

(No Model.)

2 Sheets—Sheet 1.

J. HUGHES.  
AUTOMATIC DRILL.

No. 315,411.

Patented Apr. 7, 1885.

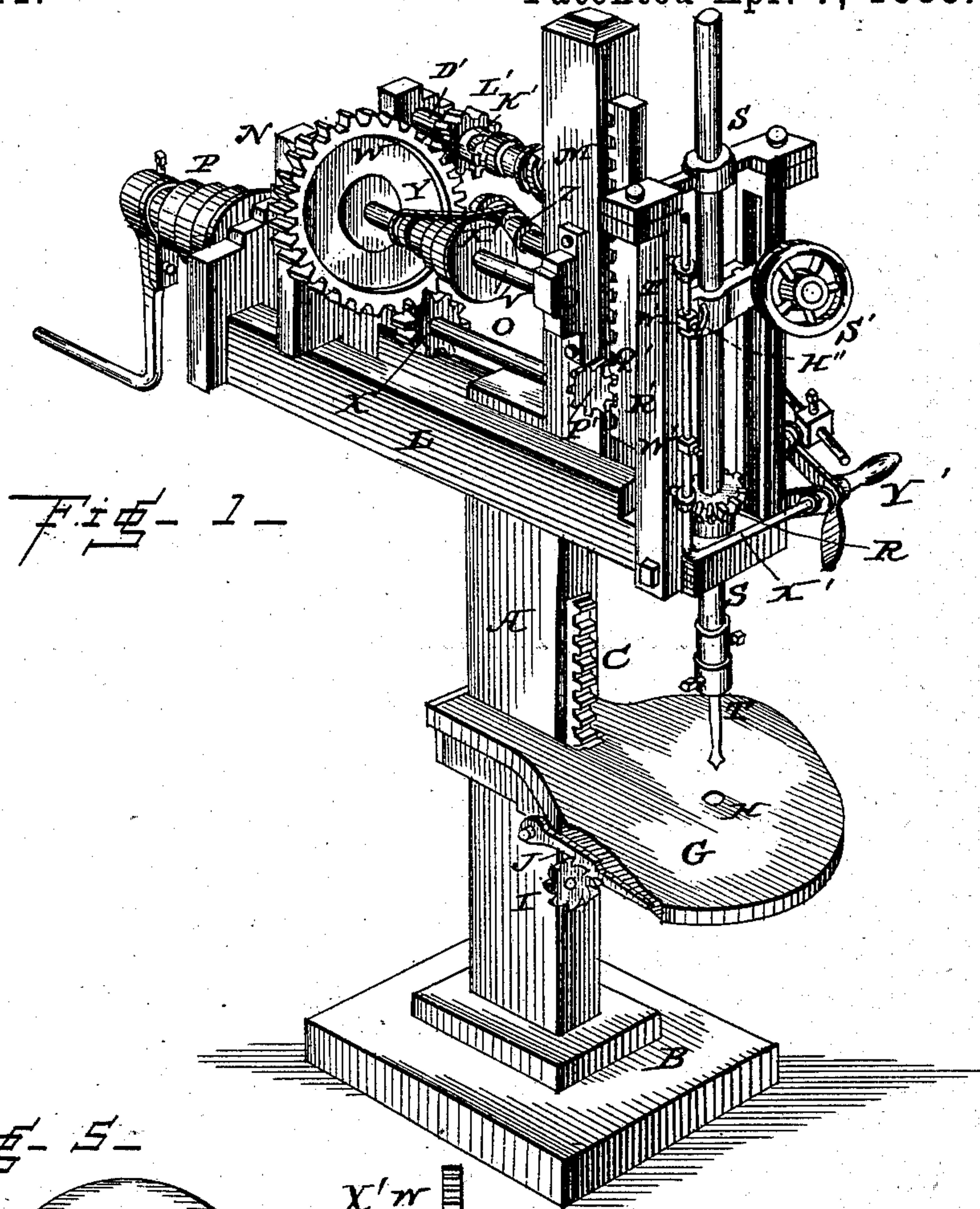


Fig. 1-

Fig. 5-

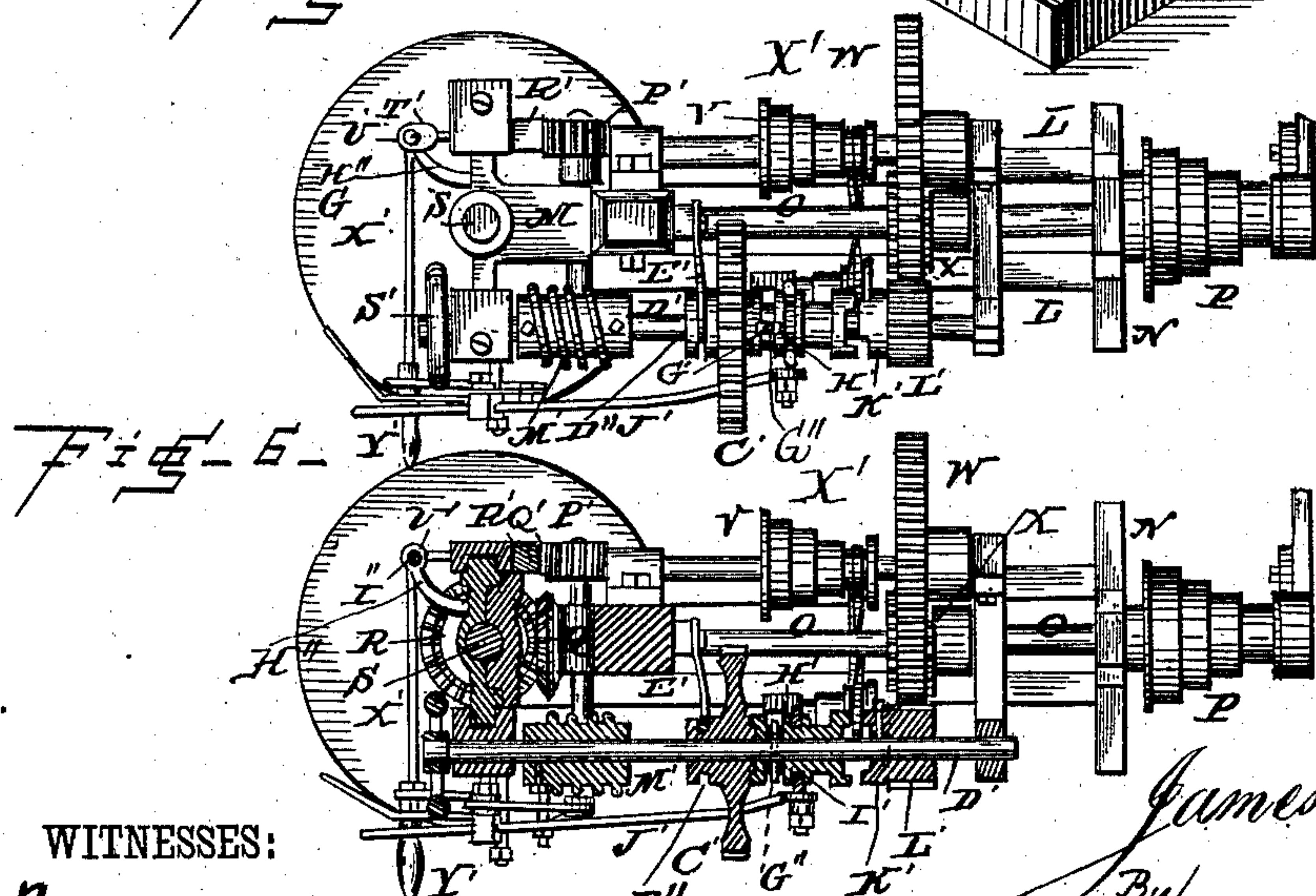


Fig. 5-

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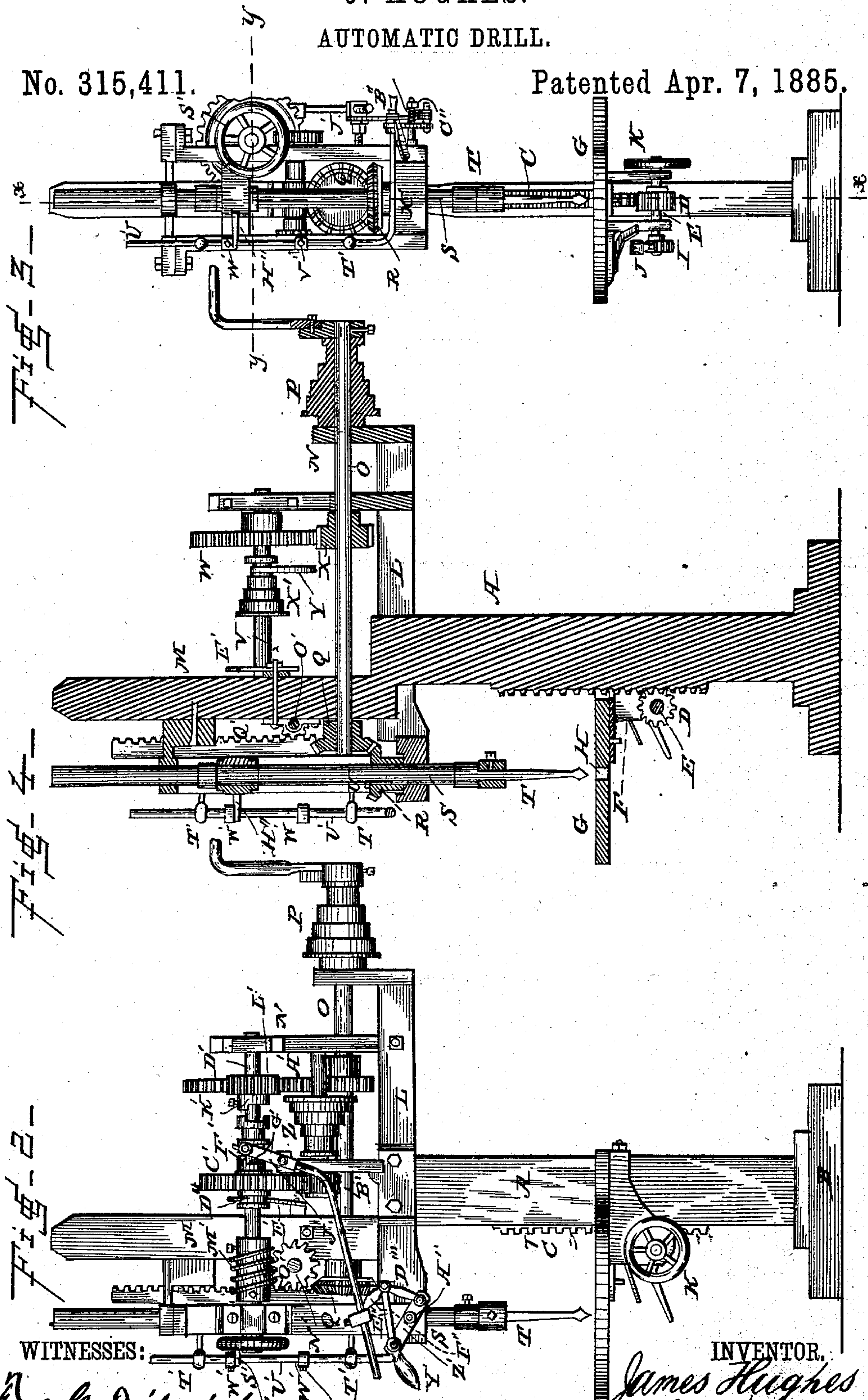


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INVENTOR.

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# UNITED STATES PATENT OFFICE.

JAMES HUGHES, OF AUBURN, NEW YORK.

## AUTOMATIC DRILL.

SPECIFICATION forming part of Letters Patent No. 315,411, dated April 7, 1885.

Application filed June 28, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES HUGHES, a citizen of the United States, and a resident of Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Automatic Drills; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of my improved automatic or self-reversing drill. Fig. 2 is a side view of the same. Fig. 3 is a front view. Fig. 4 is a vertical sectional view taken on the line *xx* in Fig. 3. Fig. 5 is a top view, and Fig. 6 is a horizontal sectional view on the line *yy* in Fig. 3.

The same letters refer to the same parts in all the figures.

This invention relates to drilling-machines; and it has for its object to provide a machine of this class which shall be automatic in its action, or self-reversing, and in which provision shall be made for regulating the point at which the reversing motion shall take place.

The invention consists in the improved construction and arrangement of parts, to be hereinafter described, and particularly pointed out in the claims.

In the drawings, A designates a suitable upright mounted upon a base, B, and provided upon its front side with a rack-bar or series of teeth, C, engaging a pinion, D, which is secured upon a transverse shaft, E, mounted in suitable ears or bearings formed upon a vertically-sliding carriage, F, carrying the table or platform G, which is provided with a perforation, H, to receive the drill-point when the machine is operated. One end of the shaft E carries a ratchet-wheel, I, engaging a spring-pawl, J, which is pivoted to the side of the carriage, which is by this mechanism retained securely in any position to which it may be adjusted. The opposite end of the shaft E is provided with a hand-wheel, K, by

means of which it may be conveniently manipulated.

The upper end of the upright A is provided with a pair of horizontal arms, L L, which form the top or head of the machine. An additional arm, M, extends in an upward direction, as shown. Suitable bearings are provided in the said arm M and in a plate, N, at the rear ends of the arms L for a shaft, O, having at its rear end a cone-pulley, P, adapted to receive motion from any suitable motive power.

The front end of the shaft O is provided with a bevel-wheel, Q, engaging a pinion, R, which is seated or mounted in a suitable bearing between the front ends of the arms L. The said pinion has a central opening in which slides the shank S of the drill T, which may be connected in any suitable manner to the lower end of the said shank. The shank S is to be connected with the pinion by means of a key, U, which, while it permits the shank to slide vertically, will cause it to revolve with the pinion when the machine is operated.

V is the horizontal shaft, arranged in suitable bearings above the main shaft of the machine, and provided with a gear-wheel, W, receiving motion from a pinion, X, upon the main shaft. The shaft V also carries a cone-pulley, X', connected by means of a belt or band, Y, with a cone-pulley, Z, upon another horizontal shaft, A'. The latter is provided with a pinion, B', meshing with a spur-wheel, C', mounted loosely upon a shaft, B'. The hub of the said spur-wheel is provided at its front end with an annular groove, D'', over which is fitted the end of a forked spring, E', which is bolted to the frame of the machine. The rear end of the hub forms a clutch, F', adapted to engage a clutch-collar, G', which is arranged to slide longitudinally upon the shaft, with which it is connected by means of a transverse pin, G'', working in a slot, H', in the said clutch-collar. The latter is provided with a central annular groove, I', adapted to receive the forked end of a lever, J', which is pivoted to the side of the frame of the machine. The rear end of the clutch-col-



lar G' forms a clutch adapted to engage a clutch, K', formed upon the hub of a pinion, L', which is mounted loosely upon the shaft D, and which engages the gear-wheel W upon the shaft V.

The shaft D' is provided near its front end with a worm, M', engaging a spur-wheel, N', upon one end of a transverse shaft, O'. The other end of the said shaft is provided with a pinion, P', engaging a rack-bar, Q, which forms a part of the frame R' in which the drill-shank is mounted. It will be seen that when this pinion is revolved in either direction the said frame, with the drill, will be raised or lowered, as the case may be, while at the same time a rotary motion may be imparted to the drill by means of the bevel-wheel mounted upon its shank and the bevel-wheel upon the end of the main shaft engaging therewith.

The front end of the shaft D' is provided with a hand-wheel, S', by means of which it may be conveniently manipulated for the purpose of adjusting the drill when power is not applied to the machine.

The main frame of the machine is provided at its front end with brackets T', forming bearings for a vertically-sliding rod, U', which is provided with stops or collars W', adjustable upon the said rod by means of set-screws V'. The lower end of the said rod is bent laterally, so as to form an arm, X', terminating in a handle, Y'. The said handle is pivotally connected with a lever, Z', mounted upon a stud, A'', upon the side of the frame, and retained by the action of a spring, B'', the tension of which may be regulated by means of a nut, C''. The rear end of the said lever is provided with an upwardly-extending arm, D'', the upper end of which is connected by a rod, E'', with the main handle. The said arm is also connected by means of a link or joint, F'', with the free end of the lever J', which may thus be operated.

The frame which carries the drill-shank is provided with a forwardly-extending arm, H'', having a perforation, I'', which accommodates the vertically-sliding rod U', and adapted to engage the collars or stops upon the latter.

The operation of this invention is as follows: When the drill is to be operated, the clutch-collar G' is placed in contact with the clutch upon spur-wheel C', and the shaft O is now revolved, imparting motion, through pinion X to cog-wheel W, the shaft V of which will communicate motion through its cone-pulley and belt Y, to the shaft A' through its (shaft A's) cone-pulley Z, and the pinion B' upon this shaft will engage spur-wheel C', which, by being engaged with collar G', will revolve shaft D' and the worm upon the same. The worm will revolve spur-wheel N' and shaft O', and pinion P' upon this shaft will lower the rack-bar Q' and the drill, feeding the latter to the work, and it will be seen that the pinions communicating revolution from one shaft to another will mesh with cog-wheels

upon the shafts to be revolved—as, for instance, pinion X meshing with cog-wheel W, and pinion B' meshing with spur-wheel C'—so that the motion imparted to the drill will be comparatively slow; but when the drill-frame strikes the lower stop W', the arm X', lever Z', and arm D'' will push the main handle or lever J' back, disengaging clutch G' from the spur-wheel C', and causing its rear end to engage clutch K' upon pinion L', which is at all times engaged and revolved by spur-wheel W, and the shaft D' and its worm will now be revolved in the opposite direction by being meshed directly with spur-wheel W, revolving within spur-wheel C', causing the worm to revolve the pinion N' and P' in the direction opposite to its former revolution, raising the rack-bar and drill-frame at a comparatively greater speed, the spur-wheel W of a larger diameter engaging pinion L' of a smaller diameter. When, now, the drill-frame and its arm H'' arrive at the upper stop W', it will push rod U' upward, bringing clutch G' in engagement with the clutch upon spur-wheel C', as before, through arms X' Z' D'' and main handle J', repeating the first-described operation.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a drilling-machine, the combination, with a suitable frame, of a vertically-movable drill-carrying frame having a forwardly-extending arm, a guide-rod traveling in a perforation in the said arm, and provided with adjustable sleeves or stops, and having at its lower end a lateral extension, mechanism connecting the latter with a reversing-lever, a clutch arranged to be operated by the said lever, and sliding upon and revolving with a horizontal shaft having at its front end a worm arranged to operate the drill-carrying frame, and a pair of spur-wheels adapted to engage the said double clutch and to receive motion from the main shaft of the machine, substantially as set forth.

2. In a drilling-machine, the combination of a vertically-traveling drill-carrying frame having a vertical rack-bar, a shaft having a pinion at each end, one of the said pinions engaging the said rack-bar, a horizontal shaft having a worm at one end engaging the other of the said pinions, and having means, as described, for having its motion reversed at each end of the line of travel of the drill-carrying frame, and a hand-wheel at the end of the horizontal shaft for adjusting the drill independently of the reversing mechanism, as and for the purpose shown and set forth.

3. In an automatic reversing mechanism for a drilling-machine, the combination of the shaft D', operating the drill-feeding mechanism, the pinion C', having half-clutch F', revolving upon shaft D', and meshing with a pinion receiving motion from the drive-shaft, the sliding collar G', turning with the shaft



D', having half-clutches at both ends, and means, substantially as set forth, for sliding it upon shaft D', spring E', bearing against pinion C', and pinion L', having half-clutch K',  
5 and meshing with a cog-wheel receiving motion from the drive-shaft, as and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JAMES HUGHES.

Witnesses:

PATRICK McLAUGHLIN,  
LAWRENCE C. WHITE.