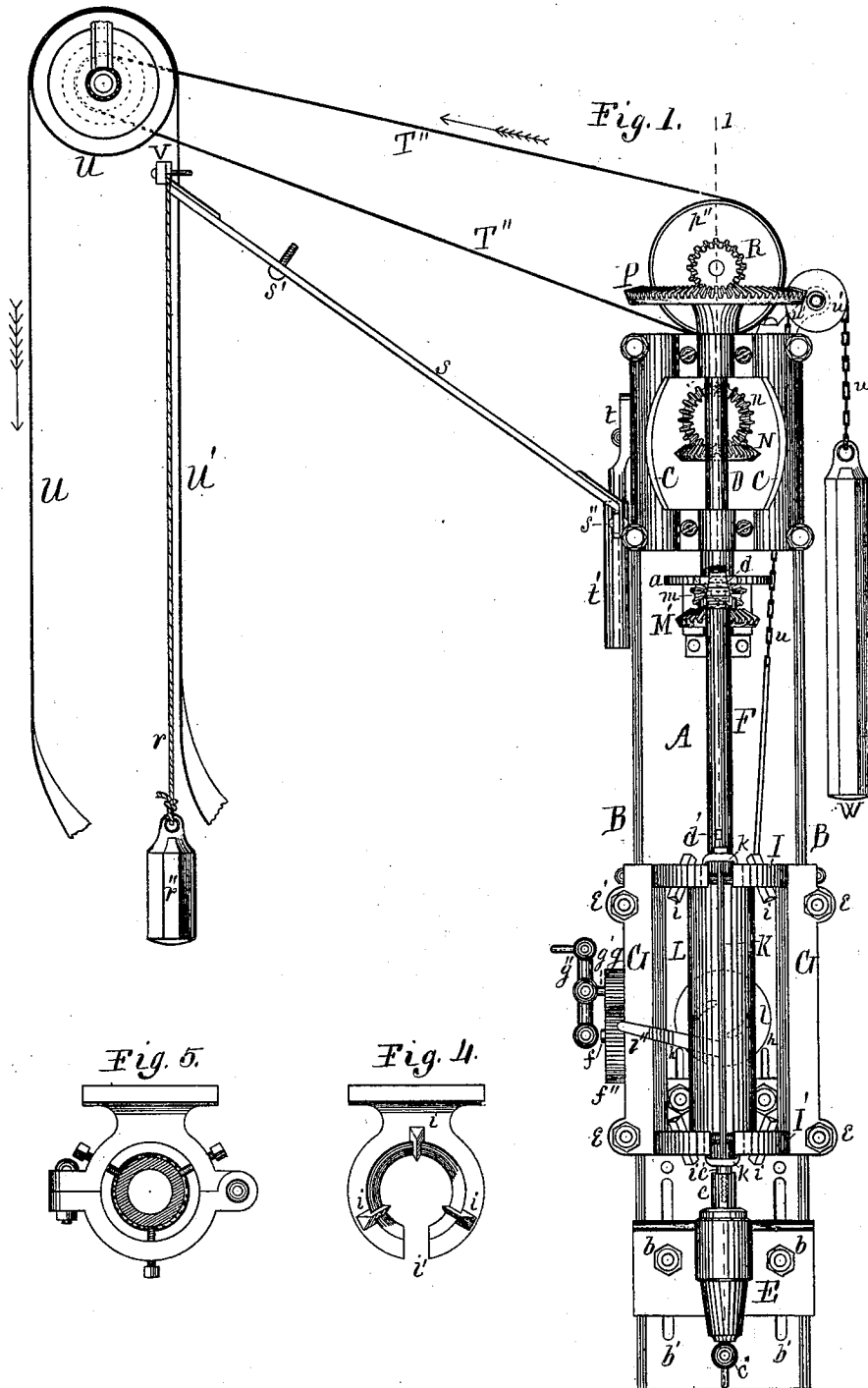


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MACHINES FOR BORING METALLIC CYLINDERS.

No. 178,350.

Patented June 6, 1876.



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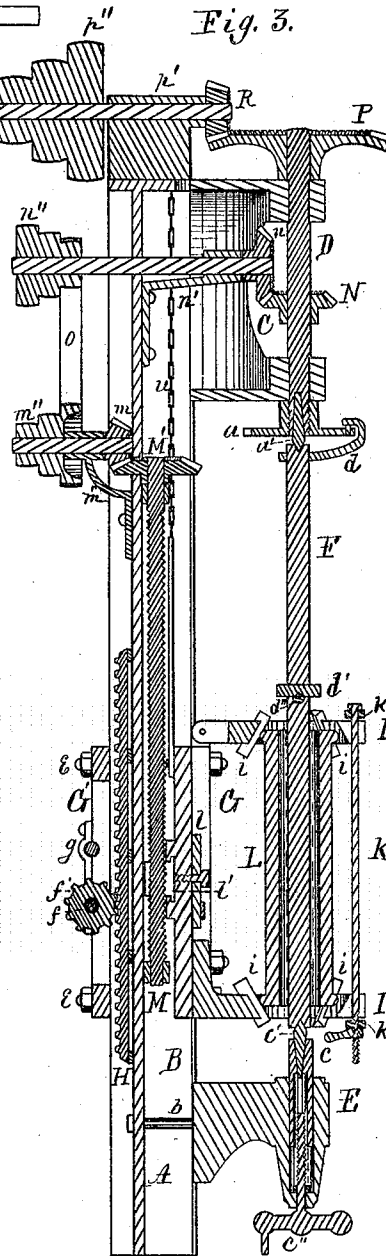
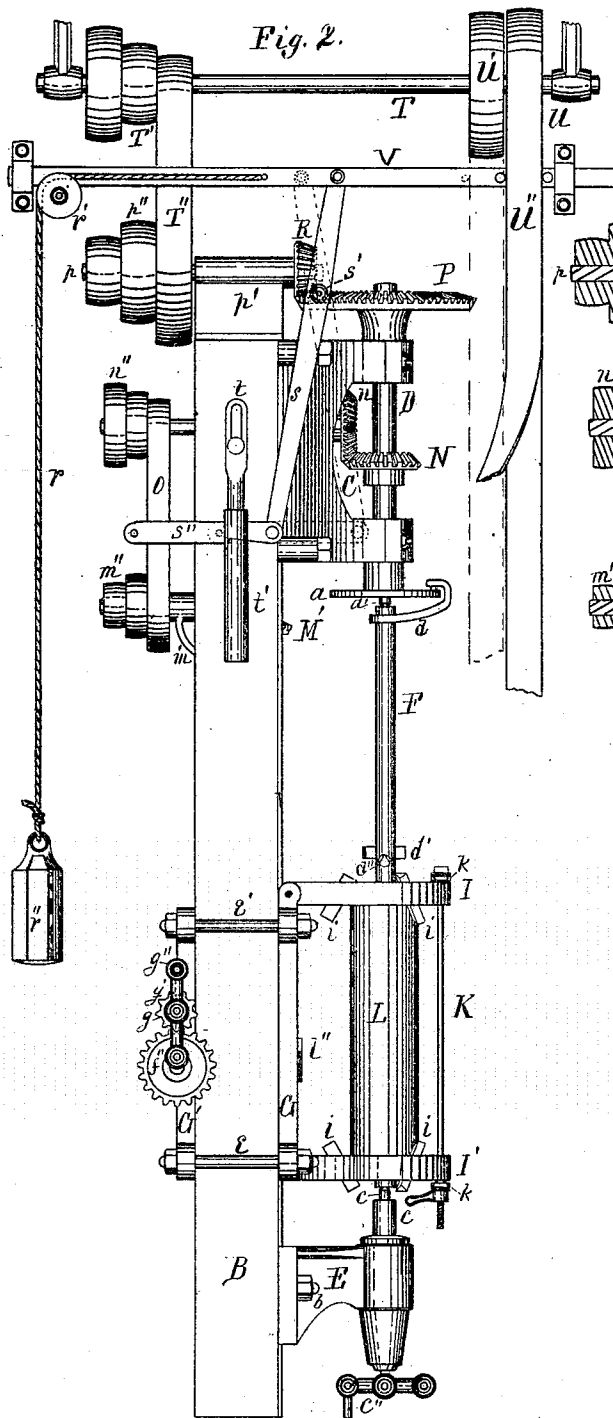
Inventor.
Franklin B. Trahern.
Per Jacob Behl.
Atty.

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UNITED STATES PATENT OFFICE.

FRANKLIN B. TRAHERN, OF ROCKFORD, ILLINOIS.

IMPROVEMENT IN MACHINES FOR BORING METALLIC CYLINDERS.

Specification forming part of Letters Patent No. **178,350**, dated June 6, 1876; application filed January 25, 1876.

To all whom it may concern:

Be it known that I, FRANKLIN B. TRAHERN, of the city of Rockford, State of Illinois, have invented certain Improvements in Boring-Machines, of which the following is a specification:

My invention relates to that class usually known as vertical boring-machines, employed for boring cylinders and similar work, in which a boring-bar is employed, and is designed for boring pump-cylinders, known in the trade as pump-barrels, and can be successfully employed for other and similar purposes; and consists in the construction, arrangement, and combination of parts and of devices which I will now proceed to describe.

In the drawings, Figure 1 is a front elevation of my improved boring-machine. Fig. 2 is a side elevation. Fig. 3 is a central vertical section on dotted line 1 in Fig. 1. Fig. 4 is a face view of a self-centering chuck; and Fig. 5 is a face view of a centering-chuck, provided with adjustable set-screws, which may be employed instead of the self-centering chuck, Fig. 4.

In the figures, A is a central web, connecting the sides B, which are made of equal width throughout their length, and their front edges are beveled, forming guideways. This constitutes the main frame of my improved boring-machine, and it is supported in a vertical position. C is a head-block, fitted to the guideways, and is firmly secured in place on the upper end of the main frame, and furnishes bearings for mandrel D, the lower end of which is fitted with the face-plate *a*, and is also fitted with a conic-pointed center, *a'*. E is a tail-block, fitted to the guideways on main frame, on which it is held in place by screw-bolts *b*, which pass through the base of said tail-block and central web A of the main frame, web A being provided with slots *b'*, or a series of holes, for their reception. The slots *b'* and screw-bolts *b* furnish the means for the vertical adjustment of the tail-block for the purpose of receiving boring-bars differing in length. The tail-block is fitted with a sliding mandrel, *c*, fitted with a conic-pointed center, *c'*, and its sliding movements are controlled by the tail-screw, which is operated by the balance crank-arm *c''* secured

thereto. F is a boring bar, supported on the conic-pointed centers *a'* and *c'*, and is connected to the face-plate *a* by dog *d*, so as to revolve with the face-plate. The boring-bar is fitted with a cutting-tool, *d'*, which is passed transversely through the boring-bar. The cutting-tool is fitted centrally on its edge, with a V-formed notch to receive the V-formed edge of the pin *d''*, which is passed transversely through the boring-bar at right angles to the cutting-tool, to hold it centrally in place. By this method of securing the cutting-tool centrally in place, I am enabled to use larger boring-bars in small cylinders, which in long boring-bars is of great importance.

On the main frame is fitted a carriage composed of a plate, G, fitted to slide on the guideways on front edges of sides B, and open plate G', fitted to slide on the back edges of sides B, the plates G and G' being held in place by bolts *e* and *e'*, in such a manner as to slide lengthwise on the main frame. This carriage is fitted on its rear side with transverse shafts *f* and *g*, having their bearings on the side bars of open plate G.

The shaft *f* is fitted with a spur-pinion, *f'*, the teeth of which engage the teeth of rack H, which is secured centrally to the web A of the main frame, and is fitted on its outer end with a spur-wheel, *f''*, the teeth of which engage the teeth of pinion *g'* on shaft *g*, the outer end of which is fitted with a balanced crank-arm, *g''*, by means of which, through its connection with the main frame, the carriage is made to slide up and down on the frame, to change its position thereon, as circumstances may require. The carriage, as above described, is also fitted with self-centering chucks I and I', a face view of one of which is clearly shown in Fig. 4. The chuck I is connected to the upper end of the carriage by a hinge-joint, to permit of an up-and-down swinging movement, while the chuck I' is provided with a right-angled foot to rest against the plate G, to which it is held by suitable bolts, which pass through the foot and plate, and is made vertically adjustable thereon by means of the slots *h*, or holes provided for that purpose, in order to enable the machine to receive cylinders differing in length. These chucks I and I' are formed with conic

openings centrally with the axis of the boring-bar, and their inner inclined walls are provided with V-formed prominences, as seen at *i*, to receive the ends of the cylinders, the prominences embracing the outer walls of the ends thereof, to hold the work by frictional contact, and their edges are opened, as at *i'*, to freely admit the boring-bar. K is a screw clamping-rod fitted with gripes *k*, which span the openings *i'*, and is employed for the purpose of clamping the chucks on the ends of the cylinder, to hold it firmly in place, properly centered, and in line with the boring-bar, to be operated upon by the cutting-tool, for the purpose of boring the cylinder. L represents the cylinder in place in the chucks. *l* is a disk pivoted to the front face of plate G, and is fitted with spiral slots to receive studs, which project through the plate from the parted screw-nut *l'*, which is composed of two halves fitted to slide laterally in rabbeted ways on the rear face of the plate. The disk is fitted with a lever-arm, *l''*, by which it can be rotated, and, by means of its connection with the parted screw-nut, cause it to close on or open from the feeding-screw M. The feeding-screw M is fitted to revolve in suitable bearings on center web A, and its upper end is fitted with a bevel-gear, *M'*, the teeth of which engage the teeth of bevel-pinion *m*. The shaft of bevel-pinion *m* is fitted to revolve in bracket-bearing *m'*, and is provided with cone-pulleys *m''*. The mandrel D is fitted with a miter-gear, N, the teeth of which engage the teeth of a like miter-gear, *n*, on a shaft fitted to revolve in bearing *n'* on the main frame. The shaft of miter-gear *n* is provided with cone-pulleys *n''*. The cone-pulleys *m''* and *n''* are provided with a belt, *o*, which can be changed to any pair of the pulleys forming the cones, for the purpose of changing the feed by changing the velocity of the feed-screw. On the upper end of mandrel D is mounted a bevel-gear, P, the teeth of which engage the teeth of bevel-pinion R on shaft *p*, which is supported in bearing *p'* on the main frame, and is provided with cone-pulleys *p''*.

T is a counter-shaft, supported in suitable hangers, and is fitted with cone-pulleys *T'*, which are connected to the cone-pulleys *p''* by a belt, *T''*, which can be changed to any pair of the pulleys forming the cones for the purpose of varying the speed of the machine. The counter-shaft T is fitted with a fixed pulley, U, and a loose pulley, *U'*, for the reception of the driving-belt *U''*, leading from the line-shaft for the purpose of imparting motion to the machine. V is a shipping-bar or ordinary construction, fitted with pins to receive the belt for the purpose of shifting it from the fixed to the loose pulley, or vice versa, with the movement of the shipping-bar, to stop or start the machine. *r* is a cord secured to the shipping-bar, from which it is passed over the sheave *r'*, and to its free end is attached the weight *r''*, which operates to shift the belt from the fixed to the loose pulley to stop the machine. *s* is a shipping-lever, pivoted at *s'*,

one end of which is connected to the shipping-bar, and its other end to the detent-bar *s''*, which is fitted with a hooking-notch on its lower edge. *t* is a bar, slotted at its upper end, through which a screw is inserted into the main frame in such a manner as to permit of a vertical adjustment of the bar. The bar *t* is fitted with a tube, *t'*, which freely slides over the free portion of the bar *t*, both of which are slotted transversely to freely receive the detent-bar *s''*, which, when passed into the slot, as represented in the drawing, the hook will catch on the bar *t*, and the weight of the tube *t'* will hold it in its hooked position, thus holding the belt *U''* on the fixed pulley U, from which motion is imparted to the boring-bar, and to the feeding-screw, causing the carriage to ascend until the screw-bolt *e'* comes in contact with the lower end of the tube *t'*, raising it sufficiently to disengage the detent-bar *s''* from its hold on the bar *t*, when the weight *r''*, through its connections with the shipping-bar, will shift the belt from the fixed to the loose pulley, and stop the machine. In the preparation of certain varieties of pump-cylinders, it is necessary to stop the bar at some point within the length of the cylinder, and cylinders differing in length are employed in the manufacture of pumps. By means of the foregoing arrangement of the adjustable automatic shipping device, I am enabled to bore all varieties, and to automatically stop the boring at any point, and in the absence of the attendant the machine will stop at the proper place, and prevent spoiling the work, or injuring the machine. W is a counter-weight, connected to the carriage by a chain, *w*, which passes over a sheave, *w'*, fitted to revolve on suitable bearings in brackets *w''*, secured to the main frame for the purpose of counterbalancing the weight of the carriage and the piece therein to be operated upon, and to prevent undue wear of feeding-screw, and the raising and lowering devices. The line-shaft being in motion will transmit motion to the belt *U''* and counter-shaft T, from which motion will be transmitted to the shaft *p* by means of the belt *T''*, and to the mandrel D through the bevel-gears R and P, thence to the boring-bar F, which carries the cutting-tool *d'*.

Motion from the mandrel will be transmitted through the miter-gears N and *n* to the cone-pulleys *n''*, from thence to the cone-pulleys *m''* by means of the belt *o*, and thence, through bevel-gears *m* and *M'*, to the feeding-screw M; thence to the carriage on which the cylinder is secured, causing it to rise as the cutters revolve, until it detaches the detent-bars *s''*, when the machine will be stopped by shifting the belt *U''* to the loose pulley *U'*.

Among other advantages attending my improved boring-machine I will mention the following: It being a vertical machine I am enabled to place the machines close to each other, so as to occupy less floor-room, and in such position as to enable an attendant to op-

erate more machines, and the automatic shipping device serves to prevent injury to the machines from running beyond proper limits, and, being vertical, the cutting-tool will always work freely, and will not be wading in the chips cut from the cylinder. And my method of securing the cutting-tool in place permits of the use of larger boring-bars, which insure more accurate work in long cylinders of small bore, and by means of my self-centering chucks work is more readily and accurately placed in and removed from the machine.

I claim as my invention—

1. The centering-chuck with central opening, the inner wall of which is fitted with *V*-form prominences *i*, as shown and described, and for the purpose set forth.

2. In combination with the carriage, as described, the centering-chuck *I*, constructed as shown and described, hinged to the upper end of the carriage, so as to swing upward, to freely permit of cylinders being placed in the chuck or removed therefrom, as set forth.

3. In combination with the carriage, as described, the centering-chuck *I'*, constructed as described and shown, secured to the lower end

of the carriage, on which it is vertically adjustable for the purpose of receiving cylinders differing in lengths, as hereinbefore set forth.

4. In combination with the centering-chucks *I* and *I'*, constructed and secured to the carriage as described, the clamping-rod *K*, fitted with gripes *k*, to clamp the chucks on the end of the cylinder *L*, for the purpose of holding it properly centered and lined, to be operated on by a suitable boring-tool.

5. The carriage, provided with the centering-chucks *I* and *I'*, and clamping-rod *K*, to hold the cylinder to be operated upon by the cutting-tool, in combination with the feeding-screw *M*, for the purpose of feeding the carriage holding the cylinder to the cutting-tool, for the purpose of boring the cylinder, as set forth.

6. The combination of the adjustable rod *t*, tube *t'*, detent *s''*, lever *s*, and shipping-bar *V*, for the purpose of holding the belt *U''* on fixed pulley *U*, as shown and described.

FRANKLIN B. TRAHERN.

Witnesses:

JOHN HAMMILL,
M. D. TRAHERN.