

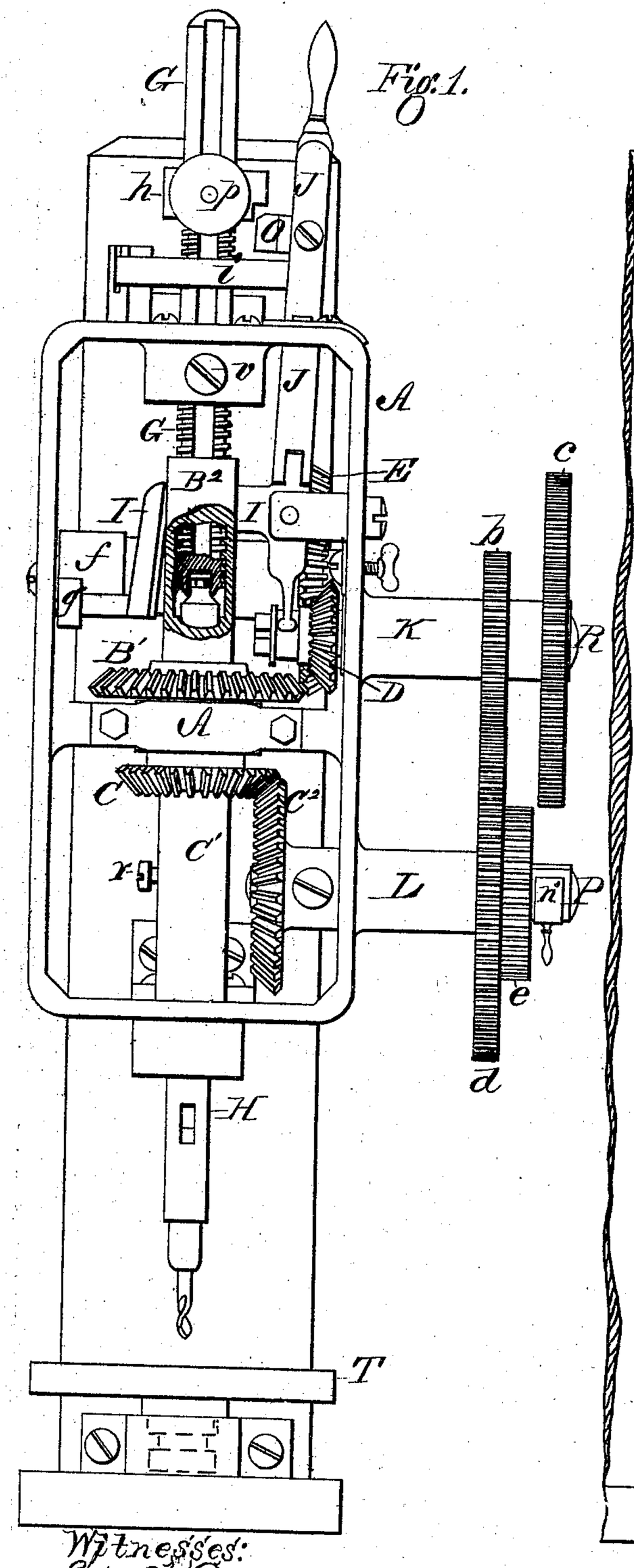
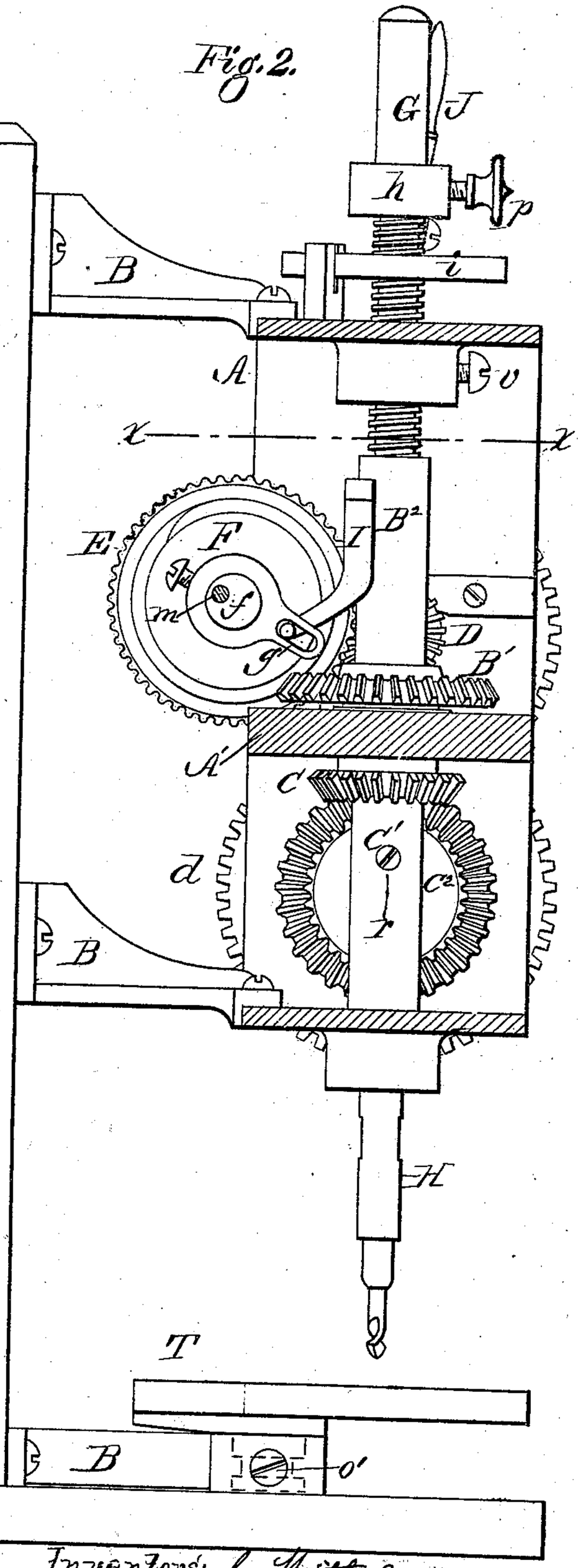


Fig. 2.



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2 Sheets--Sheet 2.

C. WITT & H. F. MOELLER.

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Fig. 3.

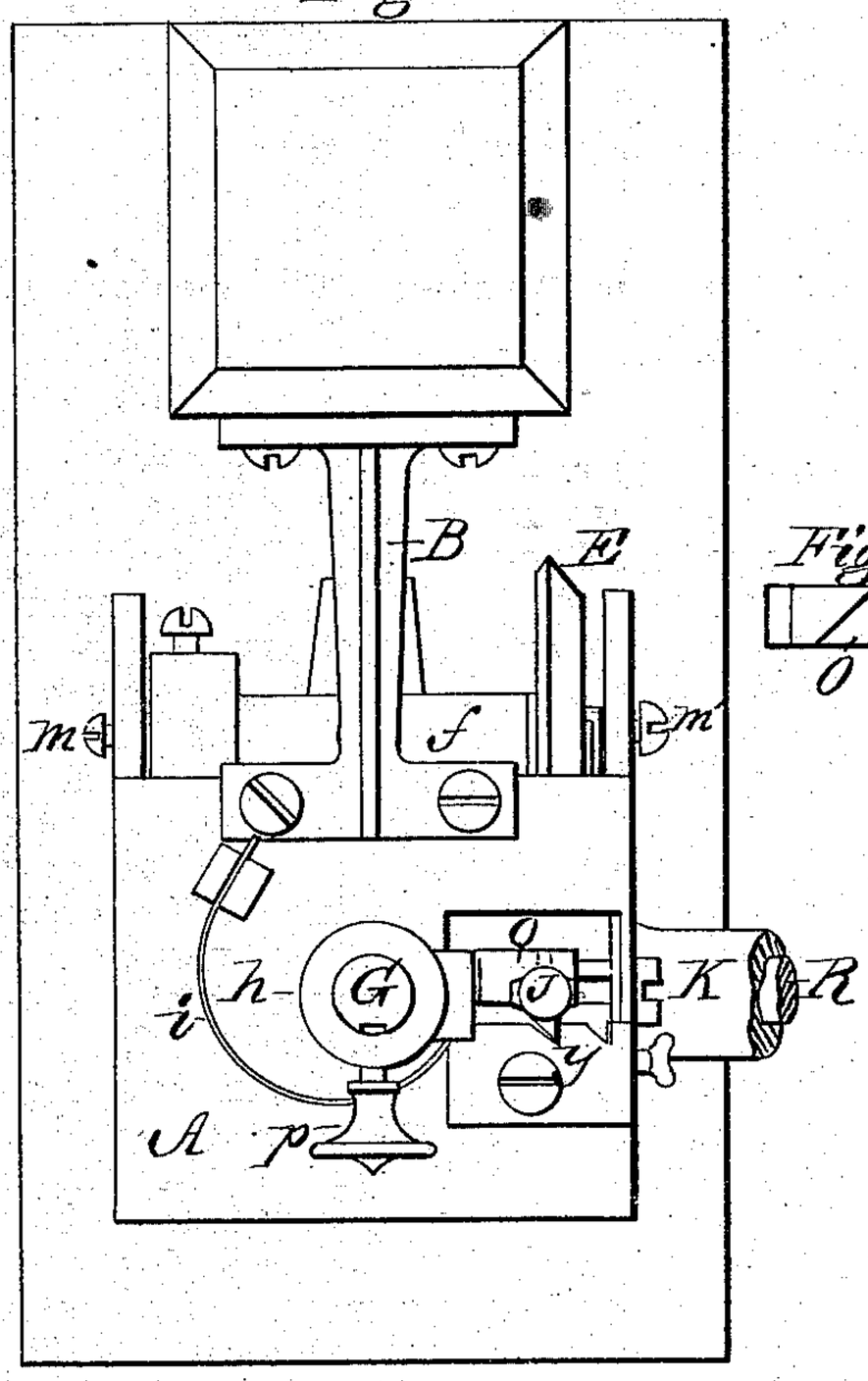


Fig. 5.

Fig. 4.

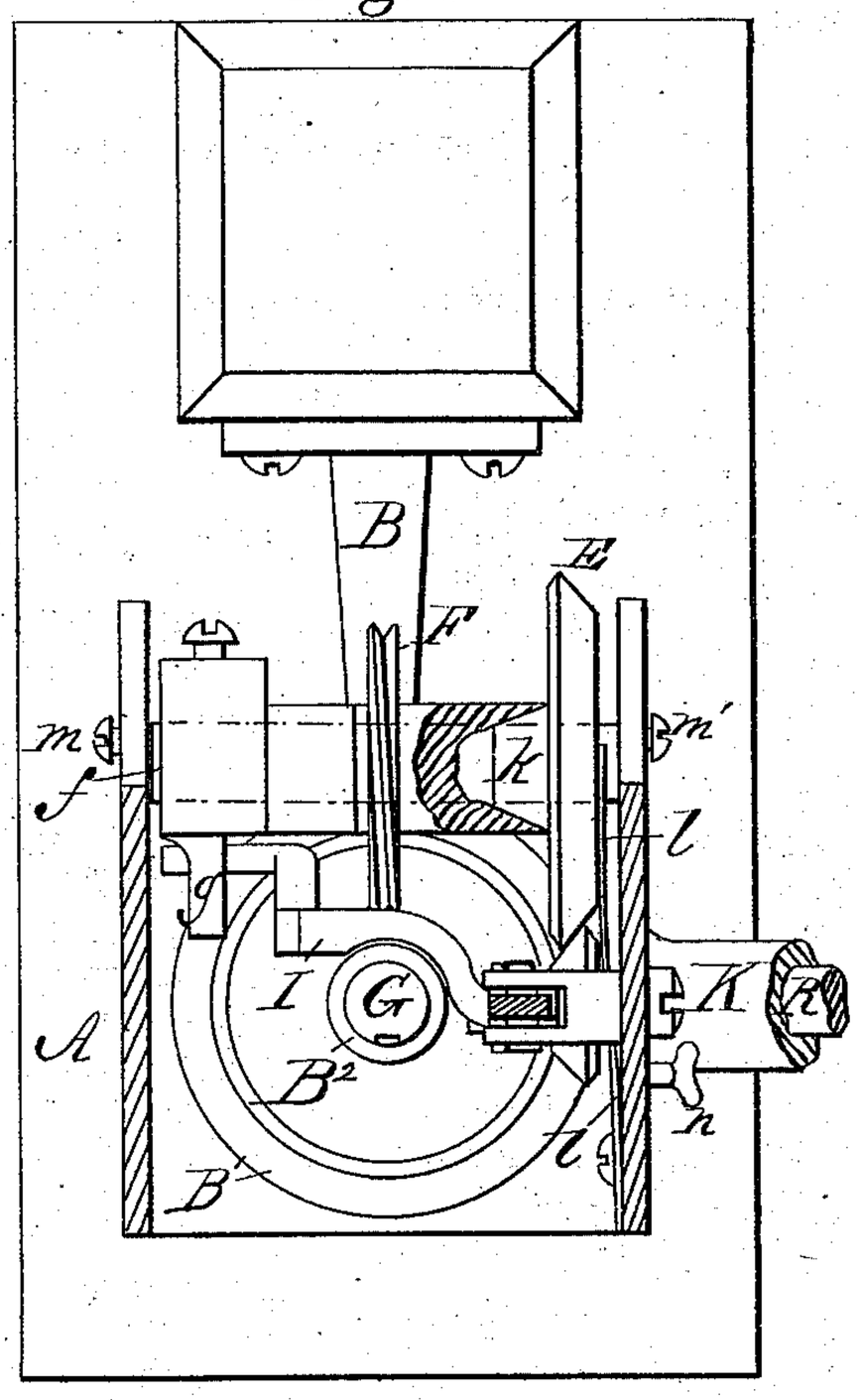
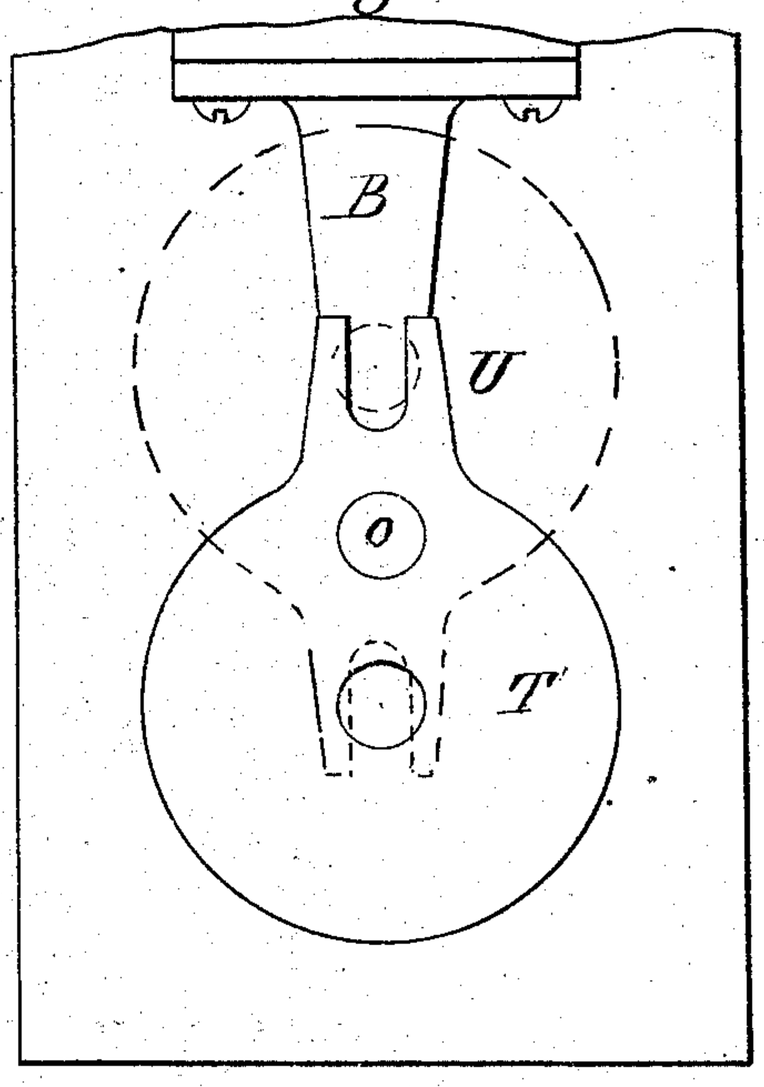


Fig. 6.



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UNITED STATES PATENT OFFICE.

CONRAD WITT AND HEINRICH F. MOELLER, OF DAVENPORT, IOWA.

IMPROVEMENT IN METAL-DRILLING MACHINES.

Specification forming part of Letters Patent No. **156,618**, dated November 3, 1874; application filed June 11, 1874.

To all whom it may concern:

Be it known that we, CONRAD WITT and HEINRICH F. MOELLER, of Davenport, Scott county and State of Iowa, have invented a Drilling-Machine, of which the following is a specification:

Our invention relates to drills of that class used in machine-shops; and the invention consists of a novel arrangement or combination of mechanism whereby the drill or tool is fed to or from the work by a continuous motion of the gear in the same direction, together with an arrangement for automatically stopping the drill at any desired point and reversing its feed. It further consists in a friction-connection of the feed-gear to the driving mechanism, whereby in case the tool becomes set the feed is stopped to prevent breaking the gear. It further consists in a reversible table, provided with a slotted horn or projection for supporting irregular-shaped pieces while being drilled, all as hereinafter set forth.

Figure 1 is a front elevation; Fig. 2, a side elevation, with the frame shown in section. Fig. 3 is a top-plan view, and Fig. 4 a transverse horizontal section on the line *x x* of Fig. 2; Fig. 5, a side view of a portion detached; Fig. 6, a top-plan view of the reversible table.

In constructing our machine, we make a rectangular metal frame, A, to receive the mechanism, this frame being connected to the side of the wall, or any suitable upright, by brackets B B, as shown in Figs. 2, 3, and 4, and having a transverse bar, A′, extending horizontally across its center, and also two sleeves or tubular studs, K and L, projecting laterally from one of its sides to furnish bearings for the gearing, as shown in Fig. 1. Upon the cross-bar A′ we mount a bevel-gear wheel, B^1, which has a tubular sleeve, B^2, projecting upward to near the top of the frame, as shown in Figs. 1 and 2; and below this cross-bar we mount another bevel-gear, C, which has a tubular sleeve, C^1, which reaches to the bottom of the frame, and has a bearing therein, the wheel B^1 having a tubular journal projecting down through the bar A′ to afford it a bearing also. The tool-stock or mandrel H extends vertically through and has its bearing in the sleeve C^1 and the tubular journal of the wheel B^1, and to the upper end of the stock or mandrel H we connect a screw-rod, G, by a swivel-joint, as shown in Fig. 1, so that the mandrel H may be rotated independently of the screw-rod G, the latter being fed up or down by an internal screw-thread in sleeve B^2, which engages with the thread on rod G, and being kept from turning by a screw, *v*, which has its end engaging in a longitudinal groove in said rod G, as shown in Fig. 1. To impart motion to the mandrel H, we provide a bevel-gear wheel, C^2, which is fast upon a shaft, P, which extends through the sleeve L, and is provided at its outer end with two spur-gear wheels, *e* and *d*, of different sizes, and which are movable longitudinally on the shaft P, for the purpose of gearing with one or the other of the wheels *b c*, as it may be desired to impart a greater or less speed to the feed mechanism, as hereinafter explained. A spring-clutch, *n′*, is provided to clasp the shaft P on either side of the wheels *e d*, and hold them in position when adjusted, as shown in Fig. 1. The feed-wheel B^1, with its sleeve B^2, has motion imparted to it by a bevel-pinion, D, mounted on the inner end of shaft R, which extends through the sleeve K, this pinion D being arranged to slide on said shaft, so as to be thrown in and out of gear at pleasure by means of a lever, J, which is pivoted above it, and extends up through the frame A, as shown in Fig. 1, the lower end of the lever being forked and engaging in a groove on the inner hub of said pinion D, the latter being prevented from turning on the shaft R by a feather or spline. This wheel D is thrown into gear with the wheel B^1 when it is desired to draw the drill away from the work, the rotation of the sleeve B^2 and its screw-thread with that of the rod G being arranged to draw the drill up, while the latter continues to rotate in the same direction that it does when drilling a hole, the motion or rotation of the drill always being the same, whether being fed to or from its work.

To feed the drill to its work we provide still other mechanism, which consists of a shaft, *f*, mounted in rear of the sleeve B^2, as shown in Figs. 2, 3, and 4, on which shaft is mounted loosely a worm-wheel, F, Figs. 2 and 3, and

also a bevel-gear wheel, E, which latter is arranged so as to gear with the wheel D when the latter is thrown out of gear with wheel B^1, the worm-wheel F being arranged to engage with the teeth of wheel B^1 whenever the wheel E engages with the wheel D.

The shaft *f* is pivoted eccentrically on points *m* at each end, as shown in Figs. 2 and 4, so that it can be swung back and forth to throw the worm-wheel F and the driving-wheel E in and out of gear; and this movement of the shaft *f* is effected by a bent lever, I, which is connected rigidly at one end to the lever J, as shown in Fig. 1, and has its opposite end engaging in a slotted arm, *g*, attached to the shaft *f* at the opposite side, as shown in Figs. 2 and 4. It will thus be seen that, when the lever J is moved so as to disconnect the wheel D from the wheel B^1, it also throws the end of lever I down, carrying with it the slotted arm *g*, thereby swinging the shaft *f* on its bearings *m*, and throwing the wheel E into gear with the wheel D, and also causing the worm-wheel F to engage with the wheel B^1. When in this condition the wheel D imparts motion to the wheel E, which carries with it the worm F, which in turn moves the wheel B^1 and its sleeve B^2, which latter, by its internal screw, operates on the rod G, and gradually feeds the drill down to its work, the drill at the same time being rotated by the wheels C and C^2, the mandrel H being made to turn with the wheel C and its sleeve C^1 by having a groove cut in it longitudinally, in which a screw, *r*, inserted through the side of the sleeve, engages, as represented in Figs. 1 and 2.

As shown in Fig. 4, the wheel E has a conical hub, *k*, which is fitted in the end of the sleeve of wheel F, the two, as previously stated, turning loosely on the shaft *f;* and on the inside of the frame A is secured a flat spring, *l*, as shown in Fig. 4, which has its free end forked, and arranged to bear against the outside of wheel E, thus crowding its conical hub into the conical end of the sleeve of wheel F, thereby creating sufficient friction to cause the two to turn together, and yet, in case the drill becomes set, to permit the wheel E to move without imparting any motion to the wheel F, thus stopping the feed. A set-screw, *n*, is arranged to bear against the spring *l*, so as to regulate the friction, as may be desired. To the lever J is secured a projection, O, which has an incline on its side, as shown in Figs. 1, 3, and 5, and an adjustable piece, *h*, having a corresponding incline, is arranged on the upper end of screw-rod G, to which it is clamped by a thumb-nut, *p*, as shown in Figs. 1, 2, and 3. When the lever J is thrown over toward the rod G, as it is in the operation of drilling, it will be seen that the stop *h*, as it is brought down by the rod G, will come in contact with the incline on the projection O, thus forcing the lever J out of the notch *y*, in which it is held, (see Fig. 3,) when the spring *i* will throw the lever J over, thereby throwing the wheel F out of gear with wheel B^1, and at the same time shifting the wheel D into connection with the wheel B^1, thus reversing the rotation of sleeve B^2 and withdrawing the drill from its hole. As the stop *h* is adjustable on rod G, it can be set so as to stop the drill at any required point, thus regulating with accuracy the depth of the holes drilled.

To still further increase the efficiency of the machine, we provide a table, T, for supporting the article to be drilled. This table is circular in form, and is swiveled or pivoted, so it can be turned around, as represented in Fig. 6, it having a hole at its center directly under the point of the drill. It has projecting from one edge a slotted horn or arm, U, for supporting pieces of irregular form, it being so arranged that when the table is turned this arm will also come under the drill, thus supporting the article and permitting the point of the drill to pass through the article into the slot. This table is supported on a bracket, B, which rests on the floor, and, like the others, is secured to the wall or upright, it having a hole or socket, in which the journal or pivot of the table fits, and is secured by a screw, *o'*, which engages in a circumferential groove on the pivot, as shown in Figs. 1 and 2. The drill is operated by imparting motion to the shaft P, which may be done by gearing with wheel *d*, or by a belt driving a pulley, to be secured on said shaft P, according to circumstances.

Having thus described our invention, what we claim is—

1. In combination with the mandrel H and its screw-rod G, provided with their operating-wheels and sleeves, as described, the shaft R, provided with the wheels D, *b*, and C, and the shaft P, provided with its wheels C^2, *d*, and *e*, all constructed to operate substantially as set forth.

2. The eccentric or rock shaft *f*, having the worm-wheel F and the gear-wheel E mounted loosely thereon, in combination with the levers I J and sliding pinion D, all constructed and arranged to operate substantially as described.

3. The worm-wheel F and gear-wheel E, connected by the conical friction-bearing, in combination with the spring *l* and set-screw *n*, all constructed and arranged to operate as set forth.

4. The reversible table T, provided with the slotted horn or arm U, arranged in relation to the drill substantially as and for the purpose set forth.

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