(No Model.) 2 Sheets—Sheet 1.

C. F. HOTCHKISS.

BORING MACHINE.

No. 491,110. Patented Feb. 7, 1893.

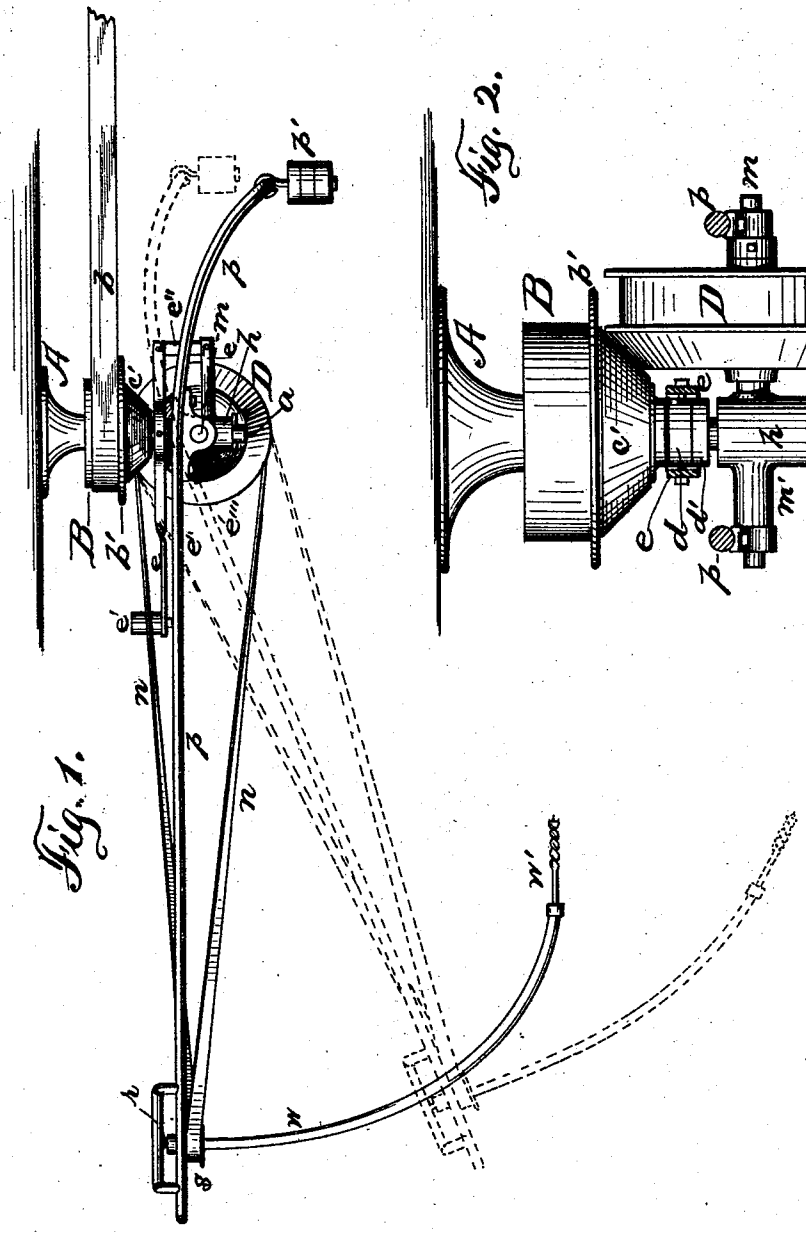

Fig. 1.

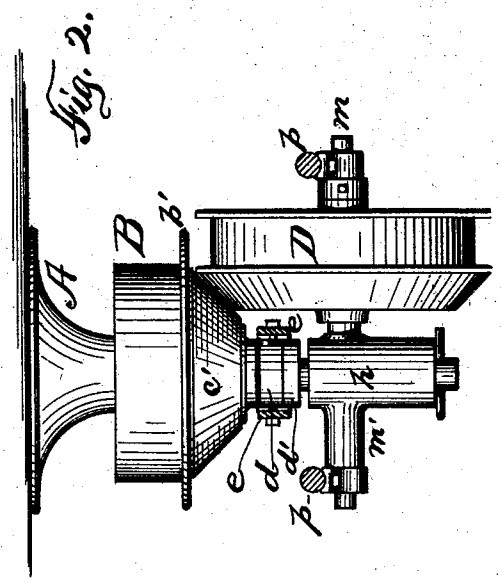

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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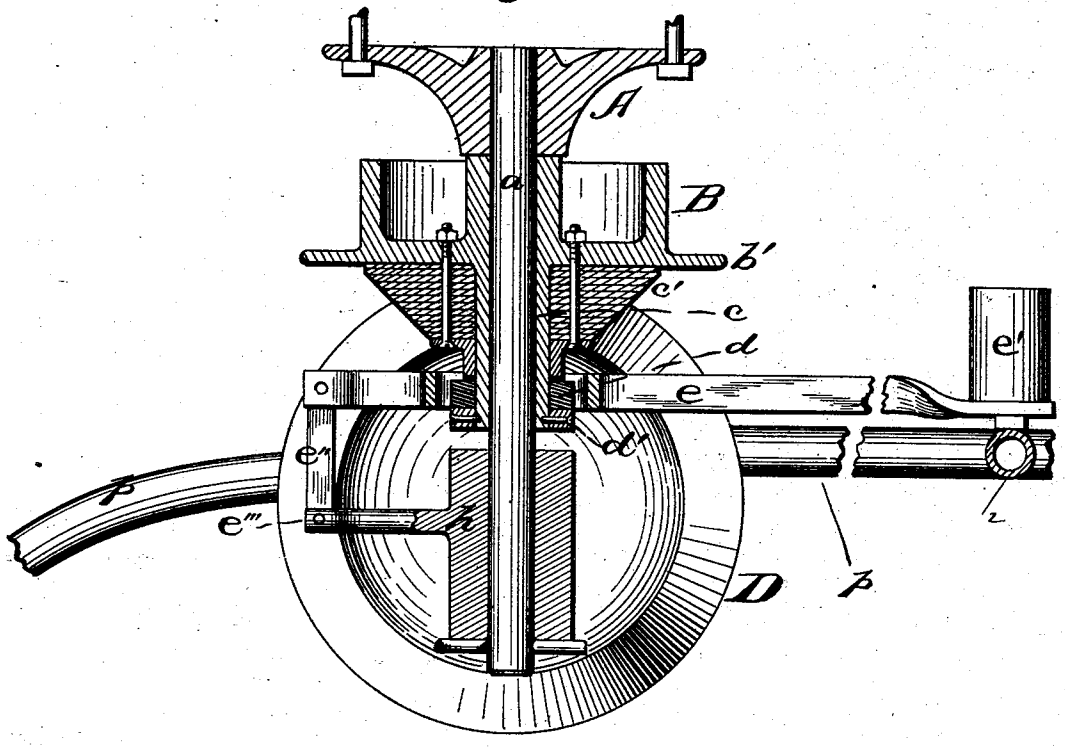
Fig. 3.



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UNITED STATES PATENT OFFICE.

CLARENCE F. HOTCHKISS, OF BINGHAMTON, NEW YORK.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 491,110, dated February 7, 1893.

Application filed June 25, 1892. Serial No. 437,984. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE F. HOTCHKISS, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Boring-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to boring machines and particularly to that class employing a pivotally mounted frame carrying at one end the driven pulley, to which a flexible shaft is connected and in the free end of which the boring, or other tool, is detachably secured, said frame being counterbalanced, and said pulley being driven by a belt actuated by two cone friction drive pulleys, held in frictional contact, and such frictional engagement being increased by a weighted lever, which exerts a downward force upon the primary drive pulley.

My invention consists in the several novel features of construction and operation hereinafter described and which are specifically set forth in the claims hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which

Figure 1, is a side elevation of the machine, set up, and showing the swing of the frame, by the dotted lines, Fig. 2, is an enlarged front elevation, of the frictional drive pulleys and their supports, sectional in part. Fig. 3, is a vertical sectional elevation of the same parts on line *x x*, in Fig. 2, showing part of the frame in elevation and a sectional elevation of the lever carrying the friction weight.

A—, is a suitable base, shown in Fig. 1, as secured to the ceiling, in which the vertical shaft —*a*— is secured.

B—, is the primary drive pulley mounted loosely upon said shaft, and driven by a belt —*b*—, supported thereon vertically by the horizontally projecting flange —*b'*—. Around the hub —*c*— of said pulley, I secure leather washers —*c'*— in such manner as to create thereby a beveled or cone-face upon the lower part of the pulley. A loose collar —*d*— is mounted upon said hub, and a tight collar —*d'*— is also secured upon the lower end of this hub. A lever —*e*— is pivotally connected to the loose collar and upon one end carries the friction weight —*e'*— and at the other end is pivotally connected to the port —*e''*— erected upon the arm —*e'''*— projecting from one side of the sleeve —*h*— upon the lower end of the shaft —*a*—.

D—, is the secondary drive pulley loose upon the shaft —*m*— projecting from one side of said sleeve, having a cone-face in engagement with the cone-face of the primary drive pulley, and grooved peripherally to carry the belt —*n*—. Upon the outer end of this shaft —*m*— and upon an arm —*m'*— in alignment therewith and projecting from the opposite side of said sleeve, I pivotally mount the side rails —*p*— which, converging at the right in Fig. 1, carry the counter weight —*p'*—; and converging at the left, a vertical shaft —*r*— is journaled therein upon which the horizontal and flanged driven pulley —*s*— is secured, which the belt —*n*— drives, to which shaft the flexible drive shaft —*w*— is secured, and —*w'*— is the tool detachably mounted in the free end of said shaft —*w*—. It will be seen that the weight —*e'*— operates to maintain the primary drive pulley in frictional engagement with the secondary one, and to increase the degree of the pressure of the former upon the latter, according to the specific gravity of the weight and the length of the lever carrying it. It will be further seen that the shaft —*a*— is the pivot of the sleeve —*h*— and through the connections aforesaid, of the frame carrying the flexible shaft, so that the said frame can be swung laterally to any point; and that the frame through the pivotal mounting of its side rails, can be swung vertically to depress the flexible belt and tool, and the counterbalance will swing it back to its normal position; and that in short, said sleeve and its mounting and the pivotal mounting of the frame thereon, together create a universal joint, as the mounting of the frame. The cone-faces of the drive pulleys are normally in frictional engagement, but can be thrown out by raising the weight —*e'*— and the lever —*e*— which will lift the primary drive pulley. When the weight throws the frame up, as aforesaid, the cross-bar —2— upon the frame will come up di-

rectly under the lever weight, and raise the horizontal gear out of engagement with the other and stop the machine entirely.

What I claim as my invention and desire to secure by Letters Patent is,

1. In a boring machine, a vertical shaft, a cone-faced drive pulley loose thereon, a sleeve loose upon said shaft below said pulley, a second cone-faced pulley loose upon a shaft projecting from said sleeve and in engagement with the other pulley, a counterbalanced frame pivotally connected to said sleeve, a driven pulley mounted in the free end of said frame, and a flexible tool-carrying shaft connected to said driven pulley, and means to drive said pulleys, in combination as set forth.

2. In a boring machine a vertical shaft, a cone-faced drive pulley, loose thereon, a collar loose upon the hub thereof, a collar secured thereto below the loose collar, a sleeve loose upon said shaft below said pulley, a second cone-faced pulley loose upon a shaft projecting from said sleeve and in engagement with the other pulley a weighted lever pivotally connected to said sleeve, a driven pulley mounted in the free end of said frame, and a flexible tool-carrying shaft connected to said driven pulley, and means to drive said pulleys, in combination as set forth.

3. In a boring machine, a vertical shaft, a drive pulley loose thereon and flanged to carry the driving belt, and having a cone face of different material secured to it below said flange, a sleeve loose upon said shaft, a grooved and cone-faced pulley loose upon a horizontal shaft secured to said sleeve, a counterbalanced frame pivotally connected to opposite sides of said sleeve, a driven pulley mounted in the free end of said frame and having a horizontal flange to carry a belt, a flexible tool-carrying shaft connected to and driven by the latter pulley, and means to drive said pulleys, in combination as set forth.

In witness whereof I have hereunto set my hand this 18th day of June, 1892.

CLARENCE F. HOTCHKISS.

In presence of—
M. A. TIERNEY,
HENRY C. OLMSTED.