(No Model.)

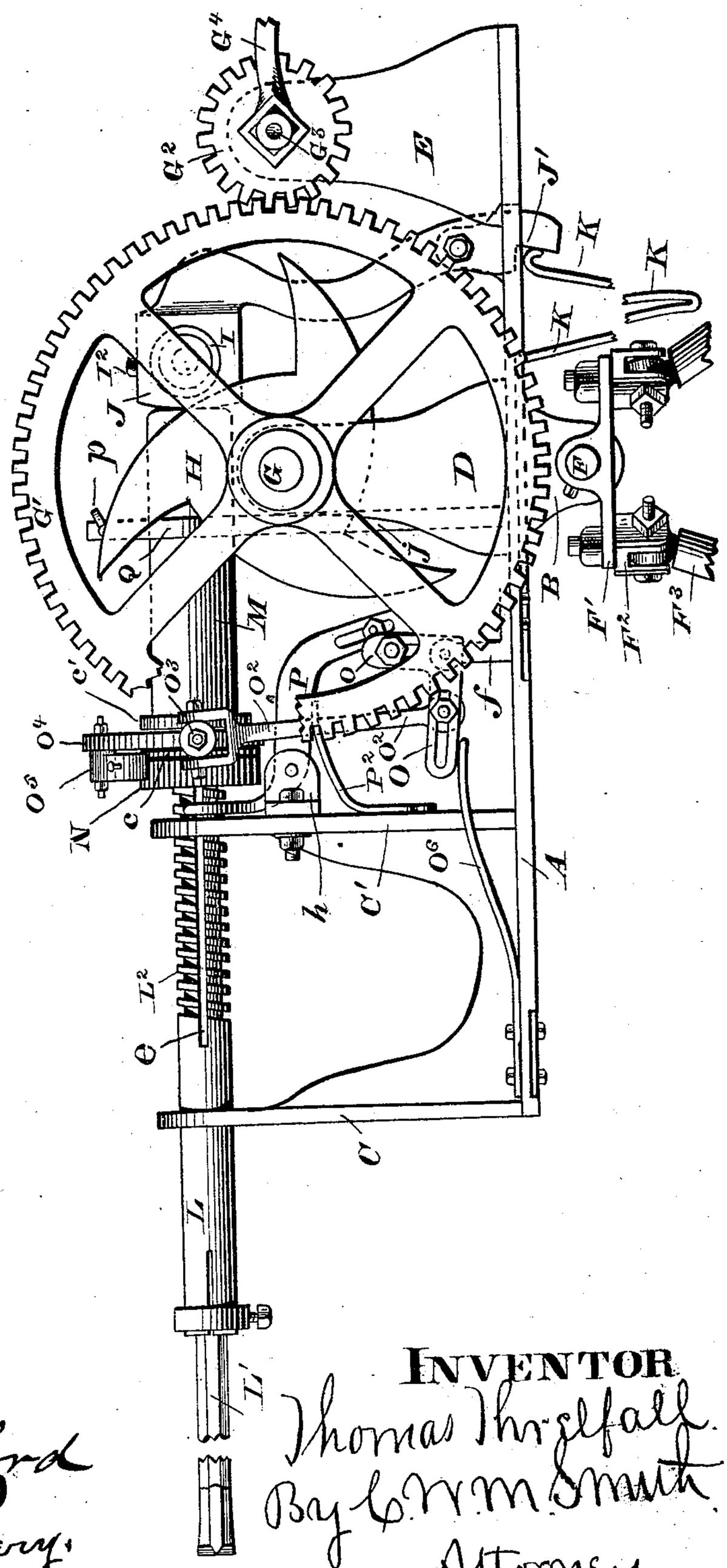
3 Sheets—Sheet 1.

T. THRELFALL.

ROCK DRILLING MACHINE.

No. 282,686. Patented Aug. 7, 1883.

FIG 1



WITNESSES

Wilmer Bradford

Charles E. Chenery.

INVENTOR

Thomas Threlfall.

By C.R.M. Smith.

Attorney.

(No Model.) 3 Sheets—Sheet 2.

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ROCK DRILLING MACHINE.

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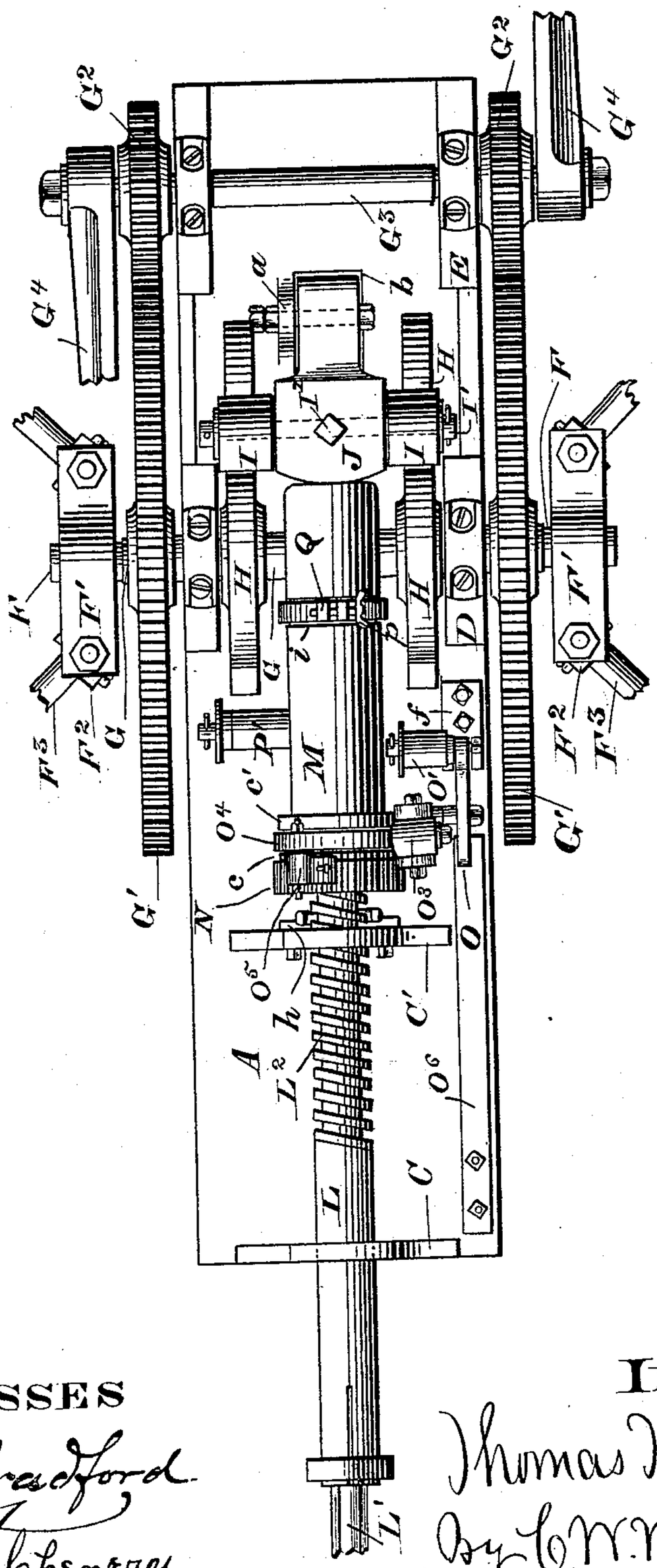
FIG 2



WITNESSES

Wilmer Bradford.

Charles E. Henery

INVENTOR

Thomas Threlfall.

by C.W.M. Smith.

Attorney.

(No Model.) 3 Sheets—Sheet 3.

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FIG 3

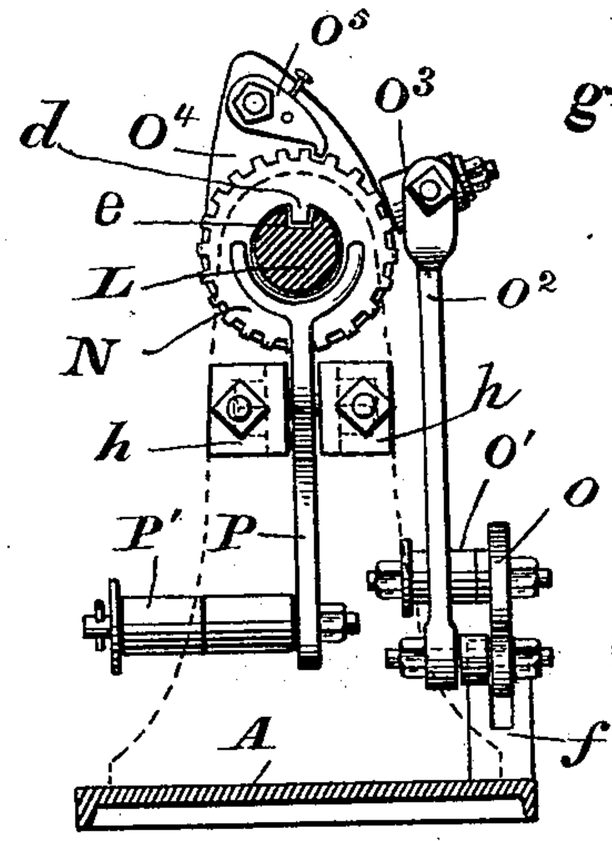


FIG 4

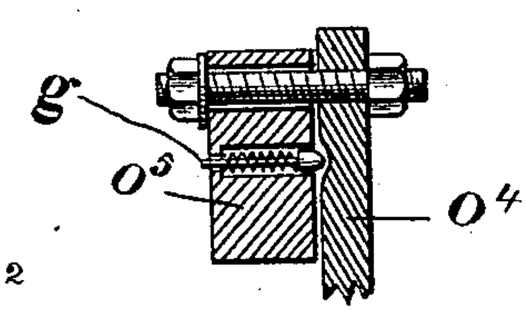


FIG 5

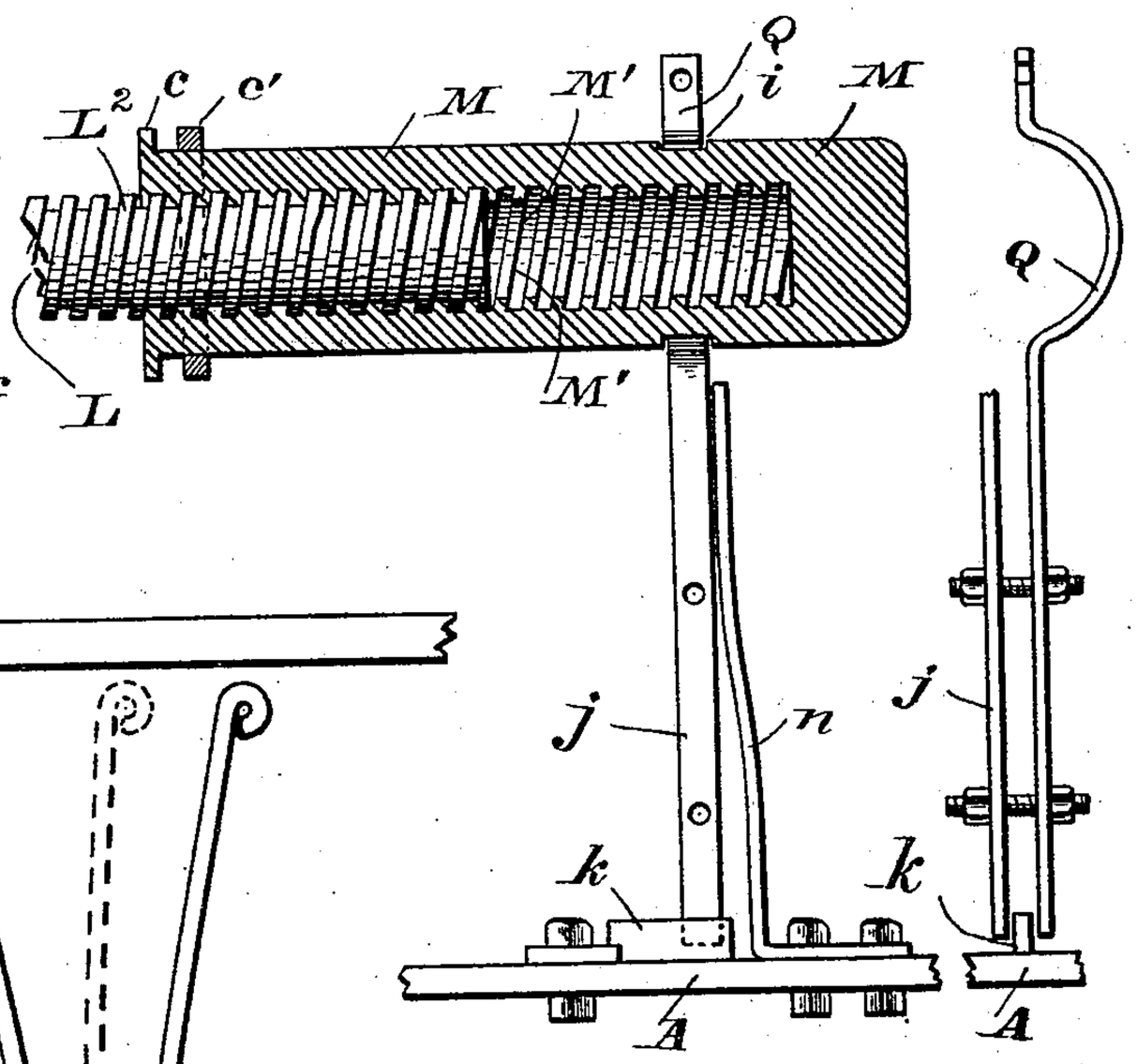
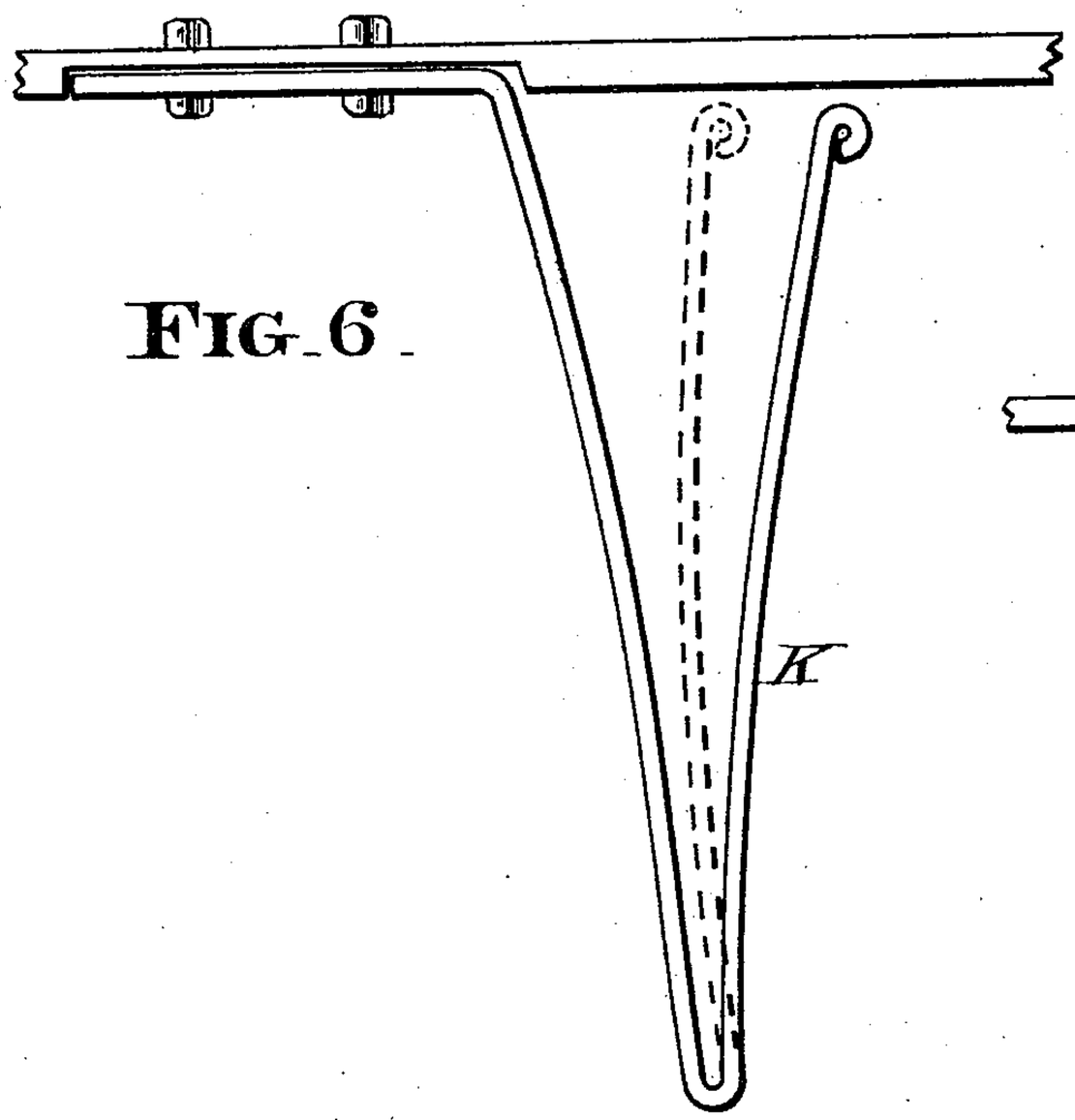


FIG 6



WITNESSES

Wilmer Bradford

Charles C. Chenery

INVENTOR

Thomas Threlfall

By C. F. M. Smith

Attorney.

UNITED STATES PATENT OFFICE.

THOMAS THRELFALL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO JAMES WATSON, OF SAME PLACE.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 282,686, dated August 7, 1883.

Application filed December 7, 1881. Renewed June 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS THRELFALL, a subject of the Queen of Great Britain, and residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Rock-Drilling Machines, of which the following is a specification.

My invention relates to improvements in rock-drilling machines which may be operated by hand or other motive power; and the objects of my improvements are, first, to provide a rock-drilling machine in which the hammer which drives the drill is actuated by an expansive spring; second, to provide a new and improved means whereby the drill may be automatically and partially rotated at the end of each stroke; third, to provide a new and improved means whereby the drill may be withdrawn from the face of the rock, partially rotated, and then pressed against the face of the rock preparatory to receiving the next blow from the hammer; fourth, to provide a new and improved feed apparatus, whereby the drill may be fed forward in an automatic manner, and also to means for regulating the speed of the feed; fifth, to provide a means whereby the rotation, feed, and blow upon the drill are given in a regular and successive manner; sixth, to provide an improved arrangement of the gearing and cams for driving the drilling mechanism; seventh, to provide means for the horizontal, angular, and vertical adjustment of the machine. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine, showing the position of the parts immediately after a blow has been struck. Fig. 2 is a plan view of the same. Fig. 3 is a sectional front elevation, showing the mechanism for rotating and feeding the drill. Fig. 4 is a detail view, showing the pawl for operating the rotating ratchet-wheel of the drill. Fig. 5 is a longitudinal sectional view, showing the mechanism for controlling the feed of the drill. Fig. 6 is a side elevation of the spring K.

Similar letters of reference are used to designate like parts throughout the several views.

The table or bed-plate A, the hangers B, and journal-bearings C, C′, D, and E constitute the frame-work of the machine.

The frame-work of my drill is keyed upon the shaft F through the medium of the hangers B B.

The shaft is supported in bearings F′ for vertical and horizontal adjustment of the drill-frame. These bearings are bolted to the hinge caps or joints F^2, which carry the supporting-legs F^3 of the drill, the legs being thus hinged, and thereby made adjustable to provide for the inequalities of the ground upon which the drill is placed. By this means the machine may be tilted sidewise by altering the position of the supporting-legs, and the point of the drill may be set at any angle of elevation by rotating the shaft F within the boxes F′ F′.

The shaft G is journaled in the bearings D D, and has keyed upon its outer ends the spur-wheels G′ G′, which are operated by the driving-pinions G^2 G^2 upon the shaft G^3. The latter is mounted in bearings E E, and has upon its outer ends the crank-arms G^4 G^4, by which it is rotated.

Upon the shaft G, between its supporting-bearings, and on either side of the feed-nut, are keyed the triple cam-wheels or wiper-wheels H H, which operate against the friction-pulleys I I, placed upon either side of the hammer-head J. These friction pulleys or rollers I I are placed upon a spindle, I′, and held thereon by means of a washer and pin. End movement of the spindle is prevented by the set-screw I^2. The shank of the hammer J is pivoted near its lower end to a lug, *a*, cast upon the upper surface of the bed-plate, and that portion which extends down through the slot *b* has a notch, J′, cut on the front face thereof, in and against which rests the upper free end of a downwardly-projecting doubled spring, K, the upper flanged end of which is firmly bolted to the under side of the bed-plate A, as seen in Fig. 6.

In the standards or journal-bearings C C′ is placed (loosely enough to allow of a forward and backward movement) the drill-stock L, in which is secured, by any well-known means, the drill L′.

The feed-nut M is hollowed out for a greater portion of its length, and has turned therein a female screw-thread, M′, which meshes with the male screw-thread L^2, turned upon the drill-stock for any suitable distance.

Upon the front end of the feed-nut is formed a flange, *c*, between which and the upright or journal bearing C′, and upon the drill-stock, is placed the feed-wheel N, having upon its bore a feather, *d*, which enters the longitudinal slot *e*, cut in the drill-stock L.

To the upper surface of the bed-plate is attached the upright *f*, to which is pivoted the bent lever or bell-crank O, the two arms of which are slotted, in order that there may be adjustably secured to the upper arm the friction-roller O′, and to the lower or horizontal arm the rod O^2, which extends downward from the universal joint O^3, attached to the collar O^4, the latter being loosely placed upon the feed-nut and held between the flange *c* and shrunk collar *c′*.

The upper part of the collar O^4 is projected a short distance above the feed-wheel, and carries a pawl, P^5, which engages with the teeth of the feed-wheel, and is prevented from falling out of contact with said feed-wheel by the spring-pin *g*, which enters a recess in the face of the collar O^4.

To the inner face of the standard C′, I attach the lugs *h h*, to which is pivoted the lever-arm or bell-crank P, the upper end of which is bifurcated, so as to partially embrace the drill-stock, while to the other end or lower arm is adjustably attached the friction-roller P′.

Near the rear end of the feed-nut is formed an annular groove or slot, *i*, which receives the jaws of a clamp, Q, formed of two pieces of metal, bent as shown in Fig. 5, and having downwardly-projecting pieces *j*, held together by bolts, and their lower ends separated by the rib or feather *k*, bolted to the bed-plate.

The operation of my improved rock-drilling machine will be as follows, to wit: The machine having been placed in position, the shaft G is rotated, carrying with it the cams H H, the rounded faces of which are successively brought against the friction-rollers I I of the hammer J and force it backward, at the same time throwing the lower end of the hammer-shank inward and compressing the spring K. When the point of the cam passes beyond the point at which contact with the friction-roller can be had, the expansive power of the spring will cause the hammer-head to fly back to its original position and deliver a sudden and powerful blow upon the feed-nut M, which carries the drill-stock. The first blow having been delivered, and the rotation of the shaft G being continued, the cam upon the right-hand side of the machine, by pressing upon the friction-roller P′, will cause the upper or bifurcated end of the bell-crank P to be pressed against the feed-wheel N, and thereby cause the point of the drill to be withdrawn from contact with the face of the rock. By the time this has been accomplished the cam upon the other side of the machine has come in contact with the friction-roller O′, and, by pressing it forward, throws down the opposite end of the bell-crank O, thereby drawing down the shaft O^2, and causing a partial rotation of the feed-wheel N and drill-stock L. By the time this rotation has taken place the cams have cleared the friction-rollers P′ and O′, and the springs P^2 and O^6 have thrown their respective levers or bell-cranks back to their original positions, and the spring *n*, by pressing upon the rods *j j*, has forced the point of the drill against the rock, and the hammer J, which was being gradually forced backward during the retraction, rotation, and propulsion of the drill, is released from contact with the cams immediately preceding those which caused the last-named movements, and flies forward and delivers another blow.

It will be readily seen that the points of one cam-wheel are directly opposite the points of the cam-wheel upon the other end of the shaft, and in a line parallel with the axis of the shaft, and that one point or cam, after having moved a bell-crank, will next come in contact with a roller on the hammer-head and force the hammer back.

It will also be seen that the friction-roller P′ sets closer to the cams than the roller O′, and is therefore the first to be operated upon by said cams, and cause the drill to be drawn backward from the face of the rock before the mechanism for rotating the drill has commenced to act.

The object of the friction-clamp Q is that, should the drill feed too fast the clamp may be slackened by unscrewing the thumb-screw *p*, and the friction of the threads of the drill-stock upon the threads of the feed-nut will be sufficient to cause the said feed-nut to rotate with the drill-stock, and therefore no feeding movement can take place; and in proportion as the friction-clamp is tightened, so will the rate of feed increase, and when the feed-nut has been clamped so tightly as to prevent rotation, then the feed will have reached its maximum speed.

I am aware of the patent to White and Bumgarner, No. 22,046, dated November 9, 1858, and do not claim the construction and arrangement of parts therein shown; but

What I do claim as my invention is—

1. In a rock-drilling machine, the combination, with the drill-stock L and nut M, of the shaft G, having cams H H, the pivoted hammer J, having friction-rollers I I and notched shank J′, and the spring K, attached to the frame of the machine, and having a bent end adapted to engage with the notch in the hammer-shank, whereby the rotation of the cams in contact with the friction-rollers forces the hammer-head backward, thereby causing its shank to compress the spring, the expansive force of said spring being adapted to throw the hammer forcibly against the nut and drill-stock, substantially as described.

2. In a rock-drilling machine, the combination, with the drill-stock L and the nut M, having feed-wheel N, of the shaft G, having cam H, and the bifurcated bell-crank P, having an arm provided with roller P′, whereby the rotation of the cam in contact with said roller causes the bifurcated end of the bell-crank to be pressed against the feed-wheel, thereby withdrawing the drill, substantially as described.

3. In a rock-drilling machine, the combination, with the drill-stock L, having slot or groove *e*, and the nut M, having ratchet feed-wheel N, provided with feather *d*, adapted to engage in said groove, of the shaft G, having cam H, the bell-crank O, having roller O′, the rod O^2, universal joint O^3, collar O^4, and pawl O^5, whereby a partial rotation is imparted to the feed-wheel N and drill-stock L, substantially as described.

4. In a rock-drilling machine, the combination of the threaded drill-stock L, having longitudinal groove *e*, internally-threaded feed-nut M, having wheel N, provided with feather *d*, pivoted bell-crank levers O and P, provided, respectively, with arms having rollers O′ P′, mechanism for connecting the bell-crank levers O with the feed-wheel N, and the shaft G, having cams H H, adapted to engage with the rollers O′ P′, whereby an intermittent rotary and feeding movement is imparted to the drill, substantially as described.

5. In a rock-drilling machine, the combination of the drill-holder L, feed-nut M, friction-clamp Q, and spring *n*, when constructed, arranged, and operating substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 26th day of November, 1881.

THOMAS THRELFALL. [L. S.]

Witnesses:
C. W. M. SMITH,
CHAS. E. KELLY.