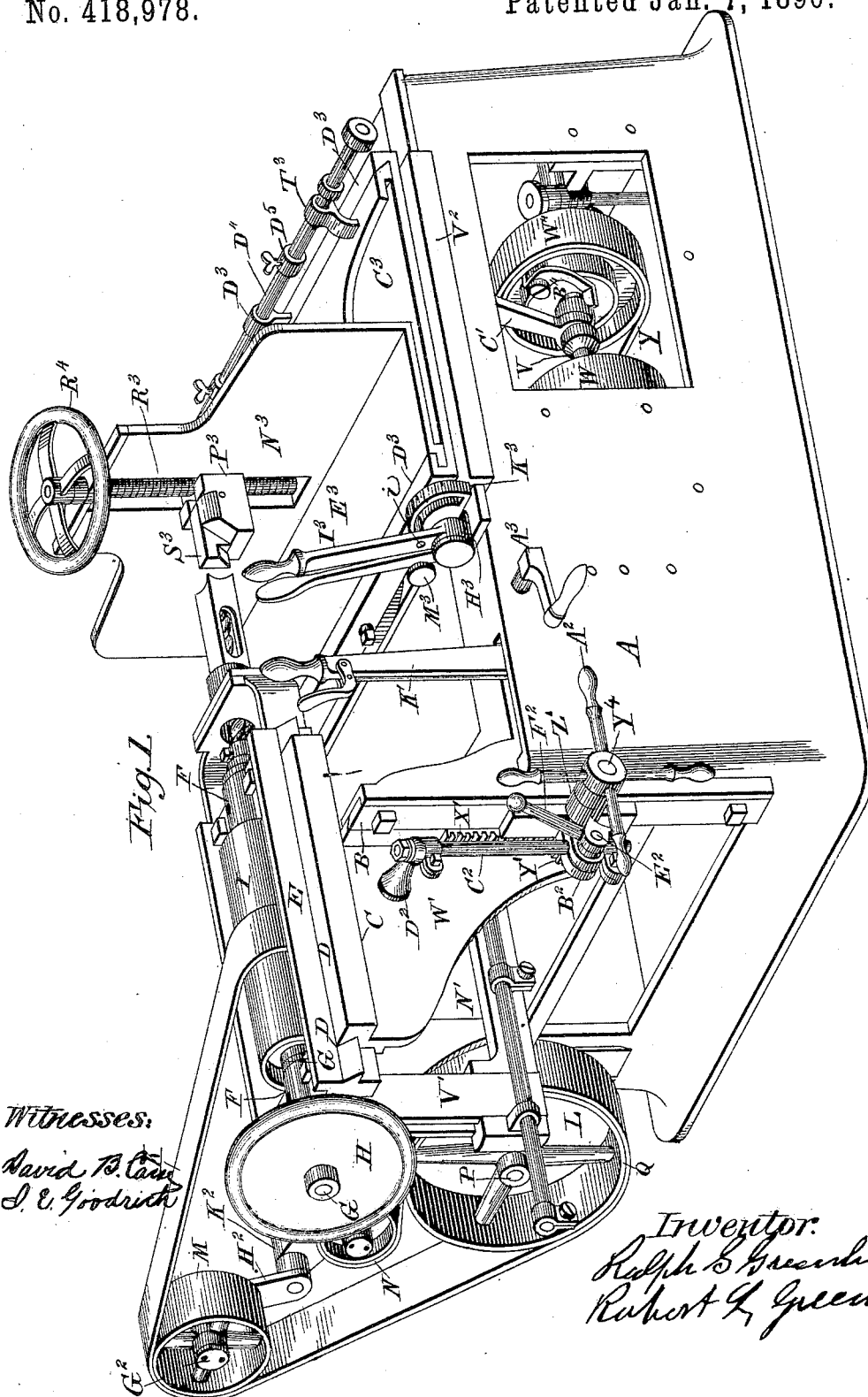


4 Sheets—Sheet 1.

No. 418,978.

Patented Jan. 7, 1890.



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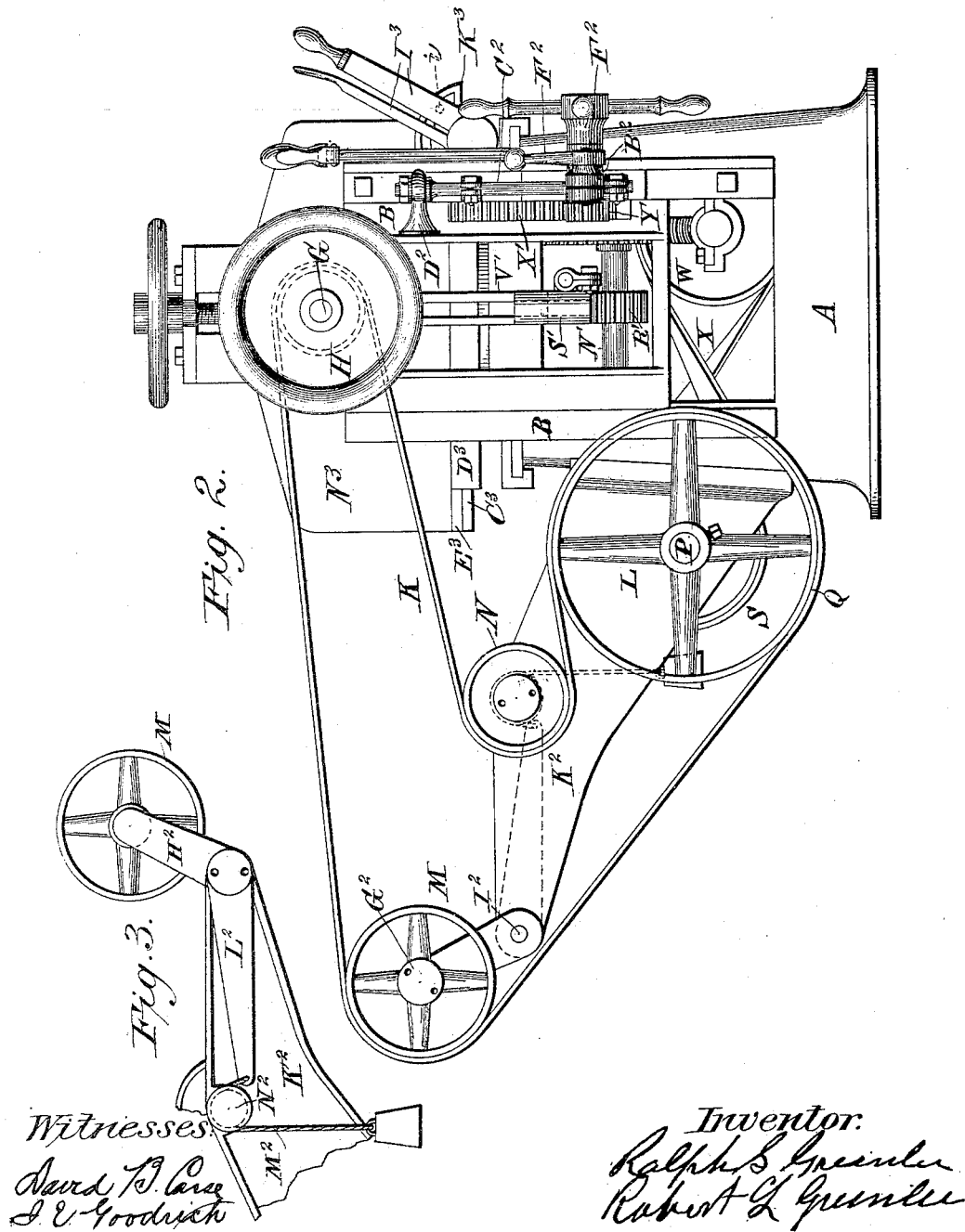
(No Model.)

4 Sheets—Sheet 2.

R. S. & R. L. GREENLEE.
MORTISING MACHINE.

No. 418,978.

Patented Jan. 7, 1890.



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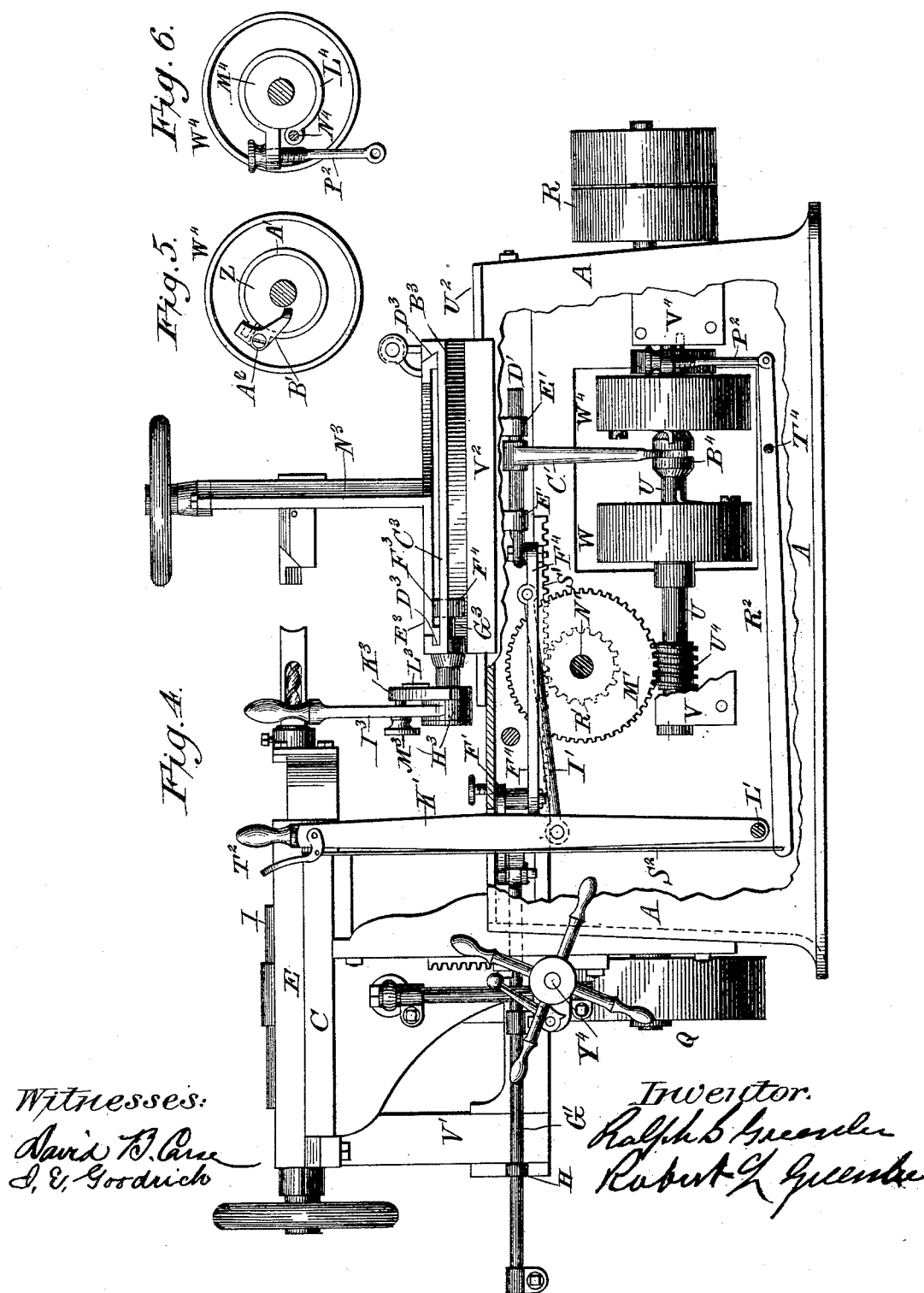
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4 Sheets—Sheet 3.

R. S. & R. L. GREENLEE.
MORTISING MACHINE.

No. 418,978.

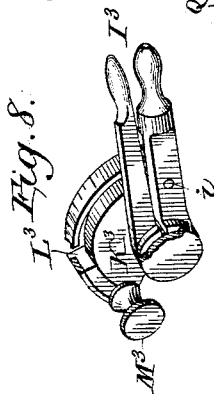
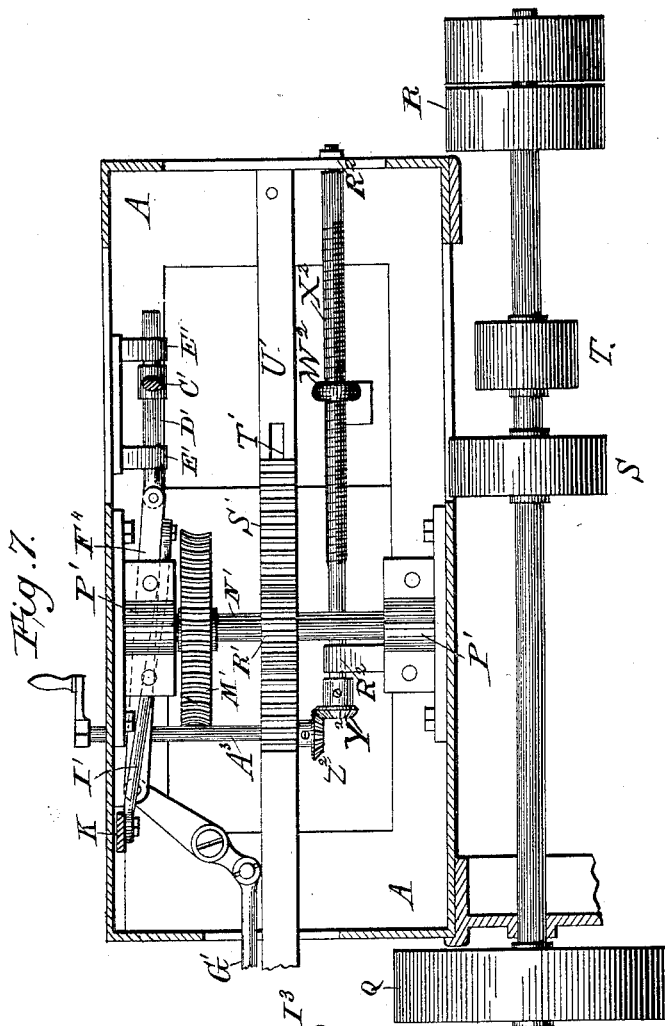
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4 Sheets—Sheet 4.

No. 418,978.

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UNITED STATES PATENT OFFICE.

RALPH S. GREENLEE AND ROBERT L. GREENLEE, OF CHICAGO, ILLINOIS.

MORTISING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 418,978, dated January 7, 1890.

Application filed December 15, 1888. Serial No. 293,750. (No model.)

To all whom it may concern:

Be it known that we, RALPH S. GREENLEE and ROBERT L. GREENLEE, citizens of the United States, and residents of Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Mortising-Machines, of which the following is a specification, reference being had to the accompanying drawing-sheets, illustrating the invention.

This invention relates to certain improvements in that class of mortising-machines for which Letters Patent of the United States No. 283,341 were granted to R. S. Greenlee the 14th day of August, 1883; and it has for its objects to provide improved mechanism for automatically imparting a rapid and uniform reciprocating movement to the chisel and auger, in order to advance the same to the work and withdraw it from the same; to provide improved mechanism for elevating and lowering the carriage which carries the chisel and auger, and for holding said carriage in any position to which it may be adjusted vertically; to provide for the uniform tension of the driving-belt during the changes in the relative positions of the driving-pulleys in elevating and depressing the carriage; to provide improved means for reversing the movement of the auger-shaft and to arrest the motion of the auger-shaft and carriage instantly; to prevent injury to the same or for other purposes, as may be desired; to provide for accurately regulating the depth to which the mortises are to be cut, and to adapt the machine to cut mortises of different sizes and at different angles in hard or soft wood, as desired, and to accurately determine and regulate the space between the mortises, as more fully hereinafter set forth.

The above-mentioned objects we attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a perspective view of a complete machine constructed according to our invention. Fig. 2 represents a front elevation of the machine. Fig. 3 represents a view in detail of a portion of the mechanism by which the proper tension of the belt is maintained. Fig. 4 represents a side elevation with a portion of the frame broken away,

so as to show the internal mechanism of the machine. Fig. 5 represents a face view of a loose pulley forming part of the machine, detached, and a friction-band and pawl-lever, by means of which it may be clamped to its shaft; and Fig. 6, a similar view of the said pulley, showing a friction-band, whereby the motion of its shaft may be arrested through the medium of suitable mechanism. Fig. 7 represents a view of the under side of the machine as the same would be seen should the machine be turned upon its side. Fig. 8 represents a view in detail of a part of the device for moving the timber-carriage intermittently backward or forward, consisting of the arc plate, with a part of the graduated scale thereon, broken away to show an adjustable stop sliding in a slot in said arc plate and the grip or friction lever, the lower end of which embraces and turns a shaft, and by the connecting mechanism moves the timber-carriage to properly space the mortises.

Referring to the drawings, the letter A indicates the bed of the machine, which may be constructed of any suitable material, preferably, however, of cast-iron. The forward end of the frame A is provided with vertical grooved ways B, between which a vertically-movable table C is arranged, as more fully hereinafter explained. The said table, on each side at its top, is provided with ways D, between which is located a longitudinally-movable carriage E. This carriage is provided with bearings F for the auger-shaft G, which extends longitudinally through the carriage, projecting at each end thereof, the rear end forming a stock for the auger-bit and having a seat for the hollow chisel, which incloses the bit, as usual. The front end of the shaft is provided with a balance-wheel H.

The letter I indicates a long pulley mounted on the auger-shaft between the bearings, around which the driving-belt K passes. The said belt passes around the driving-pulley L and the intermediate pulleys M N, the latter of which serves to maintain the belt at a uniform tension, as more fully hereinafter explained. The driving-pulley Q is mounted on the forward end of the main driving-shaft T, which is journaled in bearing-blocks at the side of the frame A, and is provided with a

pulley R at its rear end, which is driven by a belt from the driving-wheel of a suitable motor.

The letters S and T indicate two pulleys, preferably of different diameters, for the purpose hereinafter specified.

U indicates a short shaft, which is journaled in bearing-blocks V and V⁴, secured to the inside of the frame A. Upon said shaft are mounted two loose pulleys W and W⁴, which connect, respectively, with the pulleys S and T by means of belts X and Y, the former being crossed so as to rotate the pulleys in opposite directions.

The letter Z, Fig. 5, indicates two fixed pulleys secured to the intermediate shaft U, setting close up against the adjacent faces of the webs of the said pulleys W and W⁴. On these fixed pulleys are fitted loosely the friction-bands A¹, which are split and bent at about right angles at their adjacent ends, one of the bent ends of each band being secured to the web of the pulley by means of a screw A². To the said screws A² are fulcrumed the pawl levers or dogs B¹, the short arms of which are bent at right angles, so as to set over the bent free ends of the friction-bands, the long arms of said pawl levers or dogs being bent outwardly at an angle toward each other, as shown in Fig. 4 of the drawings.

Between the pulleys and mounted on the intermediate driving-shaft U is located a sliding collar B⁴, the opposite edges of which are beveled, so that when brought to bear against the bent ends of the long arm of either of the pawl levers or dogs B¹ it will cause the short arm of said lever to bear against the free end of the friction-band and bind it to the fixed pulley Z, so as to carry it with it and give motion to the intermediate shaft. To the collar B⁴ is connected a vertical arm C¹, which is attached to a rod D¹, located loosely in bearings E¹, so that it can be reciprocated back and forth in order to throw the collar into contact with either of the levers B¹ to reverse the motion of the shaft or to disengage the said collar from both pawl levers. The rod D¹ is connected at its forward end by means of a link F¹ to one end of a lever F², fulcrumed to the lower part of the bed of the frame A, and the other end of said lever has connected with it a rod G¹, extending loosely through an eye or bearing H on the rack-bar S¹, the said rod G¹ being provided with adjustable stops at each side of the eye or bearing H, whereby the said adjustable stops alternately engage the said eye or bearing as the rack-bar S¹ is moved backward or forward by the mechanism described, and thereby shifts the rod to automatically reverse the machinery, so as to advance or withdraw the tool-carriage from the work, the extent of the travel of the tool-carriage between the periods of reversal being regulated by moving the adjustable stops to or from the eye or bearing H. The rod D is also connected by means of a link I¹ with a

hand-lever K, fulcrumed at its lower end to a pin L¹ and extending up through a slot in the bed of the frame A, whereby the said rod D¹ and the collar B⁴ may be shifted by hand to reverse the motion of the shaft or to stop the same, as hereinafter more particularly described.

The bearing-block is cut away at its top, and the portion of the shaft U located in the cut-away portion is formed with a worm-screw U⁴, which intermeshes with a threaded periphery of a worm-wheel M¹, mounted on a short transverse shaft N¹, journaled at P¹, depending from the lower side of the bed of the frame A. The said shaft has mounted upon a cogged pinion R¹, which intermeshes with a rack on the under side of a rack-bar S¹, which is provided with a spline T¹ on its upper side, the said spline being arranged to slide in a groove in the lower side of a longitudinal rib U¹ on the under side of the bed of the frame A. The forward end of said rack-bar projects to the front of the frame A directly below the table E, before mentioned, and is recessed on opposite sides. From the bottom of the said table extends downwardly a bifurcated hanger V¹, the members of which embrace the recessed portion of the rack-bar, the said members being arranged to slide vertically in the recesses so far as to travel with the rack-bar and at the same time permit the table to be elevated or depressed at pleasure.

The frame W¹ of the table at one side is provided with a rack X¹, with which intermeshes a cogged pinion Y¹, mounted on one end of a short shaft Y⁴, journaled in a bearing-block Z¹ on one end of the ways B, between which the table travels. The other end of said shaft has secured to it a hub having a series of radial arms or levers A², by means of which the table may be elevated or depressed. The said bearing-block has two forwardly-projecting jaws B², having half-bearings, between which a vertical rod C², secured to a lateral bracket D², projecting from the frame of the table, is arranged to slide. Through suitable threaded openings in the said jaws passes a clamping-screw E², provided at its projecting end with a lever F², by means of which the jaws may be clamped upon the rod to hold the table in any vertically-adjusted position. The pulley M, before mentioned, is mounted on a pin G², secured to one end of an arm H², the other end of said arm being provided with a pin I², extending in a direction opposite to that of the pin G² and having a bearing in the end of a lateral bracket K², extending from the side of the frame A. To the rear end of said pin is secured an arm L², which has connected to its free end a cord or chain M², passing over a pulley N² and provided with a weight at its end, whereby the belt K may be kept constantly at the proper tension. The belt also passes around the pulley M, mounted on a journal-pin secured to the bracket K², to per-

mit it to move freely in elevating and depressing the table.

The letter L⁴ indicates a friction-band, which embraces the friction-wheel M⁴, affixed to the shaft U at its rear end, the said friction-band being secured at one end to the journal-bearing V⁴ by means of a pin N⁴, and connected at the other or free end by means of a link P² with one end of the lever R², fulcrumed at T⁴ to the inside of the frame A. The other end of said lever connects, by means of a rod S², with a short lever T², fulcrumed to the handle of the hand-lever K¹, whereby the friction-band may be caused to bind the friction-wheel M and suddenly arrest the motion of the friction-wheel and shaft.

The rear of the bed of the machine at each side is provided with ways U², over which is mounted a longitudinally-movable table V², which is provided with a hanger or bracket W², extending downwardly through an opening in the bed of the frame. The hanger is provided with an internally-threaded opening, through which passes a leading screw X², journaled in suitable bearing-blocks R² on the under side of the bed of the frame A. The said screw is provided with a beveled pinion Y² at its forward end, which intermeshes with a similar pinion Z² on one end of a short shaft A², which is journaled in a bearing below the bed of the frame A and in the side of said frame through which it passes, the outer end being provided with a lever or wheel by which it may be turned to move the table V² back and forth to regulate the depth to which the mortise is to be cut.

The top of the table V² is provided with segmental ribs B³, upon the upper edges of which rests a table C³, which is swiveled to the table V² by means of a central pivot or bolt, as shown and illustrated in Fig. 7 of drawings attached to specifications for Letters Patent No. 283,341, granted August 14, 1883, to R. S. Greenlee. The table C³ on the upper side is provided with ways D³, between which is arranged to travel transversely to the bed of the frame A a movable carriage E³, to which the work to be mortised is secured. The under side of the carriage at one side is provided with a rack F³, with which intermeshes a cogged pinion F⁴, sitting in a short slot in the table C³ and mounted on a short shaft G³, having a bearing in the side of the said table C³. The said shaft projects beyond the side of the table and has mounted loosely on its outer end a split collar H³, having upwardly-extending arms I³, which may be grasped and brought together so as to bring the collar upon the shaft, the whole constituting a grip or friction lever, by means of which the shaft may be turned intermittently to move the traveling carriage the proper distance across the front of the cutting-tools to properly space the mortises.

In order to accurately and conveniently gage the distance between the mortises an arc plate K³ is secured to the boss of the

bearing in which the shaft G³ is journaled. The said plate has a segmental slot, in which sits and is adapted to slide an adjustable stop L³, which is provided with a set-screw M³, by means of which it may be clamped in any adjusted position. The arc plate is graduated on its periphery, as shown, so that by bringing the forward edge of the stop opposite any particular graduation-mark and clamping it there the movement of the grip-lever will be limited by means of a stop or follower i, riveted or affixed to the inner side thereof, extending through the segmental slot and adjusted to slide therein, so that when the grip-lever is moved forward this stop or follower is brought in contact with the adjustable stop L³, whereby the motion of the grip-lever is arrested, so as to accurately and properly space the mortises.

The carriage E³ is provided with a vertical standard-plate N³, which forms a backing for the work to be mortised. The said standard is slotted vertically, and in said slot is located a sliding block P³, operated by means of a leading-screw R³, having a hand-wheel R⁴ at its upper end to clamp the work to its seat on the traveling carriage, the forward end of the block being provided with a dog S³, which seizes and holds the work to the tools. The rear of the traveling carriage is provided with two standards T², and the table C³ is provided with an intermediate standard D³, through which passes a gage-rod D⁴, having adjustable stops D⁵. By adjusting the said stops the travel of the carriage may be properly limited to regulate the length of the mortises to be cut.

The operation of our invention will be readily understood in connection with the above description, and is as follows: The work to be mortised is clamped to the carriage E³ by means of the clamping-block P³, and the table E is adjusted to the proper height. Upon starting the driving-shaft, the lever K¹, the collar B⁴, and the pulley W being in the position shown in Figs. 1 and 4 of the drawings, the auger will be rotated in proper direction for boring and the carriage E will be advanced to the work, so as to cause the chisel to cut into the wood while the boring is being effected. To elevate the table E, the shaft Y⁴ is turned by means of the arm A², so as to rotate the pinion Y⁴ and operate the rack X⁴. The table is held in an adjusted position by clamping the jaws B², as hereinbefore mentioned. The carriage E³ is traversed across the machine in front of the tool at intervals to properly space the mortises by means of the lever I³, and the distance between the spaces is regulated by means of the stop L³, being determined by adjusting the said stop to the graduations on the arc plate, as before described. The stop may be also adjusted so as to limit the movement of the lever in such manner as to merge the successive mortises and make one long mortise of any suitable length.

It will be observed that most of the devices

for controlling the operation of the machine are well to the front and right hand thereof, where they may be readily manipulated by the attendant of the machine.

5 Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination, with the main driving-shaft of a mortising-machine, of the pulleys
10 thereon, and intermediate driving-shaft and the loose pulleys mounted thereon, a collar between the pulleys and mounted loosely to slide on said shaft, the pawl-levers fulcrumed to the loose pulleys, and clutch-band engaging
15 the pulley Z and operated by the levers, and the mechanism for shifting the collar to engage or disengage the pawl-levers to stop or reverse the travel of the tool-carriage, substantially as specified.

20 2. The combination, in a mortising-machine, of the intermediate driving-shaft, the loose pulleys and intermediate collar mounted thereon, the arms connecting with said collar, the reciprocating rod carrying the said arm,
25 and the hand-lever connected with the said rod by means of a link, whereby the motion of the intermediate driving-shaft may be reversed to reverse the travel of the tool-carriage, substantially as specified.

30 3. The combination, in a mortising-machine, of the vertically-movable table arranged to slide between ways at the front of the main frame, the rack secured to the frame of the table, the pinion intermeshing with the rack,
35 levers by which it is operated, and the clamp-jaws and screw, whereby a sliding rod forming part of the table is clamped to hold the

table in any desired vertically-adjusted position, substantially as specified.

4. The combination, in a mortising-machine, 40 of the friction-band surrounding the friction-wheel, the intermediate driving-shaft, the connecting links and levers, and the short lever fulcrumed to the handle of the reversing hand-lever, whereby the motion of the machine may be instantly arrested, substantially
45 as specified.

5. The combination, with the intermediate driving-shaft, its worm-screw and pinion, of the rack-bar intermeshing therewith, and
50 having opposite vertical recesses at its forward end, and the bifurcated hanger depending from the tool-carriage, whereby the said carriage is advanced and withdrawn while it is permitted to be moved vertically, substantially
55 as specified.

6. The combination, in a mortising-machine, of the vertically-movable table carrying the tool-carriage, the rack-bar by which the same is moved, the intermediate shaft and gearing, 60 whereby the rack-bar is operated, the reversing-pulleys, their band-clutches and dogs or pawls, and the intermediate sleeve, levers, and rod extending through a loose bearing on the rack-bar, the said rod being provided with
65 adjustable stops, whereby the travel of the carriage is reversed at any desired point, substantially as specified.

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