(No Model.)

T. J. & F. T. CURRIER.

DRILLING MACHINE.

No. 287,366. Patented Oct. 23, 1883.

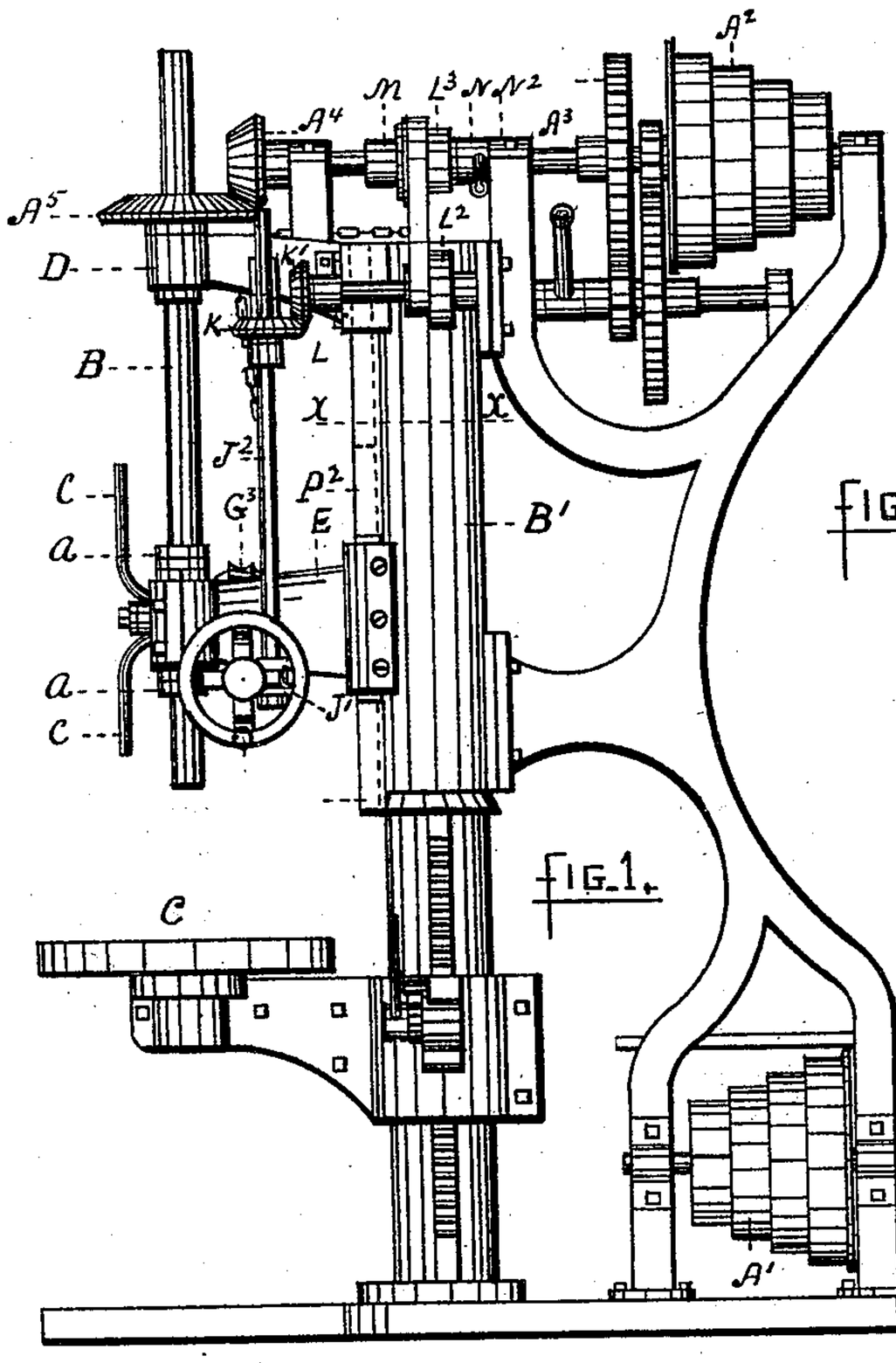

FIG. 1.

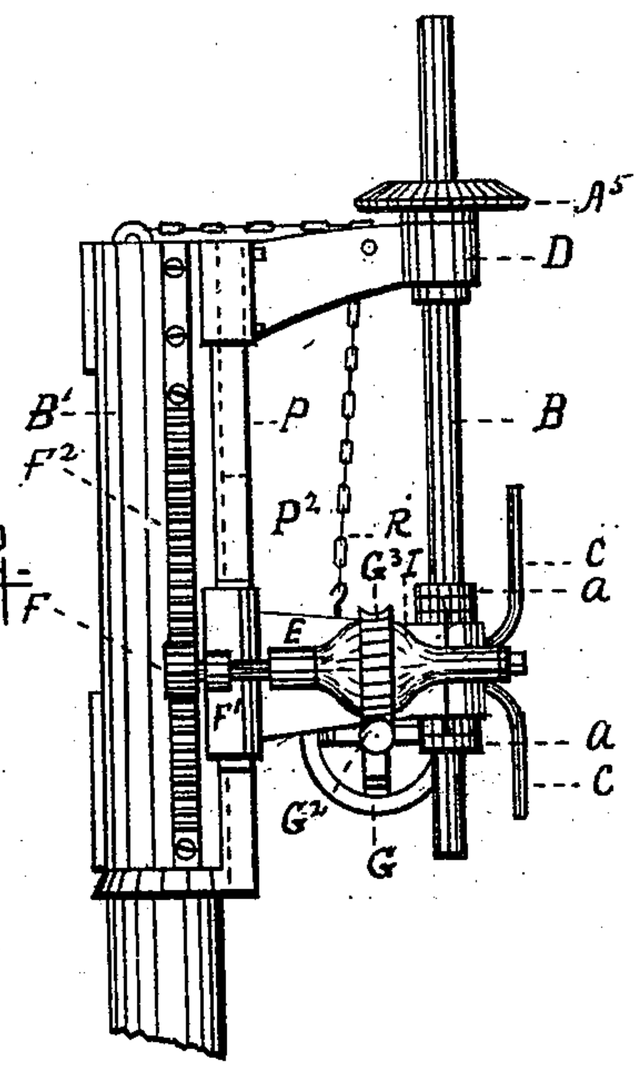

FIG. 2.

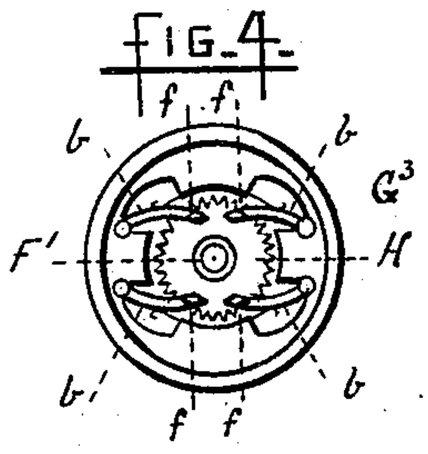

FIG. 4.

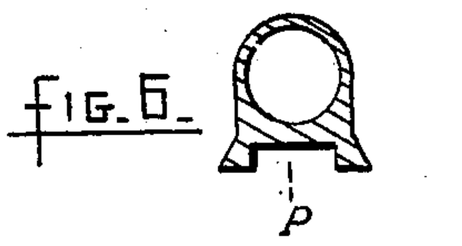

FIG. 6.

FIG. 7.

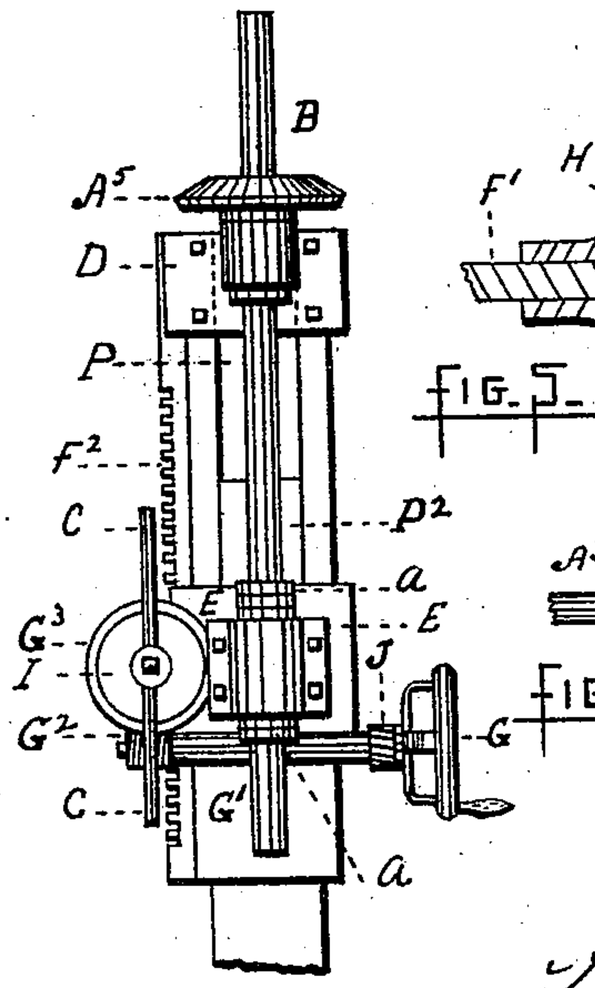

FIG. 3.

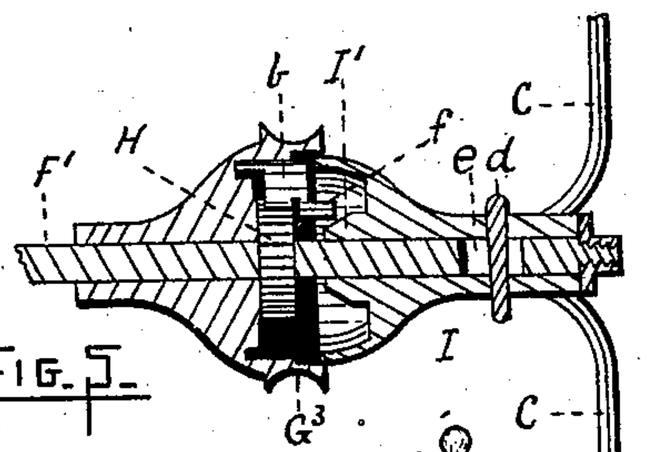

FIG. 5.

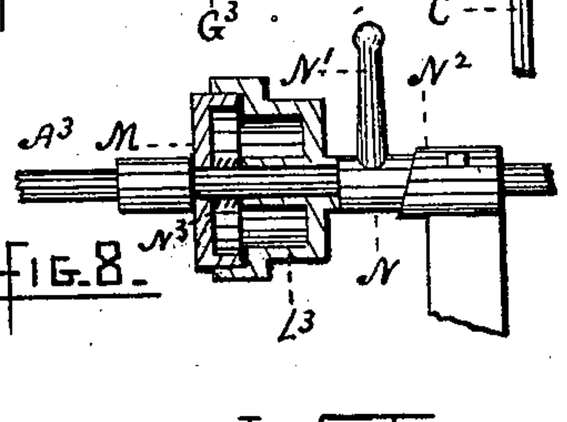

FIG. 8.

Witnesses.

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UNITED STATES PATENT OFFICE.

TIMOTHY J. CURRIER AND FRANK T. CURRIER, OF WORCESTER, MASS.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 287,366, dated October 23, 1883.

Application filed December 26, 1882. (No model.)

To all whom it may concern:

Be it known that we, TIMOTHY J. CURRIER and FRANK T. CURRIER, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Drilling-Machines, the nature and objects of which are fully set forth in the following specification, reference being had to the accompanying drawings, which illustrate our invention, and in which—

Figure 1 represents a side elevation of our improved drilling-machine; Fig. 2, a side elevation of a portion, showing the "feeding" device; Fig. 3, a front elevation of the same; Fig. 4, an interior view of the clutch; Fig. 5, a sectional view of the same; Fig. 6, a sectional view of the post on line *x x;* Fig. 7, a top view of the sliding head; and Fig. 8 represents the friction-clutch pulley used to drive the feeding mechanism.

Similar letters refer to similar parts in the several views.

The driving mechanism of our improved drilling-machine is similar to that of drilling-machines in common use; and it consists of the receiving-pulley A, the cone-pulleys A′ and A^2, by which a change of speed is effected, shaft A^3, bevel-gears A^4 and A^5, imparting a rotary motion to the drill-spindle B, all supported by the post B′ and connected framework, as illustrated. The work is supported upon the table C, which is capable of the usual adjustments common in drilling-machines. The drill-spindle B rotates in the two supporting-heads D and E, the head D being fixed to the post B′ and carrying the gear-wheel A^5, through which the drill-spindle B slides, a spline and groove causing a rotary motion of the spindle. The head E slides upon ways on the face of the post B′, held by the gibs *g g*. The vertical sliding motion of the head E is imparted to the drill-spindle by means of the collars *a a*, attached to the spindle B. A vertical feeding motion is given to the sliding head E by means of the pinion F, on the shaft F′, rotating in the rack F^2, fixed to the post B. The pinion F is driven by the hand-wheel G on the short transverse shaft G′, which carries the endless screw or "worm" G^2, driving the worm-wheel G^3, which actuates the shaft F′ by the four pawls *b b b b*, engaging the ratchet-wheel H, fixed to the shaft F′, one pair of the pawls driving the ratchet-wheel in one direction and the other pair in the opposite direction. The shaft F′ has a sliding sleeve, I, having handles *c c* and a pin, *d*, which passes through a slot, *e*, in the shaft F′, and by which the shaft may be rotated by the handles *c c*, allowing a quick "return motion" to be given to the drill-spindle and head E. In order to operate the pinion F by means of the handles *c c*, the pawls *b b b b* must first be disengaged from the ratchet H, which is effected as follows: Each of the pawls has a short arm, *f*, Figs. 4 and 5, projecting forward at right angles to and from the free end of the pawl, and the sliding sleeve I carries at its inner end a conical ring, I′, whose beveled surface, sliding under the arms *f*, raise the pawls *b*, and thereby disengage the worm-gear G^3, permitting the shaft F′ to be operated by the handles *c c*.

Upon the transverse shaft G′ we place the worm-gear J, attached to the shaft G′ by any suitable clutching device by which it may be connected to or disconnected from the shaft G′ at will. This gear J is driven by the worm J′ on shaft J^2, which latter is held in suitable bearings attached to the sliding head E, and having a sliding motion through the bevel-gear K as the head E is moved up or down. Power is imparted to the sliding shaft J^2 by the bevel-gear K, (by means of a spline and groove,) the bevel-gear K′, shaft L, and pulley L^2, driven by the pulley L^3 on the main shaft A^3. The pulley L^3 runs loose on the shaft A^3, beside the drum M, fixed to the shaft. A cam, N, having a handle, N′, turning on the shaft and pressing against the cam-surface on the box N^2, serves to slide the pulley L^3 onto the drum M, as shown in Fig. 8, forming a friction-clutch, and thereby applying power to pulley L^3 and the feeding mechanism. When the pulley is released by the cam N, the spring N^3 separates the drum and pulley, thus disconnecting the feeding mechanism from the driving-shaft A^3.

In the operation of drilling the pressure upon the drill-spindle is upward, causing an undue strain upon the gibs *g g*. To obviate this, we make a groove, P, in the face of the post and attach a tongue, P′, to the sliding head E, causing it to project upward for some distance, as at P^2, Fig. 3. This tongue, as the

head E moves up or down, slides in the groove P, resting against the bottom of the groove, the part P^2 passing under the head D. By this construction we get a much greater length of bearing-surface to resist the vertical pressure against the drill. We have shown the groove P in rectangular section, but we do not confine ourselves to this form. It can be made with beveled sides and the tongue P dovetailed into the groove, so as to secure the head to the post and render the use of the outside gibs, *g g*, unnecessary.

We are aware that drilling-machines have been heretofore made having heads capable of sliding on the post, for the purpose of adjusting the position of the drill with reference to the work; but in the operation of drilling the head is fastened to the post, and the feeding motion given to the drill-spindle by means of a slide passing through the head E, and within which the drill rotates. This mode of feeding the drill has two obvious disadvantages, viz: As the head E remains stationary and the drill-spindle advances downward, the distance between the point of the drill and the support in the head E is constantly changing, and in holes of considerable depth the strain at the point of the drill is brought at too great a distance from the head; again, the bearing of the drill-spindle in the slide is subject to wear, which soon interferes with the accuracy of the work; but by our improved mode of feeding the sliding head E we maintain the same distance between the point of the drill and the head E, and we are able to inclose the drill-spindle in an ordinary box, by which any lost motion may be taken up, and this result is accomplished by making the rack F^2 stationary and fixed to the post, and attaching the feeding mechanism to the sliding head E. We are also able to readily connect our feeding mechanism with the power used to drive the drill, and that without stopping the drill by connecting the worm gear J to the transverse shaft G′, and the friction clutch-pulley L^3 to the shaft A^3.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a drilling-machine, the combination, with a post having a fixed head and a drill-spindle sliding through the fixed head, of a sliding head carrying the drill-spindle and sliding on ways on the post, and suitable mechanism for imparting a "feeding motion" to the sliding head on the post during the operation of drilling, as and for the purpose set forth.

2. In a drilling-machine, the combination of post B′, fixed head D, sliding drill-spindle B, sliding head E, carrying the drill-spindle and sliding on ways on the post B′, with a fixed rack attached to the post, and rotating pinion journaled on the sliding head and engaging the fixed rack, with means for rotating the pinion, whereby a feeding motion may be imparted to the sliding head and connected drill-spindle, as and for the purpose set forth.

3. In a drilling-machine, the combination, with the drill-spindle B and sliding head E, sliding on ways on the post and carrying the drill-spindle, of the pinion F, shaft F′, fixed rack F^2, worm-gear G^3, attached to the shaft F′ by a clutch, so as to be disconnected at will, the worm G^2, and shaft G′, with connected mechanism for rotating the shaft G′, as and for the purpose set forth.

4. The combination, with the drill-spindle B and sliding head E, of the hand-wheel G, shaft G′, worm G^2, gear G^3, attached to the shaft F′, pinion F, and rack F^2, attached to the frame of the drilling-machine, as and for the purpose set forth.

5. The combination, with the driving-gear G^3 and ratchet H, attached to the shaft F′, of the actuating-pawls *b b b b*, each pawl having a projecting arm, *f*, operated by the sliding beveled ring, with its connected sleeve sliding upon but capable of turning the shaft F′, and having the handles *c c*, as and for the purpose set forth.

6. The combination, with the driving-shaft A^3 and the connected feeding mechanism comprehending the rotating pinion F, journaled on the sliding head E, and a fixed rack on the post B′, as described, of a clutching device on the shaft A^3, whereby the feeding mechanism may be disconnected from the driving-shaft, as and for the purpose set forth.

7. In a drilling-machine, the combination, with the sliding head, as described, of a tongue sliding in a groove formed in the post and extending upward beyond the head E, so as to increase the length of the bearing-surface and serve to resist the pressure against the drill in the operation of drilling, as and for the purpose set forth.

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