(No Model.)

C. B. DAWSON.

ROCK AND COAL DRILL.

No. 362,366. Patented May 3, 1887.

Fig. 1.

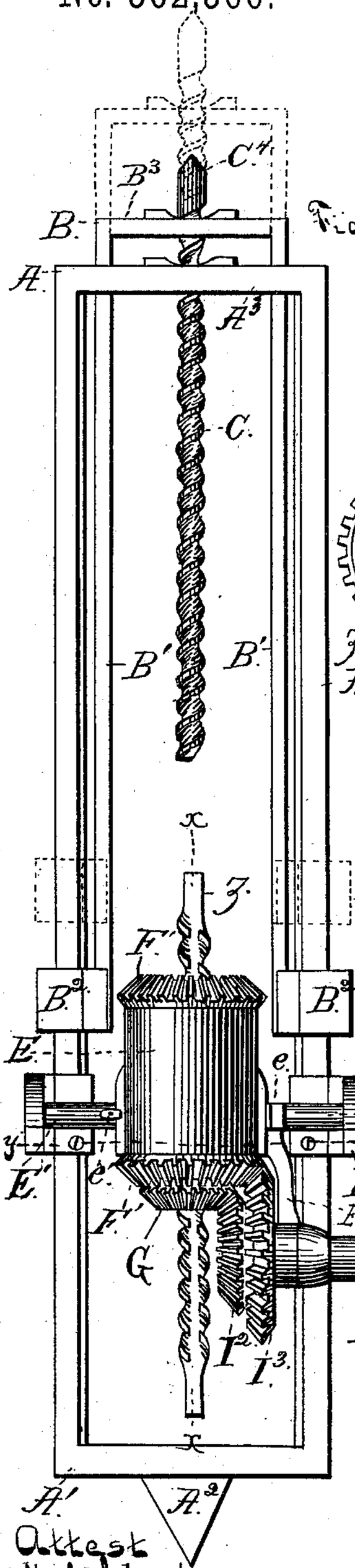
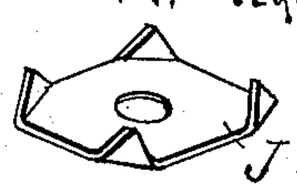


Fig. 9. Fig. 2.



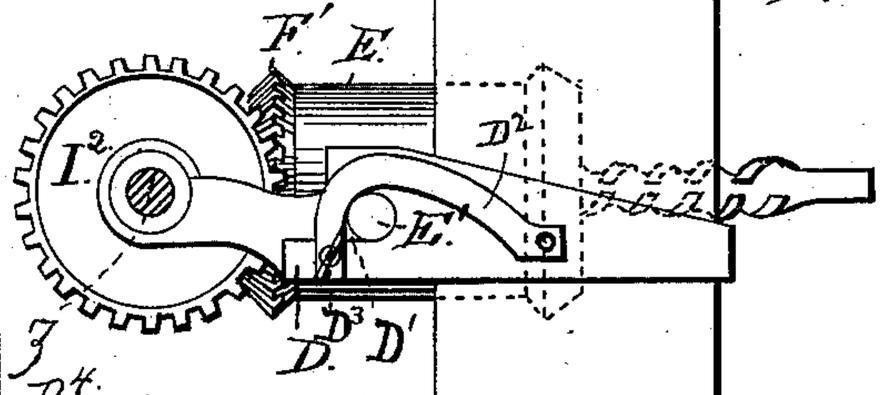
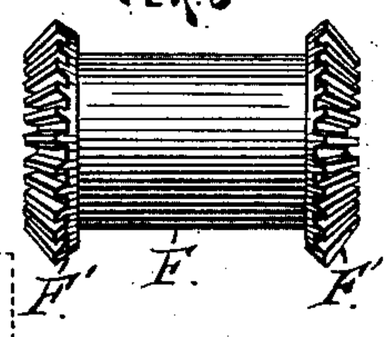


Fig. 5.



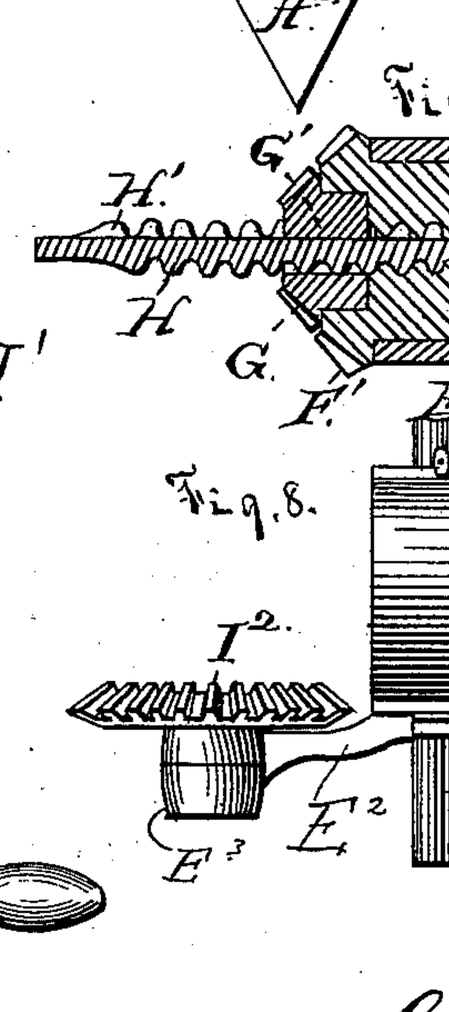


Fig. 4.

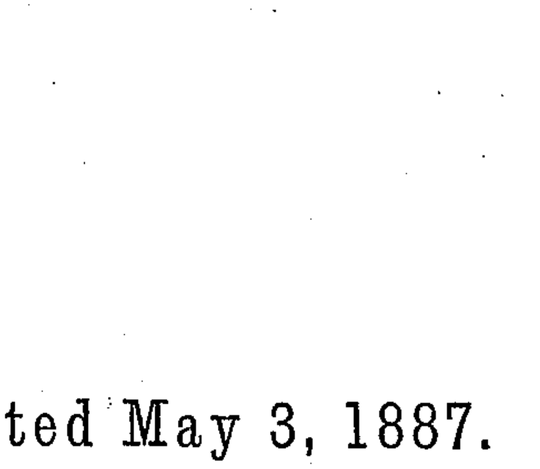


Fig. 6.

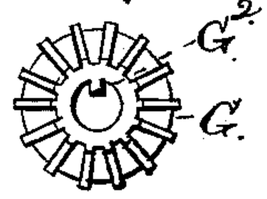


Fig. 7.

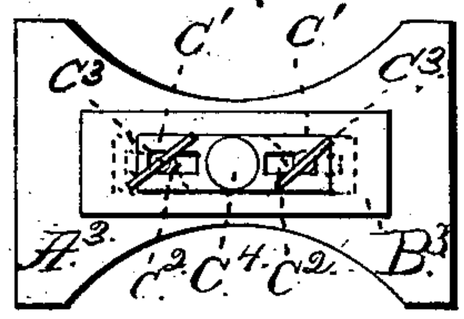


Fig. 3.

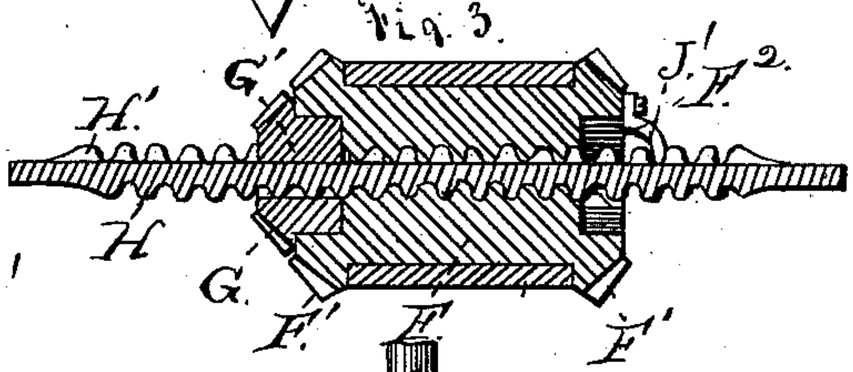


Fig. 8.

Attest
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Inventor.
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Attys.

UNITED STATES PATENT OFFICE.

CHARLES B. DAWSON, OF ANGUS, IOWA.

ROCK AND COAL DRILL.

SPECIFICATION forming part of Letters Patent No. 362,366, dated May 3, 1887.

Application filed June 23, 1883. Serial No. 99,206. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. DAWSON, a resident of the town of Angus, in the county of Boone and State of Iowa, have invented certain new and useful Improvements in Rock and Coal Drills, of which the following is a specification.

My invention relates to improvements in mining-machines; and it consists in the combination, construction, and arrangement of the several parts, as will be hereinafter fully described and claimed.

In the drawings, Figure 1 is a vertical elevation of a machine constructed according to my invention, with the boring mechanism turned to a vertical position to more clearly illustrate the position of the several parts thereof. Fig. 2 is a side elevation of my machine with the upper part of the framing broken away. Fig. 3 is a detached vertical section on line *x x*, Fig. 1. Fig. 4 is a cross-section on line *y y*, Fig. 1. Fig. 5 is a detail view of the cylinder. Fig. 6 is a detail end view of the gear for rotating the feed-screw. Fig. 7 is an end view of the supplemental and main frames. Fig. 8 is a detail view of the boxing with its trunnions, &c.; and Fig. 9 is a detail view of a bearing-plate for the frame-clamping screw, all of which will be described.

The supporting-frame of my machine is composed of a main frame, A, and a supplemental frame, B. At one end, A′, of the main frame I provide the barb or point A^2, and its opposite end bar, A^3, is provided with openings, through which pass the side bars, B′, of frame B, as will be understood from Fig. 1. These side bars, B′, are passed through the openings in the end bar, A^3, and extend along close to the inner side of the side bars, A^4, of the frame A, and they are provided on their inner ends with boxes or slides B^2, which embrace the bars A^4 and secure the frames together.

It will be seen that the frame B may be adjusted or moved in or out so as to vary the length of the supporting-frame.

I prefer to use the boxes B^2; but, where so desired, grooves could be formed in the inner sides of the bars A^4 and the side bars, B′, of frame B be placed and moved therein, and there are various other ways in which the frames could be connected so as to permit the adjustment before described. This adjustment is for the purpose of varying the length of the framing to suit the different-sized chambers in which it may be used in the mines.

In order to secure the frames rigidly together at any desired point, I preferably provide the screw C, which is passed through openings in the end bars, A^3 B^3, of the frame A B, and on the said frames over the said openings I provide divided nuts, preferably constructed as shown in Figs. 1 and 6, with the halves C′ C′ arranged one on each side of the opening and each constructed with a slot, C^2, through which works the set-screw C^3, whereby these halves or sections can be secured in engagement with or clear of the screw C.

When it is desired to change the relative positions of the frames A B, the divided nuts are cleared of the opening for the screw C and the frames moved to the desired positions and the nuts adjusted into engagement with the said screw, which may be turned, and its point C^4 will serve as a barb opposing the one A^3, but the frames will be held in the same position relatively with each other.

The screw C may be formed with an angular portion to receive a wrench or be turned in other suitable ways.

On the side bars, A^4, of frame A are placed slides or carriers D, which may be secured at any suitable point by the screws *d*, and are provided with the bearings D′ for the gudgeons of the boxing, hereinafter described. In order to secure the said gudgeons within the bearing D′, I pivot hooks or keepers D^2 below said bearing, as shown in Fig. 2, so that they can be turned up over the gudgeons, as shown, and be secured by means of a thumb-screw, D^3, or other suitable devices. The boxing E, as shown in Fig. 8, is made in two sections. As shown in Fig. 4, the top of the boxing is thrown back, for the purposes hereinafter explained. The two parts are hinged together on the same side as the bracket E^2 is rigidly secured to the lower section of the boxing E, and to the opposite end of the boxing to where the drill-point is located, and the bracket E^2 extending rearwardly from the end of boxing E and in a line therewith, and the bracket E^2 has a bearing, E^3, on its outermost end, adapted to receive the operating-shaft I, and this shaft I, on its outermost end, is provided with a crank-wheel,

I, for operating this driving-shaft I. Steam or any other suitable power may be applied for operating the said shaft, and on the inner side of the bracket E^2 are placed the driving gear-wheels I^2 I^3, which are rigidly secured together and to the inner end of the shaft I, for positively operating the gear-wheels F and pinion G, for the purpose hereinafter explained, and the same section of the boxing E that has the bracket E^2 secured to it is also provided with trunnions E', rigidly secured on the opposite sides of the said section, and on the outermost ends these trunnions are made round and placed in bearings in the carriers D, which are adapted to receive the said trunnions, and these trunnions are held snugly in their bearings with a hook-latch, which is pinned loosely in the middle of the carriers D, so that when the boxing E is required to be removed from the frame all that is necessary is to throw back the hook-latch and lift it from said bearing in the carriers. These carriers D are in the shape of a clamp, and they reach across the side bars, A^4, of the main frame and clamp loosely around the inner corners of the said bars, and the carriers D may be slid up and down to any desired point that the operator wishes to place it, and the carriers, when placed at any certain spot, are secured to the side bars, A^4, by a thumb-screw, and when the trunnions E' are secured to the main frame, as described, it is possible to oscillate the operative portion of the machine to any desired degree.

The cylinder F has beveled gear-wheels F' and F' on its opposite ends, and the length of the cylinder between the inner sides of the said wheels is of the same length as the box E, and on the opposite ends of the cylinder F, or on the outer face of these said wheels F' and F', I provide mortises F^2 and F^2, adapted to receive the shank G' of beveled pinion gear-wheel G, which will be hereinafter explained. The aforesaid cylinder F is provided with a central perforation and thread cut in that perforation adapted to receive and engage the thread on the feed-shaft H, as shown in Fig. 3. This said shaft H has a groove, H', running longitudinally the full length of the feed-shaft H, as shown in Figs. 1 and 3, for the purposes hereinafter explained. The aforesaid pinion G has a shank or journal, G', extending a short distance out from the flat side of the wheel G and journaled in the mortise or bearing F^2, and the shank or journal G' is adapted to turn in said bearing F^2, and the shaft H, pinion G, and cylinder F all revolve in the same direction, whereby the journal G' makes only one revolution in its bearing to feed the shaft H forward one thread, and thus it has less revolutions and friction than it would have if the shank of pinion G had a stationary bearing, for if shank or journal G' would have a stationary bearing it would have a revolution in its bearing for every revolution of the feed-shaft H. This pinion G is provided with a central perforation having feather G^2, adapted to receive the said shaft H, and groove H', for operating the said shaft, and the groove H' being the full length of the shaft for enabling the operator to slip the pinion G off of the end and slip it on the opposite end, for the purpose hereinafter explained. The said boxing E, being, as before stated, in two sections and hinged together on the same side of the boxing as bracket E^2, is secured and latched with a suitable latch on the opposite side, so that when the top section is thrown back, as shown in Fig. 4, the cylinder can be placed easily therein. The aforesaid shaft H has a left-hand thread cut thereon for enabling the operator to turn the crank and shaft I in a right-hand direction, and it will be readily seen that when the said shaft H is placed in the cylinder F the pinion G, with shank G', is placed at the same end of the cylinder and on the shaft H, whichever may be placed at the same end of the boxing E, that the driving gear-wheels I^2 I^3 are located, so that when the cylinder is placed in the boxing the rear gear, F', will engage gear I^3 and pinion-gear G will engage gear I^2, and the drill-point is located at that end of the cylinder, and on shaft H, which is opposite to where the pinion G is placed, so that when the shaft H is driven forward the end of the shaft opposite to where the drill-point is located comes up to the pinion G. The boxing may then be opened and the cylinder F lifted out, the pinion G slipped off the end and slipped on the other end, and the cylinder reversed and placed back in the boxing in the same manner as before stated, whereby the operator is not required to turn the shaft back through the cylinder for each hole that is bored; and, as before stated, the pinion G and wheel F' operate at the rear of the boxing E and the beveled gear-wheels I^2 I^3 operate at the rear side of the wheel F' and pinion G—that is to say, the wheels I^2 I^3 operate at the rear side of said cylinder and gear-wheel, and opposite to where the working-point of the drill is located. Thus a part of the strain on the gearing caused by the resistance of the drill-point when the latter is being advanced in the mineral is borne by the forward end of the box E, this portion of the back-pressure from the drill-point being communicated to the said forward end of box E through the intermediate means or agency of the annular outlying gear-wheel F', whose rear side rests against the forward end of said box E. Another portion of the back-pressure is borne by the gear-wheels I^2 I^3, being transmitted thereto by the bevel gear-wheel F' and pinion G, the gear-wheels I^2 I^3 receiving a direct strain from the gear-wheel F' and pinion G, and also a strain arising from the resistance to rotation of the gear-wheel F' and pinion G. I do not limit myself to any certain size of gear-wheels, nor to any certain number of teeth on these wheels, for they may be arranged substantially as hereinafter described,

for enabling the cylinder F to rotate faster than the feed-shaft H, and for enabling the operator to have at his hand different-sized gear-wheels I^2 I^3, for the purpose of boring soft or hard material, as may be required. When the material to be bored is soft, the diameter of the gear-wheels I^2 I^3 may be increased—that is to say, gear-wheels like I^2 I^3, and having the same relative number of teeth, but of larger diameter, may be substituted therefor. In such event the bracket E^2 will be lengthened, either by using a bracket extensible as to length, or by substituting a box E having a larger bracket E^2, (*i. e.*, of suitable length.) Such changes enable the drill to rotate much more rapidly and bore faster. At the same time, while gear-wheel F′, pinion G, cylinder F, and feed-shaft H all acquire a more rapid rotary motion, the cylinder F and feed-shaft H will still have a more rapid rotary motion than shaft I, and in consequence of the relative size, construction, and arrangement of the working parts of the machine, as aforementioned, the box E will take a portion of the strain resulting from the back-pressure of the drill and enable the operator to bore a hole with greater rapidity, and all that is required of the operator to bore hard material is to have at his hand an extra boxing E, substantially as described, a smaller pair of wheels I^2 I^3 than before described in comparison to the wheels F′ and pinion G, so that the operator may have more power than before described, and the teeth on the said wheels I^2 I^3 F′ and pinion G to be less in comparison to those before described, so that the feed-shaft may not have so greatly a progressive movement.

The shaft H, carrying the drill-point, the cylinder, and the pinion revolve in the same direction; but the cylinder revolves relatively at a higher rate of speed and steadily feeds forward the shaft and its drill-point, and in such capacity it has a tendency to carry around with it the feed-shaft. This tendency is proportional to the pitch of the thread. The coarser or greater the pitch of the thread the stronger becomes the tendency of the cylinder to turn the shaft; hence it is a desideratum to have the pitch of the thread as steep as possible consistent with the operativeness of the drill, as thereby the strain incident to back-pressure and resistance is in a measure removed from off the feather G^2 and the gear-wheel I^2 and pinion G.

I am aware that Letters Patent No. 134,305 have been issued to John North for mechanism consisting of an externally-screw-threaded drill-spindle, of a revolving sleeve of peculiar formation for imparting a progressive or sliding movement to the spindle for advancing or retracting it from its work, and of a secondary sleeve for rotating the spindle; also, that Letters Patent No. 195,256 have been granted to H. Burk for a novel arrangement of a series of gear-wheels in combination with the rocking journal and shaft of the drill, whereby the progress of the bit in any given number of revolutions of the crank may be retarded; but neither of these descriptions of mechanism in said patents, either alone or together, performs the functions or fulfills the purposes of my invention.

What I claim as new and useful, and desire to secure by Letters Patent, is—

1. In a mining-machine, the combination, substantially as described, of the main frame, the adjusting-frame secured to the main frame and adjustable on and from the end thereof, divided nuts or their equivalents secured on the adjacent ends of the two frames, and the screw C, turned through the divided nuts, and thereby rigidly connecting the two frames, and serving, also, to secure the machine in position in the mine, substantially as set forth.

2. In a drilling-machine, the combination of the internally-screw-threaded cylinder F, having at each end a bevel gear-wheel, F′, and a mortise, F^2, and the bevel pinion gear-wheel G, having shank G′ and central perforation carrying feather G^2, and the shank G′ being adapted to freely turn within mortise F^2, and the screw-threaded shaft H, having groove H′, substantially as and for the purposes set forth.

3. In a drilling-machine, the combination of the internally-screw-threaded cylinder F, having a bevel gear-wheel, F′, and mortise F^2, and pinion G, having shank G′, located in said mortise F^2 and rotating therein, and central perforation carrying feather G^2 and screw-threaded shaft H, having groove H′, and the bracket E^2, one end of the latter being rigidly secured to the box E, and the other or free end having a bearing, E^3, adapted to receive the operative shaft I, and the bevel gear-wheels I^2 and I^3 being rigidly secured together and to shaft I, substantially as and for the purposes set forth.

4. The combination of the threaded shaft H, gear F′, bevel-pinion G, trunnions E′, arranged transversely to the axis of said cylinder and turning in bearings in the frame, and bevel-gears rotating at right angles to the gear F′ and pinion G, and the bracket E^2, oscillating with said cylinder and at its free end carrying said bevel-gears, and the main frame carrying said trunnions, and the adjusting-frame secured to the main frame and adjustable out from the end thereof, divided nuts or their equivalents secured on the adjustable ends of the two frames, and the screw C, turned through the divided nuts, thereby rigidly connecting the two frames, and also for securing the machine in position, substantially as set forth.

5. In a drilling-machine, the combination of the cylinder F, having a beveled gear-wheel, F′, and mortise F^2, and with central perforation having thread adapted to receive the screw-threaded shaft H, and beveled pinion gear-wheel G, having shank G′, and central perforation carrying feather G^2, adapted to receive the said shaft H and groove H′, and the

shank G′ being adapted to rotate in the said mortise F², and the beveled gear-wheels I² and I³ being rigidly secured together and to shaft I, for operating the said gear F′ and pinion G, and the gears I² and I³ operating at the rear side of the gear F′ and pinion G to where the drill-point is located, and the gear-wheels I² I³ F′ and pinion G may be applied in any manner, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES B. DAWSON.

Witnesses:
D. J. MORRIS,
JOHN RICHARDS.