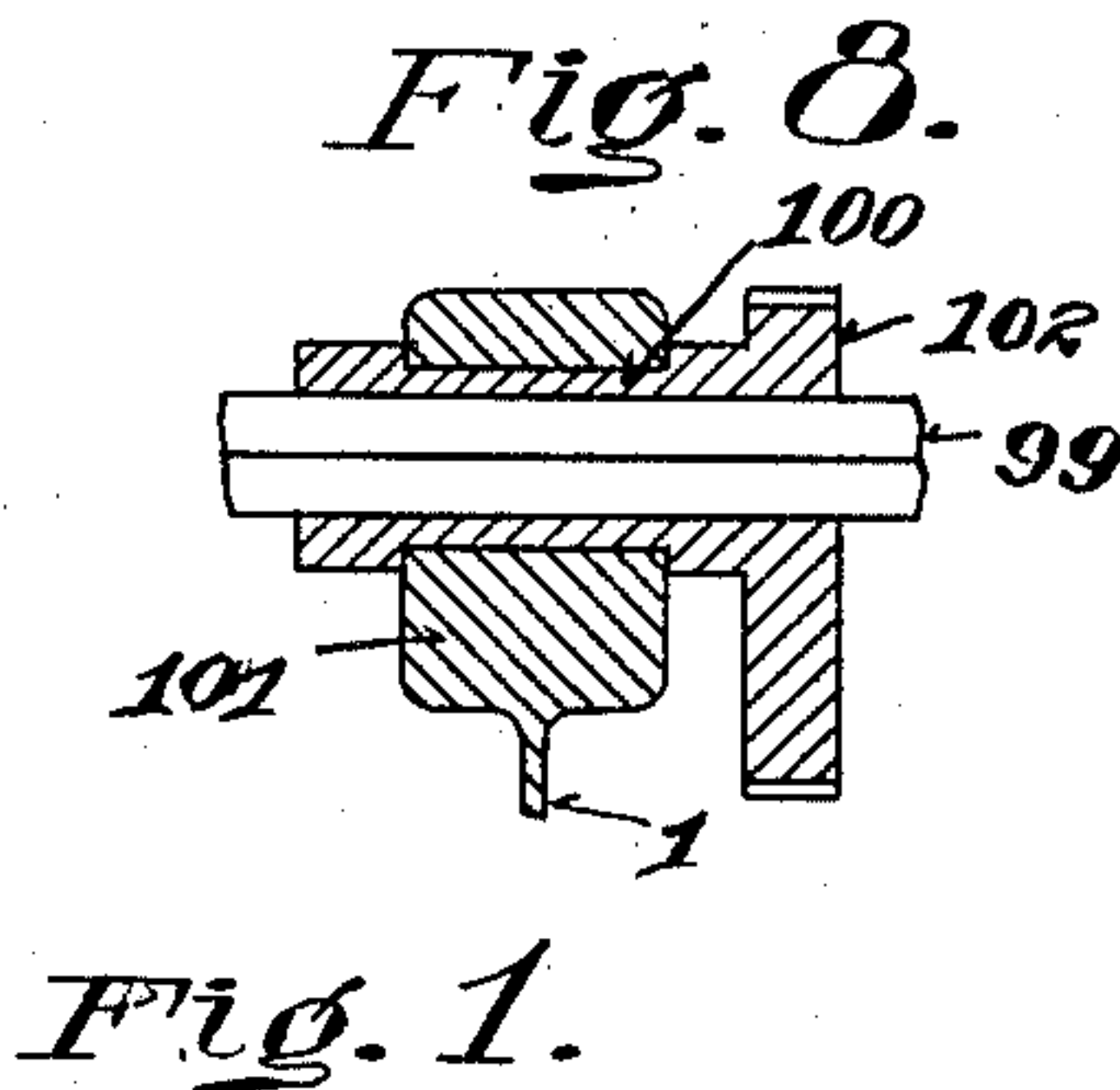


PATENTED APR. 5, 1904.

APPLICATION FILED DEC. 4, 1903.

3 SHEETS—SHEET 1.



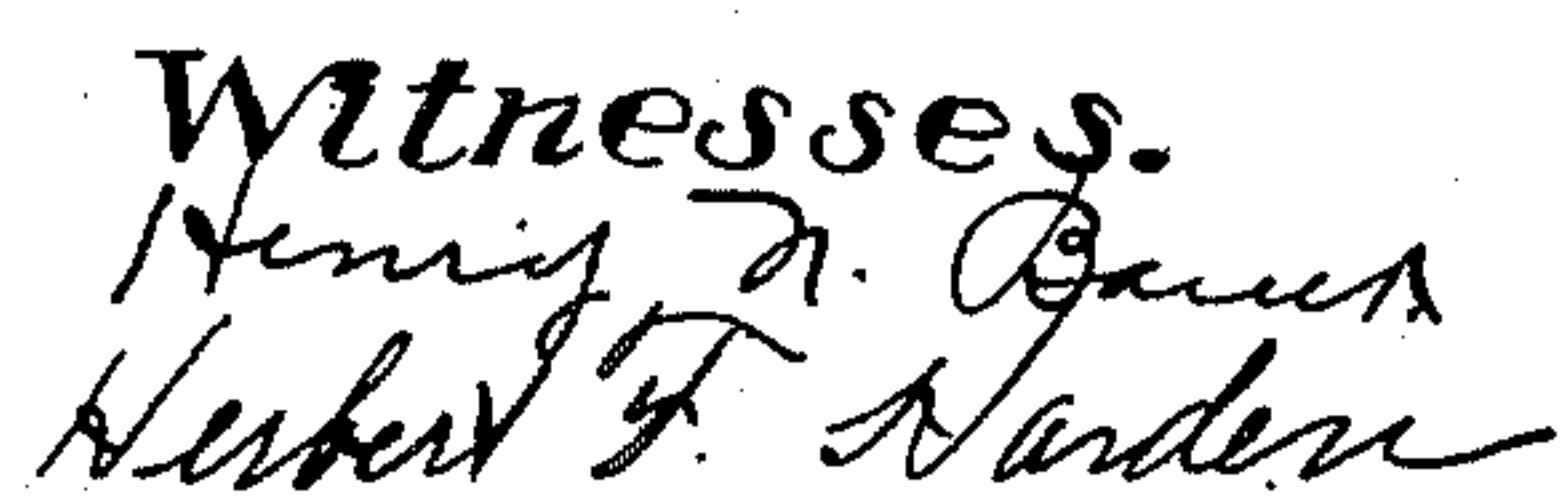
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147 by B. F. Werbolet, his atty.

PATENTED APR. 5, 1904.

APPLICATION FILED DEC. 4, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



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No. 756,725.

PATENTED APR. 5, 1904.

H. S. SPENCER.  
HOLLOW CHISEL MORTISING MACHINE.

APPLICATION FILED DEC. 4, 1903.

NO MODEL.

3 SHEETS—SHEET 3.

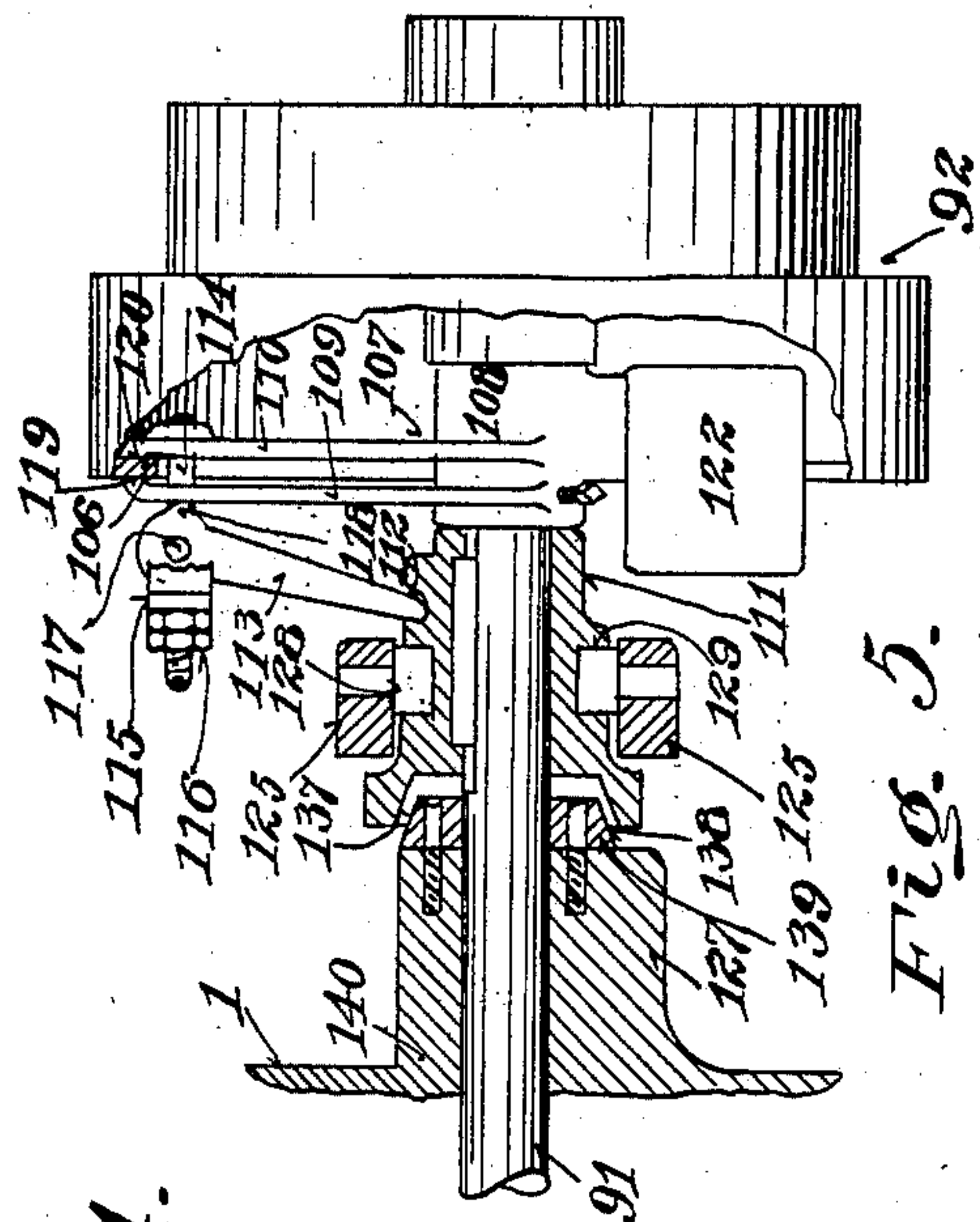


Fig. 4.

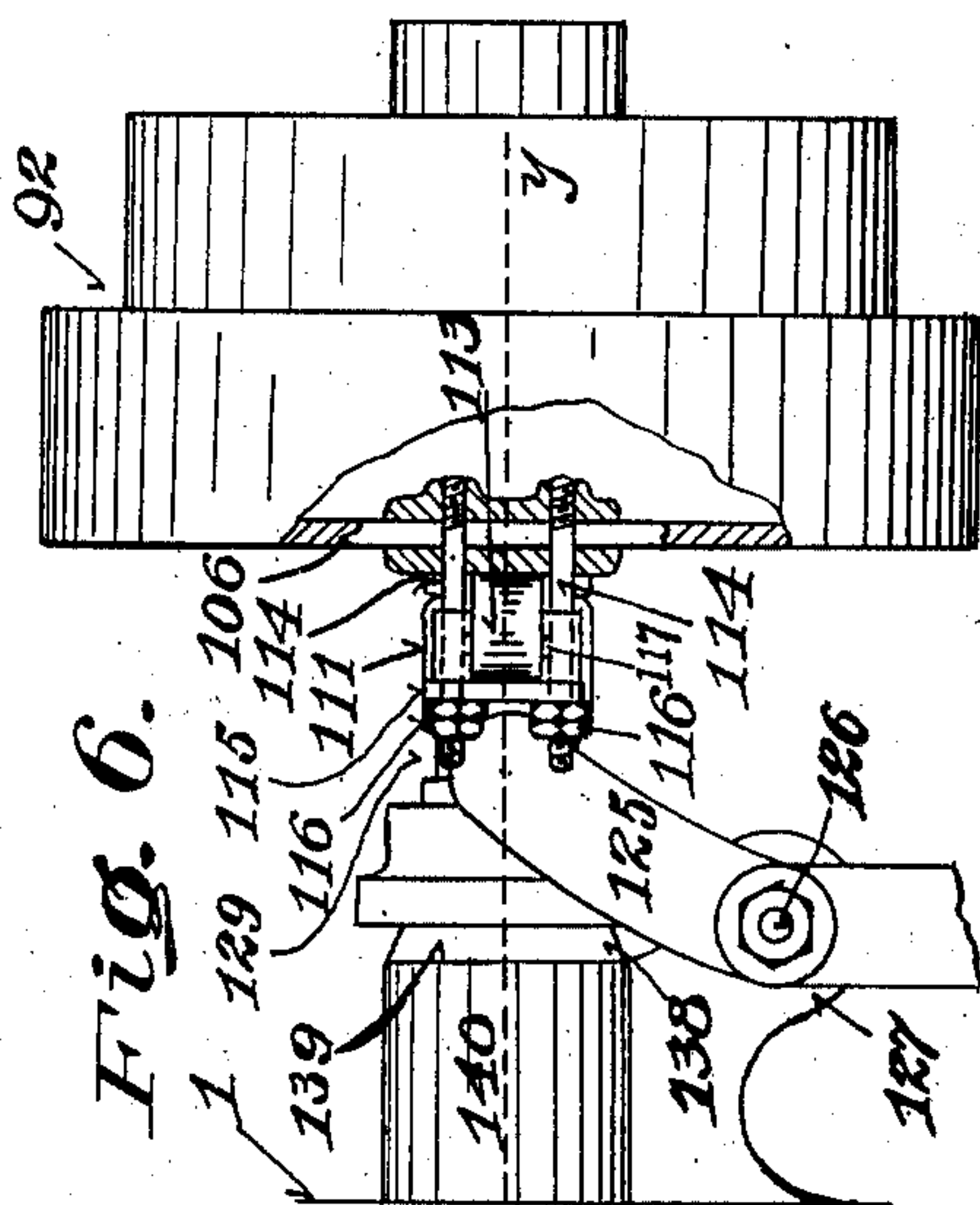
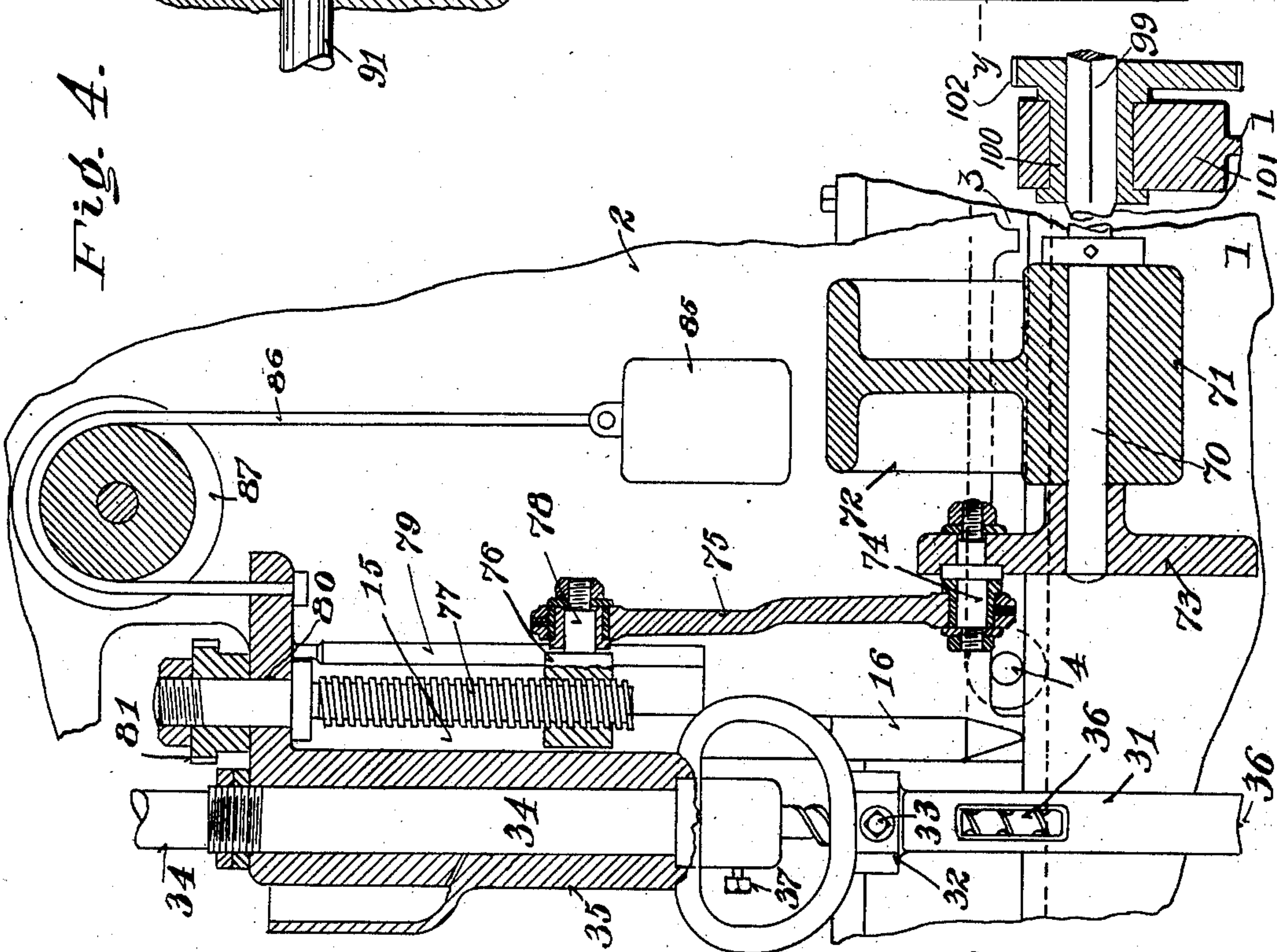


Fig. 6.



Witnesses.

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# UNITED STATES PATENT OFFICE.

HARRY S. SPENCER, OF NORWOOD, OHIO, ASSIGNOR TO J. A. FAY- & EGAN COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF WEST VIRGINIA.

## HOLLOW-CHISEL MORTISING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 756,725, dated April 5, 1904.

Application filed December 4, 1903. Serial No. 183,693. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY S. SPENCER, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Hollow-Chisel Mortising-Machines, of which the following is a specification.

My invention relates to hollow-chisel mortising-machines, and has for its object the providing in a machine of this character of novel means for imparting to the auger and chisel a rapid reciprocation with a slow feed and quick return and in novel means for arresting the reciprocation of the chisel-ram; and the invention will be readily understood from the following description and claims, and from the drawings, in which—

Figure 1 is a side elevation of my improved device. Fig. 2 is a front elevation of the same. Fig. 3 is a rear elevation of the same. Fig. 4 is a section on the line *xx* of Fig. 3, showing the pitman mechanism for reciprocating the hollow-chisel ram. Fig. 5 is a detail in side elevation and partly in section on the line *yy* of Fig. 6, showing the clutch mechanism for throwing the hollow-chisel ram in and out of operation. Fig. 6 is a plan view of the same, partly broken away. Fig. 7 is a detail in section on the line *zz* of Fig. 2, showing the means for adjusting the bearing of the auger-spindle extension; and Fig. 8 is a detail on the line *xx* of Fig. 3, showing the connection between the elliptical gear and its sliding shaft.

The frame 1 supports a carriage 2 movable forward and back or longitudinally of the frame on ways 3, antifriction-rollers 4 relieving friction. (See Figs. 1 and 4.) A gib 5, adjusted by bolts 6, is provided for taking up lost motion and wear. The carriage has a stud 7 secured thereto, a pinion 8 being journaled on the stud and meshing a rack 9 on the frame for shifting the carriage longitudinally of the frame. The enlarged hub of the pinion has pilots 10 for turning the pinion, or a hand-wheel or other turning agency may be provided for the purpose. The outer end of the stud is screw-threaded and receives a clamping-nut 11, having a weighted lever 12 and

clamping the pinion rigidly with relation to the carriage and rack for locking the carriage in position. A slight turn of the nut serves to release the pinion, permitting it to be turned, and the weighted lever on the nut prevents turning of the nut after the lever has dropped to hanging position upon release from its clamping or frictional contact with the pinion. The carriage has a hollow-chisel ram 15 slidable up and down thereon in ways 16, the ram being reciprocated in manner hereinafter explained.

A suitable table is provided for supporting the stock or material to be operated upon, which table may be of any suitable construction and arranged to be shifted by hand or power. I have shown a table 21 supporting the stock shown at 22, the table slidable from side to side or transversely of the frame in ways 23 on a bracket 24 adjustable vertically on the frame on ways 25 by means of a threaded adjusting-rod 26. The table has a rack 27, with which a pinion 28 on a shaft 29, journaled in the bracket, engages for shifting the table transversely of the frame, thereby bringing any part of the length of the stock under the hollow chisel, the shifting of the carriage longitudinally of the frame permitting the chisel to be positioned at any desirable point transversely of the stock. The movement of the table transversely of the frame and the movement of the carriage longitudinally of the frame make any part of the stock accessible to the chisel.

The hollow chisel 31 is arranged to be stationarily secured with relation to the ram by being received in a socket 32, in which it is clamped by a set-bolt 33. A spindle 34 is journaled in a bearing 35 on the ram and has an auger 36 rigidly secured thereto by a set-bolt 37, the auger turning within the hollow of the chisel and the spindle being held against longitudinal movement in the bearing, the spindle, however, reciprocating with the hollow chisel and ram. The spindle is turned by means of a shaft 41, journaled in bearings 42 43 on the carriage and having a pulley 44 and bevel-gear 45 secured thereto. The bevel-



gear 45 meshes a bevel-gear 46, journaled in a bearing 47. The upper end of the spindle is extended, as shown at 48, and projects through the bevel-gear 46 and a bearing 49, the spindle and bevel-gear 46 being splined together, as shown at 50, or the connection between the spindle and bore of the bevel-gear may be angular in cross-section for causing the gear and spindle to rotate together while permitting longitudinal movement of the spindle in the gear. Each of the bearings 47 49 has set-bolts 53 taking therethrough, the bolts of said respective bearings taking against faces 54 on the carriage for adjusting the bearings accurately into line with the bearing 35 and the spindle, clamping-bolts 55 taking through the bearings 47 49 into the carriage for clamping said bearings in place. This provides convenient means for accurately aligning the bearings and spindle. The bearings 47 49 may be held between flanges 56 57, extending from the carriage. Gibs 59 60 take between the ram and carriage, set-bolts 61 aligning the gibs, thereby providing alignment of the ram with the carriage in the ways 16. Bolts 62, taking through slightly-slotted apertures in the gibs and into the carriage, hold the gibs in place. Stops 63 64 are arranged to be clamped adjustably on rod 65, supported in brackets 66 67, extending from the frame, a lug 68, extending from the carriage, being arranged to strike the stops for limiting the forward and backward movement of the carriage.

For reciprocating the hollow-chisel ram a shaft 70 is journaled in a bearing 71 on a cross-girt 72 of the carriage. The shaft 70 carries a crank-plate 73, having a crank-pin 74. A pitman 75 connects the crank-pin with a cross-head 76, receiving a threaded rod 77. The cross-head has a stud 78 for the pitman and the ram slides when adjusted on the cross-head. The threaded rod has a bearing 80 in the ram and has secured thereto a spiral gear 81, with which a spiral gear 82, journaled in a bearing 83 on the same, engages, a hand-wheel 84 being provided for turning the said gears and the threaded rod. The purpose of this threaded connection between the pitman and the ram is to adjust the hollow-chisel ram up and down, so as to raise or lower the hollow chisel and its ram for accommodating different depths of cut. Thus the lower the position of the threaded rod in its cross-head the lower will be the position of the hollow chisel with relation to the table. A counterbalance-weight 85 is provided for the ram and is attached thereto by a rope 86, passing over a pulley 87 on the carriage.

A driving-shaft 91 is driven through pulleys 92 in manner hereinafter explained. The driving-shaft has suitable bearings in the frame and has a pinion 93 meshing a gear 94 on a shaft 95, also journaled in the frame, this latter shaft having a pinion 96, which

meshes with a gear 97 on a shaft 98, also journaled in the frame. The shaft 70 hereinbefore mentioned has an extension 99, shown angular in cross-section and extending through a sleeve 100, having a bore corresponding to the cross-section of the extension 99 for permitting longitudinal movement of the shaft while causing the shaft to rotate with the sleeve. The sleeve is journaled in a bearing 101 on the frame and has an elliptical gear 102 thereon. The sleeve 100 may form the hub of this elliptical gear. The elliptical gear 102 meshes with a corresponding elliptical gear 103, secured to the shaft 98. These elliptical gears are so constructed as to drive the shaft 70 at alternately comparatively slow and rapid speeds for imparting to the hollow-chisel ram a comparatively slow movement while the hollow chisel is entering the stock or performing its cutting operation and permitting quick withdrawal of the hollow chisel from the stock when it has reached its proper depth for returning the chisel rapidly preparatory to another cut. This construction also permits these reciprocations to be very rapid, without shock or jar. It also gives a positive feed and quick return to the chisel with but few parts and permitting compactness of construction.

For driving the shaft 91 from the pulley 92 I prefer to provide a releasable connection between the pulleys and shaft. The pulley 92 has an internal friction-rim 106. Upon the shaft 91 is secured a clamp 107, having a hub 108 and a pair of clamping-plates 109 110. A collar 111 is loosely splined on the shaft and has a socket 112 for receiving and moving the end of a lever 113. The clamping-plate 110 has a pair of rods 114 secured thereto, said rods projecting loosely through the clamping-plate 109. A yoke 115 takes loosely about the free ends of said rods, the ends of the rods being screw-threaded and receiving adjusting-nuts 116. The lever 113 has a pivotal connection with the yoke 115 at 117. A nose 118 extends from the lever and is arranged to take against the plate 109. When the collar 111 is moved toward the clamp 107, the nose of the lever is forced against the plate 109, thereby forcing the clamping edges 119 120 of the clamping-plates against the friction sides of the friction-rim 106, the clamping-plates, clamping-lever, collar 111, and the shaft being thereby caused to revolve with the pulley 92. A counterweight 122 is provided for the clamp 107.

For shifting the collar 111 I provide a lever 125, pivoted on a bolt 126, screwing into a lug 127 on the frame, one end of the lever being yoke-shaped and having pins 128, taking into an annular groove 129 on the collar 111. A link 130 connects the lever 125 with a bell-crank lever 131, pivoted at 132, a link 133 connecting the other end of said bell-crank lever with a lever 134, pivoted at 135 to the



frame and having a handle 136 for operating the same. The collar 111 has a cup-shaped recess 137, which is adapted to be received by the friction-faces 138 of a plate 139, arranged to be rigidly secured with relation to the frame, as by being secured to the lug 127, which lug may be a part of the bearing 140 of shaft 91. The cup-shaped recess and plate form friction means for instantly stopping rotation of the driving-shaft 91, and consequently instantly stopping the reciprocation of the hollow-chisel ram, thereby putting the ram under immediate and definite control of the operator. By the shifting of the lever 134 the reciprocation of the ram is immediately either started or stopped at any point in its upward or downward travel.

In my improved device the auger-spindle on the hollow-chisel ram is driven by means of bevel-gearing from a shaft at right angles to the spindle, the latter having thereon a pulley. The parts of my improved machine are so constructed and correlated that the driving-belt for said pulley may pass from its source of power through the body of the machine from below without interference with any of the parts, so as to make an exceptionally compact structure and convenient and effective driving means that subjects the machine to minimum strain. In my improved construction the strain from the belt is directly toward the sliding connection between the carriage and frame, subjecting that connection to least strain.

The pulley 44 is adapted to receive a belt (indicated by the dotted line 144) which passes thereover and through the aperture 145 in the rear of the carriage, the belt passing to either side of the shafts 91 95 98 in the frame, thus having unobstructed passage through the carriage and machine. To further my object, I place the driving means for reciprocating the hollow-chisel ram at alternately-varying speeds to outside the frame, as shown by the position of the elliptical gears 102 103. The belt takes over a driving-pulley 146 on a driving-shaft 147, suitably placed below the machine.

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

1. In a hollow-chisel mortising-machine, the combination of a hollow-chisel ram, an auger-spindle rotatable thereon, and elliptical gearing for reciprocating said hollow-chisel ram.

2. In a hollow-chisel mortising-machine, the combination of a ram supporting a hollow chisel and auger rotatable in the hollow chisel, elliptical gearing for reciprocating the ram, and a horizontally and vertically movable work-supporting table.

3. In a hollow-chisel mortising-machine, the combination of a ram supporting a hollow chisel and auger rotatable in the hollow chisel, elliptical gearing for reciprocating the ram,

and means for instantly stopping said reciprocation.

4. The combination, in a hollow-chisel mortising-machine, of a frame, a carriage on the frame, a reciprocating hollow-chisel ram mounted on the carriage and arranged for supporting a hollow chisel, an auger-spindle rotatably mounted on the ram and arranged for supporting an auger in said hollow chisel, a shaft, means between said shaft and the hollow-chisel ram for causing reciprocation of said ram, a driving-shaft, and elliptical gearing between said driving-shaft and said first-named shaft for alternately rotating the latter at different speeds.

5. In a hollow-chisel mortising-machine, the combination of a frame, a carriage movable thereon, a reciprocating hollow-chisel ram mounted on the carriage arranged for having a hollow chisel attached thereto, a rotatable auger-spindle journaled in the ram and arranged for having an auger rotatable in the hollow chisel attached thereto, a shaft and connections on said carriage for reciprocating said ram, a pair of elliptical gears for rotating said shaft, said shaft having a splined sliding connection with one of said elliptical gears.

6. In a hollow-chisel mortising-machine, the combination of the frame, a carriage movable thereon, hollow-chisel ram reciprocating on the carriage, a bearing on said ram, an auger-spindle journaled in said bearing, said spindle having an extension projecting beyond the ram, bearings on said carriage for said extension, bolts taking through each of said last-named bearings and stepped between said bearings and carriage, and other bolts clamping said last-named bearing to the carriage, constructed and arranged for alining said last-named bearings with said hollow-chisel ram-bearing.

7. In a hollow-chisel mortising-machine, the combination of a hollow-chisel ram and auger-spindle journaled thereon, a hollow chisel secured to said ram and an auger in said chisel secured to said spindle, means for reciprocating said ram, elliptical gearing for driving said latter means, a driving-shaft for said elliptical gearing, a rotative agency loosely journaled thereabout, a collar taking about said driving-shaft, a friction-clamp having connection with said driving-shaft for causing the clamp and driving-shaft to rotate together, said clamp operated by said collar to clamp said rotative agency for causing rotation of said driving-shaft, a rigid part having a friction-face and said collar having a friction-face engaging therewith, constructed and arranged for starting and instantly stopping the reciprocation of the ram, substantially as described.

8. In a hollow-chisel mortising-machine, the combination with a frame, a carriage movable thereon, a hollow-chisel ram on the carriage, an auger-spindle rotating thereon, means for



reciprocating said ram, elliptical gearing for driving said latter means, a driving-shaft, a rotative agency for rotating said driving-shaft, a friction-clamp therefor, a collar for  
 5 said shaft, a connection between said friction-clamp and said collar, said collar having a friction-face and a part rigid with relation to the frame having a friction-face arranged to be engaged by said friction-face on the collar,  
 10 and means for shifting said collar for causing engagement either between said friction-clamp and rotating agency for rotating the driving-shaft or engagement between said collar and said named part having the friction-  
 15 face rigid with relation to the frame for stopping the shaft, substantially as described.

9. In a hollow-chisel mortising-machine, the combination of the frame, movable carriage, hollow-chisel ram having rotating auger-spindle thereon, means for reciprocating said ram,  
 20 elliptical gearing for driving said latter means, a driving-shaft for said elliptical gearing, a pulley loosely mounted on said driving-shaft and having an inner flange, a pair of clamping-plates secured to said shaft, a yoke hav-  
 25 ing connection with one of said plates, said connection projecting loosely past the other of said plates, a lever pivoted on said yoke and having a nose between its pivot and said  
 30 last-named plate, a collar having connection with said lever for shifting the same, said collar having connection with said shaft for permitting longitudinal movement thereon and causing rotation therewith, said collar  
 35 having a friction-face and a part rigid with relation to the frame having a friction-face arranged to be engaged by said latter friction-face, and means for shifting the collar for starting and stopping the reciprocation of the  
 40 hollow-chisel ram, substantially as described.

10. In a hollow-chisel mortising-machine, the combination of the frame, movable carriage, hollow-chisel ram having rotating auger-spindle thereon, a driving-shaft, a pulley  
 45 loosely mounted on said driving-shaft and having an inner flange, a pair of clamping-plates secured to said shaft, a yoke having connection with one of said plates, said connection projecting loosely past the other of said plates, a  
 50 lever pivoted on said yoke and having a nose between its pivot and said last-named plate, a collar having connection with said lever for shifting the same, said collar having connection with said shaft for permitting longitudinal  
 55 movement thereon and causing rotation therewith, said collar having a friction-face and a part rigid with relation to the frame having a friction-face arranged to be engaged by said latter friction-face, and means for shift-  
 60 ing the collar, an intermediate shaft, means be-

tween said intermediate shaft and hollow-chisel ram for reciprocating said ram, and elliptical gearing between said intermediate shaft and said driving-shaft.

11. In a hollow-chisel mortising-machine, 65 the combination of the frame, a movable carriage, reciprocating hollow-chisel ram, auger-spindle journaled on said ram, a crank-shaft, a cross-head, a threaded rod connecting said ram and cross-head for shifting said ram, a pitman 70 between said cross-head and crank of the crank-shaft, a driving-shaft, a pair of elliptical gears between said driving-shaft and crank-shaft, and a slidable connection between one of said elliptical gears and said crank-shaft construct- 75 ed for rotating said shaft, substantially as described.

12. In a hollow-chisel mortising-machine, the combination of a hollow-chisel ram, an auger-spindle rotatable thereon, a shaft for the 80 auger-spindle at right angles to the latter, bevel-gearing forming driving connection between said shaft and spindle, a pulley on said shaft, means for reciprocating the hollow-chisel ram, a shaft in a plane below said latter 85 means and in vertical plane with the machine, a pulley thereon, and constructed and arranged for passing a belt directly between said named pulleys, substantially as described.

13. In a hollow-chisel mortising-machine, 90 the combination of the frame, carriage, hollow-chisel ram, auger-spindle rotatable on the latter, a shaft for the auger-spindle at right angles to the latter, bevel-gearing forming driving connection between said shaft and spindle, 95 a pulley on said shaft, driving means located outside the machine-frame imparting alternately varying speeds for reciprocating the hollow-chisel ram, a shaft in a plane below said latter means and in vertical plane with the 100 machine, a pulley thereon, and constructed and arranged for passing a belt directly between said named pulleys, substantially as described.

14. In a hollow-chisel mortising-machine, 105 the combination with the frame, carriage, hollow-chisel ram and auger-spindle on the latter, of elliptical gearing located outside the machine-frame imparting alternately varying speeds for reciprocating the hollow-chisel ram, a pulley for the auger-spindle, a second pulley, 110 and constructed and arranged for permitting a belt to be passed between said pulleys and through the carriage.

In testimony whereof I have signed my name hereto in the presence of two subscribing wit- 115 nesses.

HARRY S. SPENCER.

Witnesses:

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 JOHN J. TIGHE.