(No Model.) 2 Sheets—Sheet 1.

H. A. AXTELL.

MORTISING AND BORING MACHINE.

No. 343,217. Patented June 8, 1886.

Fig. 1.

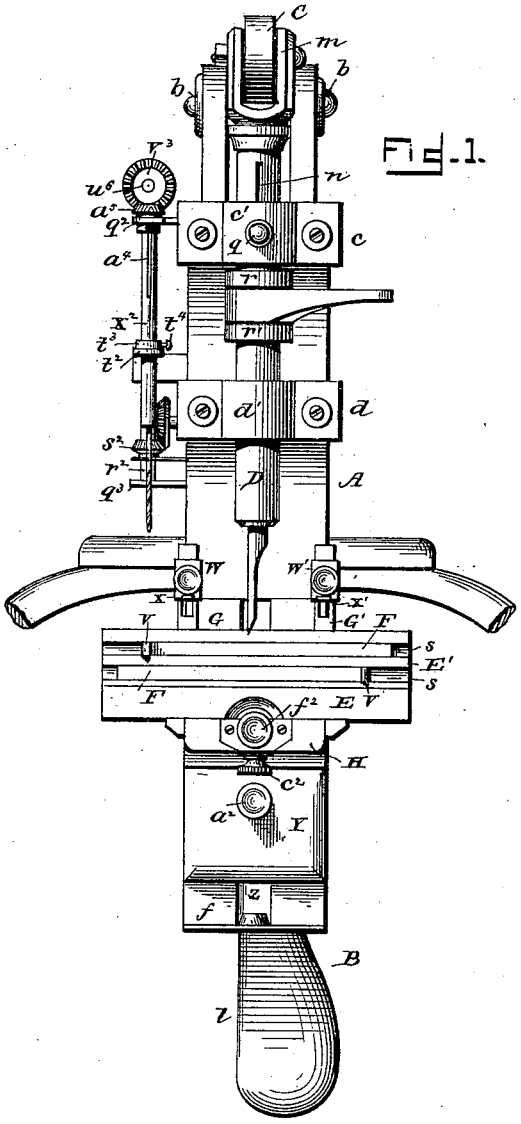
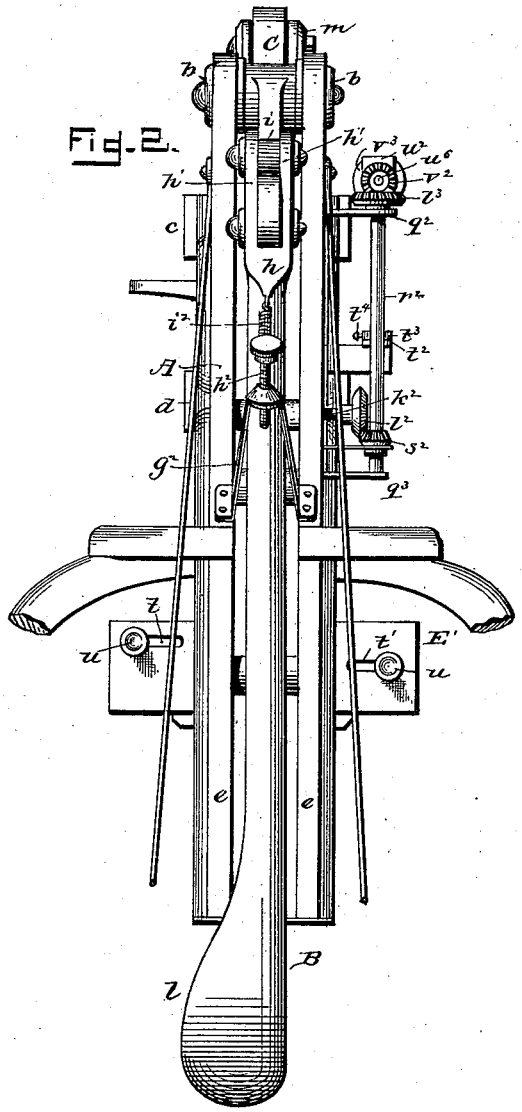


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

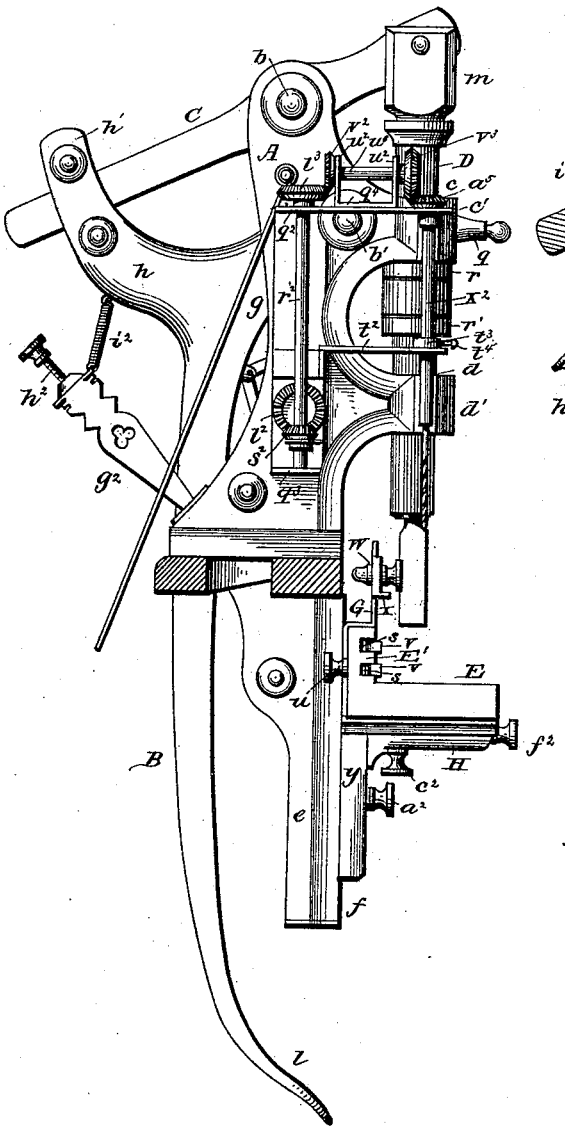
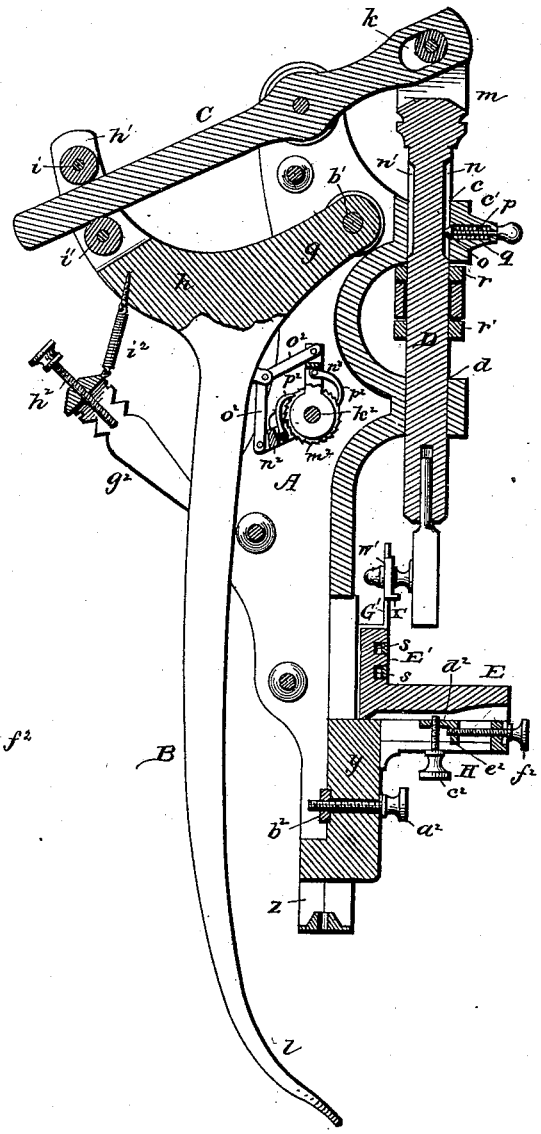


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY A. AXTELL, OF MONTAGUE, MASSACHUSETTS.

MORTISING AND BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 343,217, dated June 8, 1836.

Application filed March 6, 1886. Serial No. 194,324. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. AXTELL, a citizen of the United States, residing at Montague city, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Mortising and Boring Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is a machine embracing improvements in machinery for mortising and boring in carpentry.

The first part of my invention has relation more particularly to the manner in which I operate the mortising-chisel, and the arrangement of the table upon which the material to be worked rests and is held.

The second part of my invention relates to the mechanism by which I convert reciprocating into rotary motion to operate the auger from the same leverage by which I operate the mortising mechanism.

The mortising and boring tools may both be operated from the foot movement of the operator at the same time, one pedal-lever being employed in the operation of both parts of the machinery.

The frame of my machine rests upon suitable legs, which are secured to side wings fastened to said frame.

The frame of the machine is formed of two upright side pieces placed and secured together in front by facing and held by suitable bolts. The back of the frame is left open to allow of a free movement to the pedal-lever and form, together with the facing, a recess to receive a ratchet mechanism for the boring-machine.

The upright side pieces of the frame are provided with suitable bearings for journals, which form fulcrums for the levers employed in operating the auger and the mortising-chisel. The principal lever employed is of peculiar form, and it may be described as follows: It has two arms at the upper portion, which form a U and unite and extend downward with a graceful curve into a long narrow arm, which terminates at the bottom with a flat pedal within easy reach of the foot of the operator as he stands or sits in front of the work-table of the machine. One of the arms forming the U of this pedal-lever is pivoted upon a journal fixed in the uprights of the frame. The opposite of said U is bifurcated and provided with two anti-friction spool-bearings resting upon pins which cross the slot formed by the said bifurcations. Between the two bifurcations and the anti-friction spools plays the long arm of a straight lever, which finds its fulcrum in a pin fixed in two jaws which form bearings at the extreme upper portion of the uprights of the frame of the machine. The short arm of said straight lever is slotted at its end, and connects by a pin with the jaws of the plunger of the mortising-machine, to the lower end of which is attached the mandrel for the mortising-chisel. Within the elongated slot of the said straight lever is an anti-friction spool, through which passes the pivoting-pin of said lever, and against the outside of which bears the surroundings of the said slot. The said spool plays in the said slot during the movement of the pedal-lever and plunger, and thus compensates for the difference between the vertical movement of the said plunger and the oscillating movement of the said straight lever. The head of the plunger of the mortising-machine is provided with jaws, which receive the end of said straight lever, and said head is connected to the spindle of the said plunger by a swivel-connection. The spindle of the plunger is held to the front portion of the frame of the machine in journal-boxes by suitable caps at two points, and said spindle is provided near its head with vertical grooves on opposite sides, which engage a spring latch or hold, which keeps said plunger and chisel to fixed positions when mortising to the right or left. The spring-latch is fixed in a suitable housing secured to the upper of the two holding-caps of the spindle, and normally bears against said spindle, and when one of the said grooves comes in line with said latch it is engaged. Collars are fixed upon the spindle between the upper and lower holding-cap, and between these is fixed to the said spindle a hand-lever to shift the said spindle about its axis to change the chisels. The lower end of the spindle, or the part which forms the mandrel, has a cylindrical opening in its end, terminating with a flat opening, the latter of which

receives the flat end of the chisel-stem and keeps the chisel from turning in its place.

The table for holding the work is composed of a horizontal portion to support the material, and a vertical back or apron provided with two grooves formed about half the depth of of said apron. In each of said grooves is a through-slot to receive a bolt connected with a metallic bar having a lip turned at right angles and projecting forward. The said bar is for the purpose of holding and steadying the material being mortised or bored. This bar has, near the end opposite to the said lip, a fixed screw, which passes through the slot of the said apron, and may be clamped at any point within the limit of said slot. One of the through-slots, as shown, is in the upper horizontal groove and on the right, and the other is in the lower groove and on the left. One bar may be used in each of said grooves, or one only may be used and changed from one groove to the other, making the holding-lip of the said bar either right or left.

Secured behind the apron of the table, bent to a suitable form, are flat upright slotted bars, which rise above said apron and hold sleeves provided with lips on the bottom edges, adjustable by means of set-screws, which move in the slots in said upright bars and are clamped to given heights by clamping-nuts. These upright bars and slides, together with the upper surface of the table, hold the work against vertical motion. The under side of the horizontal portion of the work-table has fixed guiding-cleats, between which the horizontal portion of a supporting-bracket for said table fits, the said bracket being held to vertical adjustment against the frame of the machine by a screw-bolt running through the vertical portion of said bracket, and a tongue connected therewith, which fits in a slot at the bottom of the frame of the machine, and holds by engaging a nut and drawing the latter against the facing-board of the said frame. The horizontal portion of the supporting-bracket for the table has a slot and a recess above the same, formed through it vertically, the latter to allow a free movement to a screw-nut fixed to the under side of the horizontal portion of the table. A screw-bolt which passes centrally through the front of the horizontal portion of the supporting-bracket engages said nut of the table and secures to the latter a horizontal adjustment forward and backward. Another screw-bolt enters said nut secured to the under side of the table, and it, together with a washer bearing against the head of said bolt and the under surface of the horizontal portion of the said bracket, fixes the said table to any degree of horizontal adjustment.

At the rear of the frame of the machine is fixed a bracket or support, which rises obliquely from the uprights of said frame, and to which is secured a spiral spring, which connects with one of the arms of the U portion of the pedal-lever arm. This spring has the function to return the pedal-lever toward the operator. The outward movement of the said pedal-lever and throw of the chisel is limited by an adjusting-screw fixed in the said bracket, to which the said spring is attached, said screw extending toward the back of said lever-arm. On the inner side of the pedal-lever arm are pivoted the ends of two arms of a lazy-tongs lever, which have their opposite ends pivoted to arms provided with narrow collars fitting loosely on a horizontal shaft which is journaled in the uprights of the frame of the machine. Fixed upon the horizontal shaft between the said collars is a ratchet-wheel, moved by spring-pawls pivoted to the said arms attached to said collars. Cylindrical thimbles fit over the shaft upon which the ratchet is fixed, and fill up the spaces between the uprights of the frame and the said narrow collars. The shaft which carries the ratchet-wheel extends through one of the uprights of the frame of the machine, and has fixed upon its end a bevel-wheel. An angle-plate is fixed to the outside of one of the uprights of the frame, and projects by its ends to form bracket-bearings for an upright shaft, which carries a bevel-pinion gearing with the bevel-wheel on the horizontal ratchet-carrying shaft and a bevel-wheel at its upper end. Gearing with the said upper wheel is a pinion fixed upon a shaft journaled in suitable supports formed at right angles to the said upright shaft. On the opposite end of this shaft is a bevel-wheel gearing with a bevel-pinion at the upper end of a vertical shaft, which carries at its lower end an auger-bit. The said pinion, at the upper end of this auger-carrying shaft, is keyed by a pin to a longitudinal groove of said shaft, so that the said shaft and auger may have a vertical movement. A metal plate secured to the side of the frame of the machine serves as a guide to the auger-carrying shaft and a limiting-point to a collar, which is fixed to said shaft at given points by a suitable set-screw. The auger is fed to its work by the weight of its shaft, which gravitates as it revolves until its limit fixed by said collar and the guide-plate is reached.

In my drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a rear elevation of a part of the same. Fig. 3 is a side elevation of the same. Fig. 4 is a vertical central section exhibiting the relation of the several parts.

Similar reference-letters indicate like parts in all of the figures.

Referring to the drawings, A is the frame of the machine, composed of parts irregular in outline, as shown, and provided with uprights *e e*, horizontal wings *a a'*, journal-bearings *b b'*, and front journal-boxes, *c d*.

f represents the facing of the frame, which assists in holding the uprights *e e* together, and forms a neat front finish to the said frame. In viewing the frame from the rear a recess is seen between the two uprights, which forms a housing for the ratchet-and-pawl mechanism of the auger, and allows play to the pedal-arm.

B is the pedal-lever, journaled by its arm *g* on a suitable shaft, which bears at *b'* in the frame. The other arm, *h*, is bifurcated into jaws *h'*. Anti-friction rollers *i i'*, mounted on pins, are located in the jaws of this bifurcated portion, and serve as bearings for the long arm of straight lever C to play against. Lever C is journaled on a suitable shaft fixed in the frame at *b*, and its short arm is provided with a slot, *k*, and an anti-friction roller, *k'*, to bear within the same. The lever B extends downward from its U-shaped head in a graceful curve, and terminates with a foot-piece, *l*, which extends within reach of the operator.

The spindle D of the mortising-machine is held loosely to the front of the frame of the machine in bearing-boxes *c d* by caps *c' d'*, said spindle terminating below in a mandrel for the chisel, and above with a swivel-head, *m*, provided with jaws, between which is held by a pin running through said jaws and the anti-friction roller in the slotted end the straight lever C. Spindle C has longitudinal grooves *n n'* on opposite sides, which are engaged, one at a time, by the conical end *o* of a latch, which is held to place against said spindle by a spring, *p*, in a housing, *q*, mounted upon the cap *c*. Collars *r r'* are fixed to spindle C, the former of which limits the upper movement of said spindle by coming in contact with the capping *d'* and guide-box *d*. Between the two collars *r r'* is a hand-lever secured to the spindle *c*, to shift the chisel (when the latch *o* is withdrawn) a half-revolution, to give a right or left cut. The mandrel of the spindle is formed cylindrically hollow, with a flat hollow space at its upper end to receive the shank of the chisel, the flat portion of said space serving, together with the flat portion of the end of the chisel, to keep said tool from turning in its place while at work.

Either single or double chisels may be used, and they are of the usual form for tenoning.

The table for the work consists of a horizontal portion, E, and an upright portion, E'. The said upright portion is faced with grooves *s s* and slots *t t'*. A bar, F, has fixed to it at one end a screw, *u*, and the opposite end of said bar is provided with a lip, *v*. The bar F is thick at the end provided with the screw, and thinned off toward the lip, so as to be springy. The said bar F is adjustable to the right or left in the slots *t* or *t'*, and reversible in said slots, so that the lip *v* may be either on the right or left of the operator.

The bar F is secured to place on the apron E' by a nut and washer on the back of said apron, which engage the screw *u*. Slotted bent bars G G' are secured to the back of the apron E', and they have adjustably secured to them vertically-sliding pieces *w w'*, which latter are adjusted to place upon said bars by clamping-screws. Pieces *w w'* have at their lower ends lips *x x'*, which project frontward to bear upon the work and hold it down against the horizontal portion of the table. The bar F may be sprung into its slot by the work bearing against it when it is not needed to assist in holding the work. When one of these bars only is used, it depends upon the operator to assist in keeping the work from moving in a direction from the lip of said bar. When two of said bars are used, they, together with the slides of the bent bars, hold the work quite firmly to place.

The table E E' is supported upon a bracket, H, provided with a tongue, *y*, fitting in a groove, *z*, of the frame A, by a clamping-screw, a^2, and nut b^2. The horizontal portion of the table rests upon said bracket H, being held from side motion by cleats secured to the under side of said table.

The table and bracket supporting same may be clamped together by a clamping-screw, c^2, which engages a nut, d^2, fixed to the under side of said table. The said nut d^2 has a flange, e^2, projecting downward from its under side, which engages an adjusting-screw, f^2, secured to the horizontal portion of the bracket at its front face.

By means of the screw f^2 the table E E' may be adjusted horizontally frontward, to bring the work held upon it to proper position with reference to the chisel or auger, where it may be clamped by screw c^2.

To the frame of the machine is secured a bracket or support, g^2, through the head of which passes a screw, h^2, which, when adjusted, serves as a contact-point to limit the movement of the pedal-lever. Secured to this bracket g^2 and the arm *h* of the pedal-lever is a spiral spring, i^2, which serves to return said pedal-lever when it is released from the foot of the operator.

In the uprights *e e* of the frame of the machine is journaled a shaft, k^2, which extends outside of the said frame on one side, and upon its outside end is fixed a bevel gear-wheel, l^2. Upon the shaft k^2, between the uprights *e e* of the frame, is fixed a ratchet-wheel, m^2, and on either side of the said wheel collars encircle the shaft k^2 and branch with arms n^2 n^3, which connect by hinge-joints with arms o^2 o^2, to form a lazy-tongs leverage pivoted to the inner edge of the pedal-lever B. To the arms n^2 n^3 are pivoted spring-pawls p^2 p^2, which bear upon the ratchet-wheel m^2 at different points in its periphery.

Brackets q^2 q^3 extend from the side of the frame of the machine to serve as bearings to a vertical shaft, r^2, which has near its lower end a pinion, s^2, gearing with gear-wheel l^2, and at its upper end a gear-wheel, l^3. Extending from bracket q^2 is a supporting-bracket, q^4, with uprights u^2, which serve as bearings to a shaft, w^6, carrying pinion v^2, gearing with wheel l^3, and a gear-wheel, v^3. Gearing with the wheel v^3 is a pinion, a^5, which has a collar attached to it provided with a pin, which passes through it and into a groove, a^4, formed longitudinally in the auger-shaft X. The said auger-shaft has fixed upon it by a set-screw a collar, t^3, which may be fixed at any point upon said shaft. A bracket, t^2, extends from

the frame of the machine, and serves as a guide for the shaft X and a rest or contact-point for the collar t^3. The shaft X has a vertical movement by gravity, to feed the auger, which it carries to its work, limited in its downward movement by the collar t^3 and bracket t^2.

The auger is operated from the motion of the pedal through the lazy-tongs leverage and pawl stepping over the ratchet-wheel, to drive said ratchet-wheel and shaft, to which it is fixed, and transmit the movement through gear-wheels l^2, pinion s^2, wheel l^3, pinion v^2, wheel v^3, and pinion a^5 to the said auger.

In order that the supporting structure of the machine may be rigidly sustained upon its base, I have provided bracing-rods, which are secured to the upper portion of the upright frame and extend diagonally downward, reaching to the said base, where they are also secured. I have made no special mention of these rods, as they are such as are in ordinary use.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a compound leverage for use in operating a mortising or boring machine, the pedal-lever provided at one end with a foot-piece and at the other end with a U-shaped head, one arm of which is pivoted to the frame of the machine, the other arm of said head being bifurcated and provided with pivoted anti-friction rollers, in combination with a straight lever pivoted to the said frame of the machine, having a long arm, which moves between the anti-friction rollers of the pedal-lever arm, and a short arm provided with a slot, and a roller which unites with the head of a vertically-moving plunger for a mortising-chisel, substantially as and for the purpose set forth.

2. In a mortising-machine, the combination, with the pedal-lever formed with an arm terminating at its bottom with a foot-piece, and having a U-shaped head at its top, one arm of which is pivoted in the frame of the machine, a straight lever pivoted to the said frame and arranged, substantially as described to coact with the said pedal-lever through the bifurcated arm of same, of the vertically-moving plunger of the mortising-machine, provided with a swivel-head united to said straight lever, and provided with grooves on opposite sides of its spindle, a latch and spring influencing said latch, inclosed in a suitable housing fixed to the frame of the machine, the returning-spring i^2 for the pedal-lever, and the chisel secured to the mandrel of said spindle, as and for the purpose set forth.

3. In a table for use in a mortising or boring machine, the combination, with the horizontal portion E, of the vertical portion E′, provided with one or more horizontal grooves, s, and one or more through slots, $t\,t'$, and holding bar or bars F, adapted to fit in said grooves s, and be secured by means of screw bolts and nuts, as and for the purpose set forth.

4. The combination, with the work-table provided with a horizontal portion and a vertical portion, substantially as described, and the holding-bar F, located in groove s of said vertical portion, of vertically-slotted bars G G′, secured to the said upright portion, sleeves $w\ w'$, provided with lips $x\ x'$, adjustable upon said vertically-slotted bars, and screw bolts and nuts adapted to hold said sleeves to vertical adjustment, as and for the purpose set forth.

5. The combination, with a work-table for a mortising or boring machine, having apron E′, provided with horizontal grooves, and through-slots $t\,t'$, of the spring-bar F, provided with screw u, lip v, and a holding-nut, as and for the purpose set forth.

6. The combination, with the uprights of the frame of the machine and the pedal-lever B, of the pawl-and-ratchet mechanism composed of ratchet-wheel m^2, fixed upon shaft k^2, journaled between said uprights at a point convenient to said pedal-lever B, arms $n^2\ n^3$, loosely clasping said shaft k^2, provided with spring-pawls $p^2\ p^3$, arms o^2, connected with said arms $n^2\ n^3$ and the pedal-lever B, the auger-shaft X^2, and gearing, substantially as described, connecting said auger-shaft with the pawl and ratchet carrying shaft, as set forth.

7. The combination, in a boring-machine, with the longitudinally-grooved self-feeding auger-shaft X^2 and pinion a^5, provided with a collar and a pin, the latter fitting into the groove of the auger-shaft, of the collar t^3, provided with a set-screw to fix said collar to given points on said shafts, and bracket t^2, upon which said collar bears when down to its limit, substantially as and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY A. AXTELL.

Witnesses:
JAMES S. GRINNELL,
CHAS. ALLEN.