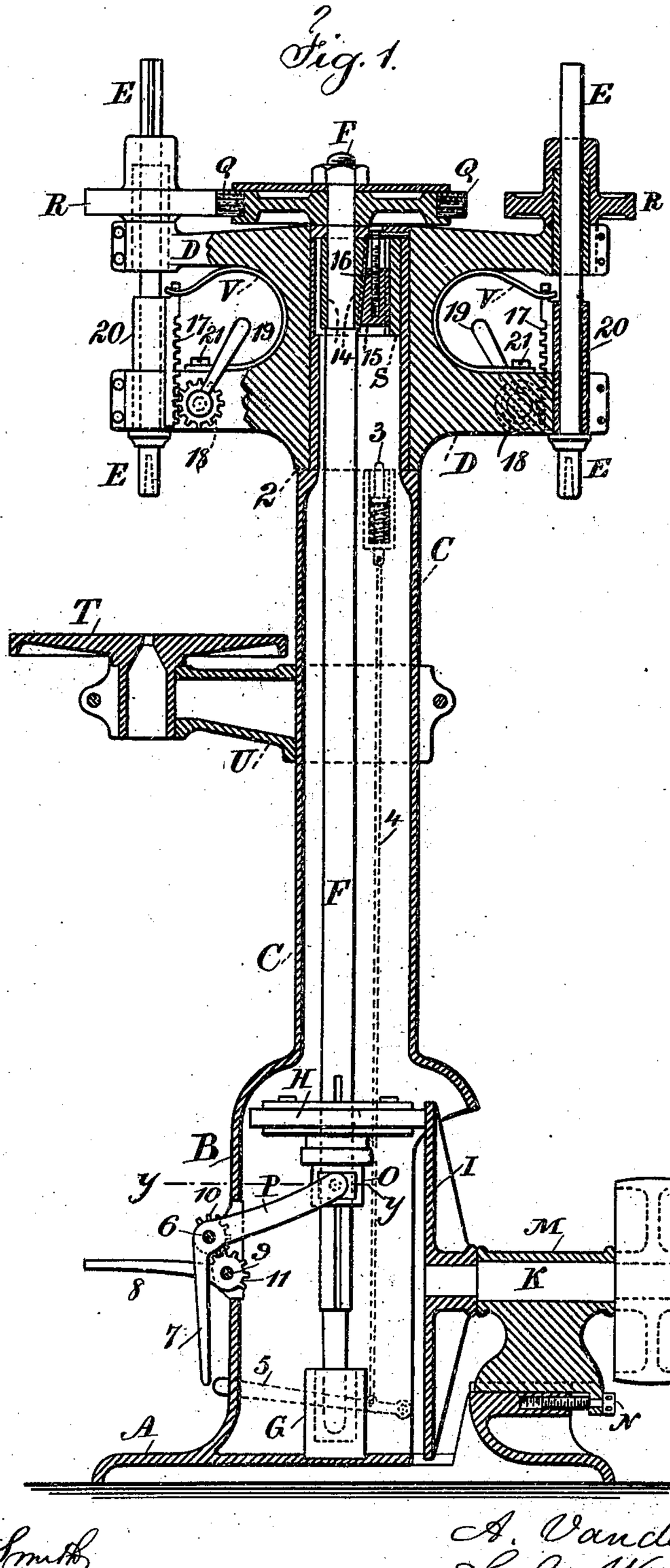
(No Model.) 2 Sheets—Sheet 1.

A. VANDERBEEK & L. C. WORRON.

DRILLING MACHINE.

No. 504,289. Patented Aug. 29, 1893.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

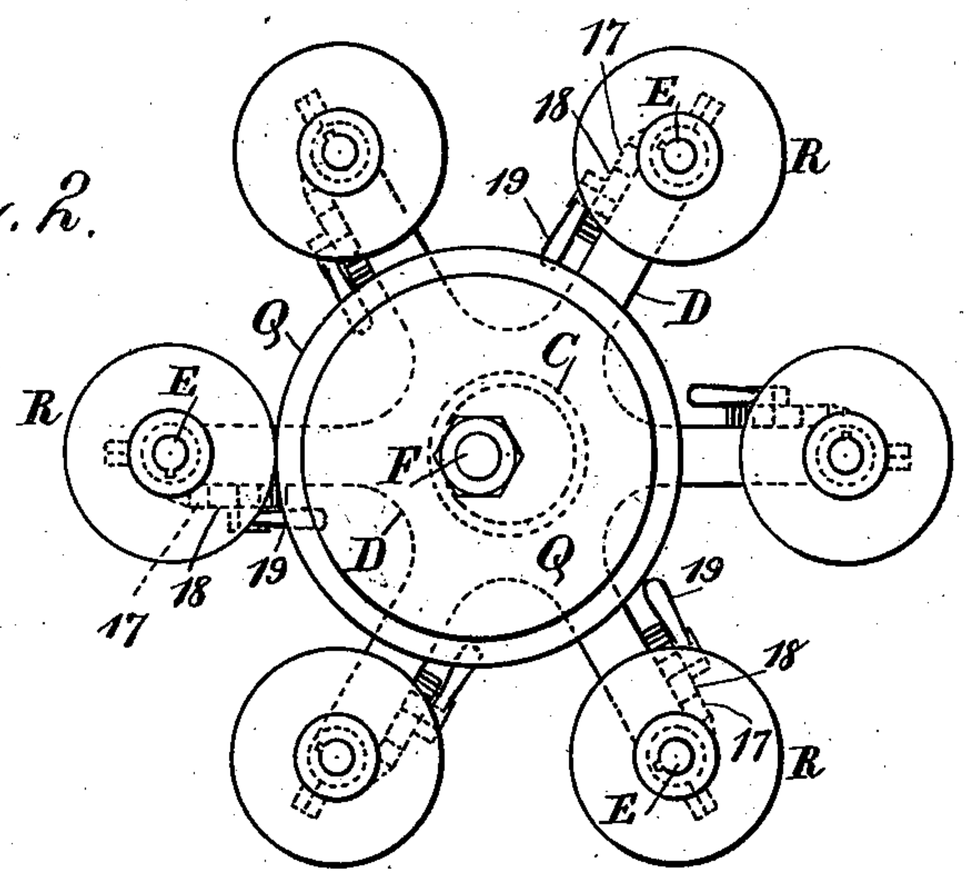


Fig. 3.

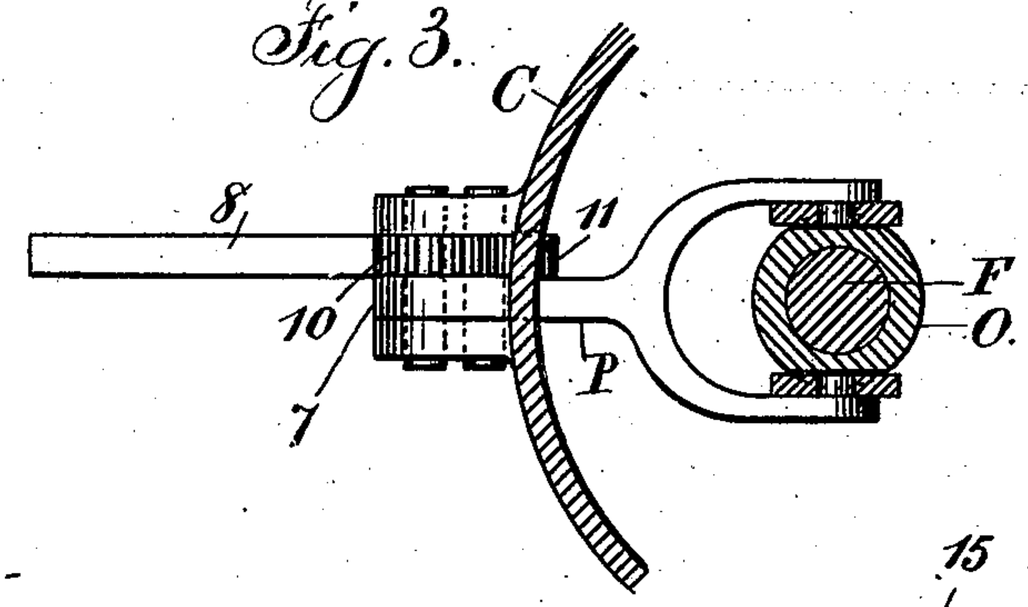


Fig. 4

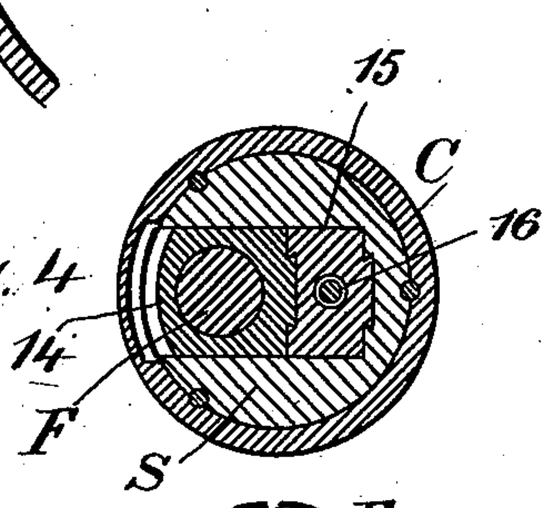
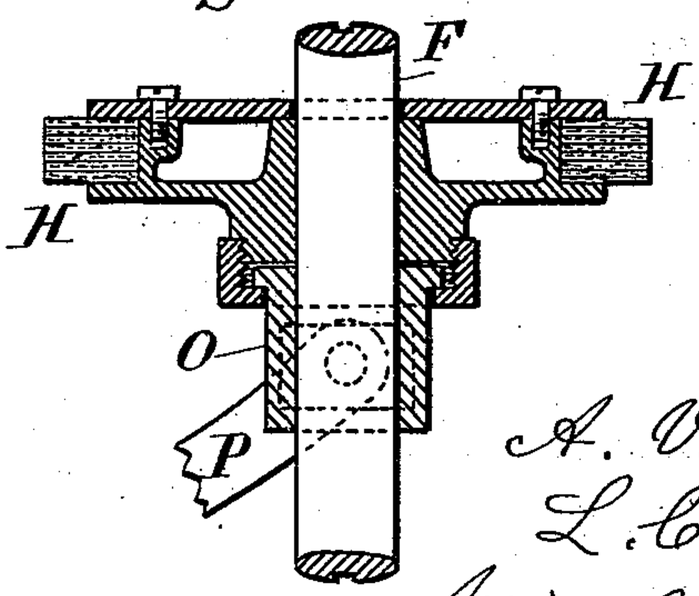


Fig. 5.



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UNITED STATES PATENT OFFICE.

ABRAHAM VANDERBEEK AND LEWIS C. WORRON, OF HARTFORD, CONNECTICUT, ASSIGNORS TO SAID VANDERBEEK.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 504,289, dated August 29, 1893.

Application filed June 15, 1893. Serial No. 477,746. (No model.)

To all whom it may concern:

Be it known that we, ABRAHAM VANDERBEEK and LEWIS C. WORRON, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented an Improvement in Drilling-Machines, of which the following is a specification.

In the present improvement a fixed column is made use of, supporting a head that may be rotated to bring into position and action one of several tools standing in a circle and a revolving shaft is in the standing column, eccentric to the same with a friction wheel on the upper end that comes into contact with the pulley of the drill to be propelled and is out of contact with all the wheels and other pulleys; and the countershaft for driving the apparatus is in the base, provided with a face wheel, and there is a friction pinion upon the vertical shaft, such friction pinion being slid upon the vertical shaft by the action of peculiar treadles so as to bring the friction pinion nearer to or farther from the axis of rotation of the face wheel, thereby increasing or lessening the speed of the drill.

In the drawings, Figure 1 is a vertical section of the drilling machine. Fig. 2 is a plan view of the upper portion of the same. Fig. 3 is a sectional plan of the treadle mechanism at the line *y y* of Fig. 1. Fig. 4 is a horizontal section through the bearing of the vertical driving shaft, and Fig. 5 is a vertical section of the pinion and collar at the lower portion of the vertical driving shaft.

The machine is supported on a suitable base A upon which is the box B forming the base of the hollow column C, and there is a shoulder at 2 around the upper part of the column upon which rests the drill head D that is provided with a circular range of vertical spindles E or tool holders, and the head may be rotated to bring either of the spindles into position for use, and there is a bolt 3 that passes up into one of the recesses in the lower part of the drill head for holding such head when it has been revolved to bring the proper tool into position, and from the bolt 3 a rod 4 extends to a lever 5 by which the bolt can be engaged or disengaged. It is preferable to employ a bolt that is raised by a spring as shown by dotted lines in Fig. 1 and is brought down by the lever 5 whenever the bolt is to be disengaged.

The column C is hollow for the reception of the vertical shaft F which is supported by the step or socket G upon the base A, and upon this shaft F is a friction pinion H, the edge of which is against the surface of the disk I upon the shaft K which receives rotary movement from any suitable device such as the belt pulley L, and there is a key or feather for connecting the pinion H with the shaft K and upon which key or feather such pinion can be raised or lowered to bring it nearer to or farther from the axis of the disk I and hence to increase or lessen the speed with which the shaft F is rotated in relation to the counter or driving shaft K.

The counter or driving shaft K is supported by a bearing M upon the base A, and said bearing can be slid radially toward or from the vertical shaft F, and we make use of a screw N to act upon the bearing M to press the same and the disk I toward the friction pinion H with the desired force for insuring the proper driving of the pinion H by the friction therewith of the disk I.

The collar O is connected with the friction pinion H so that by it said pinion H can be raised or lowered as the shaft is revolved with and by the pinion through the intervention of the key or feather, but the collar O does not revolve and it is connected with the arm P that extends from the axis or short shaft 6 that is supported by the box portion or base of the column C, and the treadle 7 is connected directly with the arm P and the treadle 8 is on an axis 9, and there are segmental gears 10 and 11 upon the respective parts and the treadle 8 connected with the segmental gear 11. Hence when the foot is placed upon or against the treadle 7 the arm P moves the collar O and the friction pinion H upwardly and nearer to the periphery of the friction wheel or disk I, and when the foot is placed upon the treadle 8 it acts through the gear 11 upon the segmental gear 10 to move the arm P and the collar O downwardly and draw the friction pinion H downwardly and nearer to the axis of rotation of the disk I. By this means the speed of rotation of the disk I and

vertical shaft F can be regulated; and we remark that it is advantageous to employ rings of leather clamped together to form the friction pinion H, so that the edges of these rings being in contact with the friction disk I receive rotation from the same.

At the upper end of the vertical shaft F there is a friction wheel Q, preferably having a surface or edge of rings of leather clamped together and upon each drill spindle is a friction pinion or wheel R, and the shaft F being eccentric to the column C the wheel Q is in such a position as only to come into contact with and to drive one of the friction pinions or wheels R, as represented in Figs. 1 and 2 and in order to compensate for wear and to cause the wheel Q to press with the necessary force against the wheel R that is to be driven for rotating the same, the spindle and the tool held by the spindle, we employ an adjustable bearing for the upper part of the shaft within the column, such bearing being composed of the box 14 having an inclined side with which the wedge 15 comes into contact, and it is advantageous to have the box 14 supported by a bearing S within the upper part of the column, and the wedge 15 is suspended and moved vertically by the screw 16, and the surface of the wedge 15 that is in contact with the bearing S is dovetailed to connect the parts and allow of the vertical movement of of the wedge, and so also is the wedge 15 dovetailed with the box 14, and there is a space between the opposite edge of the box 14 and the inside of the column that allows for the parts to be adjusted by raising or lowering the wedge 15 by the screw 16, and in so doing the box 14 is moved in one direction or the other and the friction between the wheel Q and the wheel or pinion R can be regulated with facility.

It is advantageous to employ a table or bearing plate T carrying the article to be bored, and there is an arm U having an eye that surrounds the column C and on which column the arm can be raised or lowered and clamped so as to vary the height of the bearing plate and the proximity of the article to the spindle and the tool carried by the spindle. Each spindle E is movable vertically by any suitble device such as a rack 17, pinion 18 and lever 19 acting upon the sleeve 20 surrounding the lower part of the spindle and forming a box or bearing for the same, and the spindle slides through the friction wheel R, there being a spline or feather to cause the wheel R to give motion to the spindle as it is driven by the wheel Q; and each spring V is fastened at one end 21 upon the surface of the head and within the semi-circular recess formed for the reception of such spring V, and the other end of the spring V is connected to the sleeve 20, and when the sleeve 20 is in an elevated position the exterior surface of the spring V rests against the interior, or curved surface of the arm, and as the spindle is drawn down the active portion of the spring V is gradually lengthened by the end of the spring moving vertically and drawing the curved part of the spring away from its bearing against the semi-circular surface of the spindle head D, thereby we are enabled to make use of a spring which has the necessary length for obtaining the proper flexibility, and when the spindle is raised the active portion of the spring is lessened by such spring bearing against the surface of the head, but as the spindle is moved downwardly during the drilling operation the effective lengths of the springs V increase and its flexibility is correspondingly augmented by being pulled away from its bearing against the surface of the head D. By this means we are enabled to employ a flexible spring that is sufficiently stiff when the spindle is raised for holding the same in position and which is sufficiently long for practical use when the spring is strained by the spindle being moved downwardly to its extreme point.

We claim as our invention—

1. The combination with the column and its vertical eccentrically located shaft, of a countershaft and friction disk, a friction pinion upon the vertical shaft capable of being raised and lowered upon a feather or spline, a collar connected with the pinion, a lever and treadle for acting upon the collar to raise the pinion, and a second lever and intermediate gear segments for acting upon the lever and collar to draw down the pinion and lessen the speed, substantially as set forth.

2. The combination in a drilling machine, of a vertical column and a shaft within the same, a friction pinion movable up and down upon such shaft, a disk for rotating the pinion, a countershaft for such disk and a bearing carrying the countershaft and movable upon the base of the column, and a screw for applying the pressure and friction between the revolving disk and the pinion, substantially as set forth.

3. The combination in a drilling machine, of a column, an eccentrically located shaft within the column, means for driving the same, a drill head supported by the column and capable of being rotated, a circular range of vertical spindles carried by the drill head, friction wheels upon the respective spindles, and a friction wheel upon the eccentrically located vertical shaft coming into contact and driving the spindle which is in position for use, and a movable bearing for the upper end of the eccentric shaft for applying friction between the wheel upon the upper end of the vertical shaft and the wheel upon the spindle that is being rotated, substantially as set forth.

4. The combination with the circular range of vertical spindles, of a head carrying such spindles, a supporting column for such head, there being concave surfaces upon the exterior of the revolving head and springs within such concave surfaces, means for permanently attaching the springs at one end, and connections from the other ends of the sleeves to

the spindles, substantially as specified, whereby the spring has a bearing against the concave surface of the head when the spindle is raised and the effective length of the spring is increased as the spindle is drawn down in consequence of the spring leaving the concave surface of the head, substantially as set forth.

5. The combination with the spindle E and the sleeve 20 surrounding the same, of a head for carrying the spindle having a concave surface, and a plate spring fastened at one end to the head and resting against the concave surface, the other end of the spring being connected with the sleeve, and means for raising and lowering the sleeve and the spindle, substantially as set forth.

Signed by us this 10th day of June, 1893.

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L. C. WORRON.

Witnesses:
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W. L. GRISWOLD.