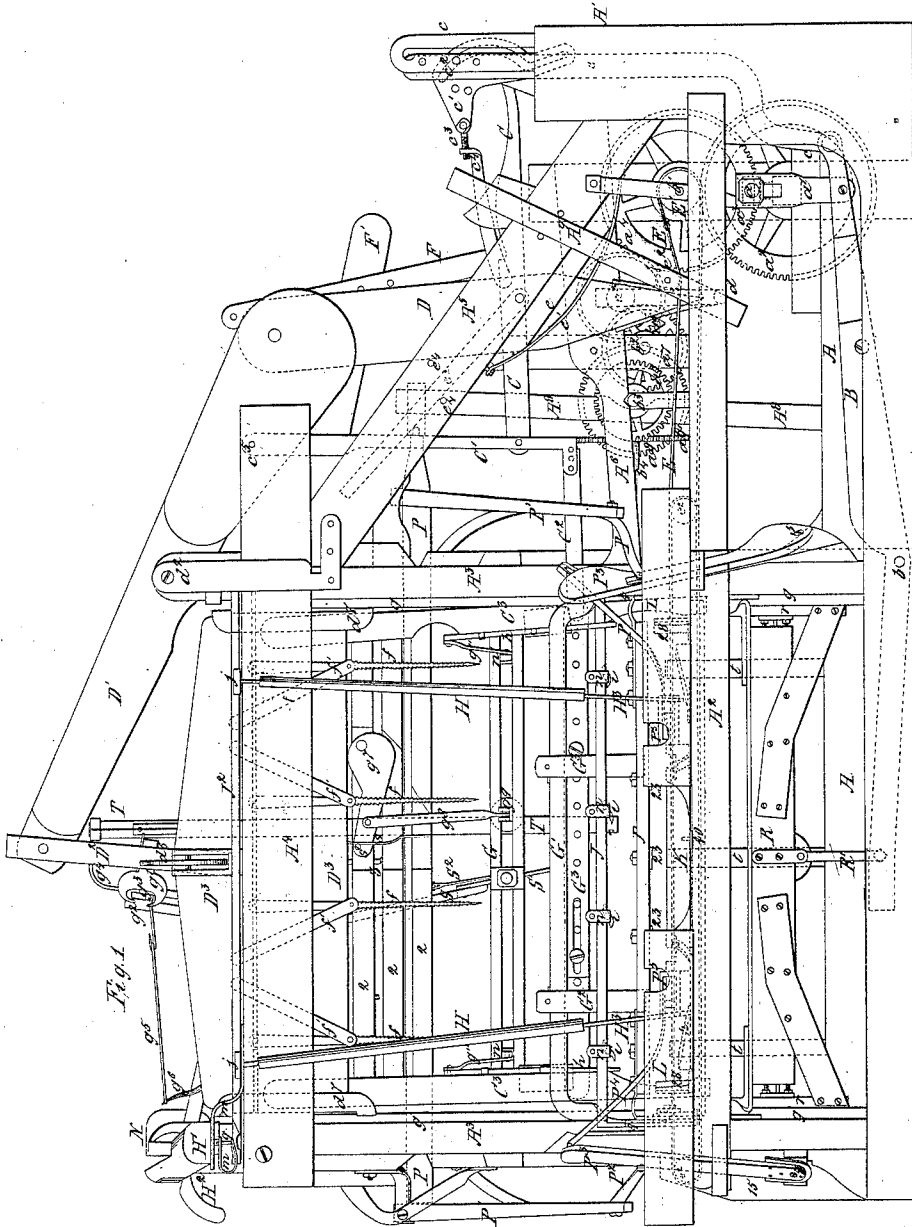


L. G. Merrill,
Mortising Machine.

No. 108,503.

Patented Oct. 18, 1870.



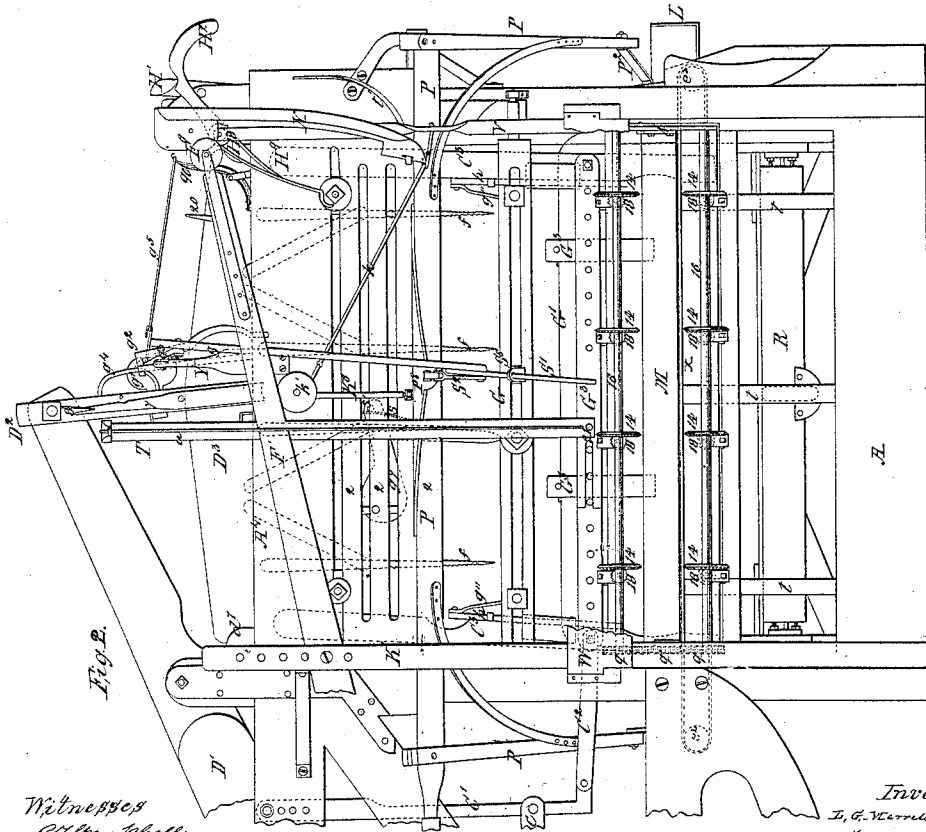
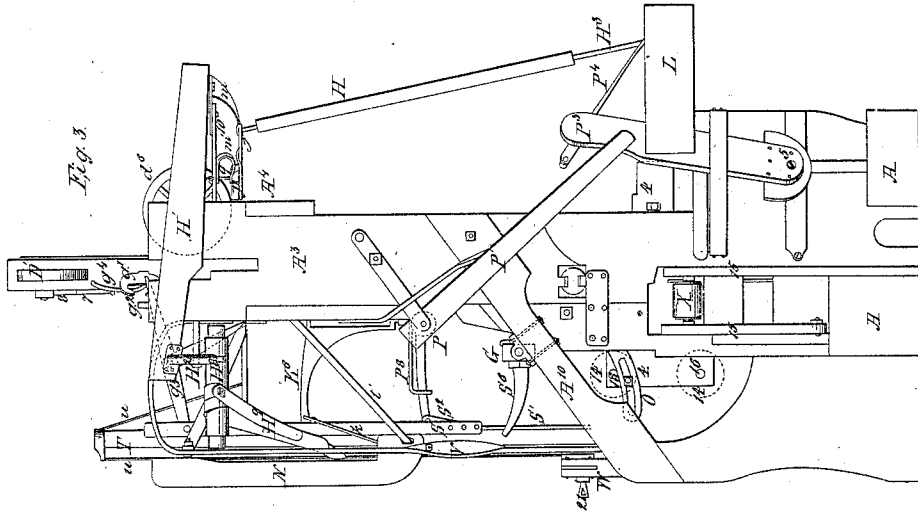
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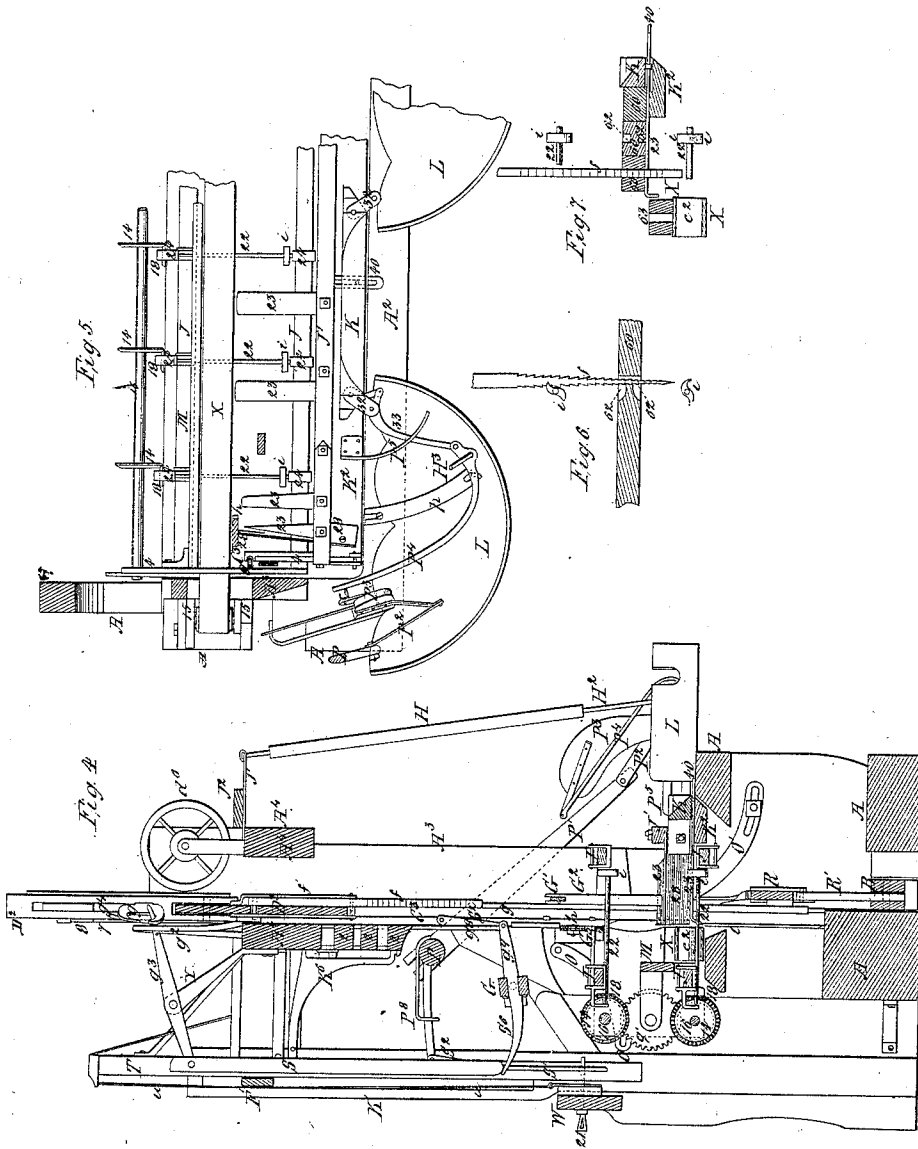
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L. G. Merrill,

Mortising Machine.

No 108,503.

Patented Oct. 18, 1870.



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LOWELL G. MERRILL, OF ANGELS, CALIFORNIA.

Letters Patent No. 108,503, dated October 18, 1870.

IMPROVEMENT IN MORTISING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, LOWELL G. MERRILL, of Angels, in the county of Calaveras and State of California, have invented a new and Improved Mortising-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1, plate 1, is a front elevation of the machine.

Figure 2, plate 2, is a rear elevation of the machine, with portion of the driving mechanism broken away.

Figure 3, plate 2, is an elevation of one end of the machine.

Figure 4, plate 3, is a section taken vertically and transversely through the machine, a little to one side of the center thereof.

Figure 5, plate 3, is a horizontal section, taken just above the carriage, showing in detail some of the devices for moving the follower.

Figures 6 and 7 are sectional views in detail, showing the operation of the chisels and rotary cutters in mortising lumber.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to certain novel improvements on mortising machinery wherein are employed rotary cutters and tapering chisel-edged cutters.

The stuff is first acted upon by the rotary cutters, which deeply score it at those points where the mortises are to be made, and thus prepare the stuff for the chisels, after which the stuff is moved beneath the chisels and mortised by them, and then discharged from the machine by means of an endless belt.

The principal parts of the machine are—

First, a vertically-movable horizontal carriage, on which the stuff is held while being scored and mortised, and on which a follower is applied that moves the stuff up to the rotary cutters, thence beneath the chisels, and thence upon the endless discharging-belt.

Second, two gangs of rotary cutters, arranged so as to score the stuff on both of its sides, preparatory to its adjustment by the follower beneath the chisels.

Third, chisels or mortising-blades, of a taper form, having chisel-edged teeth upon two edges, and applied to a vertically-reciprocating sash.

Fourth, devices which gripe and hold the stuff while it is being acted on by the chisels, and which give to each piece of stuff a movement in the direction of its length, thus feeding it up to the chisels so as to produce oblong mortises.

My object is to so combine and arrange the above-named parts, and to operate them, that any number of mortises can be made in each piece of stuff put into

the machine, the only manual labor required being the introduction of the stuff upon the carriage in front of the follower at the proper times.

The following description will enable others skilled in the art to understand the construction and operation of my invention.

The machine may be divided, for description, into two parts, namely, the driving mechanism, and the scoring and mortising mechanism. The former is chiefly included between the vertical portions A^1 and A^3 of the frame, and the latter is included between the two vertical portions A^3 A^3 of the frame.

B represents a long lever, which has its fulcrum at b , and is arranged between two of the sill-timbers A of the main frame; so as to receive vertical vibration. One end of this lever B is connected, by a pitman, R^1 , to a horizontal beam, R, which is applied to vertical guides g by slides r r , so as to receive a vertical reciprocating motion, and preserve its horizontal position.

By means of rigid end pieces, this beam R is rigidly secured to a horizontal carriage, K^2 , which is arranged some distance above the beam R. By this means the carriage K^2 , on which the stuff is supported while being scored and mortised, is sustained and moved up and down.

The other end of the lever B is attached by a short pitman, a^1 , to the wrist-pin a of a crank, which is on the shaft of the spur-wheel a^2 .

The lever B is also pivoted to a vertically-movable slotted rod, c , which rises through a slot made through the vertical portion A^1 of the frame, and, extending above this portion A^1 , is connected to a slotted segment-lever, c^1 , by a pin, c^2 , so that a rectilinear reciprocating movement is imparted to a bifurcated connecting-rod, C, which, in its turn, vibrates the arm C^1 , and gives a reciprocating movement to a pitman, C^2 , which, in its turn, vibrates the depending arms C^3 C^3 .

These arms C^3 C^3 are pivoted above to the rear horizontal beam A^4 of the main frame, are connected together by an extensible rod, G^2 , and are intended to give endwise movement to the stuff while it is being acted upon by the chisels.

The set-screw c^3 , and upper arm c^4 , of the rod C, are designed to adjust and adapt this rod to the adjustments of the two arms C^3 C^3 .

The arm C^1 is pivoted at c^5 , and is adjustable vertically; and the rod C^2 is adjustable on the lower end of the arm C^1 .

The spur-wheel a^2 communicates rotary motion to a spur-wheel, a^6 , through the medium of pinion-wheels, which are not shown, and this wheel a^6 communicates rotary motion to a shaft, b^4 , through the medium of spur-wheels a^7 , a^8 , and a^9 , and pinions which are keyed on the shafts b^2 b^3 .

The shaft of spur-wheel a^6 carries on one end a

crank, to the wrist-pin d of which a pitman, D , is applied, which is connected to a great lever, D^1 , that has its fulcrum at d^2 , near the upper end of the standard A^2 .

The shaft of wheel a^2 also carries another crank, which has connected to its wrist-pin a pitman, F , which gives a vertical vibratory motion to a lever, F^1 , which is pivoted to and held by a slotted standard, K^1 , at the back of the main frame. This lever F^1 is intended to operate the devices which move the follower K , as will be hereinafter explained.

On the shaft b^1 of the spur-wheel a^1 a drum, E , is keyed, over which passes an endless belt, E , that also passes over and rotates a drum, e^2 .

Around the drums e^2 passes the endless belt X , upon which the mortised stuff falls, and by means of which this stuff is discharged from the machine.

A belt-tightener is applied to the inclined brace A^5 of the main frame, for tightening the belt E . This device consists of a roller, e^3 , applied to a yoke, A^3 , on the brace A^5 , which yoke is acted upon by a tension-spring e^4 , applied at one end to the bottom edge of the brace A^5 , and at the other end to a lever, e^5 , behind said brace.

The lever e^5 is held between pins, e^6 , in the desired position for applying the required tension to the yoke A^3 . A wedge, which is driven through the yoke above the brace A^5 , holds up this yoke against the tension-spring e^4 .

The carriage K^2 is adjustably secured at its ends to bearing-plates 4 4, which are secured to the sliders $r r$ that receive the guides $g g$.

At or near the extremities of the carriage K^2 , and pivoted to its upper side, are two jaw-pieces, 23 23, which have their inner surfaces serrated, and which extend far enough to be acted against by the arms $C^3 C^3$. These jaw-pieces 22 22 are adjustable, and are intended to gripe and hold down the stuff by its ends, and to move with the stuff when it receives endwise movement from said arms $C^3 C^3$.

On this carriage K , fingers, 23 23, are secured, which extend beyond the inner edge of the table far enough to deliver the stuff upon the belt X . These fingers are arranged at proper distances apart, and may be adjustable in the direction of the length of the carriage. Above the fingers 23 23 are corresponding fingers 23 23, which are secured to and made adjustable on an overhanging bar, J , and which are designed for holding down the stuff on the carriage K^2 and the lower set of fingers 23.

Stiffening-rods $G^2 G^2$ may be applied above and below the two sets of fingers 23, and secured to rods G^1 , so as to prevent the fingers from yielding unduly. The rod G^1 is secured at its ends to the end pieces of the carriage, so as to move up and down with this carriage.

On this carriage K^2 , and arranged at the middle of the length thereof, is a follower, K , which receives forward and backward movements, as will be hereinafter explained.

This follower is attached to a slotted guide, 40, on the carriage, and is intended to move the stuff beneath the rotary cutters and beneath the chisels, and also to discharge the mortised stuff from the ends of the fingers 23 upon the endless belt X .

To each end of the follower a link, 32, is pivoted, which is again pivoted to a curved lever, 33. The latter is guided by a horizontal-slotted arc, P^5 , and pivoted at its outer end to a curved connecting-rod, P^4 , through which the end of a rod, H , passes freely.

The connecting-rod P^4 is pivoted to a vibrating arm, P^3 , which is pivoted at 5 to the frame of the machine, and vibrated by means of an arm, P^1 , to which arm P^3 is connected by rod P^2 .

The arm P^1 is secured to a horizontal rock-shaft, P , which extends across, and has its bearings at the back of the main frame.

From the back of the rock-shaft P , an arm, P^8 , extends, which is connected by a link, S^2 , to a rod, S .

This rod S is pivoted above to a lever, g^2 , which has its fulcrum on a bracket, Y , rising above the rear horizontal beam A^4 .

The front end of lever g^2 is received through a stationary irregular shaped guide, g^3 , one part of which is straight and the other bowed, and against this guide the lever g^2 is held by a spring, g^6 , to which it is connected by a rod, g^5 .

On the pitman D^2 , which connects the chisel-sash D^3 to the lever D^1 , a double-hooked lifting-piece, g^1 , is secured in such position relatively to the front end of lever g^2 that, at certain times, when the chisel-sash rises, it will carry up with it, during the upper part of its stroke, the front end of said lever, thus depressing the rod S .

During the upper part of each descending stroke of the chisel-sash D^3 , the front end of lever g^2 will be depressed, and rod S will be lifted, and the spring g^6 will detach the lever g^2 from the hooked piece g^1 , and allow this lever to remain temporarily at rest.

The lower part of the rod S terminates in a reduced portion, S^1 , which leaves a shoulder at its junction with the main portion of the rod. This reduced portion passes freely through the end of an arm, S^6 , which is secured to a slotted rocking bar, G , so that, when the rod S is depressed, as above stated, its shoulder pressing an arm, S^5 , will depress this arm and raise the free end of arms $g^9 n' n'$, which are adjustably secured to and extended forward from the slotted bar G . The middle arm g^8 , is connected by a rod, g^7 , to a vibrating plate, g^7 , which is pivoted to the front side of the slotted portion A^4 , at the back of the main frame, and provided with a stud, s^1 , which is pressed against by a friction-spring, s .

On the back side of the pitman D^3 , which connects lever D^1 to the chisel-sash D^3 , a flat strip, 7, is pivoted, and acted upon by a spring, 8.

The lower end of this strip 7 is notched, and intended to strike the stud s^1 on vibrating plate g^7 during every descent of the chisel-carriage, and thus operate to lift the rear end of the arm S^6 , and of course depress the front ends of the arms $g^9 n' n'$.

The front ends of arms $n' n'$ are connected by short links $g^{11} g^{11}$ to sliding spikes $h h$, which are applied to and suitably guided on the inner edges of the two vibrating arms $C^3 C^3$. These spikes are intended to hold the stuff firmly in place during the lower part of the descending and ascending strokes of the chisel-sash.

The lever g^2 is brought in position to be caught and acted on by the hooked catch g^4 once during every revolution of the crank-shaft of spur-wheel a^2 . This is effected by the action of lever F^2 , through its anti-friction wheel F^3 , against a channeled and curved pendulous arm N , which is pivoted at the upper end of a vertical rod, V .

This arm N is connected, by a rope or chain, k , to a horizontal swinging bracket, K^6 , carrying on its free end an anti-friction wheel, K^1 .

The arm N is pressed toward the rod S by a spring, t . Now, as the arm N is forced outward by the action of lever F^2 , this arm draws the wheel K^1 against the upper portion of the rod S , and moves the forward end of lever g^2 in a position to be caught by the hooked plate g^4 when the chisel-sash rises.

The lever F^1 is guided by the fixed standard T and the stretched wire, u .

Rising above the upper edge of the lever F^1 , near the anti-friction wheel F^3 , is a tappet, 20, which, at every descending stroke of this lever F , strikes and depresses an arm, H^3 , which is fixed to a rock-shaft, H^2 , from which a curved arm, H^2 , projects.

On this arm H^2 rests one end of a lever, H^1 , which end is lifted when arm H^3 is depressed.

The forward end of lever H^1 is pivoted to a bracket, m , and between this pivotal attachment and the arm H^2 the lever H^1 is connected to a vibrating strip, J^2 . A spring, m' , is interposed between the J^2 and a fixed arm, 10, which holds down the strip J^2 and lever H .

From arms $j j$, which are secured to the strip J^2 , rods $H H$ depend, the lower ends of which pass freely through curved connecting-rods $P^4 P^4$, and, at times, are held by their ends behind inclined planes p .

The rods $H H$, when in the position last named, hold the follower K in place after it has moved the stuff beneath the cutters and chisels.

When the rods $H H$ are released from behind the inclined planes p by the lifting operation of lever H^1 on strip J^2 , the follower K is allowed to be moved back to receive in front of it a piece of stuff to be mortised. This retrocession of the follower K takes place at every revolution of the crank-shaft of wheel a^2 , and is effected by and simultaneously with the forward movement of the arms $P^1 P^1$, as above described.

Arranged above and below the carriage K^2 are two gangs of rotary cutters $i i$, which cut recesses or scores into both the upper and lower sides of the stuff preparatory to the movement thereof beneath the chisels.

The shafts 22 of each gang of cutters are supported by suitable bearings applied adjustably to two horizontal bars, $J J$.

The rear ends of the shafts 22 22 carry bevel-pinions 18, which engage with large bevel-wheels 14, applied adjustably on a shaft, 16.

The two shafts 16 16 carry pinion spur-wheels $q q$, which engage with a spur-wheel, q' , shown in dotted lines, fig. 2, on the shaft b^4 of spur-wheel a^2 .

The bearings for the shafts 22, of both gangs of cutters $i i$, are adjustable on their bars J in a direction with the length thereof, and the spur-wheels 14 14 are also adjustable longitudinally on their shafts 16 16. These adjustments allow the cutters $i i$ to be set for at different distances apart. The upper gang of cutters $i i$ prepare the stuff on its upper side as the carriage reaches its highest point, and the lower gang of cutters $i i$ prepare the bottom side of the stuff as the carriage reaches its lowest point.

The mortising-chisels $f f$ correspond in number to the number of rotary cutters $i i$ in each gang, and these chisels are so arranged relatively to the rotary cutters that they commence mortising at the ends of their respective scores made into the stuff by the rotary cutters.

The chisels f are secured to the front side of the sash D^2 , and held firmly by diagonal braces f' , which, with the chisels, are adjustable in the direction of the length of the sash.

The sash is applied to the vertical guides g by means of slides d' , which are secured to the ends of the sash, and grooved, to receive the guides.

This chisel-sash is, as before stated, moved up and down by the vibrating lever D^1 , to which it is connected by the pitman D^3 .

The wheel d^2 , which bears against the pitman D^3 , serves to steady and guide it in its vertical movements. The chisels are all arranged in a vertical plane, which corresponds to the middle of the width of a piece of scored stuff when the same is moved in a position between the fingers 23 23, to be mortised. This arrangement is shown in fig. 7, plate 3, and will be further explained hereinafter.

Between the discharging ends of the fingers 23 and a stop-board, M , is the endless belt or carrier X , working on drums $e^2 e^2$, and adapted for conveying the mortised stuff, one piece at a time, out of the machine.

Each chisel f tapers from a point near the lower edge of the sash D^2 to its lower end, which latter is a double beveled penetrating-point. The thickness

of each chisel-blade is equal to or slightly less than the width of the mortises to be cut. Along each tapering edge of each blade, teeth are formed, which, owing to the increase in the width of the blade from its point upward, overhang the succeeding lower teeth, thus forming two lines of cutting chisel-edges on each blade.

Operation.

The several parts of the machine are adjusted according to the length and width of the stuff to be mortised; and the rotary cutters and the chisels are adjusted according to the number of the mortises, and the distances they are required to be apart.

When the machine is started, the rotary cutters receive a rapid, regular motion from the shaft b^2 , through the medium of the spur-wheels a^7 , a^9 , q^1 , q , q , and 14 18.

The crank-shaft or spur-wheel a^2 , acting through the medium of pitman-rod D , lever D^1 , and pitman-rod D^2 , gives vertical reciprocating motion to the chisel-carrying sash D^3 . The crank-shaft of spur-wheel a^2 , acting through the medium of a wrist-pin, a , pitman a^1 , lever B , and pitman-rod R^1 , gives a comparatively slow vertical motion to the carriage K^2 .

The vibrating movements of lever B , acting through the medium of a rod, c , slotted lever c^1 , connecting-rod C , pendulous arm C^1 , and connecting-rod C^2 , gives slow vibrating movements to arms $C^3 C^3$, which move the stuff on the fingers 23 23 of carriage K^2 in a direction with its length during the operation of the chisels in cutting the mortises through it.

A crank on the rear end of the shaft of the spur-wheel a^2 , operating upon mechanism above set forth, gives a forward and backward motion to the follower K , at proper times, for feeding in the stuff.

The movements of the follower K with reference to the movements of the carriage K^2 , are such that the former recedes to receive a piece of stuff in front of it, and then moves up, to properly adjust the stuff on the carriage, and, at the same time, discharge a mortised piece upon the belt x before the carriage descends below the level of this belt.

The operation is commenced by introducing two pieces of stuff upon the carriage. This having been done, the lower rotary cutters i will, as the carriage completes its down stroke, cut scores, 62, into the lower side of the piece, which is in a plane between the two gangs of rotary cutters; and, as the carriage completes its up stroke, the upper rotary cutters i will, in a similar manner, score the upper side of the said piece; the upper scores will be directly above their respective lower scores.

During the next descent of the carriage, the follower K will be moved back to receive, in front of it, another piece of stuff, and, after the introduction of the piece, the follower will be moved forward again, thus pushing the scored piece of stuff beneath the chisels, and, at the same time, adjusting the next piece to it between the rotary cutters, as shown in fig. 7.

Three pieces of stuff having been introduced into the machine, a finished piece will be pushed off upon the belt X at every subsequent introduction of another piece; at the same time a blank piece will be moved between the rotary cutters, to be scored, and a scored piece will be moved in position to be mortised by the chisels.

The elongation of the mortises is effected by the slow endwise movements given to the piece of stuff, being mortised, by the vibrating movements imparted to the arms $C^3 C^3$, between the lower ends of which and the ends of the stuff the pivoted serrated jaws 28 are interposed.

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

1. A vertically-movable carriage, K², provided with supporting-fingers 23 23, and arranged between rotary scoring-cutters, and below mortising devices, substantially as described.

2. The follower K, applied on the vertically-reciprocating carriage K², and operated substantially as set forth.

3. The pivoted gripping-jaws 28, applied on the carriage K², in combination with the vibrating arms C³ C³, substantially as described.

4. The movable spikes h h, applied to the arms C³ C³, and operated substantially as described.

5. The vibrating feed-arms C³ C³, in combination with a vertically-movable carriage, K², and mortising devices, substantially as described.

6. The combination of rotary scoring-cutters with mortising-chisels, which are constructed substantially as described, said parts being arranged so that the operation of scoring will immediately precede the operation of mortising, substantially as described.

7. The adjustable connection G³ between the feed-arms C³ C³, substantially as described.

8. A discharging-carrier, X, in combination with the carriage K² and mortising devices, arranged substantially as described.

9. The combination of adjustable rotary cutters i with adjustable mortising devices f, and a carriage, K², having supporting-fingers 23 applied to it, substantially as described.

10. The rods H H, applied above to a lifting-strip, J², and below to the vibrating rods P⁴ P⁴, in combination with the stops p p and follower K, which is applied on a vertically-movable carriage, K², substantially as described.

LOWELL G. MERRILL.

Witnesses:

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WALTER DOE.