(No Model.) 4 Sheets—Sheet 1.

S. A. GOULD.

BORING MACHINE.

No. 487,407. Patented Dec. 6, 1892.

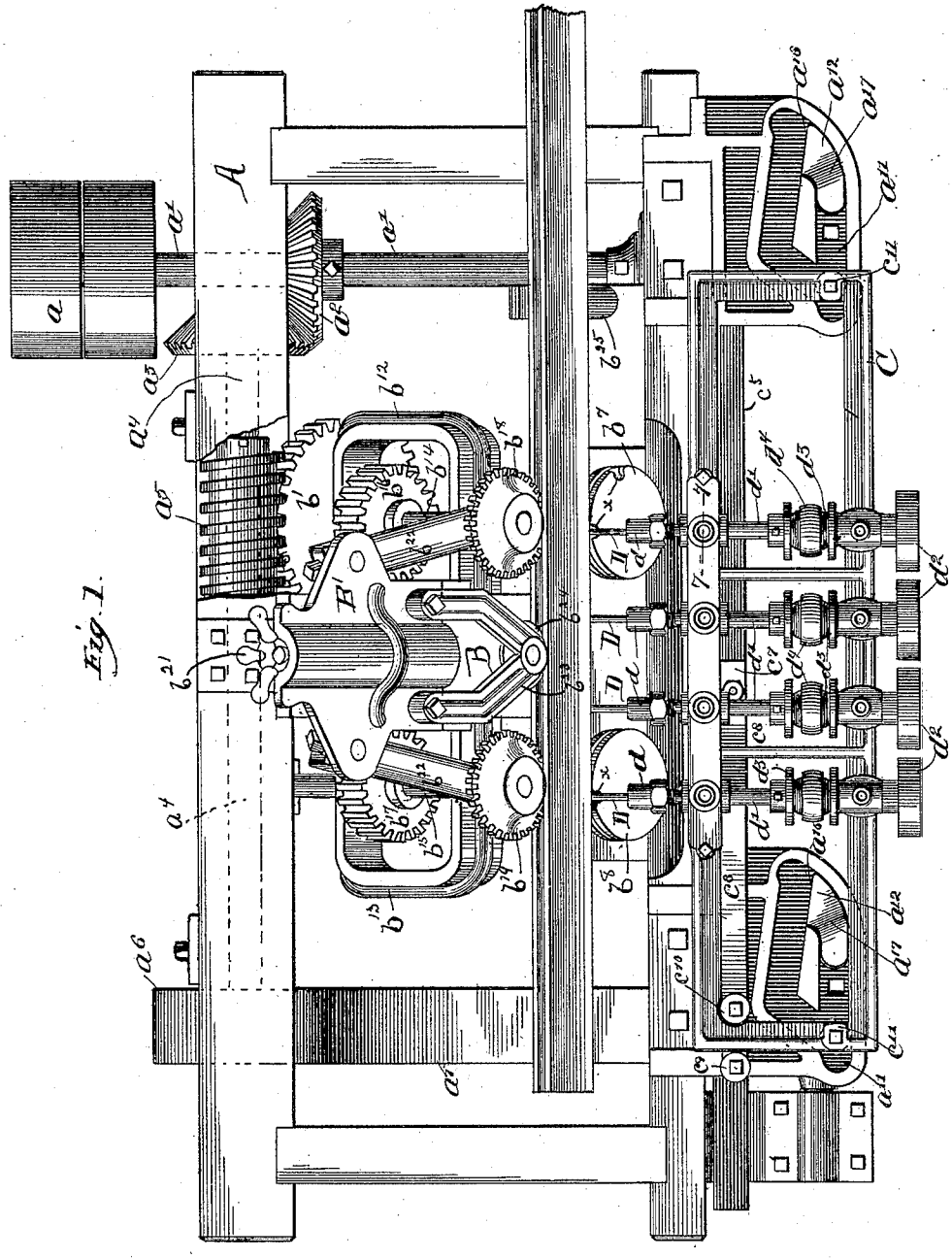

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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BORING MACHINE.

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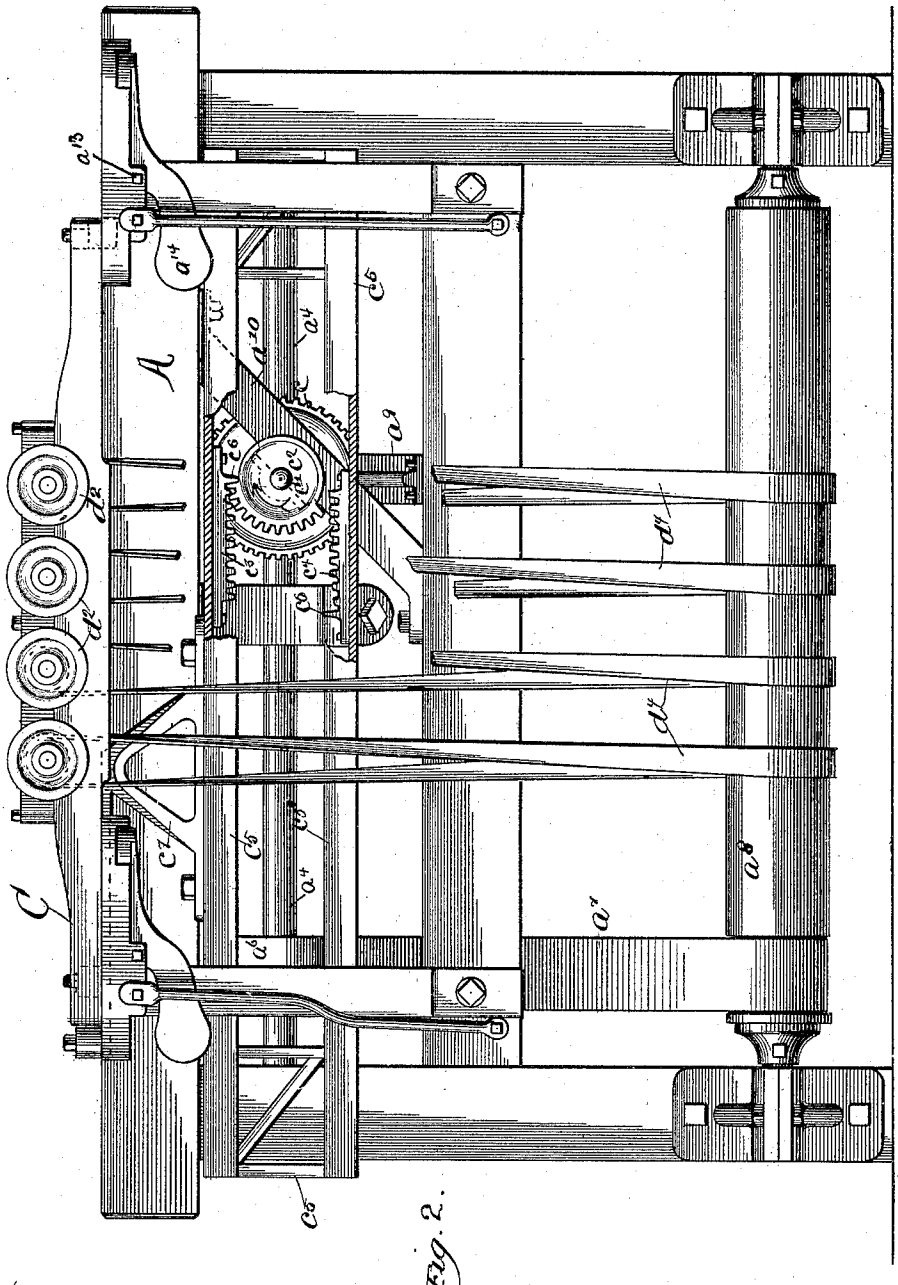

Fig. 2.

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(No Model.)

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S. A. GOULD.

BORING MACHINE.

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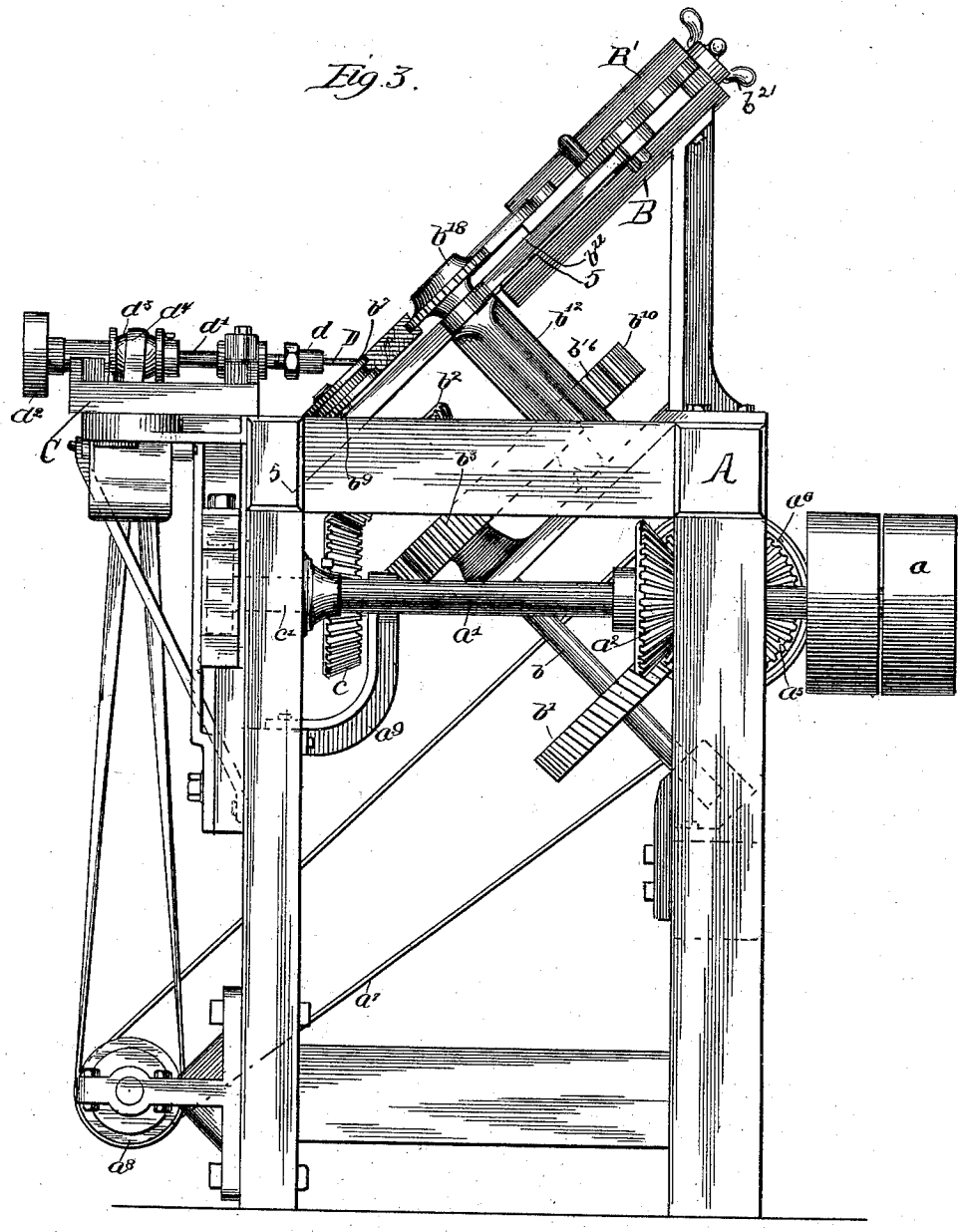
Fig. 3.



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4 Sheets—Sheet 4.

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BORING MACHINE.

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Fig. 4.

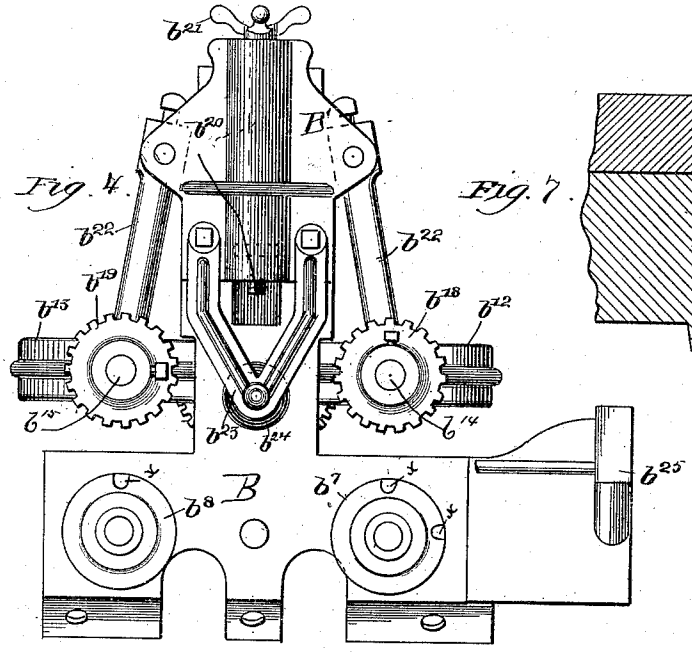


Fig. 7.

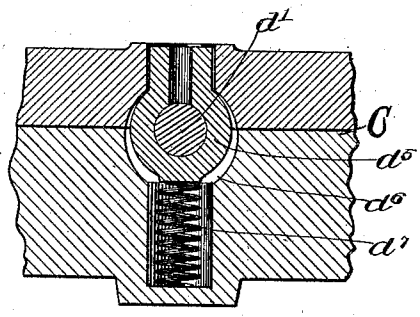


Fig. 5.

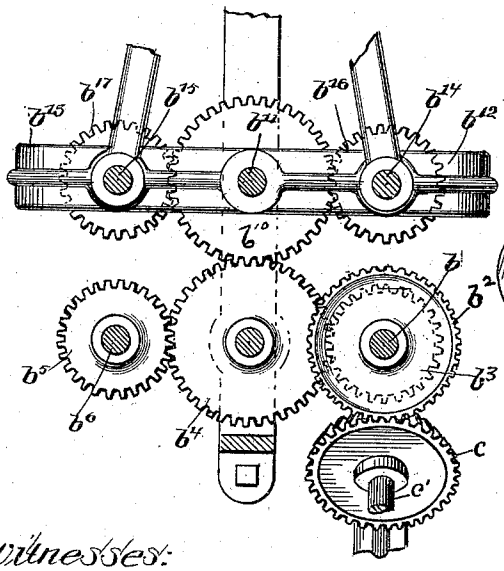
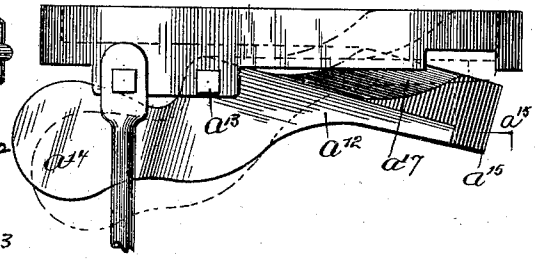


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL A. GOULD, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-THIRDS TO GEORGE R. BLANCHARD AND ALFRED H. BROWN, OF SAME PLACE.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 487,407, dated December 6, 1892.

Application filed January 19, 1891. Renewed November 5, 1892. Serial No. 451,030. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL A. GOULD, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boring-Machines, of which the following is a specification.

The improvements are embodied in the machine which is illustrated in the drawings attached hereto, of which—

Figure 1 is a plan of said machine; Fig. 2, a side elevation thereof; Fig. 3, an end elevation, and Figs. 4, 5, 6, and 7 detail views of different portions.

In laying the ordinary tongue-and-groove flooring it is customary to secure the boards to the joists or sheeting upon which they are laid by means of nails driven at an incline into the forward edges of the boards in the angle between the upper side of the tongue and the edge of the board. The laying of the flooring is greatly facilitated by boring the lumber at proper intervals to provide holes for the insertion of the nails before laying the boards. This avoids splitting the latter, insures regular spacing of the nails, and saves the labor of driving them through the boards, which in the case of hard-wood flooring is exceedingly difficult.

My invention relates to a machine designed to bore the holes in the flooring at such distances apart as may be desired, which shall preferably be wholly automatic and perform the desired operation while the lumber is in continuous motion through the machine.

Said invention consists in various improvements, which when combined, as illustrated in the drawings, make up an exceedingly-satisfactory machine. Many of said improvements may, however, be used separately in other machines of this class or of other kindred classes, and I do not desire to limit my invention to any combination of the different improvements, except so far as the same shall be done by the claims appended to this specification, wherein these different improvements are clearly pointed out and closely defined.

Referring to the drawings for the preferred construction, I mount upon a suitable frame A a second frame B, provided with suitable devices for holding the boards to be bored by means of adjustable clamps adapted to engage with the edges of the board, which clamps carry feed-rollers geared to the driving mechanism to carry the boards lengthwise through the machine. The frame B is made to carry the board at an incline edgewise, and at one side of the lower edge of the board a third frame C is mounted, carrying horizontal chucks rotated through suitable gearing and adapted to receive bits to bore the holes at the required intervals in the edge of the board. This frame C is mounted upon the frame A, so as to travel back and forth longitudinally of said frame, and is speeded to correspond exactly with the motion of the boards through the machine. Said frame is also provided with means for advancing it toward and drawing it from the board and with a reversing-gear so arranged that when the bits are advanced to the board the frame C shall travel in the same direction and at the same speed as said board, but that when said frame is withdrawn from the board its longitudinal motion shall be reversed and it returned to its original position. I prefer to provide this frame C with enough chucks so that a series of holes may be simultaneously made in the board, which shall take up a length upon said board equal to just twice the traverse of the chuck-supporting frame, so that the return of the gang of bits carried by said chucks, together with the advance of the board during this return motion, shall bring said bits into the proper position to bore a new series of holes at the desired space from the last one of the former series. In this manner it will be seen that the machine is made both automatic and continuous in its operation, and the boards being successively fed to the machine at one end will pass directly through the machine without stopping and be delivered, properly bored, from the other side. While this is my preferred construction, it is not absolutely necessary that all of these features should be present in my invention.

Describing the construction of my machine in detail, the driving-gear carried by the frame A consists of a pulley a, Fig. 1, fast upon a shaft a', carrying a miter-gear a^2 in mesh with a miter-gear a^3, fast upon a shaft a^4, (shown

in dotted lines in Fig. 1 and in full lines in Fig. 2,) which shaft bears a worm a^5, (see Fig. 1,) by means of which the feed mechanism is driven through gearing hereinafter described. Said shaft a^4 also bears a pulley a^6, geared by means of a belt a^7 to a roller a^8, which drives the boring mechanism. The feed mechanism and the mechanism for longitudinally reciprocating the bit-carrying frame C are both driven by a shaft b, Fig. 3, rotated by the worm a^5 through a worm-gear b'. Said shaft carries a bevel-gear b^2, Figs. 3 and 5, by means of which it drives the mechanism for reciprocating said frame C, as hereinafter described. The shaft b also carries a gear b^3, by means of which it drives the feed mechanism. This feed mechanism, which is carried by the frame B, is shown in the plan view of Fig. 1, the end view of Fig. 3, and in detail in Figs. 4 and 5. Fig. 4 is a front view of the frame B in a vertical position and detached from the remainder of the machine. Fig. 5 is a broken section of the same frame cut in line 5 5 of Fig. 3, and showing in addition the gear-wheels which impart the rotation to the shaft b to the feed mechanism and to the reciprocating frame C. The feed mechanism is driven by said shaft through the wheel b^3, (shown in Fig. 3 and dotted in Fig. 5,) said wheel meshing with a gear b^4, journaled to the frame B, which meshes in turn with a gear b^5 to rotate a shaft b^6, also journaled in the frame B. The shafts b and b^6 extend through the frame B to carry in front thereof feed-rollers b^7 b^8, adapted to engage with the lower edge of a board, and having circumferential grooves b^9, Figs. 1 and 3, to receive the tongue upon the board. The gear b^4 also meshes with the gear b^{10}, loose upon a shaft b^{11}, carried by the frame B. Said shaft has pivoted upon it two oscillating frames b^{12} b^{13}, extending laterally in opposite directions, provided with means described below for raising and lowering them. Said frames carry shafts b^{14} b^{15}, rotated by gears b^{16} b^{17}, in mesh with the gear b^{10}, said shafts projecting in front of their respective frames, and there carrying a second set of feed-rollers b^{18} b^{19}, Figs. 1 and 4, having rims adapted to travel in the groove of the board, and preferably having serrated peripheries to avoid their slipping upon the board. These feed-rollers are preferably of equal size, and the intermediate gearing between them and the feed-rollers b^8 and b^7 is adjusted to impart the same motion to all of the rollers. The rollers b^{18} b^{19} are raised and lowered to receive different widths of boards by means of a frame B', sliding vertically in guides upon the frame B, and adjusted by means of a rod b^{20}, Fig. 4, threaded therein and journaled in the frame B', which rod has a handle b^{21}, adapted to be grasped by the hand for turning. The frame B' carries arm b^{22}, pivoted thereto, and to the frames b^{12} b^{13}, by means of which, when it is raised or lowered, it carries the feed-rollers b^{18} b^{19} with it, and adjusts the latter to any desired width of board. Said rollers do not move in exactly-vertical directions, as that would carry the gears b^{16} b^{17} upon their driving-shafts out of mesh with the gear b^{10}; but said rollers, being journaled in the oscillating frames b^{12} b^{13}, pivoted upon the same shaft as the gear b^{10}, move in arcs whose centers are coincident with that of the gear b^{10}, and hence maintain the full mesh at all times with the latter. The frame B' has a downwardly-projecting bracket b^{23}, carrying a guiding-roller b^{24}, which assists in keeping the board straight during its passage through the machine. The frame B has at the right (see Figs. 1 and 4) a bracket b^{25}, which also assists in supporting the board as it is fed to the rollers. The bevel-gear b^2 meshes with another bevel-gear c, fast upon a shaft c', journaled in brackets a^9 a^{10}, (see Fig. 2,) and carries beyond the latter bracket a segment or broken gear c^2, which engages alternately with racks c^3 c^4 upon opposite sides of said segment and secured to a frame c^5 to move said frame to the right in Fig. 2 while engaging with the rack c^3 and to move the frame to the left when engaging with the rack c^4. Said racks are provided at the ends which the segment first engages when it passes from one to the other with projecting teeth c^6 to give the teeth of the segment a greater bearing at the instant when the motion of the frame c^5 is reversed. One or more of the teeth of each rack adjacent to these projecting teeth are made shorter than the remaining teeth to allow the teeth of the segment to pass over them in changing its engagement from one rack to the other. The segment is shown in its initial engagement with the rack c^3 in Fig. 2, and the direction in which the segment rotates is indicated by an arrow thereon. From this position it carries the frame c^5 to the right by means of its engagement with the rack c^3, the rack c^4 meanwhile passing beneath the toothless portion of the segment or broken gear. As soon as the teeth of the segment have passed over the rack c^3 they leave said rack and engage with the rack c^4 to return the frame to the position shown in the drawings. A bracket c^7 upon the frame c^5 (see Figs. 1 and 2) extends upward and bears an arm c^8, extending to the left in Fig. 1, which has at its ends two rollers c^9 c^{10}, embracing between them the end of the frame C, so as to carry said frame back and forth longitudinally with the frame c^5, but to allow it a lateral reciprocating motion independent thereof. The frame C slides freely over its supports and is guided by means of rollers c^{11}, turning upon studs secured to the frame and projecting downward into cam-grooves a^{11}, formed in the frame A or a plate attached thereto. In these cam-grooves there are placed oscillating dogs a^{12} an enlarged view of one of which is shown in Fig. 6, pivoted at a^{13}, having weighted ends a^{14}, designed to raise the opposite ends a^{15} as far as permitted by the adjacent parts of the frame. The bottoms of the grooves a^{11} are cut away to

allow the ends 15 of the dogs to rise into said grooves, and said dogs bear upon their upwardly-projecting portions flat vertical faces a^{16} (see Fig. 1) and inclined tops a^{17}.

In Fig. 1 the frame C is shown almost at the extreme limit of its longitudinal movement toward the left and its backward lateral movement, at which time the bits carried by said frame are withdrawn from the board and the engagement of the segment c^2 has just shifted, as seen in Fig. 2, to return the frame C to the opposite end of the traverse. As it moves from this position the rollers c^{11} enter the lower portions of the grooves a^{11} of Fig. 1, slide over the inclined tops of the dogs a^{12}, which are depressed against the weight a^{14} to allow said rollers to pass, and thus reach the upper right-hand portions of the grooves. As soon as the rollers pass over the dogs a^{12} the weights a^{14} drop, raising the opposite ends of the dogs and blocking the return of the rollers through the lower portions of the grooves because of the abrupt edges a^{16}. The upward curve at the right-hand end of the grooves has already advanced the frame C laterally to bring the bits carried thereby up to the edge of the board in position to commence boring. The longitudinal motion of the frame C is now reversed and the frame starts toward the left at the same speed at which the board is passing through the machine. The upward incline of the upper portions of the grooves a^{11} still further advances the frame C, crowding the bits into the boards as they pass along together until the opposite ends of the grooves are reached, when the downward incline of said ends of the grooves withdraws the frame and the bits carried thereby into the position shown in the drawings.

The boring-bits, which are lettered D, Fig. 1, are held in chucks d, threaded to the ends of the shafts d', which are journaled in the frame C and bear balance-wheels d^2 to prevent their rotation from being checked by any unusual obstruction encountered by the bits, and also pulleys d^3, carrying belts d^4, which pass by a quarter-turn to the roller a^8 and transmit the motion of said roller to the shafts d'. The roller a^8 extends from end to end of the frame A, and as the frame C passes back and forth the belts d^4 travel back and forth upon said roller. The shafts d' are journaled directly in the frame C or in rigid attachments thereof at the ends opposite the chucks d; but said shafts are journaled at the ends adjacent to the bits D, so as to give the latter a slight vertical or lateral motion to lessen the liability of breaking them. The means by which this is done are illustrated in Fig. 7, which is a vertical section in line 7 7 of Fig. 1. The shafts are here journaled in blocks d^5, loosely fitted in the hole d^6 in the frame C, so as to have a little play therein. A spring d^7 holds these blocks in position. As the feed-rollers b^7 b^8 cover the edge of the board in which the hole is to be made, said rollers are cut away, as seen at x, to allow the bits to enter the boards at the proper places.

I claim as new and desire to secure by Letters Patent—

1. In a feed device designed for boards or other articles of varying dimensions, the combination of a feed-roller adapted to engage one side or edge of the board mounted upon a shaft journaled in the frame of the machine and rotated by the driving-gear thereof, an oscillating frame pivoted to the frame of the machine and provided with means for holding it firmly in different positions, a gear-wheel rotated by the driving-gear about an axis coincident with the pivot of the oscillating frame, a second gear-wheel driven by the first and fast upon a shaft journaled in the oscillating frame, and a second feed-roller mounted upon the last-mentioned shaft and adapted to engage with the opposite side or edge of the board, substantially as described.

2. In a feeding device adjustable to different-sized timbers, the combination of a supporting-frame, a feed-roller mounted upon a shaft journaled in said frame and rotated by suitable driving mechanism, an oscillating frame and a connecting gear-wheel mounted upon the same axis, the latter being also rotated by the driving mechanism, a second feed-roller mounted upon a shaft journaled in the oscillating frame and driven by the connecting-gear, and a frame adjustable upon the supporting-frame and engaging with the oscillating frame to carry the latter with it in its adjustments, substantially as described.

3. In a feed device adjustable to different-sized timbers, the combination of a supporting-frame, a feed-roller fast upon a shaft journaled in the supporting-frame and rotated by driving-gear, an oscillating frame and a connecting gear-wheel, both journaled upon the same axis in the supporting-frame and the latter rotated by the driving-gear, a second feed-roller fast upon a shaft journaled in the oscillating frame and driven by the connecting gear-wheel, an adjustable frame sliding in guides in the supporting-frame, and an arm pivoted to the sliding frame and to the swinging portion of the oscillating frame, substantially as described.

4. The combination of the frame B, the driven shaft b, geared to the wheel b^{10} and carrying the roller b^7, the frame b^{12}, oscillating upon the axis of the wheel b^{10}, the shaft b^{14}, carrying the roller b^{18} and geared to the wheel b^{10}, the frame B′, provided with means for adjustment, and the connecting-arm b^{22}, substantially as described.

5. The combination, with the frame A and the frame B, of the driven shaft b, the roller b^7, the gear b^8, the gear b^{10}, driven by the gear b^8, the frame b^{12}, the shaft b^{14}, the gear b^{16}, the roller b^{18}, the frame B′, and the adjusting-screw b^{20}, substantially as described.

6. In a feeding device for tongue-and-groove boards, the combination, with a suitable frame, of two rollers journaled thereon, fitted

to the tongue and groove of the board, respectively, and one of them rotated by suitable connections with the driving-gear, substantially as described.

7. In a feed device for a continuous-boring machine designed to bore nail-holes in tongue-and-groove flooring, the combination, with a suitable frame provided with devices for operating the boring-bit, of two rollers fitted, respectively, to the tongue and groove of the boards, one of said rollers being provided with notches in its periphery to receive the boring-bit, substantially as described.

8. In a boring-machine, a feed device adapted to present the timbers to the bits, a bit-carrying frame having suitable devices for carrying the bits with the timber while advancing them into the same and for withdrawing them and returning it to the proper position, a gang of bits mounted upon shafts journaled in said frame, pulleys fast upon said shafts, a roller rotated in suitable bearings by driving mechanism, and a series of belts geared to the pulleys and the roller and adapted to travel back and forth upon the latter, substantially as described.

9. In a boring-machine, the combination of a feed device adapted to present the timber to the bits at the required angle, a horizontally-sliding frame having suitable connections with the driving-gear for reciprocating it parallel to the timber and for giving it an independent lateral reciprocation toward and from said timber, and a series of bits carried by shafts journaled in the frame and rotated by the driving-gear, substantially as described.

10. In a boring-machine, the combination of a feed device, a bit-carrying frame, a driving-gear adapted to move the timber and the frame in parallel lines at the same speed while the boring is done, mechanism for alternately advancing and withdrawing the frame from the timber, a reversing-gear adapted to move the frame in the same direction as the timber while the bit is forced into the same and return the frame to its first position when the bit is removed, a bit mounted upon a shaft journaled in the frame, and a pulley fast upon said shaft and rotated by suitable connections with the driving-gear, substantially as described.

11. In a boring-machine, the combination of a feed mechanism, a bit-carrying frame having suitable devices for forcing the bit into the timber and withdrawing it therefrom, and a bit mounted upon a shaft rotated by the driving-gear and journaled in the frame adjacent to the bit by means of a journal-block having a slight play in said frame, substantially as described.

12. In a boring-machine, the combination of suitable mechanism for presenting the timber to be bored to a bit, a bit-carrying frame having suitable devices for forcing the bit into the timber and withdrawing it therefrom, and a bit mounted upon a shaft rotated by the driving-gear and journaled in the frame adjacent to the bit by means of a block having a slight play therein against a spring force, substantially as described.

13. In a boring-machine, the combination of feed mechanism adapted to carry the timber in continuous motion through the machine, a bit-carrying frame having suitable connections with the driving-gear for simultaneously moving it in the same direction at the same speed as the timber and advancing it toward the latter and also for withdrawing it therefrom and returning it to the first position, and a bit mounted upon a shaft rotated by the driving-gear and journaled in the frame adjacent to the bit by means of a journal-block having a slight play in said frame against a spring force, substantially as described.

14. The combination of a feed device adapted to carry a timber in continuous motion and present it in proper position for boring, a bit-carrying frame having suitable connections with driving-gear for imparting reciprocating motion parallel to the timber and guided toward or from the timber by a projection running in a cam-slot, and a bit mounted upon a shaft journaled in the frame and rotated by the driving-gear, substantially as described.

15. The combination, in a boring-machine, with suitable feed devices to carry a timber in continuous motion through the machine and present it in proper position for boring, of a bit-carrying frame having a bit mounted on a shaft journaled therein and rotated by the driving-gear, conecting-gear between the frame and the driving-gear adapted to impart motion to the frame in the same direction and at the same speed as the timber while the boring is done, reversing-gear adapted to return the frame after the boring is completed, and an endless cam-groove adapted to guide the frame toward and from the timber and having an oscillating dog interposed therein, substantially as described.

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