(No Model.) 3 Sheets—Sheet 1.

# D. C. STOVER & F. W., E. A. & A. HOEFER.

## DRILLING MACHINE.

No. 506,865. Patented Oct. 17, 1893.

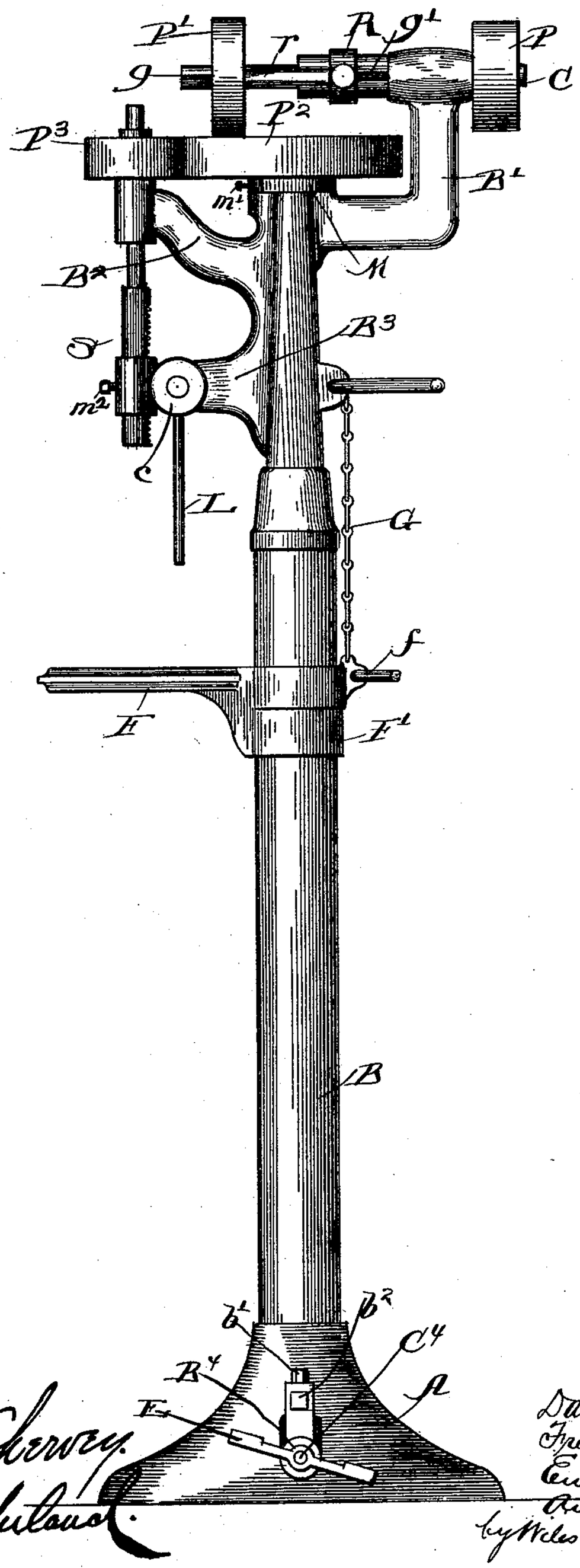


Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

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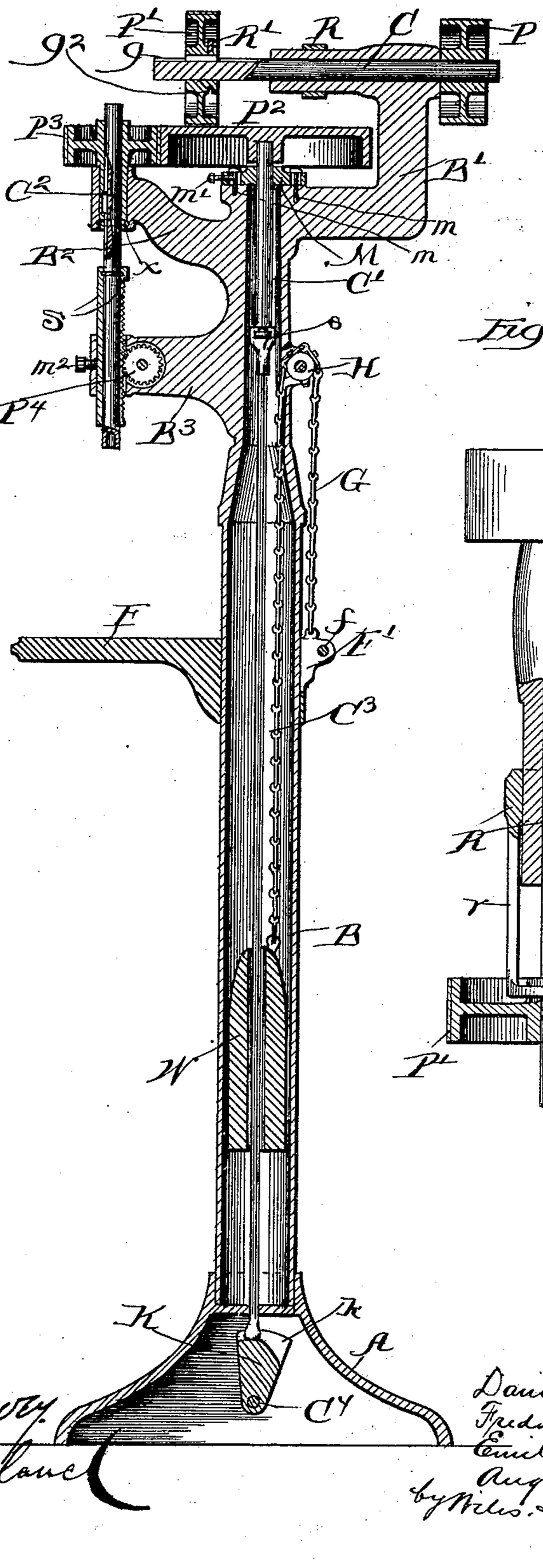


Fig. 2.

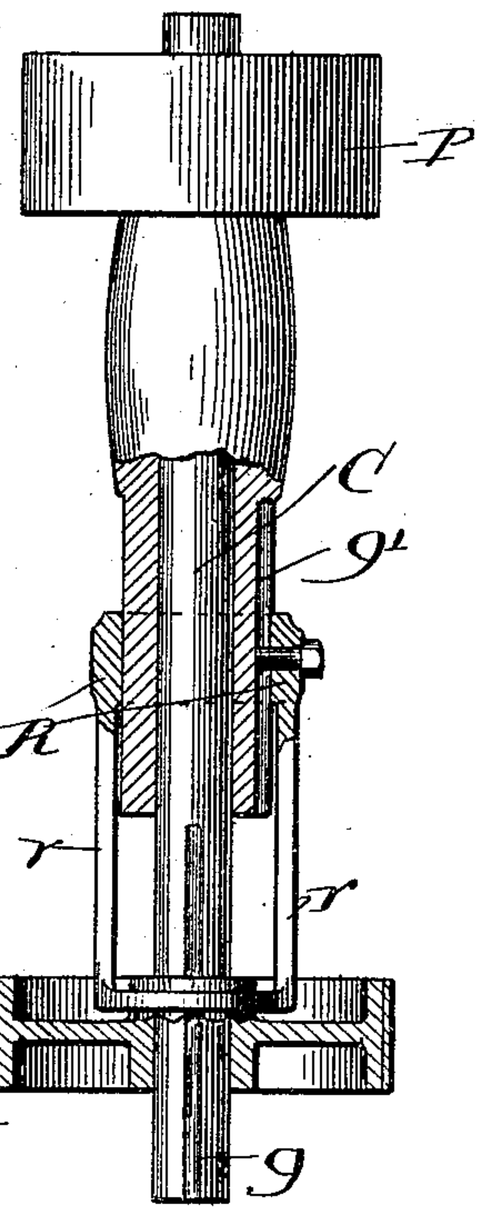


Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

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## DRILLING MACHINE.

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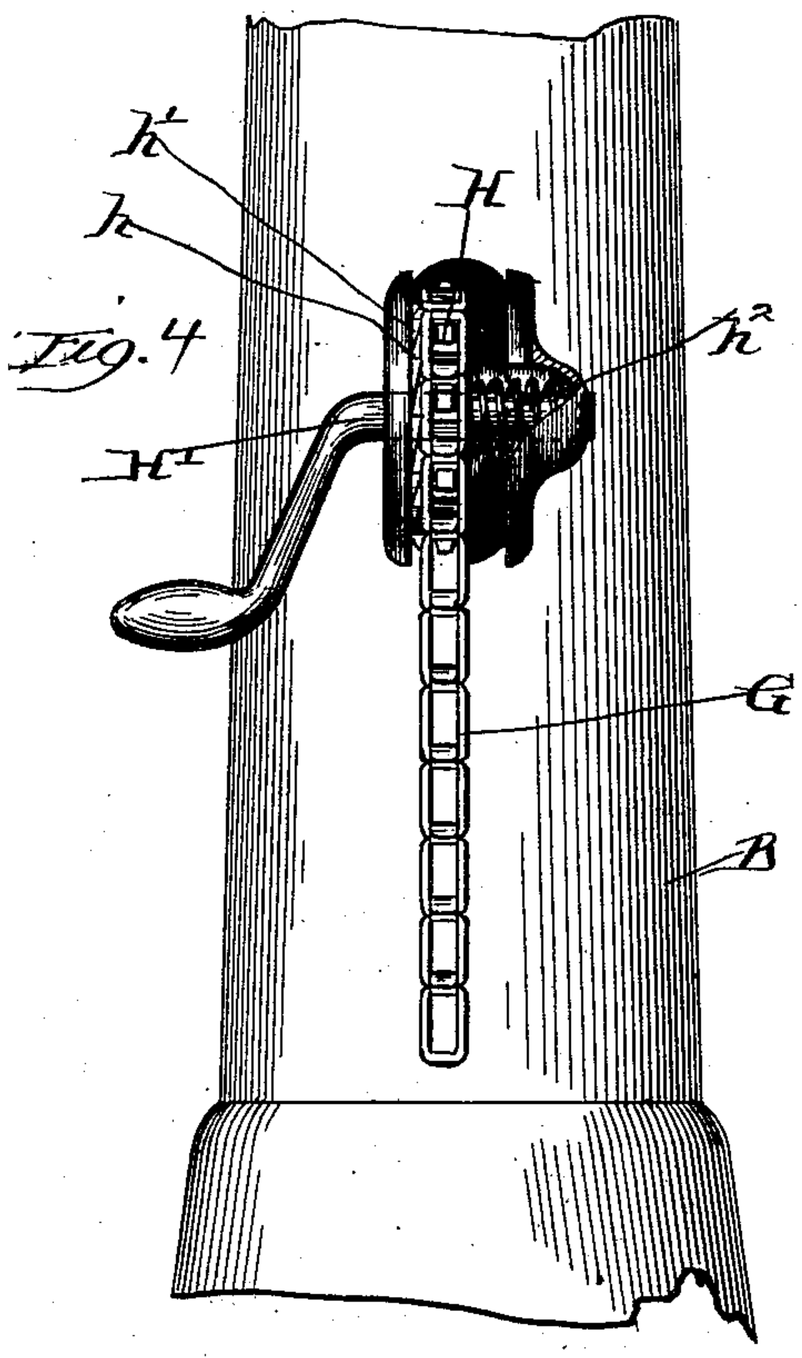


Fig. 4

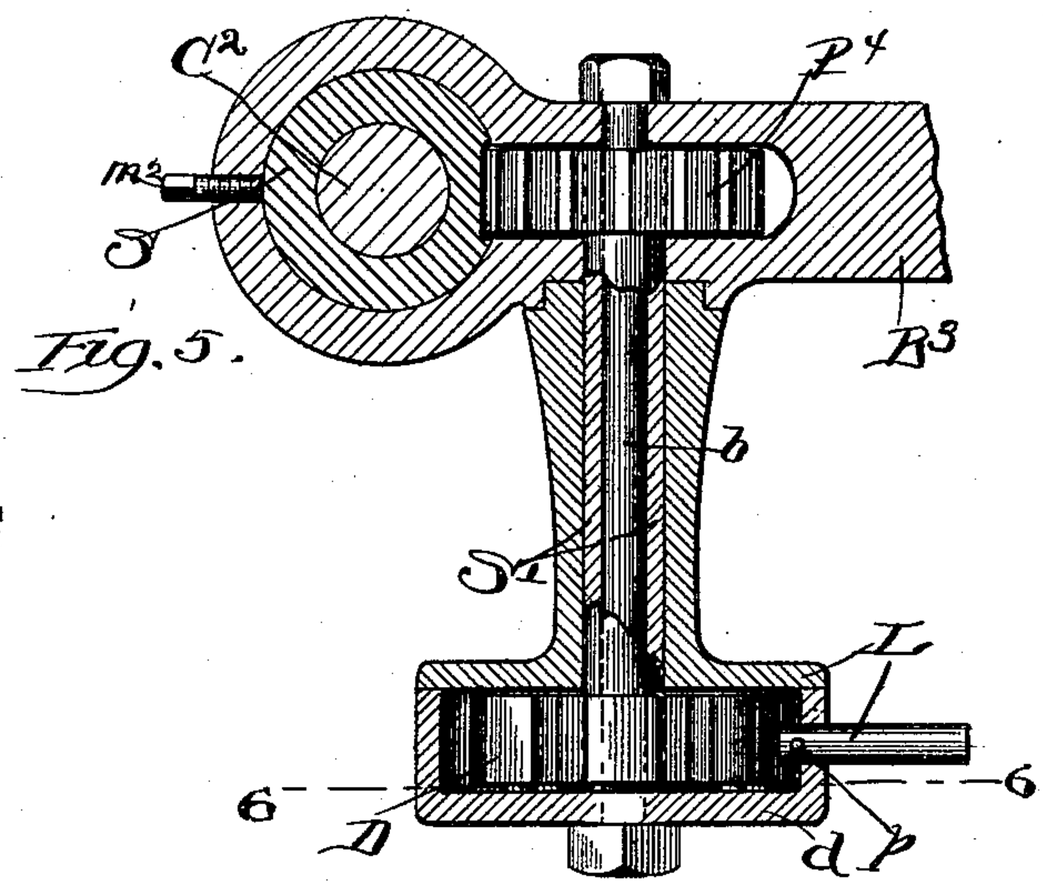


Fig. 5.

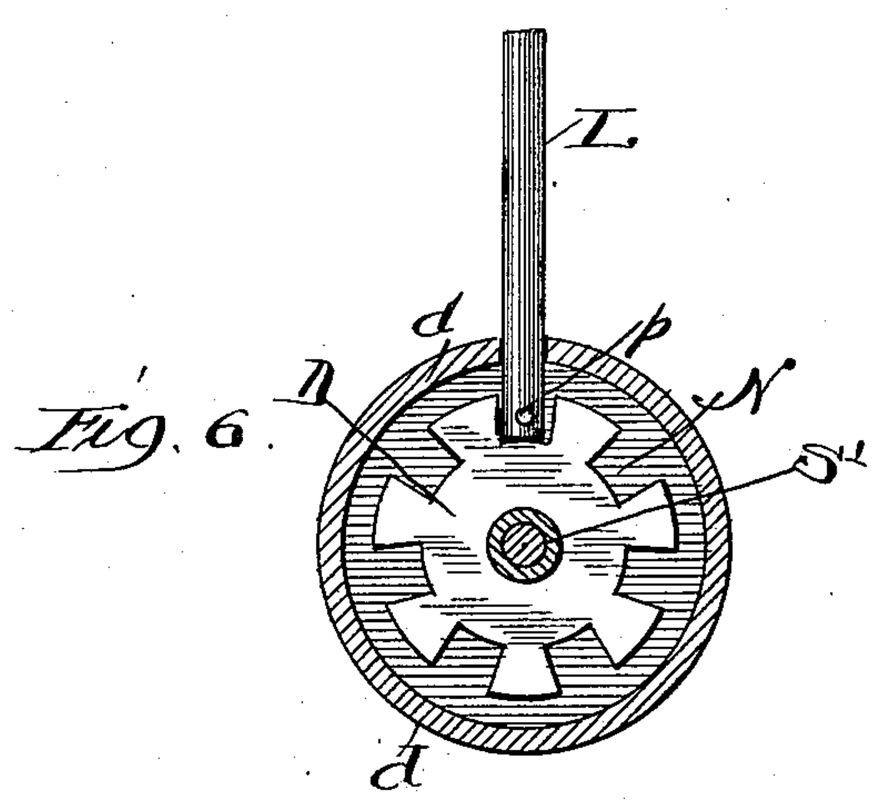


Fig. 6.

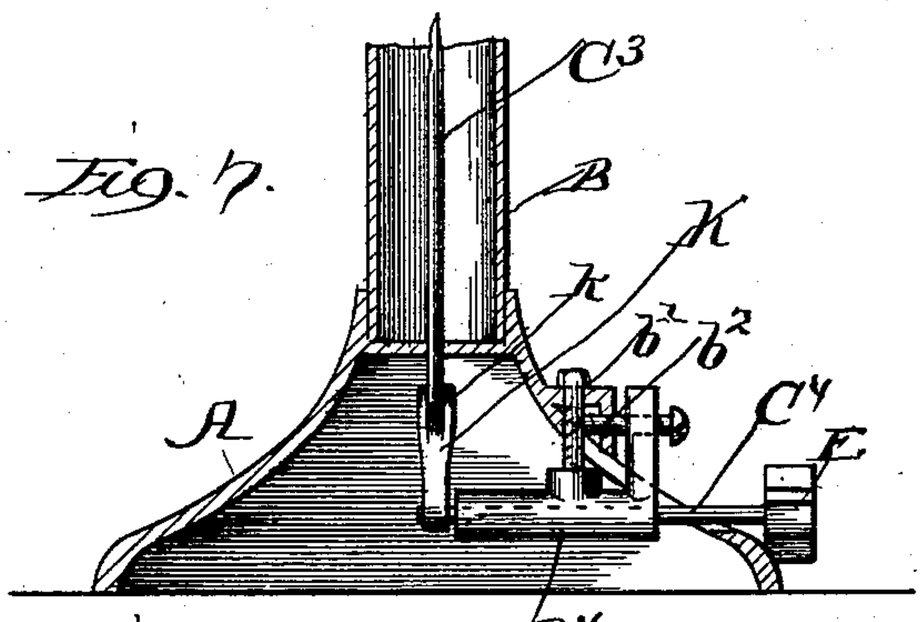


Fig. 7.

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# UNITED STATES PATENT OFFICE.

DANIEL C. STOVER, FREDERICK W. HOEFER, EMIL A. HOEFER, AND AUGUST HOEFER, OF FREEPORT, ILLINOIS, ASSIGNORS TO THE STOVER NOVELTY WORKS, OF SAME PLACE.

## DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 506,865, dated October 17, 1893.

Application filed October 12, 1892. Serial No. 448,655. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL C. STOVER, FREDERICK W. HOEFER, EMIL A. HOEFER, and AUGUST HOEFER, citizens of the United States of America, residing at Freeport, in the county of Stephenson and State of Illinois, have jointly invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

Our invention relates to improvements in drilling-machines of that class in which motion is communicated from the driving pulley to the drill-chuck through co-acting friction devices adapted to be so adjusted with reference to each other as to vary the speed of rotation of the chuck.

The invention is fully described and explained in this specification and shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a drilling-machine embodying our improvements. Fig. 2 is a vertical section thereof. Fig. 3 is a view partly in top plan and partly in horizontal section illustrating the means for moving the adjustable element of the friction devices. Fig. 4 is an enlarged elevation of the crank for raising and lowering the platen of the machine and the parts immediately connected therewith. Fig. 5 is a horizontal section illustrating a device for raising and lowering the drill-chuck. Fig. 6 is a front elevation of a part of said device, the cap being removed by a vertical section through the line 6—6 Fig. 5; and Fig. 7 is a vertical section of the base of the machine illustrating the means for raising and lowering the vertical shaft and the intermediate pulley of the friction device mounted thereon, the plane of section being at right angles to that in Fig. 2.

In these views, A is a supporting base of suitable form, and B is a hollow vertical standard stepped in a socket in the base. The standard is provided at and near its upper end with arms, B′, $B^2$, $B^3$, formed integrally with it, the arm B′, being provided with a horizontal bearing which supports a shaft, C, and the arms, $B^2$, $B^3$, being provided with vertical bearings lying in line with each other and supporting a vertical shaft, $C^2$. The shaft, C, has at one end a rigidly mounted pulley, P, adapted to receive motion through a belt from any suitable source of power and is provided at its other end with a sliding pulley, P′, having a key which moves in a groove, *g*, in the shaft, the pulley being thus adapted to rotate with the shaft, and, at the same time, to move longitudinally upon it as desired. The longitudinal movement of the pulley, P′, upon the shaft is controlled by means of the device illustrated in Figs. 1, 2, 3, in which R is an external ring moving longitudinally upon a portion of the bearing of the shaft, C, and provided with a set screw sliding in a groove, *g*′, in the bearing, this screw being adapted to prevent rotation of the ring upon the bearing, and also to fix the ring in any desired position thereon. The ring, R, is provided with two arms *r*, *r*, parallel with the shaft, C, and having at the end opposite the ring, R, an integrally formed half-ring, or yoke, R′, lying in an annular groove, $g^2$, in the hub of the pulley P′. The longitudinal movement of the ring, R, moves the pulley P′, longitudinally upon the shaft, C, without interfering in any way with its rotation.

Within the upper end of the hollow standard, B, is a vertical shaft, C′, journaled in suitable bearing and adapted to be moved up and down through slight limits in the manner hereinafter described, and on the upper end of this shaft is mounted a horizontal pulley, $P^2$, whose plane upper face may be brought into frictional contact with the cylindrical face of the pulley, P′, and when in such contact may be rotated by the rotation of said pulley. It is evident that the longitudinal movement of the pulley, P′, upon its shaft must vary its distance from the center of the pulley, $P^2$, and correspondingly vary the speed of the rotation imparted to the pulley, $P^2$, by the pulley, P′.

Upon the upper portion of the vertical shaft, $C^2$, is mounted a pulley, $P^3$, whose working edge is in contact with the edge of the pulley, $P^2$, already described. The pulley, $P^3$, is provided with an elongated hub extending downward within the bearing formed at the end of the arm, $B^2$, and this hub and the shaft, $C^2$, within it are connected by means of a key permitting vertical sliding move-

ment of the shaft with reference to the pulley. Vertical movement of the pulley and its hub is prevented by means of a horizontal pin, *x*, Fig. 2, lying partly in the bearing and partly in an annular groove in the hub.

On the lower end of the shaft, $C^2$, is mounted a sleeve, S, so connected with the shaft that the vertical but not the rotary movement of the shaft is communicated to the sleeve. The sleeve, S, is formed at one side with a vertical line of teeth forming a rack and engaging a pinion, $P^4$, whose rotation raises and lowers the sleeve. The pinion, $P^4$, is mounted on a sleeve, S′, Fig. 5, journaled in a suitable horizontal bearing supported by the arm, $B^3$, and on the outer end of this sleeve is mounted a disk, D, formed with marginal notches, N. A cap, *d*, covers the disk, D, and is held in place by a bolt, *b*, lying within the sleeve, S′, and passing through the pinion, $P^4$, and the arm, $B^3$, which supports the entire device. A lever, L, passes through the side wall of the cap, *d*, and extends outward from it in a radial line, the inner end of the lever being adapted to enter the notches N, N, in the disk, D, and being provided with a transverse pin, *p*, which prevents its escape from the cap. The lever, L, is free to move in and out with reference to the center of the disk, D, and forms, in use, a combined lever and gravity pawl, its weight being sufficient to engage it with the notches of the disk when above the center thereof, and to disengage it from the disk when below the center. The lever thus forms a very convenient means for imparting step by step rotation to the disk, D, sleeve, S′, and pinion, $P^4$, and thereby raising and lowering the sleeve, S, which carries the drill-chuck of the machine.

The means above referred to, for raising and lowering the pulley, $P^2$, are fully illustrated in Figs. 1, 2, and 7, in which $C^3$ is a vertical rod bearing at its upper end a socket, *s*, which receives the lower end of the shaft, C′, of the pulley, $P^2$, the rod, $C^3$, being supported by a cam, K, formed with a groove, *k*, in which the lower end of the rod rests. The cam, K, is mounted on a horizontal shaft, $C^4$, journaled in a horizontal bearing, $B^4$, lying in the base of the machine and susceptible of vertical adjustment therein by means of bolts, $b'$, $b^2$, Figs. 1 and 7. On the outer end of the shaft, $C^4$, is rigidly fastened a transverse step, E, adapted to be operated by the foot in such a way as to swing the cam, K, through a slight angular limit of motion. When the cam is in the position shown in Fig. 2, the pulley, $P^2$, is raised and is in frictional contact with the pulley, P′; but when the cam is at its opposite limit of motion, the pulley, $P^2$, is dropped down out of contact with the pulley, P′. Hence, when the cam is in one position, the rotation of the driving pulley, P, is transmitted through the pulleys, P′, $P^2$, to the pulley, $P^3$, and when the cam is in its opposite position, the pulleys, P, P′, may rotate without transmitting any motion to the pulley, $P^3$, and the drill-chuck.

Beneath the shaft, $C^2$, is a work-supporting platen, F, provided with a split-ring, F′, encircling the standard and sliding up and down upon it, the ring, F′, being provided with a screw-threaded tightening bolt, *f*, having a crank or handle for turning it to tighten the ring upon the standard and thus to secure the platen in any desired position. A chain, G, having one of its ends secured to the ring, F′, passes upward over a sprocket-wheel, H, journaled in an attachment to the standard, and thence downward within the standard, its free end being provided with a tubular weight, W, which encircles the rod, $C^3$, and slides freely up and down within the standard, this weight being adapted to counterbalance the platen and facilitate its adjustment upon the standard. The sprocket-wheel, H, is mounted upon the horizontal shaft, H′, provided with a crank for its rotation and has on one of its faces a series of inclined ratchet teeth *h*, adapted to engage a corresponding series of teeth formed upon the ear or projection which supports one end of the shaft, H′, and presses in one direction against the sprocket-wheel, H, in such a way as to tend to bring the teeth, *h*, of the sprocket-wheel into engagement with the teeth, *h′*, upon the stationary support. When these teeth are in engagement, the ratchet wheel may be turned in a direction adapted to raise the platen but is secured by the teeth against reverse rotation. When the platen has upon it a heavy load of work sufficient to overbalance the weight, W, it may be raised by means of the crank and sprocket-wheel, but at each step is locked against any tendency to drop down. When it is desired to lower it, however, a slight longitudinal movement of the shaft, H′, and sprocket-wheel, H, against the force of the spring, is sufficient to withdraw teeth, *h*, from engagement with the teeth, *h′*, and as soon as this engagement is broken the platen may be lowered.

As shown in the drawings, the pulleys, P′, $P^3$, are faced with leather or other suitable material adapted to increase their friction when in contact with the intermediate pulley, $P^2$, and we have found the use of such a facing advantageous in practice. This feature of construction, however, constitutes no part of our invention.

The shaft, C′, which carries the pulley, $P^2$, may be supported in any suitable bearings, but we prefer such a construction as will permit lateral adjustment of the shaft in order to preserve the contact of the pulleys, $P^2$, $P^3$. Fig. 2 shows a device for this purpose, M being a bearing plate secured to the top of the standard by means of bolts, *m*, *m*, passing through longitudinal slots of slight extent formed in the bearing plate. An adjusting bolt, *m′*, passes horizontally through one end of the bearing plate and abuts against the corresponding bolt, *m*, the rotation of the bolt,

$m'$, being evidently adapted to draw the plate, M, in either direction, and the bolts, $m$, $m$, being adapted to secure the plate in any desired position.

In order to hold the sleeve, S, at any desired elevation, we have found it desirable to provide it with a friction bolt, $m^2$, Fig. 2, passing through the wall of the bearing of the arm, $b^3$, and impinging upon the sleeve. This bolt may be so set as to give the sleeve any desired degree of friction and thus to practically counterbalance its weight and that of the shaft, $C^2$, and hold them in any position to which they may be brought by means of the rotation of the pinion, $P^4$.

Having now described and explained our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with the standard, the shaft, $C^2$, journaled in suitable bearings thereon, and means substantially as shown and described, for rotating said shaft, of the chuck-supporting sleeve, S, sliding on the shaft and rotating therewith, the pinion, $P^4$, engaging teeth upon the sleeve, the notched disk, D, rigidly connected with the pinion, and the gravity lever, L, adapted to engage the notches in the disk and to serve as means for rotating the disk and pinion and raising and lowering the sleeve; substantially as shown and described.

2. The combination with the shaft, $C^2$, sliding sleeve, S, and pinion, $P^4$, of the notched disk, D, rigidly connected with the pinion, the rotating case, $d$, inclosing the disk, and the gravity lever, L, passing through and projecting from the case and provided with a pin, $p$, preventing its escape from the case, the inner end of the lever being adapted to engage the notches in the disk; substantially as shown and described.

3. The combination with the hollow standard, B, the drill-carrying shaft, $C^2$, supported therein and means for rotating said shaft, of the platen, F, provided with the ring, F', sliding upon the standard and having means for clamping it thereon, the sprocket-wheel, H, supported by the standard, the chain, G, fastened at one end to the platen and passing over the sprocket-wheel, and the weight, W, lying withing the standard and fastened to the end of the chain, said weight being adapted to move up and down within the standard and balance the weight of the platen; substantially as shown and described.

4. The combination with the hollow standard, B, the platen, F, means for securing it at any given point upon the standard, of the sprocket-wheel, H, supported by the standard, the chain, G, passing over and engaging the sprocket wheel and fastened at one end to the platen, the weight, W, fastened to the opposite end of the chain to balance the weight of the platen, and a suitable crank attached to the sprocket-wheel and adapted to rotate it in either direction and thereby to raise and lower the platen; substantially as shown and described.

5. The combination with the standard and the drill-carrying and drill-operating mechanism supported thereby, of the vertically adjustable platen, F, the weight W, the chain, G, having its ends fastened to said weight and platen, respectively, the sprocket-wheel, H, mounted on the standard and supporting the chain, G, co-acting teeth formed on the sprocket-wheel and standard and adapted to lock the sprocket-wheel against rotation, and a spring adapted to maintain the engagement of said teeth and to yield to pressure and permit the disengagement thereof and the free rotation of the sprocket-wheel; substantially as shown and described.

6. The combination with the standard, B, the drill-carrying shaft and means for rotating the same, of the platen F, the sprocket-wheel, H, provided with ratchet teeth, $h$, on its face, the weight, W, the chain G, passing over the sprocket-wheel and having its ends fastened to the platen and weight respectively, the crank for rotating the sprocket-wheel and the spring, $h^2$, adapted to press the teeth, $h$, of the sprocket-wheel into engagement with corresponding teeth upon the standard and lock the sprocket-wheel against rotation; substantially as shown and described.

7. The combination with the hollow standard, the driving shaft, C, and adjustable pulley, P', of the shaft, C', the pulley, $P^2$, mounted thereon, the cam, K, supporting the shaft, C', the shaft, $C^4$, supporting the cam, the bearing $B^4$, supporting the shaft, $C^4$, and means substantially as shown and described for rocking the shaft, $C^4$, and the cam, K, and raising and lowering the shaft, C', substantially as shown and described.

8. The combination with the standard, the shaft, C, the adjustable pulley, P', the shaft, C', and the pulley, $P^2$, mounted thereon, of the vertically adjustable horizontal box, $B^4$, the shaft, $C^4$, journaled therein and provided with means for rocking, and the cam, K, mounted on the shaft, $C^4$, and supporting the weight of the shaft, C', the rocking of the shaft, $C^4$, and cam, K, being adapted to raise and lower the pulley.

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