No. 669,473.

Patented Mar. 5, 1901.

C. W. H. BLOOD.

BORING MACHINE.

(Application filed Dec. 1, 1899.)

(No Model.)

2 Sheets—Sheet 1.

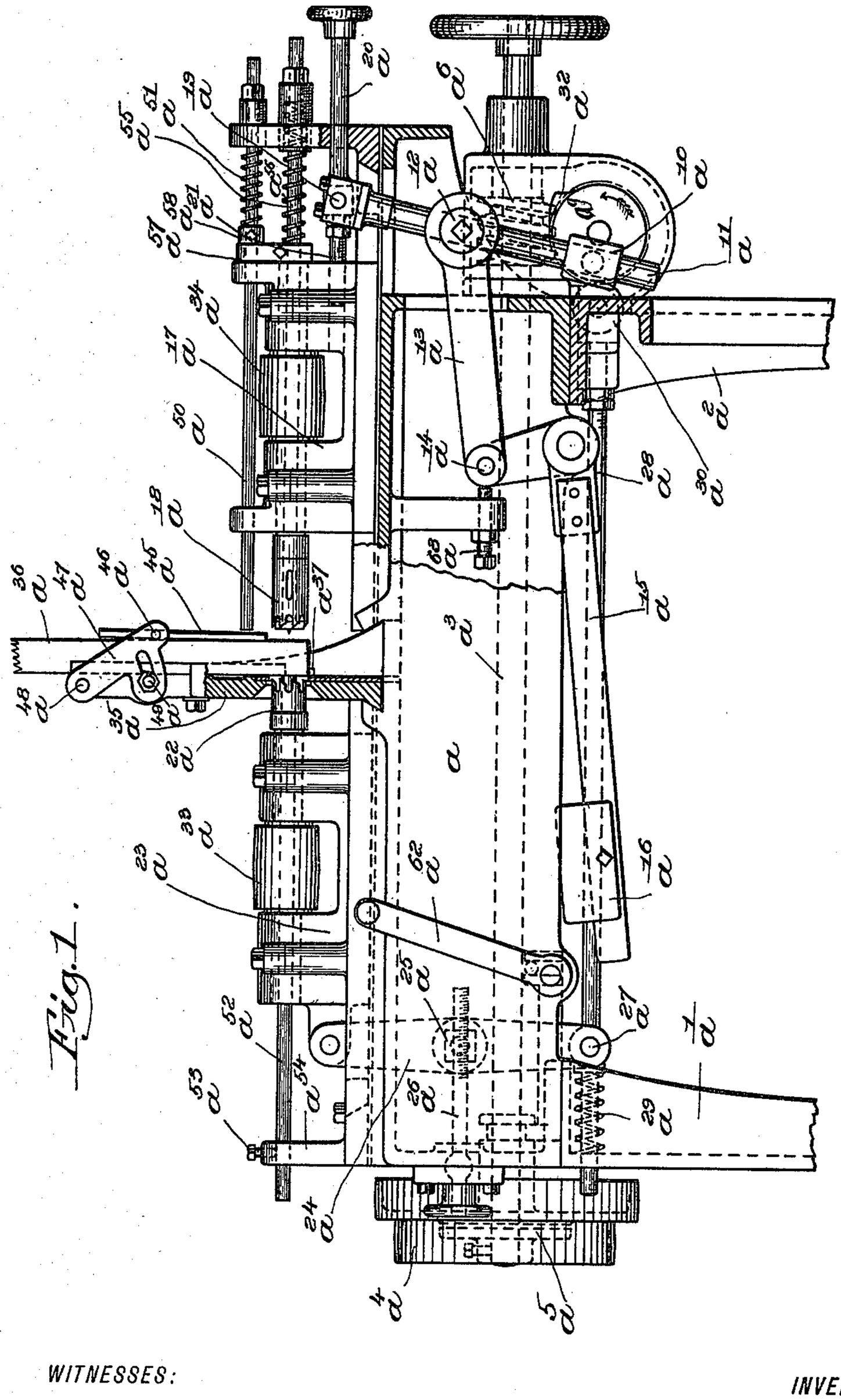

Fig. 1.

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Fig. 3.

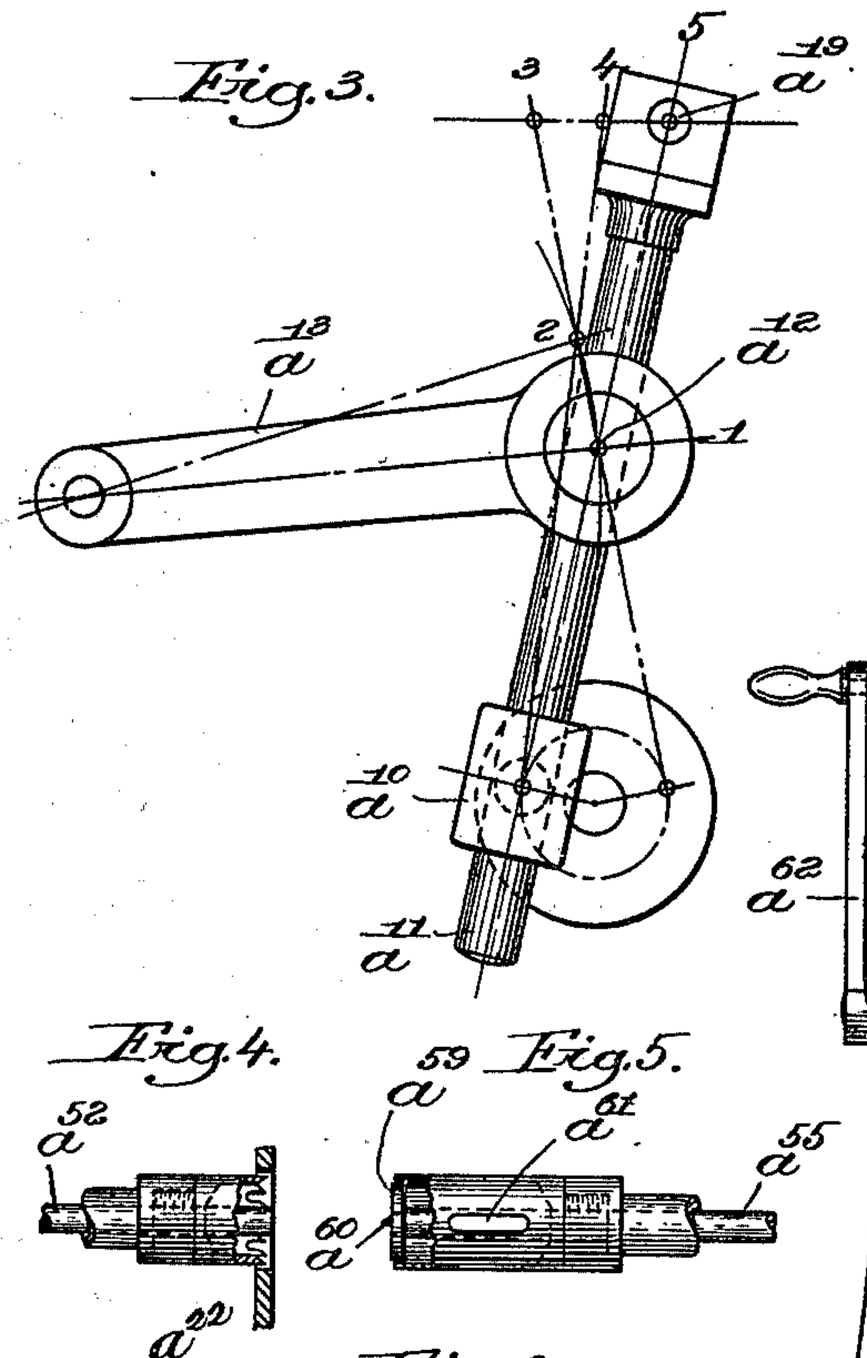


Fig. 2.

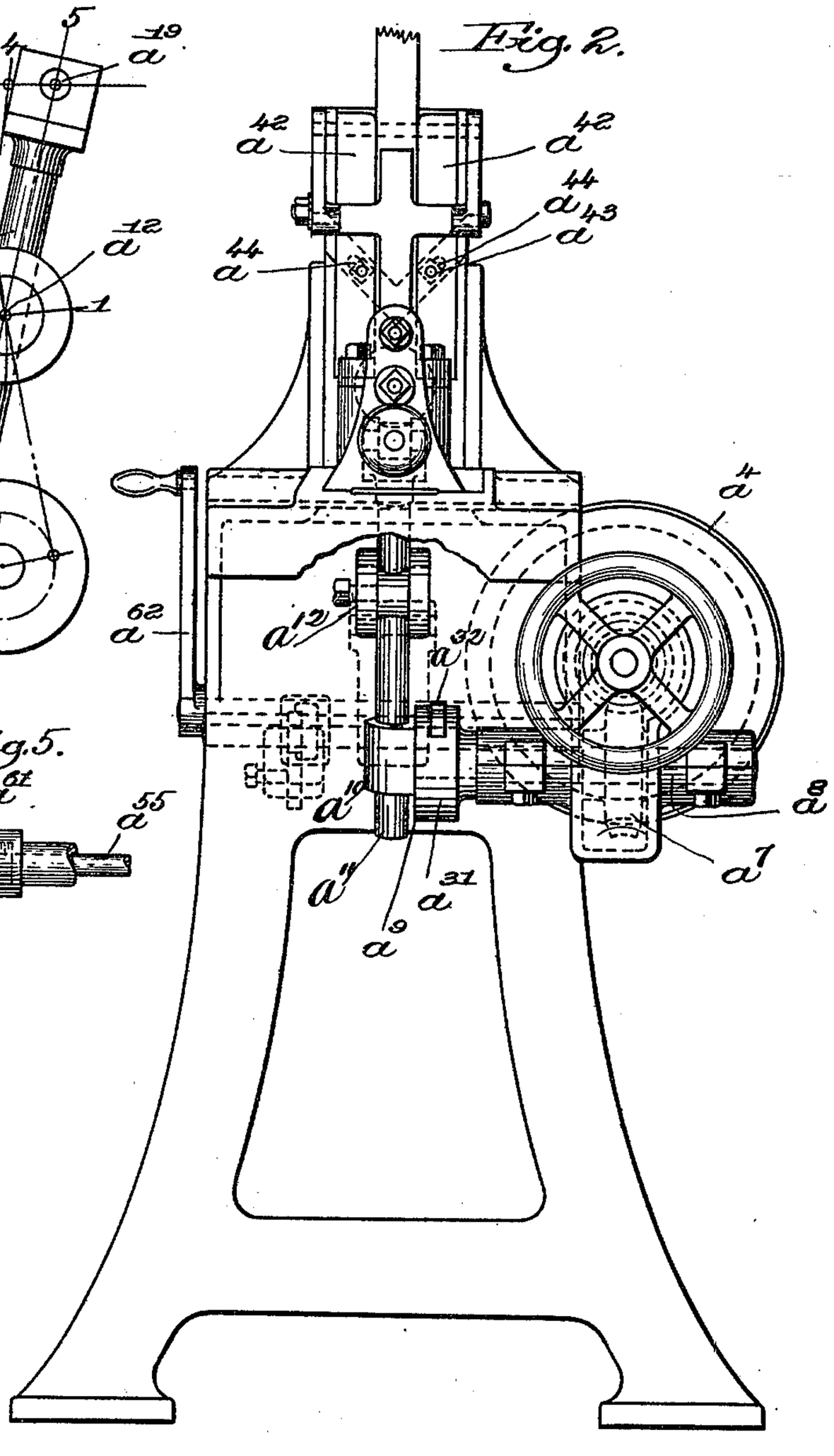


Fig. 4.

Fig. 5.

Fig. 6.

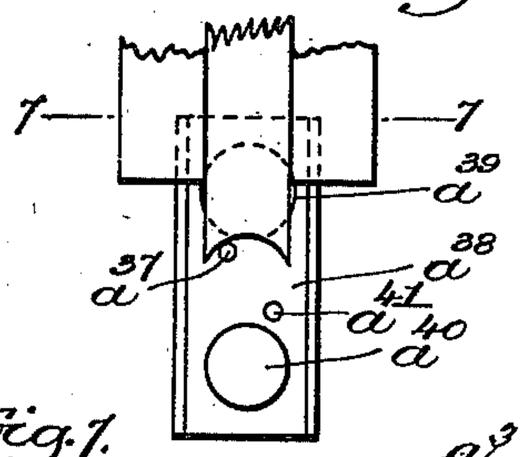
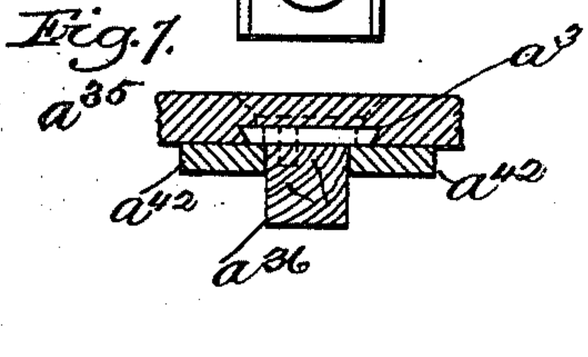


Fig. 1.



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UNITED STATES PATENT OFFICE.

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BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 669,473, dated March 5, 1901.

Application filed December 1, 1899. Serial No. 738,771. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. H. BLOOD, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Boring-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention is an improved boring-machine, being particularly intended for cutting out plugs, such as are required for filling over countersunk bolt and screw heads.

In certain kinds of work, particularly in the construction of men-of-war, it is necessary that the numerous depressions caused by countersinking the bolts or screw-heads into the wood should be filled even with the main surface of the wood by means of plugs or wooden filling-blocks in which the grain runs crosswise of the block, so as to take the same finish or polish as the surrounding wood, and thereby more perfectly conceal the presence of the plug or filler, and for this reason, likewise, it is necessary that the plug should be cut into with extreme neatness and accuracy, so as to make the joint as nearly imperceptible as possible, and inasmuch as the plugs must necessarily be cut from the various kinds and qualities of wood into which they are to be fitted a special machine of great accuracy is required. With this object in view I have invented a special plug-cutting machine or, more properly considered, a new boring-machine, inasmuch as I do not intend my invention in all respects to be limited to the cutting of plugs, as the invention in many of its novel features is broadly new and capable of wide application to this general class of machines.

The constructional details and further advantages as well as the operation of my machine will be pointed out in the course of the following description, reference being had to the accompanying drawings, illustrative of a preferred embodiment of the invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 shows my invention in side elevation, parts being broken away and other parts being shown in vertical longitudinal section for clearness of understanding. Fig. 2 is a right-hand end elevation thereof, parts being broken away. Fig. 3 is a detail in front elevation, also illustrating diagrammatically the special feed adjustment referred to. Figs. 4 and 5 show in side elevation, parts being broken away, the two cutters employed in my machine as herein embodied. Fig. 6 is a broken detail showing a stop in front elevation. Fig. 7 is a transverse section on the line 7 7, Fig. 6.

It will be understood that the framework and general construction of my machine may be of any desired or preferred style, the mechanism being herein shown as mounted in and on a bed a, supported on opposite standards a' a^2 and including a main drive-shaft a^3, having at one end a cone-pulley a^4, turning loosely on the shaft a^3 and driving the latter by means of a friction-clutch a^5, the details of which need not be explained, and at its other end being provided with a worm a^6, meshing into a worm-wheel a^7.

The above mechanism may be of any desired kind.

The worm-wheel a^7 is mounted on a short feed-shaft a^8, carrying a face-wheel a^9, on which is a crank or pivoted sleeve a^{10}, in the eye or sleeve whereof freely slides a feed-arm a^{11}. This feed arm or lever is fulcrumed at a^{12}, preferably in the pivotal hub or end of an arm or link a^{13}, pivotally supported, said arm being herein shown as pivoted at a^{14} to the bell-crank lever a^{15}, carrying a weight a^{16} at its free end for a purpose to be described, and the arm a^{13} is adjustable at a^{12} along the arm a^{11}, a set-bolt being shown in Figs. 1 and 2 for the purpose. This mechanism is of great importance, as will appear more fully in connection with the detailed description of operation farther on. The upper end of the feed-lever a^{11} is pivotally connected to a carriage a^{17}, containing one of the cutters a^{18}, being herein shown as pivotally mounted at a^{19} on a rod a^{20}, tapped into the carriage a^{17} at a^{21}. The opposite boring-tool a^{22} is mounted in a similar carriage a^{23}, and the two carriages are arranged to reciprocate horizontally on the bed a of the machine, the carriage a^{23} being moved back and forth by means of a link or lever a^{24}, pivoted at a^{25} adjustably on a rod

or bolt a^{26}, as clearly shown in Fig. 1, the opposite end of the lever a^{24} being pivotally connected at a^{27} with a plunger-rod a^{28}, normally held forward by a spring a^{29} and having a roller a^{30} bearing on a cam-surface a^{31} of the face-wheel a^{9}, so that at every time a lump a^{32} (see Fig. 1) of said cam engages the roller a^{30} the latter through the plunger a^{28}, link a^{24}, and carriage a^{23} causes the cutter a^{22} to move quickly forward and back again. The two cutters are driven by belt-pulleys a^{33} a^{34}.

Referring now to the stock-feeding mechanism, it will be seen that I provide a vertical support or standard a^{35}, against which the stick of wood or other stock a^{36} is placed, said stock normally resting against a stop a^{37}, preferably carried by a stop-plate a^{38}, (see Figs. 6 and 7,) adjustably secured in the face of the upright or standard a^{35}, this plate a^{38} also having a hole a^{39} just above said stop through which the cutter a^{22} may pass in its work. Said plate, as herein shown, is reversible, having a second hole a^{40} adjacent its opposite end and a second stop a^{41}. The stick a^{36} is held against lateral movement by opposite side guides a^{42}, which are movable toward and from each other in order to accommodate stock of varying width, it being understood that the stock from which the plugs are cut is provided of substantially the same width as the diameter of the plug, so that if a large plug is to be cut a wide stick will be needed, whereas if a small plug is to be cut a narrow stick is required.

In order that no material may be wasted, I have made the guides a^{42} adjustable not only toward and from each other, but have given them a compound oblique movement in order that when a smaller plug is being made, and consequently a smaller cutter employed, the guides may descend according to the decrease in size, and thereby engage the stock as close to the smaller cutter, as they previously did in connection with a larger cutter, and for this purpose the guides a^{42} have their securing-bolts a^{43} mounted in oblique slots a^{44}.

The stock a^{36} is held close against the upright a^{35} by means of a front guide or retaining plate a^{45}, carried at a^{46} in arms a^{47}, pivoted at a^{48} to the upright a^{35} and guided on bolts a^{49}, (see Fig. 1,) these guide-plates a^{45} likewise being so mounted that as a smaller plug is being cut they will descend, and thereby maintain their retaining position close to the cutter. Coöperating with the retaining plate or guide a^{45} is a holder or clamping device a^{50}, mounted, preferably, in the carriage a^{17} and held yieldingly forward by a spring a^{51}. This holder a^{50} extends normally just ahead of the cutter a^{18}, so that as the carriage a^{17} and cutter are moved forward the holder a^{50} will engage the plate a^{45} and clamp the same tightly and firmly against the stock before the latter is engaged by any of the moving parts.

The two cutters and their driving-spindles are hollow, as is clearly shown in Figs. 1, 4, and 5, the cutter a^{22} containing a fixed rod or support a^{52}, adjustably secured at a^{53} in a tail-stock a^{54} of the machine, and the cutter a^{18} containing a rod a^{55}, normally held forward by a spring a^{56}, bearing at its rear end against a fixed part of the machine and at its forward end against a block a^{57}, clamped on the rod and bearing at its upper end against the forward end of a stop a^{58}, carried by the rod a^{50}, before alluded to. At its forward end the rod a^{55} carries a head or shield a^{59}, herein shown in the form of a round plate or disk, and also a spur a^{60}, preferably having a sharp flattened end, said spur being provided for the purpose of preventing the plug when it is cut from turning with the cutter. The shield a^{59} normally projects slightly forward of the cutting-teeth of the cutter a^{18}. The cutter a^{18} has an opening a^{61} for the escape of such shavings as may possibly get inside of the cutter.

a^{62} is a hand-lever for operating the clutch a^{5}, and the connecting mechanism need not be described in detail.

a^{63} is a bearing-stop for the fulcrum arm or link a^{13}.

I will point out some of the leading advantages in the course of the following explanation of the operation of the machine.

Having placed a stick of material a^{36} in position, as shown in Fig. 1, with its lower end resting on the stop a^{37}, the machine is set in motion and thereafter proceeds automatically without further attention until the stick a^{36} has been entirely cut, the plugs as made dropping away and the stick feeding itself into proper position after each cut. The cutter a^{18} cuts the plug proper with cylindrical sides, and the cutter a^{22} forms a kerf or beveled edge on the adjacent end of the plug, this being required in order that the plug may readily enter the hole which it is to close, as is well understood in the art. Heretofore there have been devices for cutting plugs and forming said beveled end, said devices depending upon a cutter arranged to cut the cylindrical plug and having on its inner surface a tooth or teeth for cutting the beveled end just as the plug was being finished—that is to say, the cutter having been forced nearly through the material the inner teeth would come in contact with the first formed end of the plug and cut the beveled edge thereon; but one serious disadvantage of this device is that the greatest cutting and therefore twisting engagement of the cutter with the wood is brought upon the latter just as the plug is severed from the stick, and therefore the final cut of the plug is imperfect, and the plug invariably rotates with the cutter. With a view to obviating the above-noted features I have, as already explained, provided a cutter a^{22} for cutting the beveled end and a second cutter a^{18} for cutting the plug proper, the former cutter having a quick inward movement due to the cam projection a^{32} moving inwardly and back again before the cutter a^{18} has reached that

part of the stick, the rod a^{52} meanwhile holding the partially-formed plug firmly against the forward pressure of the cutter a^{18}, while likewise the rod a^{55} firmly holds the opposite side of the plug as the cutters a^{18} and a^{22} act on the same. In other words, the stick is clamped firmly between the ends of the rods a^{52} and a^{55}, as well as by the lateral holding-guides a^{42} and the front plate a^{45}, which also engage the stick at its front and side close down to the part about to be formed into a plug. Another difficulty heretofore experienced in making plugs has been that the machines have required that the cutter should enter in the body of the wood, and therefore the sawdust or shavings have seriously blocked and interfered with the progress of the cutter beyond the depth of the teeth.

By my invention, as is evident, viewing Fig. 6, I have provided the holding devices before explained, operating in such manner as to hold a narrow stick firmly, so that the cutter is permitted to cut directly on the side edges of the stick, and therefore dispose of the shavings at the sides and lower end of the stick as the cutting progresses, insuring freedom of forward movement without interference from shavings. The cutter a^{22} having moved quickly forward and back again and cut the required beveled edge at the rear end of the plug and the cutter a^{18} having then moved forward and completed the plug, the small depending triangular pieces of wood left at the lower end of the stick drop away, as will be evident, viewing Fig. 6, and while the cutter is being moved back away from the plug the latter is held immovably in place without tendency to move back or to rotate by means of the rod a^{55} and the spur a^{60}. As soon as the cutter a^{18} has moved out of engagement with the plug the rearwardly-moving carriage a^{17} engages the block a^{57} on the rod a^{55} and disengages the spur a^{60} and head or shield a^{59} from the plug, and the latter instantly drops by gravity away from the stick a^{36}, the latter being retarded for an instant from feeding forward by reason of the pressure of the rod a^{50} against the clamping-plate a^{45}. I regard this feature of my invention as of great importance, inasmuch as it insures an automatic and certain discharge of the plugs, whereas if the stock a^{36} were permitted to drop down on the plug the moment the cutter escaped therefrom the weight of the stick would be likely to hold the plug between it and the stop a^{37}, so that the cutter a^{18} would simply return and mutilate the previously-formed plug and the adjacent end of the stock. By the provision, however, above explained, the plug having been formed is left without retaining support and is therefore compelled by gravity to tumble out of the way and discharge itself, and inasmuch as the position of the stop a^{37} gives the plug a slight tendency to pitch forward I have provided the shield a^{59}, as explained, so that the plug cannot possibly come in contact with the revolving teeth of the cutter a^{18}. The discharge of the plug is almost instantaneous, and immediately thereafter the plug a^{57} comes in contact with the block a^{58} on the rod a^{50}, and thereby removes the pressure of the latter from the stock, whereupon the stock feeds itself by gravity, dropping in accurate position against the stop a^{37}. This process is repeated until the extreme upper end of stock a^{36} has been utilized by reason of the close engagement of the holding devices a^{42} a^{45} with the stock at their lower extremities, as already explained in connection with the engaging devices a^{52}, a^{55}, a^{59}, and a^{60}. If now smaller and shorter plugs are to be formed, and therefore a narrower and thinner piece of stock fed in the machine, the guiding and holding devices a^{42} a^{45} are lowered to correspond with the piece of stock, the cutters are changed, and the throw or feed of the latter is adjusted by raising the fulcrum-point a^{12} on the lever a^{11}.

The mechanism a^{9} to a^{16} is of much value for this general class of machines. The cutting movement of the cutter must of course be relatively slow, and therefore, as will be evident, observing Fig. 1, the forward feeding movement of the cutter is accomplished during that part of the rotation of the face-wheel a^{9} which carries the sleeve a^{10} in the lowermost arc of its revolution, and therefore when the sleeve a^{10} has slid down on the lever a^{11}, so as to lengthen the end of the lever between the sleeve and the fulcrum, thereby causing slow-feeding movement, whereas when the cut has been made and the cutter is to be backed away from the material the face-wheel a^{9} is carrying the collar a^{10} around in the uppermost arc of the revolution of said collar, and hence the collar a^{10} has slid up on the rod or lever a^{11}, thereby shortening the distance between the fulcrum a^{12} and the application of power, and consequently causing rapid backward feeding movement.

If in cutting into the stock a dangerously hard spot or substance should be found or other obstruction met with, the cutter is not forced into the same destructively, nor, on the other hand, is the feeding mechanism or the machine stopped, but instead thereof the fulcrum a^{12} simply yields, the weight a^{16} being lifted, and the bearing-pivot a^{14} moving away from the bearing-stop a^{63}, thereby permitting the cutter to act upon the hard spot in the wood with its usual pressure, but no more, and if the plug is not cut through the machine simply leaves the partial plug formed in place to be finished by the next forward movement of the cutter. In other words, the machine automatically accommodates itself to all conditions, and likewise the feeding of the stock does not progress invariably the same irrespective of variations in the stock, but it likewise accommodates itself to such exceptional conditions that may occur.

A further exceedingly valuable feature of my invention resides also in the feeding mechanism and is shown diagrammatically

in Fig. 3, relating to the changing of the throw or feeding movement of the cutter. It is evident that the cutter a^{18} must invariably cut through the stock; but, on the other hand, it is not necessary that it should have the same throw or stroke for a thin piece of stock as for a thick piece of stock, and accordingly I have so positioned the wheel a^9, the fulcrum a^{12}, the arm a^{13}, and the pivot-point a^{19} that upon adjusting the fulcrum-point a^{12} upwardly from position 1, Fig. 3, to position 2 the point 3 at which the forward feed stops is unchanged, whereas all the change takes place between the points 4 and the points 5, the latter point being the rear end of the throw when the fulcrum is at 1 and the point 4 being the rear end of the throw when the fulcrum is at 2, my object being to make all the adjustment or variation of throw at the rear end of the feeding movement while leaving the forward end thereof the same.

It will be observed that I have minutely described the construction herein shown, this being done for the sake of clearness and accuracy of understanding; but I wish it distinctly understood that I do not thus limit myself, inasmuch as the mechanism shown is merely a preferred embodiment, whereas my invention resides in the novel features as more fully pointed out in the course of the description of operation and in the earlier part of the specification, the specific mechanism being merely one way of applying my invention to the particular object of cutting plugs, whereas my invention is not limited to this use or mechanism and may be embodied in slightly different mechanisms and mechanical movements and combinations, all within the spirit and scope of my invention as I have intended to explain it above and as more particularly set forth in the appended claims.

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

1. In a machine for cutting plugs, means for supporting the stock in a manner to allow gravity feed thereof, a rotary cutter for cutting plugs from said stock, holding means for preventing rotation of the plug within said cutter as the cutting of the plug is completed, and retarding means for preventing the feeding of the stock, said retarding means being normally in position to operate on said stock for a longer interval than the engagement of the stock by said cutter and holding means, and said holding means being normally in position to operate on said stock for a longer interval than the engagement with said stock of said cutter, substantially as described.

2. In a machine for cutting plugs, a cutter for cutting plugs, an upright for supporting a piece of stock to be operated upon by said cutter, opposite side supports for engaging the stock at its sides, a front support for engaging the stock at its front side, and means for adjusting said side and front supports to accommodate different sizes of stock, substantially as described.

3. In a machine of the class described, a stock-support, and a rotary cutter to operate on the stock, combined with a stop-plate removably mounted in said support, said stop-plate having an aperture opposite said cutter, and a stationary stop at the lower edge of said aperture, substantially as described.

4. A stop-plate for a plug-cutter of the kind described, means for supporting said stop-plate in reversed positions, said stop-plate having adjacent its opposite ends apertures of different sizes to receive cutters of different sizes, and having a stop at the inner side of each aperture, said stop projecting from the face of the plate to stop a piece of stock in position over said aperture to be cut by the cutter operating through said aperture, substantially as described.

5. In a machine of the class referred to, a stock-support, a cutting-tool, means to give said tool a forward and backward feeding movement, including means causing said tool to feed forward to the same point irrespective of change in extent of feeding movement, and means to change the extent of backward movement of said tool, substantially as described.

6. In a machine of the class referred to, a stock-support, a cutting-tool, a lever pivotally connected at one end to said tool, said lever being fulcrumed intermediate its ends, and provided at its opposite end with means for turning it on said fulcrum, said fulcrum being provided with swinging movement, substantially as described.

7. In a machine of the class referred to, a stock-support, a cutting-tool, a lever pivotally connected at one end to said tool, said lever being fulcrumed intermediate its ends and having its fulcrum-point connected with the free end of a pivoted arm, the opposite end of said arm being weighted and provided at its opposite end with means for turning it on said fulcrum, substantially as described.

8. In a machine of the class referred to, a stock-support, a cutting-tool, a lever connected at one end to said tool for reciprocating the same, means at the other end of said lever for swinging said lever, a bell-crank mounted on a stationary part of the machine, said lever being intermediately fulcrumed on an arm pivoted to the free end of said bell-crank, and means for holding down yieldingly the other end of said bell-crank, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES W. H. BLOOD.

Witnesses:

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