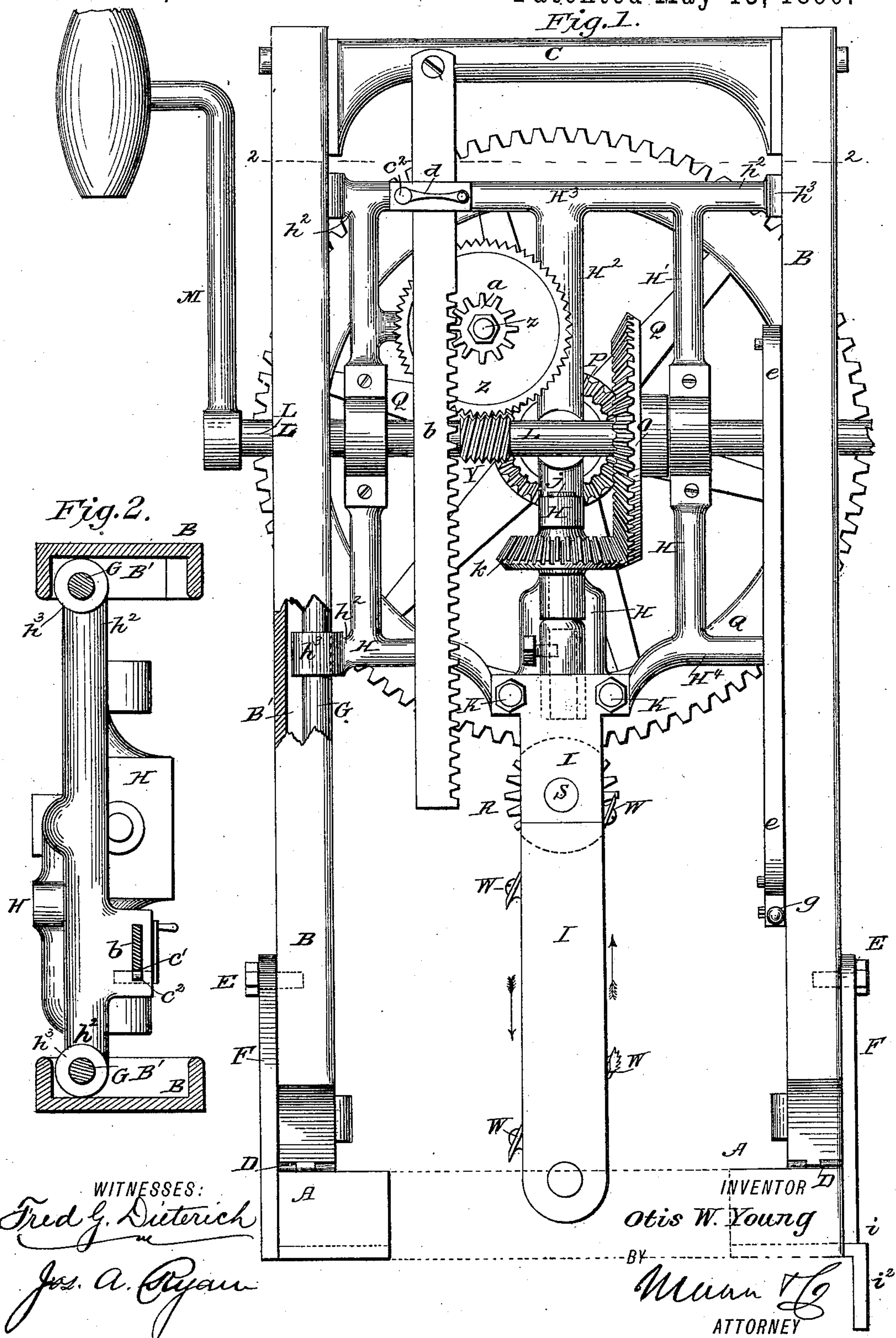


3 Sheets—Sheet 1.

No. 427,818.

Patented May 13, 1890.



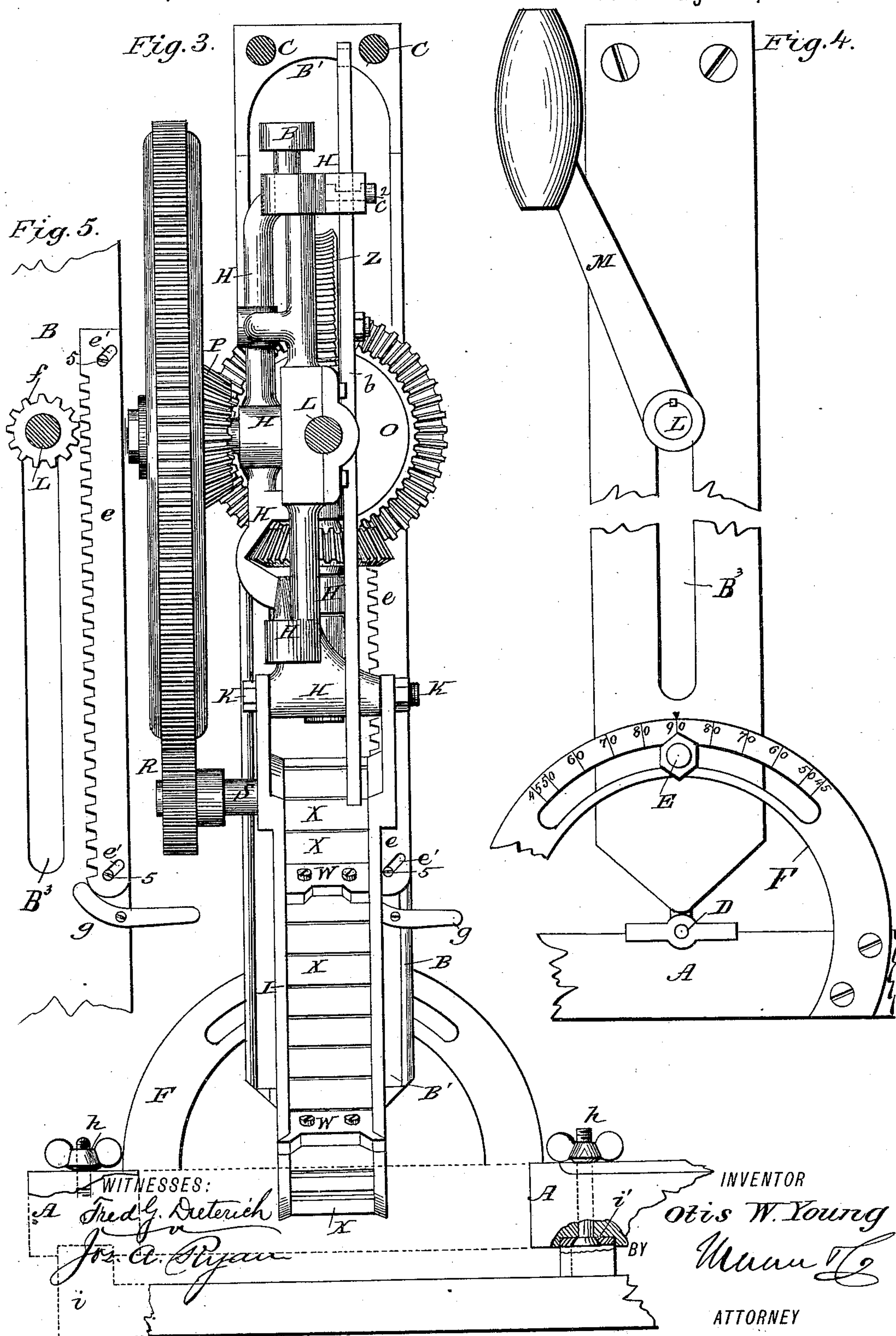
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BORING AND MORTISING MACHINE.

No. 427,818.

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(No Model.)

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O. W. YOUNG.
BORING AND MORTISING MACHINE.

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Patented May 13, 1890.

Fig. 6.

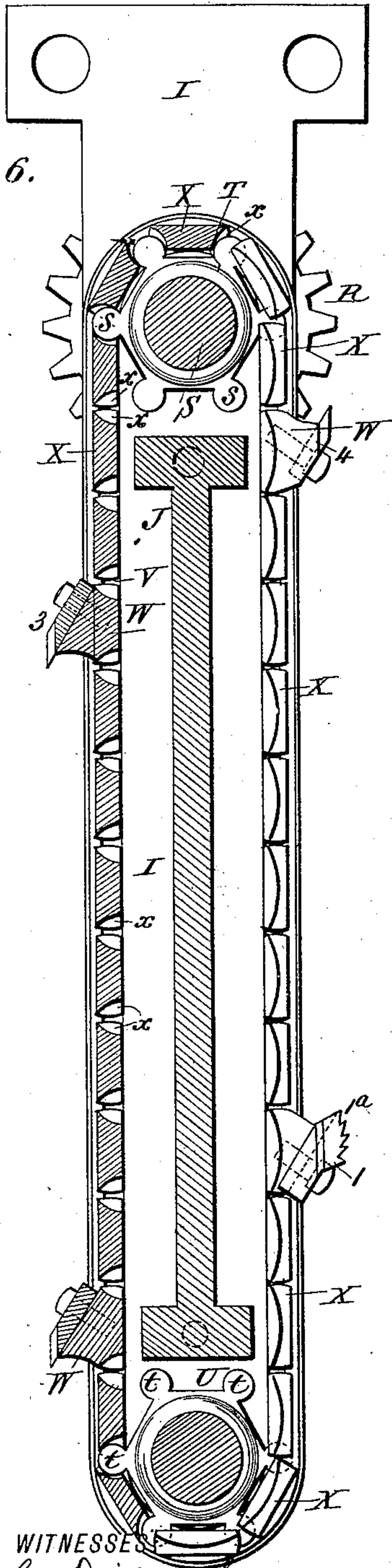


Fig. 7.

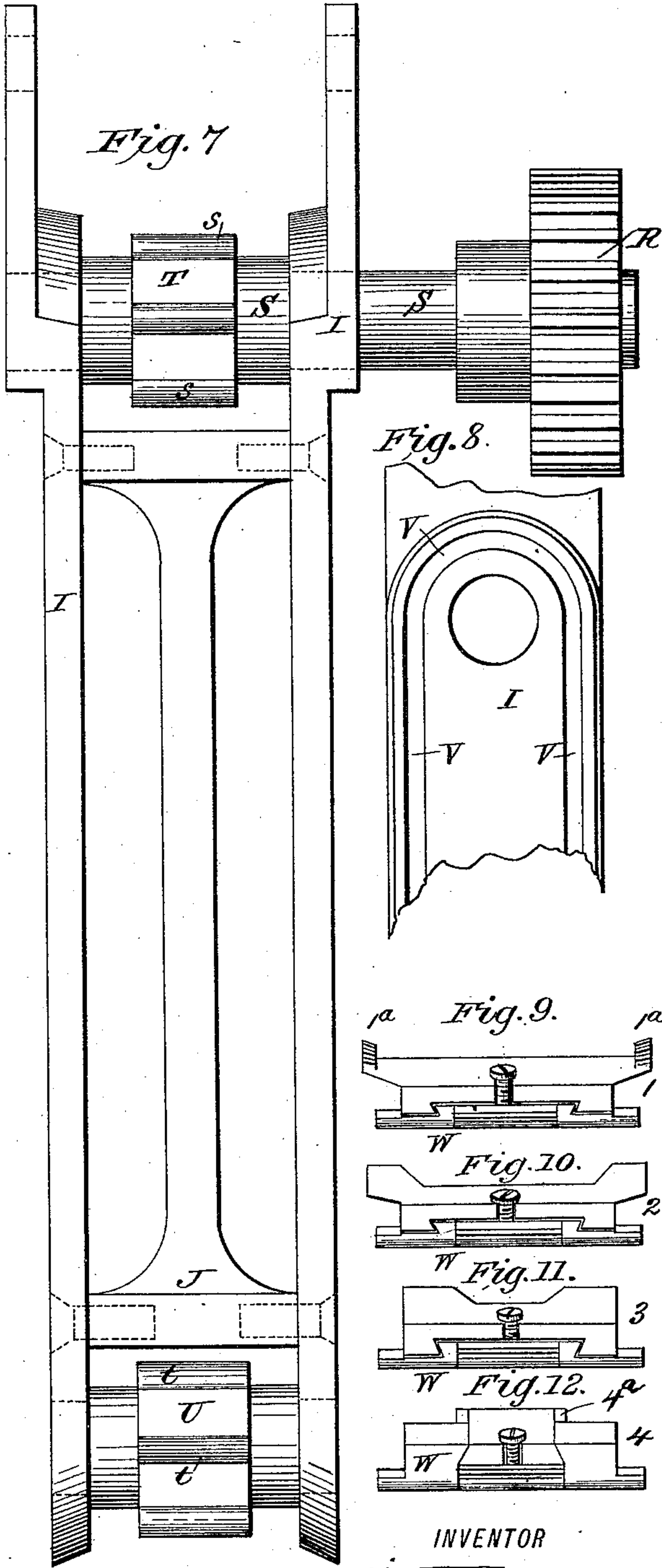


Fig. 8.

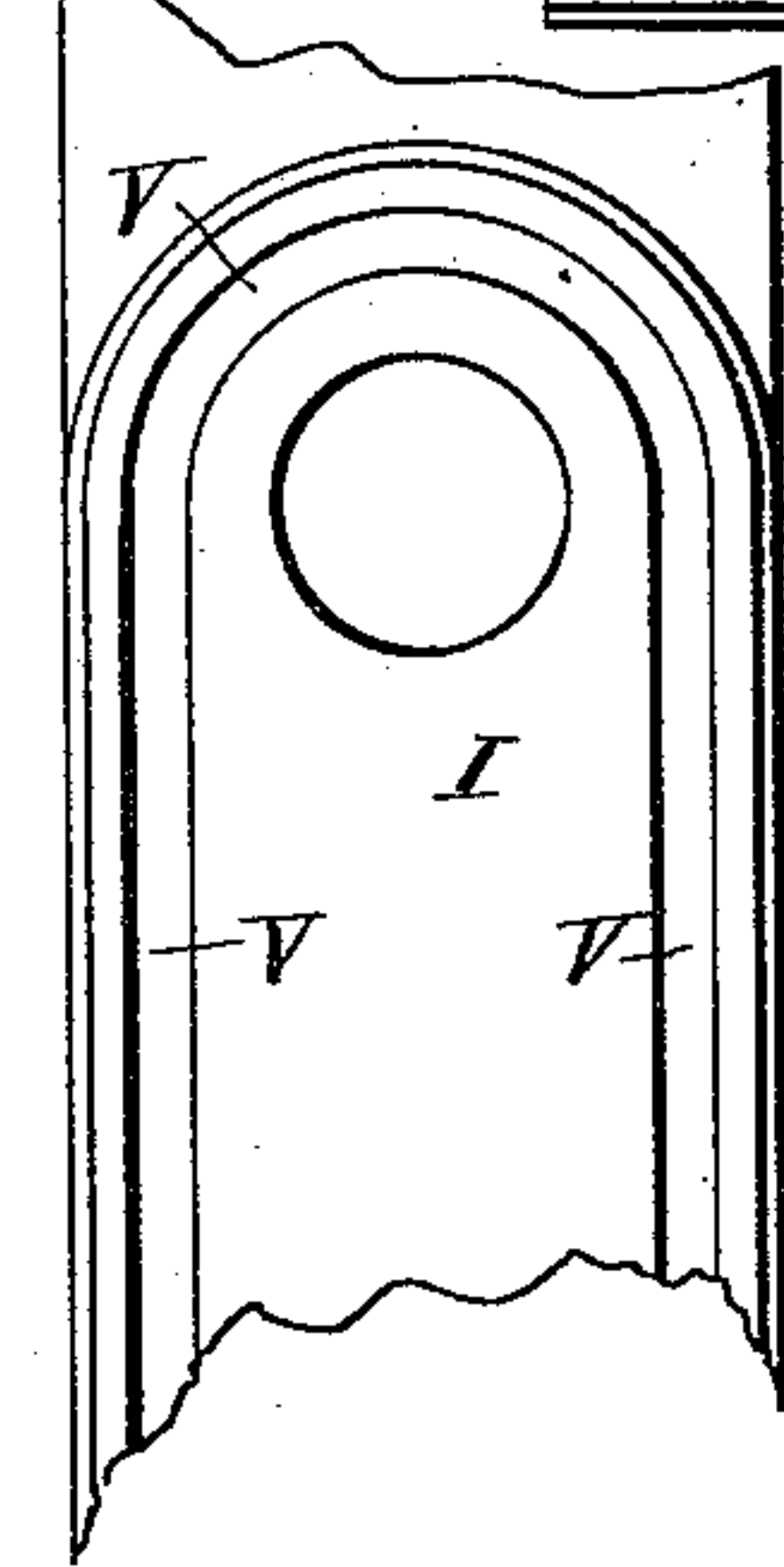


Fig. 9.



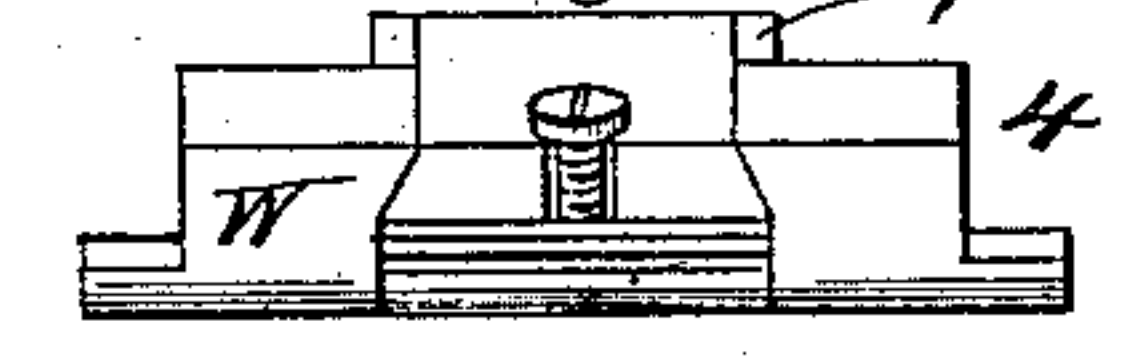
Fig. 10.



Fig. 11.



Fig. 12.



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BORING AND MORTISING MACHINE.

SPECIFICATION forming part of Letters Patent No. 427,818, dated May 13, 1890.

Application filed August 3, 1889. Serial No. 319,640½. (No model.)

To all whom it may concern:

Be it known that I, OTIS W. YOUNG, residing at Charles City, in the county of Floyd and State of Iowa, have invented certain new and useful Improvements in Boring and Mortising Machines, of which the following is a specification.

My invention relates to improvements in combined mortising and boring machines adapted to be operated either by hand or other suitable power and provided with interchangeable attachments for the boring or cutting of either rectangular or round holes or mortises.

My invention consists in providing a suitable upright frame pivoted to and angularly adjusted upon a supporting-base, a sliding frame arranged in the upright frame and carrying gearing, shafting, and other operating mechanism, to which is detachably secured the mortising device and by which it is operated and advanced to its work.

It consists, essentially, of parallel side pieces fitted with sprocket-wheels arranged between them at either end and having in the inner face of each an endless groove extending from end to end of the side piece and around the sprocket-wheel bearings. Fitted and adapted to run in said grooves are a series of bars or sections arranged side by side, with their ends respectively in the opposite grooves and completely filling the entire length of the grooves. The sections are recessed on their under sides to receive the sprockets of the sprocket-wheels, by means of which the sections are forced or pushed around the ends of the grooves, all the other sections of the series being advanced along the grooves by the pushing-contact of the sections engaged by the sprockets, whereby the continuous rotation of the sprocket drive-wheel imparts continuous movement of the series of sections around the grooves. Secured to the several sections of the series are cutting attachments, more fully hereinafter described, for cutting away a rectangular space in the material operated upon, the size of the space or mortise being determined by

the length of the sections and the distance between their upward and downward paths of movement. The direction of the cut of the device is determined by adjusting the angle of the upright frame, and the speed is determined by the rapidity of the travel of the cutter-sections and the speed with which the device is advanced to its work.

My invention further consists in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front view of my machine. Fig. 2 is a horizontal section of the main and sliding frame, taken on the line 2 2, Fig. 1. Fig. 3 is a side view of the machine with one side of the main frame removed. Fig. 4 is a side view of the main frame, showing its connection to the base. Fig. 5 is a view of the rack and gear for drawing the tool out of the hole. Fig. 6 is a central vertical section, on an enlarged scale, of the cutter-frame or mortising-auger. Fig. 7 is a side view of the cutter-frame with the power chain or carrier removed. Fig. 8 is a detail face view of the cutter-frame, showing grooves for cutter-carrier to run in. Figs. 9, 10, 11, and 12 are views of the different kinds of cutters and their attachments to their supports or bearings.

In the accompanying drawings, A indicates the base, from which rise two standards B, which, with their top connection C, constitute the main or supporting frame. This frame is fastened to the base A by means of hinges D, allowing the entire frame and all its attachments to swing back and forth to form different angles with the base A, the frame being held at the angle desired by the bolts E and semicircular braces F.

The inner faces of standards B are recessed, as at B', as most clearly shown in Fig. 2 of the drawings. In said recessed portions are secured the circular vertical rods or guides G, upon which travels a vertically-movable frame H. This frame consists of the vertical side arms H' H', the back and

the upper and lower cross-bars $H^2 H^3 H^4$, which are provided with extensions $h^2 h^3$, having apertured heads $h^3 h^3$, which encircle the rods G, as clearly shown in the drawings.

5 Supported by this frame H and depending therefrom is a cutter-frame composed of two side plates I, connected by a brace J, Figs. 6 and 7, and detachably fastened to the sliding frame H by the bolts K, as shown.

10 L denotes the main or driving shaft journaled in the sliding frame H, the ends of which pass through vertical slots B^3 in the standards B and have secured thereon the cranks M.

15 Securely fastened to the drive-shaft L is a bevel cog-wheel O, which gears into bevel-cogs P, secured to the speed and balance wheel Q, which turns upon a stub-shaft set at right-angles with the drive-shaft L, and

20 which is supported by the back H^2 of the sliding frame. The wheel Q is fitted with cogs upon its outer rim designed to engage with a cog-wheel R upon the outer end of a shaft S, which passes through the upper portion of the side plates I and has formed

25 thereon between the two side plates a gear or sprocket wheel T, for a purpose hereinafter described. By following these connections it will be seen that as a revolving motion is

30 given to the drive-shaft L by turning the handles the same motion at an increased velocity will be imparted to the shaft S. Passing through the lower portion of the side plates I is another shaft provided with a

35 similar sprocket-wheel U, the ends of said shaft being flush with the outer faces of the side plates I. Upon the inner faces of the side pieces I are formed endless grooves V, (see Fig. 8,) and with their ends fitted into

40 and running in these grooves are a number of bars or links W and X', all separate and independent from each other, but placed side by side, so as to completely fill the grooves and pass over the sprocket-wheels T

45 U, said links being provided at their inner meeting ends with segmental grooves or depressions w and x , which form semicircular-shaped recesses, into which project the sprockets $s t$ on the wheels T U, said sprockets being formed of spherical projections, as shown,

50 so that as the sprocket-wheel T is caused to revolve the entire chain of bars will be forced around in the grooves, each link pushing the one ahead of it, thus forming a pushing-chain,

55 which causes the lower sprocket-wheel U to revolve, thereby constituting a power for driving the cutters.

Upon the bars or links W are fastened the cutters 1, 2, 3, and 4. These cutters are so arranged that the one shown in Fig. 9 will strike

60 the wood first a little in advance of the others, said cutter being provided on its outer edges with projecting saw-teeth $1^a 1^a$, which serve to cut a furrow in the wood and sever

65 the ends of the chips to be removed. The

following cutters are provided with cutting-edges of different widths, each taking out a small section, the cutter 4, which is provided with a central cutting portion 4^a , serving to take out the center or core part of the hole. 70 By arranging the knives in this manner it will be seen that each succeeding knife will disconnect and carry out the chips or shavings, the result being a clean smooth square hole or mortise, the bottom being left (when 75 not run clear through the timber) in the shape of a half-circle. The high rate of speed at which the cutters run and the distribution of the work so that each cutter has but a small portion of material to remove cause 80 my machine to do smooth accurate work and to operate easily, whether in dry or green, soft, hard, or knotty wood.

Upon the drive-shaft L is formed a worm-thread Y, arranged to engage a cog-wheel Z, 85 mounted upon a stub-shaft z , secured to a projecting arm H^5 of the sliding frame (see Fig. 2) arranged at right angles with the drive-shaft L, and attached to and turning with this wheel is another cog-wheel a , which en- 90 gages with a swinging rack-bar b , suspended from the top of the main frame c and passing through an elongated slot c' in the top bar H^3 of the sliding frame H and held in gear with the cog-wheel a by means of an eccentric-pin 95 c^2 , Figs. 1 and 3, which can be turned one-fourth of a revolution by means of a handle-
lever d , secured to the projecting end of the pin, which releases said rack-bar from a fixed contact with the cog-wheel a , the aforesaid 100 combination constituting the feed for regulating the progress of the tools into the work.

Secured to one of the standards B is a rack-bar e , Figs. 1, 3, and 5, held by screws or pins 5 5, which pass through elongated diagonally- 105 arranged slots $e' e'$ in the bar e , said slots allowing the bar to be slid in and out of engagement with a cog-wheel f , (see Fig. 5,) firmly secured upon the drive-shaft L. By this arrangement it will be seen that the weight of 110 the bar e will cause it to drop into gear with the wheel f . To hold the same normally out of gear with said wheel f , I provide a gravity-lever g , pivoted at one side of the standard B, its short end engaging the lower end 115 of the bar e and forcing the same up out of gear. Thus when the hole has been finished, by releasing the rack-bar b by turning the lever d to disengage the eccentric-pin, and by lifting the long end of the gravity-lever 120 g , to admit of the bar e falling into gear with the wheel f , and by turning the crank M backward, the tools will be rapidly drawn out of the hole.

Secured to the base A by means of thumb 125 screws and bolts h is an adjustable sliding gage i , provided with longitudinal slots i' , through which the bolts h pass, and a depending lip i'' , which engages one face of the timber being operated on. By this arrange- 130

ment it will be seen that the machine can be held the desired distance from the timber being operated upon.

Supported on the sliding frame H is a short shaft *j*, formed with an auger-socket at its lower end for holding a round auger, said shaft being revolved by having a cog-wheel *k* secured to it, which meshes into the cog-wheel O on the drive-shaft L.

To change the mortising-machine into an ordinary boring-machine, it is only necessary to detach the mortising augers or cutters by removing the bolts K, placing a round auger in the socket, and throwing the feed out of gear by turning the lever *d*. The machine is then ready for boring round holes.

While I have shown my machine as operated by hand-power, it is obvious that the same may be run by steam or other power, when it is designed for use in shops, &c., where such power exists.

The superiority of the form of endless carrier above described over that of an endless chain or link belt is that the sections, being solid bodies, can be used efficiently for an indefinite time; that the carrier, being impelled by a pushing instead of a pulling power, cannot be broken by any excessive strain or undue wear, as so frequently and often disastrously happens with link-belts, and the strength of the carrier is thus limited only by the strength of the sprockets and the guides, and not, as with the link-belt, to the strength of the weakest link, which is continually by use made weaker. The power also is more efficiently applied in forcing the cutters into and through the wood with this device than with a link-belt, because the cutter-sections are firmly supported at both ends upon their guides or the walls of the grooves, the wear upon which is insignificant, whereas with a belt the strain is thrown upon the shaft of the sprocket-wheel, which much more rapidly wears and causes unevenness and looseness of movement between the parts, thus impairing the efficiency of the cutters in performing their work. As a result of this improved construction, very much closer and nicer adjustment can be made for the cutters than by any other construction, which adjustment can be maintained an indefinite time before the wear upon the bodies of the sections and the walls of the guides will cause any appreciable variation. In addition, the simplicity of construction makes the first cost of the apparatus much less than that of a chain or link belt, and being independent and separate the sections are readily interchanged or others substituted for any of them. These and other features of superiority in construction serve to make practicable and successful what has heretofore been impracticable and inefficient.

Having thus described my invention, what I claim as new is—

1. In a mortising-machine, the combination

of a series of independent bars or sections arranged in endless grooves or channels, knives or cutters secured to said bars, and means for driving said bars, substantially as and for the purposes set forth.

2. In a device of the class described, an endless carrier composed of independent disconnected sections or bars, endless guides for said carrier, cutters arranged upon said sections, and a driving mechanism adapted to engage said sections and to carry them forward in said guides, substantially as and for the purposes set forth.

3. The combination of an endless carrier composed of independent disconnected sections or bars, guides engaging with and directing the course of movement of said carrier, operating tools or attachments secured severally to said bars, and driving mechanism engaging said bars successively, and thereby pushing said carrier along said guides, substantially as described.

4. The combination of an endless carrier composed of independent disconnected sections or bars, guides engaging with and directing the course of movement of said carrier, and driving mechanism engaging said bars successively, and thereby pushing said carrier along said guides, substantially as described.

5. In a mortising-machine, the combination of an endless carrier composed of disconnected bars or sections, endless grooves engaging the outer edge of said sections, a sprocket-wheel engaging said sections and pushing the same along said grooves, cutters arranged upon sections of said carrier, having projecting spurs on their outer edges, other cutters having cutting-edges transverse of the line of cut of said spurs and arranged upon other sections of said carrier, and mechanism for advancing said carrier and its attachments and supports, substantially as and for the purposes set forth.

6. In a device of the class described, a mortising-auger detachably secured to the frame of the machine, comprising, in combination, parallel side pieces having endless grooves or channels arranged on their inner surfaces, an endless carrier composed of disconnected bars or sections arranged in said grooves, cutters arranged upon the sections of said carrier and adapted as moved by said carrier to cut away the material in advance of and away from the sides and edges of said side pieces, sprockets journaled in said side pieces and engaging with the sections of said carrier and adapted to drive the same, and means for advancing said auger, as and for the purposes set forth.

7. In a device of the class described, a mortising-auger detachably secured to and depending from the frame thereof, comprising, in combination, the side pieces I I, rigidly secured parallel with each other and having endless grooves V arranged in their inner

faces, an endless carrier formed of the independent sections X W, arranged in said groove, sprockets T U, journaled in said side pieces and engaging with said sections, spur-
5 cutters detachably secured to said sections W, and knife-edged cutters detachably secured to said sections X, and suitable means

for driving said sprockets and advancing said auger, as and for the purposes set forth.

OTIS W. YOUNG.

Witnesses:

S. F. FARNHAM,
H. C. IRELAND.