No. 797,170. PATENTED AUG. 15, 1905.

L. BRODT.

DOOR STILE AND RAIL BORING MACHINE.

APPLICATION FILED APR. 9, 1903.

8 SHEETS—SHEET 1.

Fig. 1.

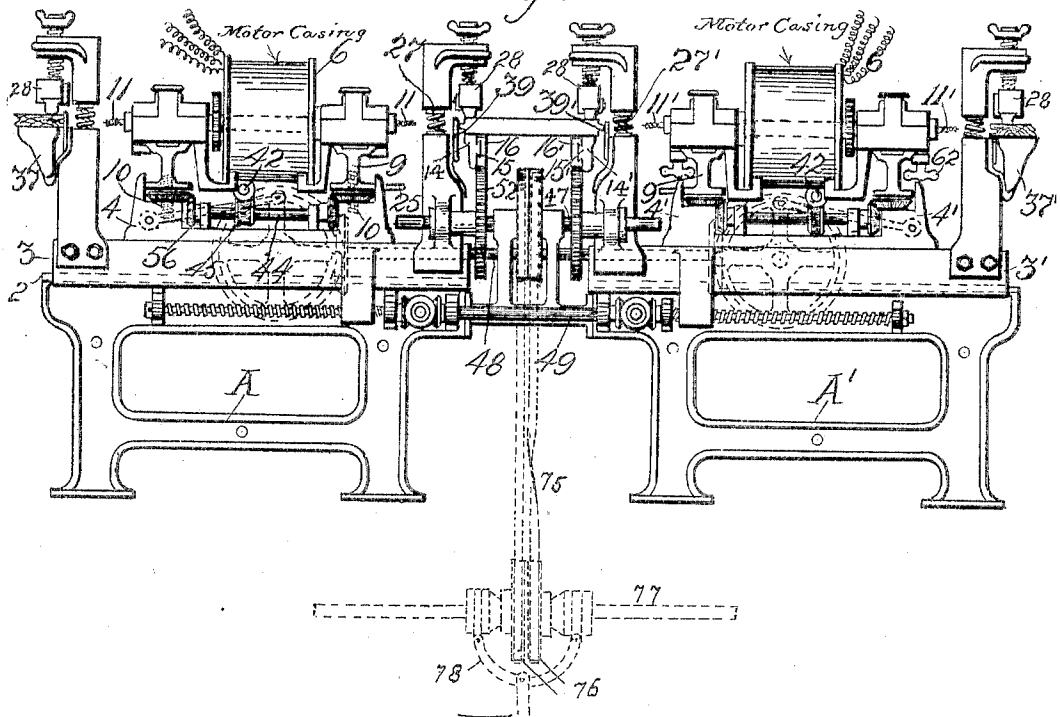
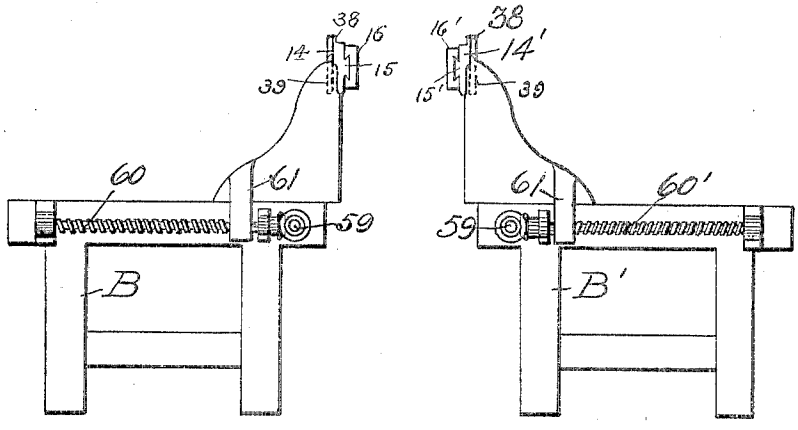


Fig. 2.



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Lincoln Brodt

BY Geo. H. Strong

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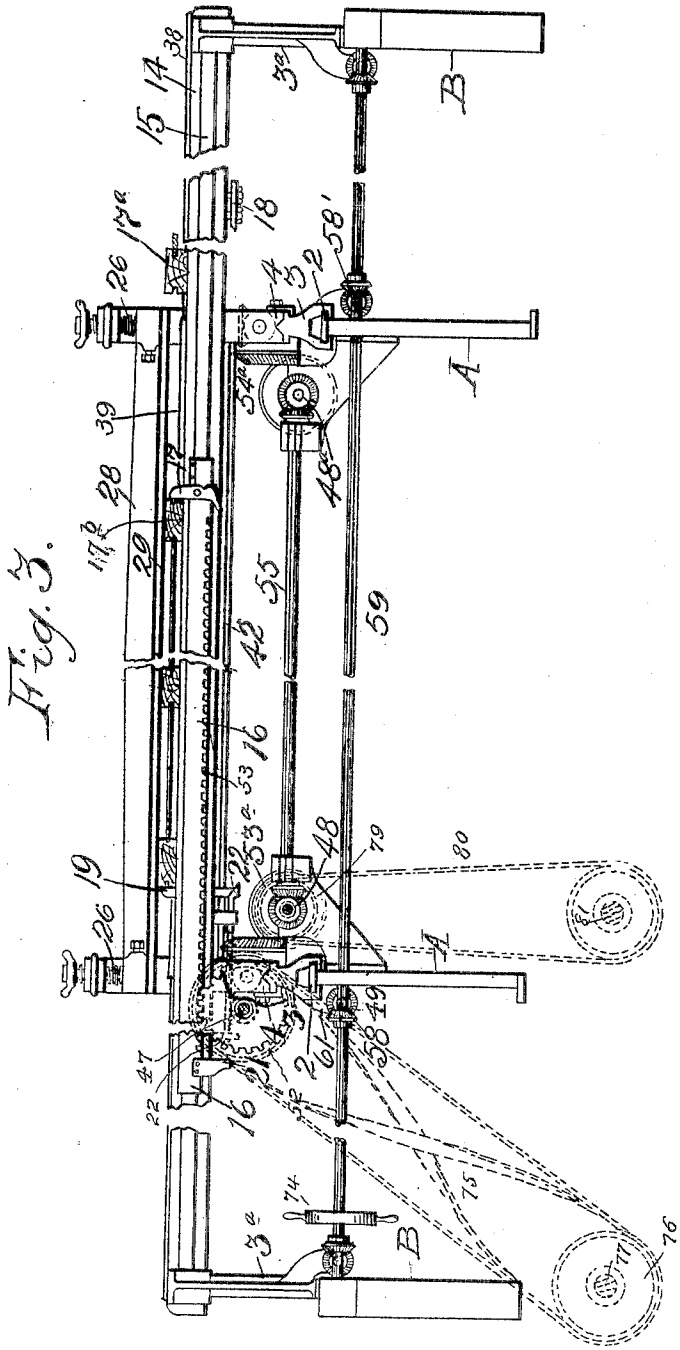
8 SHEETS—SHEET 2.

Fig. 3.



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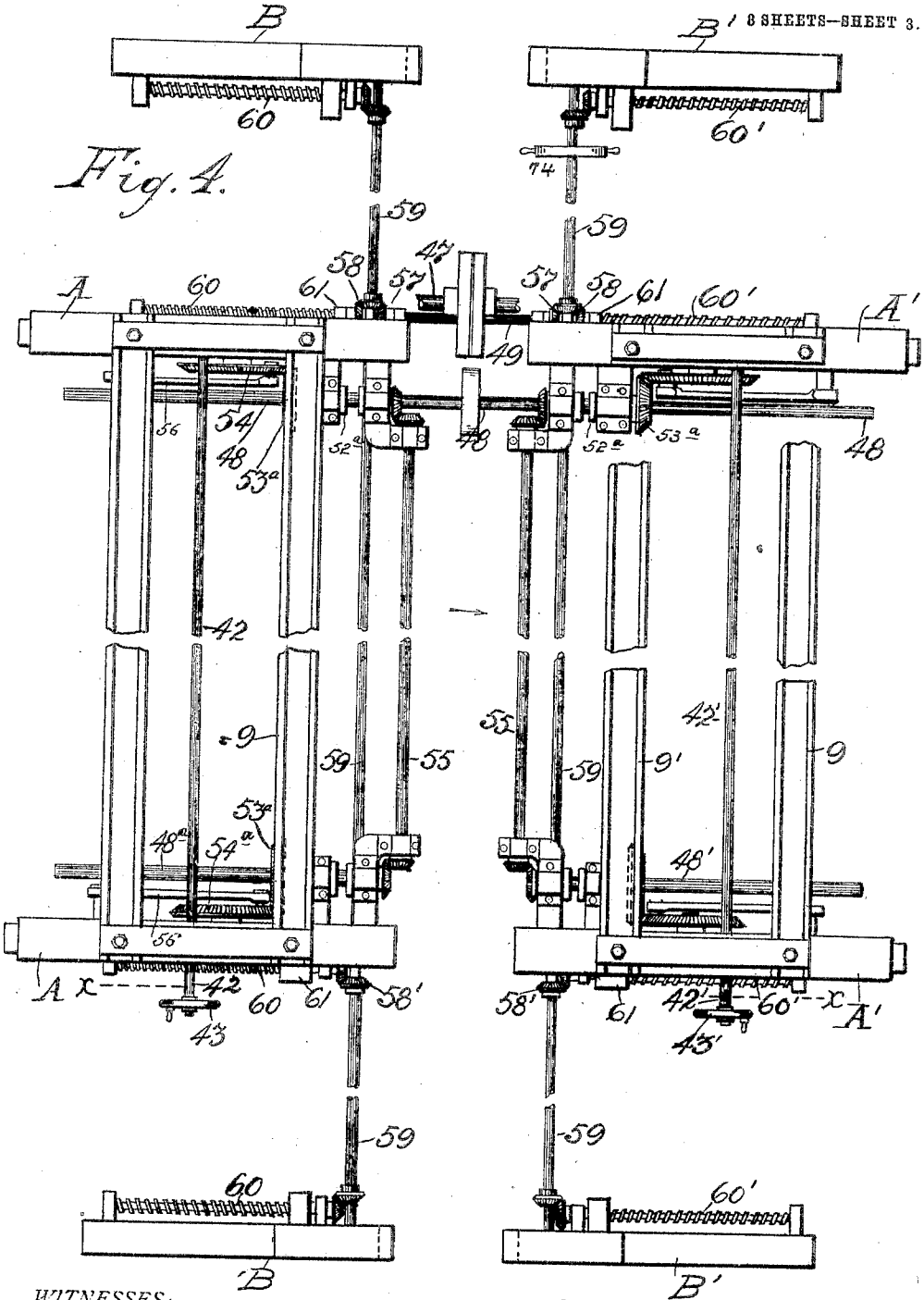
8 SHEETS—SHEET 3.

Fig. 4.



WITNESSES:

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8 SHEETS—SHEET 4.

Fig. 7.

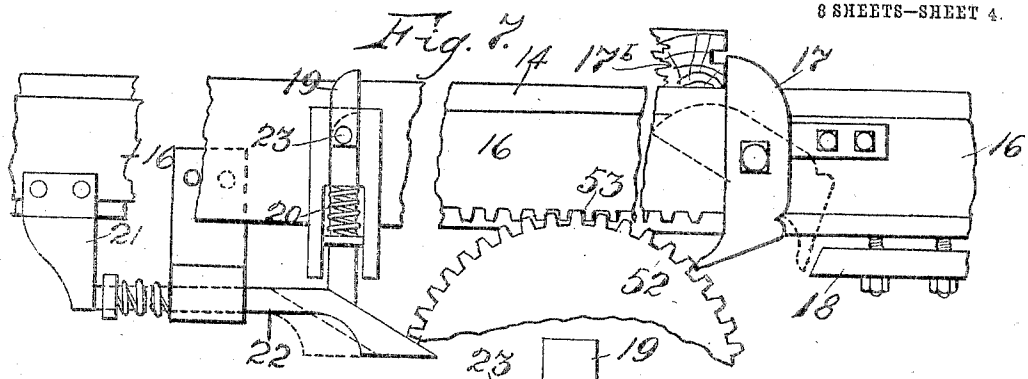
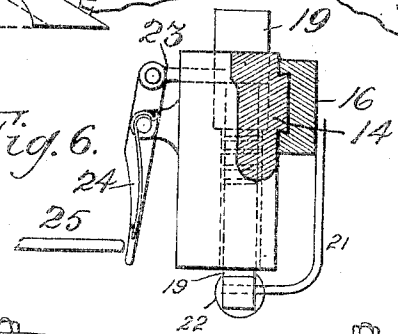


Fig. 6.



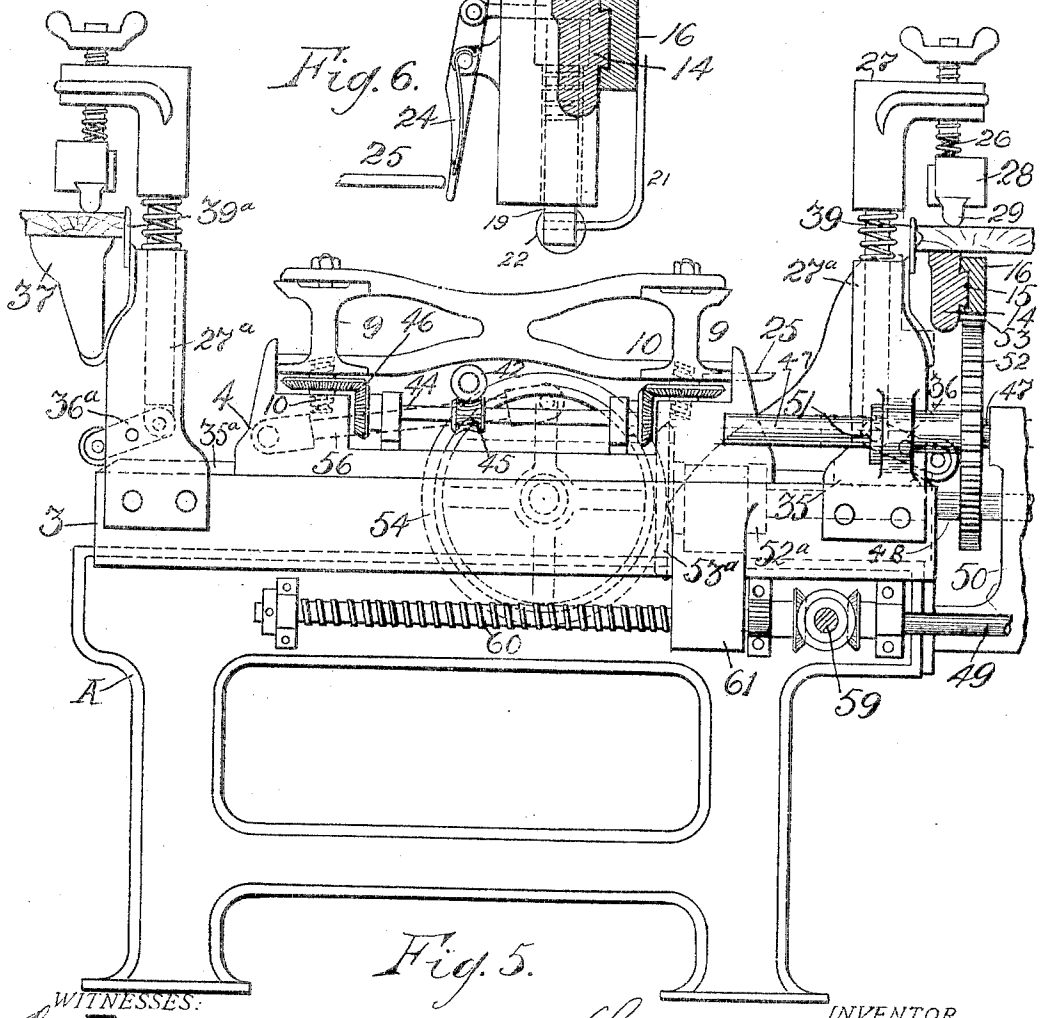


Fig. 5.

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8 SHEETS—SHEET 5.

Fig. 8.

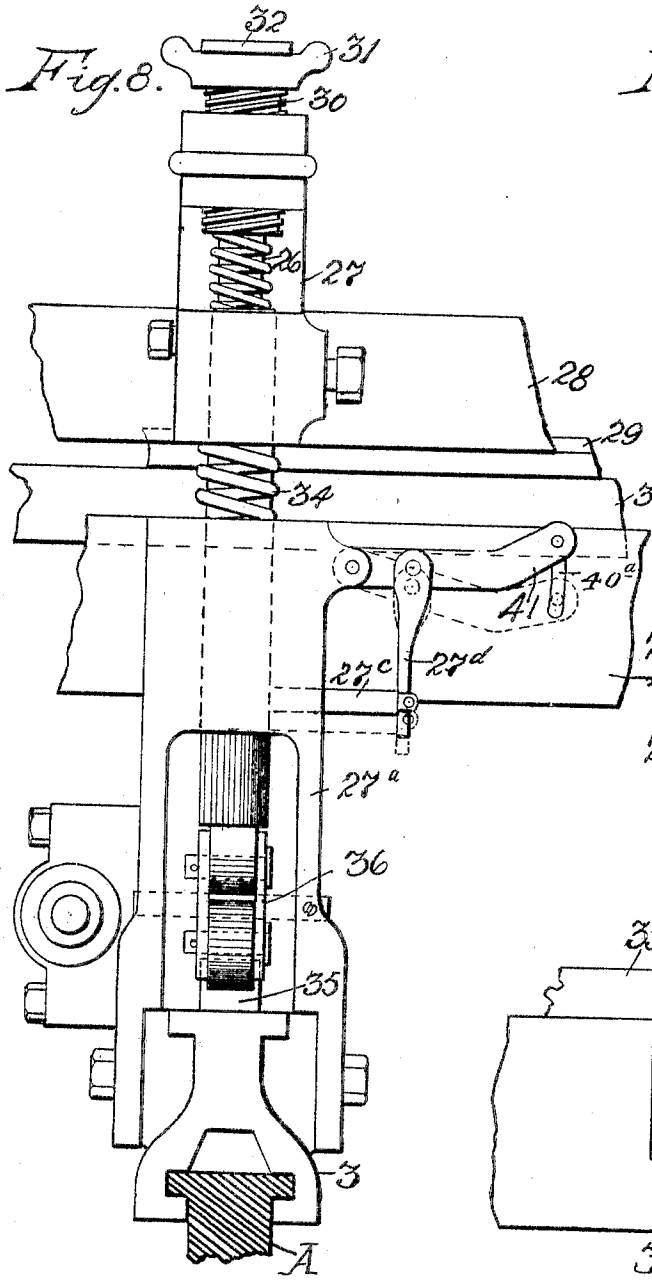
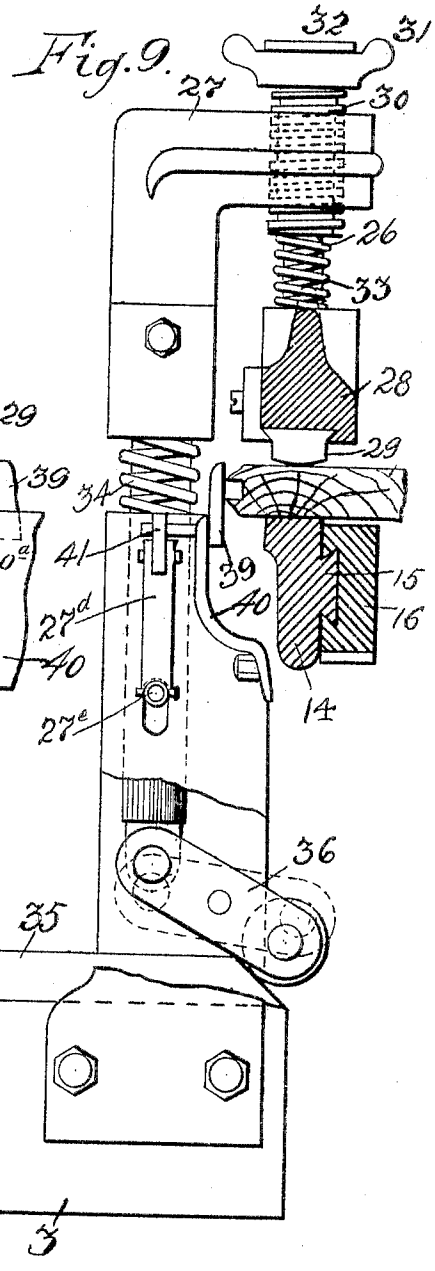


Fig. 9.



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8 SHEETS—SHEET 6.

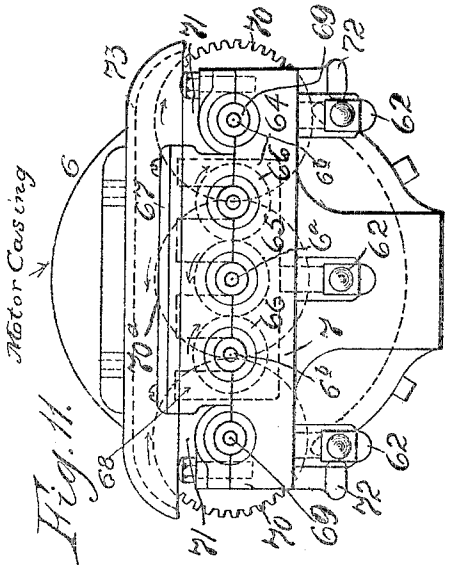

Fig. 11.

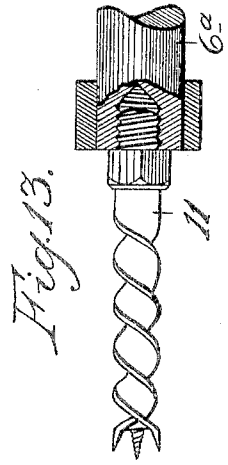

Fig. 13.

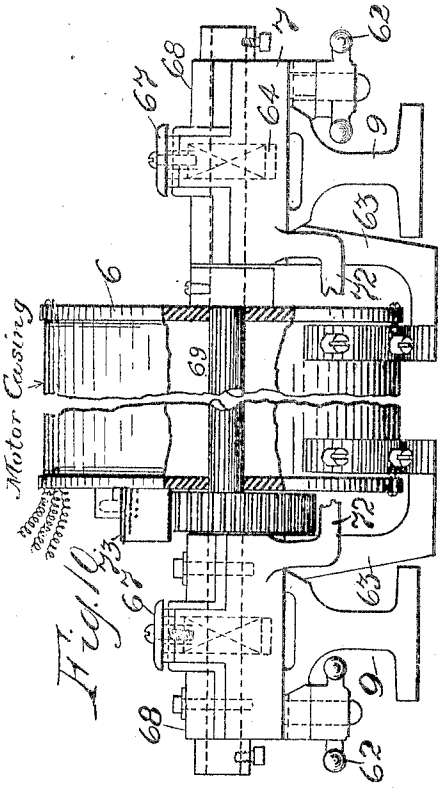

Fig. 10.

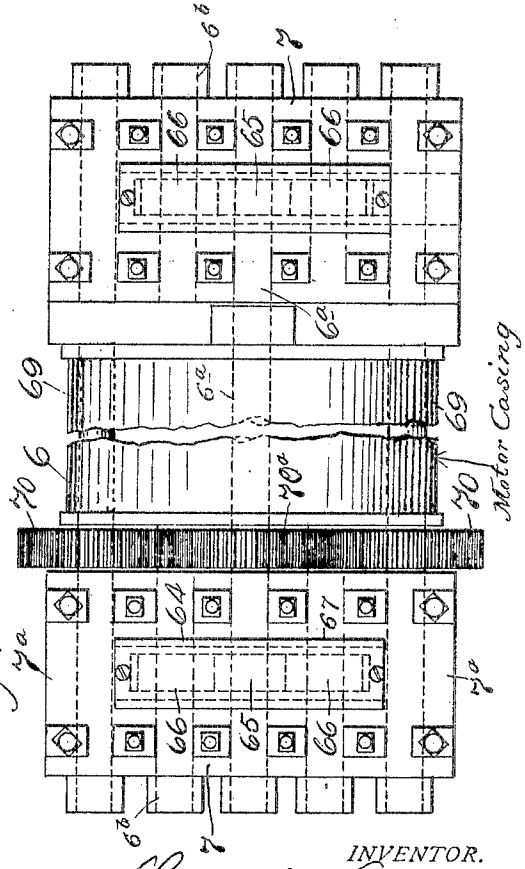

Fig. 12

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No. 797,170. PATENTED AUG. 15, 1905.

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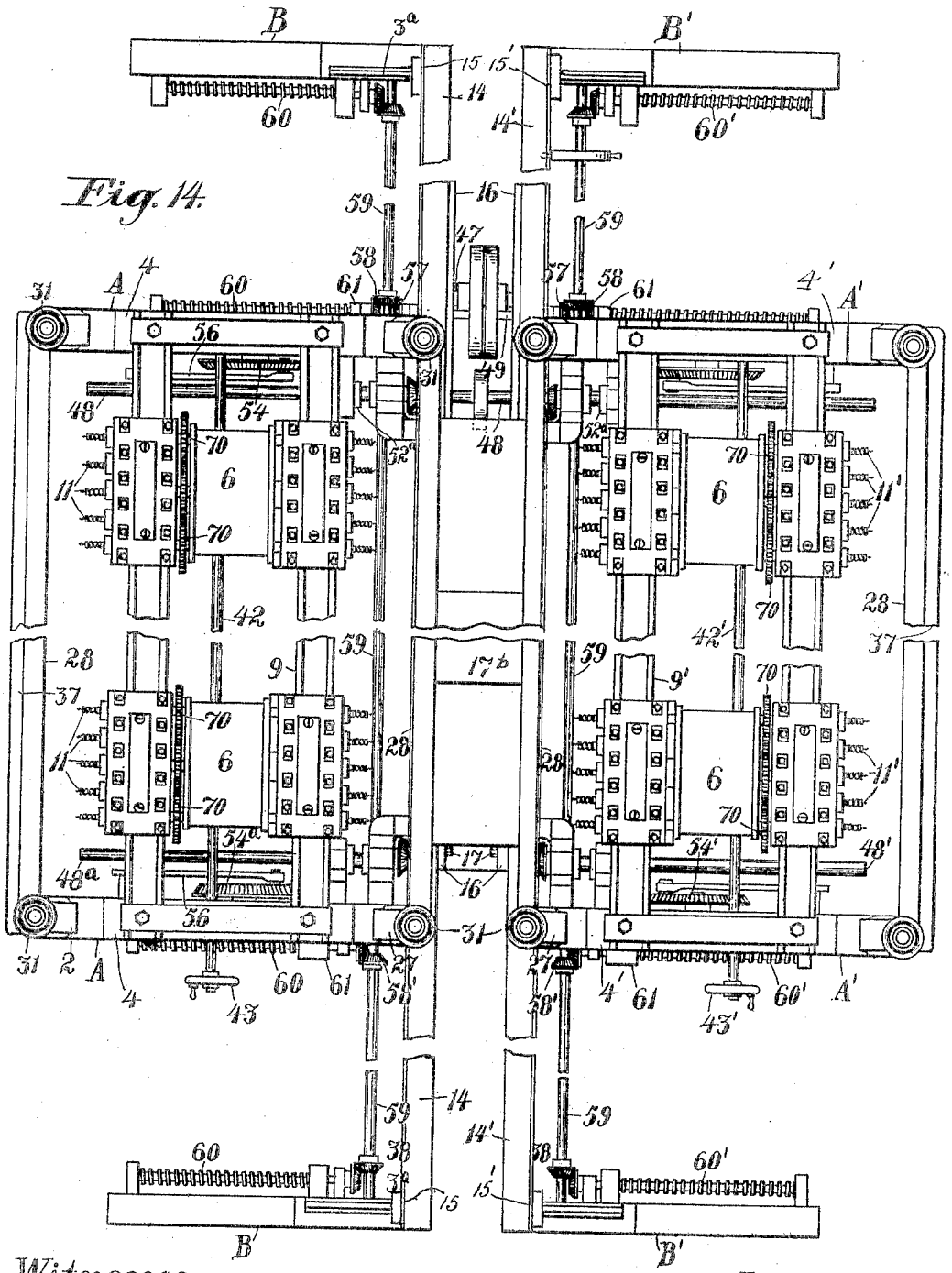
8 SHEETS—SHEET 7.

Fig. 14.



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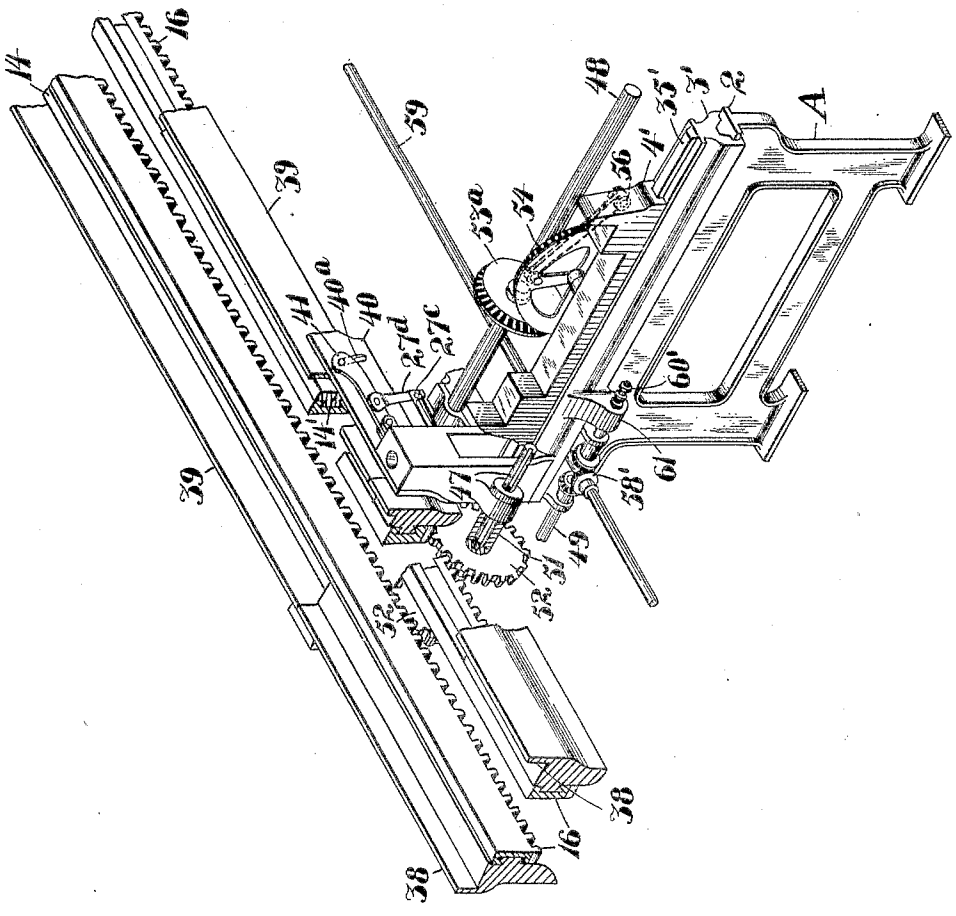
8 SHEETS—SHEET 8.

Fig. 15.



Witnesses:-
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J. A. Amuse

Inventor;
Lincoln Brodt
Geo. H. Strong.
Atty

UNITED STATES PATENT OFFICE.

LINCOLN BRODT, OF WEST BERKELEY, CALIFORNIA.

DOOR STILE AND RAIL BORING MACHINE.

No. 797,170. Specification of Letters Patent. Patented Aug. 15, 1905.

Application filed April 9, 1903. Serial No. 151,803.

To all whom it may concern:

Be it known that I, LINCOLN BRODT, a citizen of the United States, residing at West Berkeley, county of Alameda, State of California, have invented an Improvement in Door Stile and Rail Boring Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in machines for boring the stiles and rails of doors preparatory to the reception of the dowels by which the parts after being assembled and passing the gluing-machine are bound together.

The main object of my invention is to provide a machine of simple construction and operation and having a greatly-increased capacity over machines at present in use, one by which all the holes in both stiles and in each end of the rails may be bored at the same time and by which the parts are accurately matched and one which is readily adjustable to any length, breadth, or thickness of door stile or rail.

It consists of the parts and the construction and combination of parts hereinafter more fully described, having reference to the accompanying drawings, in which—

Figure 1 is a general front elevation of the portion of the machine carrying the boring machanism on line x x, Fig. 4, certain details being omitted. Fig. 2 is a view of one end of machine. Fig. 3 is a side elevation of one section of machine, taken from between the sections. Fig. 4 is a diagrammatic view of the several main driving mechanisms. Fig. 5 is a view similar to Fig. 2 of one section of the machine on a larger scale. Fig. 6 is a detail of trip mechanism for one of rail-clamp stops. Fig. 7 is a detail of the rail-clamp stops and means for engaging and tripping the same. Figs. 8 and 9 are different views of the clamp mechanism for holding the rails and stiles on their supports during the operation of boring. Fig. 10 is a side elevation of a motor and the bit-shaft cases. Fig. 11 is an end view of same. Fig. 12 is a plan of same. Fig. 13 is a detail of a bit. Fig. 14 is a general plan of the machine. Fig. 15 is a perspective view, partially broken away, showing particularly the guides 38 and 39, the shafts 47, 48, and 49, and the gear 52 on the shaft 47 and other parts.

The machine comprises two separated opposed adjustable longitudinal sections duplicates of each other in all respects, and it will be understood that the description of one section will apply equally to the other. Each section includes, essentially, a stationary support or base having transverse ways upon which a bed is adjustable relative to its complement on the opposite section to doors of different widths, a boring-mechanism carrier reciprocable on the bed, and means carried directly on the carrier as an integral feature of the machine for operating the bits.

Referring to the drawings, A A′ represent opposed stationary central base portions separated a space preferably in excess of the width of the widest door to be handled. B B′ are respective and similarly-separated stationary base portions disposed at each end of the machine, the parts B A B supporting the movable superstructure of one section and the parts B′ A′ B′ supporting the movable superstructure of the other section. The construction of the section built upon base B A B need only be detailed. The superstructure of this section comprises a central bed portion 3, movable transverse to the axis of the machine on the ways or tracks 2 of portion A, and the auxiliary end bed portions 3^a, movable in unison with bed 3 on portions B B. The parts 3^a form end supports for the horizontal bar 14, which latter is secured to bed 3 adjacent to the open space between the sections and affords a support for one side of a door-rail. A similar door-rail support 14′ is carried by the opposite section. Suitable means will be described later by which the bed portions 3 3′ of the two sections may be operated simultaneously to advance the rail-supports 14 14′ toward or withdraw them from each other to adapt the machine to the width of door handled.

4 is a boring-mechanism carrier supported on bed 3 and having a reciprocating movement intermediate of the door-rail support 14 and the stile-support 37, as will be more fully described hereinafter. The stile support or rest 37 is disposed at the outer edge of the machine parallel and with its upper surface in the same plane with the rail-support 14, and like the latter is rigidly connected to and movable with bed 3.

A vertically-adjustable platform 9, which forms the immediate support of the boring mechanism, is mounted on screw-standards 10 on carrier 4. This vertical adjustment, which is for the purpose of centering the bits relative to the material to be bored, may be effected in the following manner: 42 is a worm-shaft journaled in carrier 4 and running par-

allel with the axis of the machine beneath platform 9 and carrying an operating hand-wheel 43. Adjacent to each end of platform 9 is a transverse shaft 44, having a gear 45, engaging a gear on shaft 42. Each end of the shafts 44 has a beveled gear engaging a beveled gear-nut 46 on a screw 10. The screws on one side of the platform may be right-threaded and those on the other left-threaded, or suitable intermediate gears may be employed, so that in either case the operation of turning the hand-wheel 43 will be to raise or lower the four corners of the platform simultaneously and evenly.

The boring mechanism comprises a plurality of bit-stocks journaled in boxes 7, which latter are disposed in pairs and slidably mounted on lateral guides on platform 9 and adjustable longitudinally of the machine by suitable clamping means, as indicated at 62, Figs. 10 and 11.

One of the chief features of my invention is the arrangement of the driving mechanism for the bits, which is here carried direct on the machine and is reciprocable in unison with the carrier. Heretofore in machines of this class it has been usual to drive the bits from a source external to the boring-mechanism support by a cumbersome system of counter-shafts and belt transmission. In the present instance I employ a series of incased motors, as indicated at 6, mounted direct on the carrier-platform and moving with it, each motor operating two gangs of bits, one gang at the outer end of the motor to bore a set of holes in the stile and the other gang at the inner end of the motor to bore a corresponding set in the door-rail.

Each pair of boxes 7, supporting a single motor-shaft 6^a, is provided with the drop projections 63, to which the respective motor-casing is secured. These boxes are chambered, as at 64, to accommodate the gears 65 on the motor-shaft and also the gears 66 of the short shafts 6^b, which are disposed on each side of shaft 6^a and are likewise journaled in the boxes 7 and are provided with bit-sockets at their outer ends. The shafts 6^b are driven in unison with the motor-shaft, which is also provided with a bit-socket at each end through the interengagement of gears 65 66. Inasmuch as the several bits in each gang are driven from the same motor-shaft, certain of the bits are left-threaded and others right-threaded.

68 represents journal-caps, having each a central opening coincident with chamber 64. The latter is filled with oil for the gears 65 66 to run in, and access may be had to the gears through the cap-openings, which are closable by means of the covers 67.

While ordinarily in this class of work a gang will not contain more than three bits, I have shown a method by which the number may be readily increased to four or five or even more.

69 69 represent two auxiliary shafts or bit-stocks, disposed one on each side of the motor-casing parallel with and of approximately the length of the motor-shaft and adapted to be intergeared therewith, as indicated at 70 70^a. Shafts 69 are journaled in the end portions of boxes 7. The end portions of each pair of boxes are rigidly connected together by means of the tie-rods 72, so that when a motor is put in position on the machine its boxes will surely be in proper alinement, and when they are locked by means of screw-clamps 62 in position all twist on a shaft will be obviated and the two sides of the platform will be rigidly united. Gears 70 70^a are provided with a suitable housing 73.

The length of the machine is approximately three times the length of the longest door to be bored. The assembled rails and panels (herein referred to simply as "incomplete door") are placed upon the bars 14 14′ intermediate of one end of the machine and the beds 3 3′, thence delivered by a suitable reciprocating carriage 16 into juxtaposition with the boring mechanism, and finally carried into and deposited in the space between the opposite end of the machine and the beds, where the stiles which have already been bored, glued, and received their dowels may be fitted to the incomplete door while the stiles and assembled rails and panels of a second incomplete door are being admitted to the machine and bored. The carriage or conveyer 16, which is adapted to reciprocate between the sections on dovetailed guides 15, formed on the adjacent sides of bars 14 14′, is approximately twice the length of a door and its upper edges are just below the surface of bars 14 14′, so that it may freely move beneath the assembled rails and panels, which are supported in their transit through the machine on said bars. The forward or feed end of the carriage is provided with the pivoted dogs 17, adapted to project upward to engage a rail, as 17^b, Fig. 3, and carry it forward into juxtaposition with the bits. On the return of the carriage to its original position at the feed end of the machine the dogs hit a fresh incomplete door, as 17^a, which has been placed on bars 14 14′ ready to be taken between the borers on the next reciprocation of the carriage, and are depressed. Issuing from beneath incomplete door 17^a they are righted by engaging a stop, as 18. As the carriage moves forward with an incomplete door toward the center of the machine it brings the end of the said incomplete door opposite to that engaged by dogs 17 against the pins 19, projecting up through the bars 14 14′. This movement of the said incomplete door has brought it beneath the presser-bars 28, which are to hold the said incomplete door down while it is being bored,

while dogs 17 and pins 19 serve as end clamps on the assembled rails and panels to press them together prior to the action of bars 28. The latter, however, are always close enough to the upper surface of the rails to prevent them buckling when brought against pins 19. The latter are normally depressed beneath the surface of bars 14 14′ through the agency of springs 20 and are only elevated when a projection 21 on the rear end of the carriage engages a spring-pressed cam-finger 22, supported on bed 3, and pushes the cam-finger beneath a pin. On the pin being lifted a latch 23, Fig. 6, pivoted to a spring-pressed lever 24, fulcrumed on the support of bar 14, engages a notch in the pin and holds it until the lever 24 is actuated to withdraw the latch. When the carriage moves through the machine in the opposite direction to carry a fresh rail between the borers, the cam 22 moves out from beneath its pin 19 as soon as the pressure exerted by projection 21 is released; but the pin is left projecting above the rail-support 14 in the path of the approaching rail. The rail having been brought into position between the borers and against pins 19, the carriage stops, and as the two boring-mechanism carriers 4 4′ move in simultaneously toward each other the presser-bars 28 are actuated to clamp the rail down on its supports 14 14′, and the levers 24 are engaged by projections 25 on the approaching carriers to release the pins 19. As soon as the boring of the rail is complete the carriers are reciprocated outwardly, the presser-bars 28 lifted automatically, and the movement of the rail conveyer or carriage 16 continued through the machine to deliver the bored rail into the space between the rear end of the machine and the borers, where it receives its stiles which have previously been bored, glued, fitted with dowels, and while the workmen are thus finally putting the parts of the door together the rails and stiles of the next door are being bored. When the carriage, which is approximately twice the length of a door, goes back through the machine, it engages the cams 22 just as it reaches the end of its travel and lifts the pins 19 again, as described.

The operation of the presser-bars 28, one of which is disposed centrally and longitudinally of each section, is as follows: Each bar is carried on stems 26, which are adjustable in brackets 27. The latter are slidable vertically in the standards 27^a, rigid with bed 3. The presser-bars are shod with a removable facing 29, of rubber or like suitable material. The stems 26 are adjustable by means of the threaded collars 30, which are supported in the arms 27 and are turnable by hand-wheels 31 to adapt the clamps to rails of different thickness. The outer end of each stem carries a head 32 to prevent its dropping through the collar, and a spring 33 is interposed between the opposite end of the collar and bar 28. Springs 33 afford a further cushion or yielding support in addition to facing 29, so that the rails or stiles may not be marred or crushed by too great a pressure. The bracket-arms are surrounded by springs 34, by which the arms and clamps are normally made to open to allow the rails to be admitted between the facing 29 and bar 14. The presser-bars 28 are operated to descend upon a rail by means of cams 35 on carrier 4 engaging the roller-bearing ends of levers 36. These levers are fulcrumed to a part rigid with bed 3 and have their other ends connected with the arms 27, as seen in Fig. 9.

The stile support or rest 37 is disposed at the outer edge of the machine rigid with bed 3, parallel with bars 14, and with its upper surface in the same horizontal plane with said bars. Similar clamping means are employed to clamp the stile upon its rest 37. As these means are precisely like those just described to hold the door-rail on the bars 14 14′ and as they are operated by cams 35^a when the carrier 4 moves outward, it is unnecessary that their construction should be again detailed. Sufficient to say that when the carrier 4 is moved inwardly toward the center of the machine to cause the bits to bore the rails cams 35 engage levers 36 to lock the rails from above, and when the carrier is moved in the opposite direction cams 35 release those levers and allow springs 34 to act to lift the presser-bar 28, while cams 35^a engage levers 36^a to operate the stile-clamps and hold the stile while it is being bored.

The portions of rails 14 14′ at the front end of the machine and forward of the boring mechanism are provided with the outer guide-flanges 38, Fig. 2, between which a door-rail is held and guided while being fed forward between the bits.

39 represents guides continuous with guides 38, but are movable vertically, so that after the rail has been clamped from above the ends of the portions to be bored may be exposed to the free entry of the bits. Each of these movable guides 39 consists of a plate or thin metal bar slidable vertically relative to a suitable guide 40 on a part rigid with bed 3 or 3′ and is connected to levers 41 through the medium of pins projecting through slots 40^a in guide-plate 40. Each lever 41 is fulcrumed on a bracket 27^a, Figs. 8 and 9, and is connected with bracket-arm 27 by means of a link 27^d and a projection 27^c on arm 27, operating in a slot in standard 27^a. Similar connections operate the stile-clamp, so that simultaneously with the engagement of either the rail or stile presser-bars with the rail or stile and antecedent to the entry of the bits into the rail or stile the respective guides 39 39^a, Fig. 1, are depressed. They protrude again automatically on the release of the clamps.

Just as it is necessary to adjust the clamps

to varying thicknesses of rails and stiles, so is it important to adjust the centers of the bits relative to such variations. This vertical adjustment of the bits is accomplished by a simultaneous movement of the screws 10 to raise or lower platform 9, supporting the motors, as has been seen.

The manner of and means for moving bed 3 and reciprocating carrier 4 and carriage 16 are as follows, Figs. 1, 3, 4, 5: 47 48 49 represent the respective drive-shafts for the carriage 16, the carrier 4 and its complement 4′, and the bed 3 and its complement 3′. These shafts extend across the space between the sections of the machine and are all grouped adjacent to one end of carrier 4 in as close proximity to each other as is convenient for the proper receipt and transmission of power in order to leave the space through the center of the machine as open as possible. Shafts 47, 48, and 49 are each journaled in suitable parts rigid with bases A A′. Shaft 47 has a feather and is slidable in sleeves 51, Fig. 5, journaled in the movable beds of the machine and turnable with shaft 47. Integral with each sleeve, and hence slidable on and turnable with shaft 47, is a gear 52, engaging a rack 53 on the under side of carriage or conveyer 16. The feathered portions of the shaft 47 are long enough to accommodate the various adjustments in width of the machine, and according as the shaft is turned in one direction or the other the conveyer-carriage 16 is reciprocated, as before described. Shaft 48 is also a feather-shaft and is adapted to be turned to transmit motion to the crank-wheels 54 54^a to reciprocate the two boring-mechanism carriers 4 4′ simultaneously and in opposite directions. This is done in the following way: Each end of the shaft 48 engages a sleeve 52^a, journaled in the beds 3 3′ and slidable on and turnable with shaft 48. Sleeve 52^a carries a beveled gear 53^a, meshing a similarly-geared crank-wheel 54, journaled in bed 3. Shaft 48 transmits power to a second crank-wheel 54^a at the opposite end of carrier 4 through shaft 55, journaled in base A, and through the feather-shaft 48^a and suitable gearing, as indicated in the diagrammatic view Fig. 4.

As these machines may be thirty feet or more in length, provision must be made to apply power to operate the various movable parts at points such that each part will be moved easily, positively, and without strain. Each crank-wheel 54 54^a has a pitman 56 connecting with carrier 4 and similarly in regard to carrier 4′, and when those wheels are turned one complete revolution the boring mechanism is reciprocated completely across beds 3 3′, first to bore the stiles, then to bore the rail. By making the clamping and boring of the two parts successive it enables the workmen to remove the stiles and glue and fit the dowels while the rails are being bored.

Shaft 49, by which the movable beds are separated or drawn toward each other, carries a beveled gear 57 at each end, each gear engaging a corresponding gear 58 on a line-shaft 59, journaled in A B B and which extends from end to end of the machine. Shaft 59 carries adjacent to the front end of carrier 4 a second gear 58′. The latter and gear 58 engage gears on the transversely-disposed worm-shafts 60, which are also journaled in the stationary parts A B B of the machine. Bed 3 is provided with the threaded lug projections 61, engaging each transverse worm-shaft 60. By turning shaft 49 in one direction or the other the beds, with their respective rail-supporting bars 14, are moved toward or from each other to adapt the machine to any width of door to be manufactured.

It has not been deemed essential for purposes of this application to show means for driving shafts 47 48 49. Any convenient and suitable method may be employed to turn the shafts in either direction to accomplish the results desired.

By this machine all the holes in both stiles may be bored simultaneously, and all the holes in each end of the rails may be bored simultaneously, and, furthermore, the holes so bored in the stiles and rails will match perfectly.

By having two synchronously-operated boring-carriers with means for automatically delivering rails between them and providing for boring both stiles at the same time it enables all the elements of the door practically to be bored at once and by the one machine. Moreover, by making the boring of the stiles and rails successive the former may be prepared with glue and dowels in readiness for the rail as soon as it comes from the borers. The further advantage in the present construction is obvious in the matter of compactness, economy of power, and efficiency by reason of the mounting of the driving mechanism for the bits direct upon the bit-carrier and doing away with the cumberous connections with drive-shafts external to the machine.

As each section of the machine is complete in itself, it is obvious that either could be operated singly, it only being necessary to provide suitable means for supporting a rail in relation to the bits, in which case the carriage 16 could be dispensed with.

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

1. In a machine of the class described the combination of two opposed complementary structures, each including a base, a movable bed, a reciprocating boring-mechanism carrier, means for supporting material to be bored in the path of said carrier, a reciprocating conveyer intermediate of the sections, and an actuating mechanism for the beds, carriers and conveyer.

2. In a machine of the character described, the combination of two opposed complementary structures each including a base and a movable bed, an independent, reciprocatory boring mechanism for each of said structures and including a carrier and boring-tools, means for supporting material to be bored in the path of the carriers, and actuating mechanism for the carrier, and a reciprocating conveyer arranged to deliver material to and from the boring-tools.

3. In a machine of the character described the combination of two opposed structures each including a base and a movable bed, a reciprocating carrier intermediate of the sections, means for operating the carrier, complementary boring mechanism slidably mounted on each section, and means for operating the boring mechanism.

4. In a machine of the class described, the combination of two parallel-disposed, complementary supporting-sections transversely adjustable to various door widths, lateral stile-supports carried at the outer edges of the sections, work-supports between the sections, reciprocating double-ended boring mechanisms on said sections operable simultaneously in opposite directions between said stile and work supports and means including a reciprocating conveyer for delivering material into the path of the boring mechanisms.

5. In a machine of the class described, the combination of two parallel-disposed, complementary sections transversely adjustable to various door widths, lateral stile-supports carried at the outer edges of the sections, rail-supports on the adjacent edges of the sections, reciprocating boring mechanism on said sections operatable simultaneously in opposite directions between said rail and stile supports, and means including a reciprocating conveyer between the sections for delivering material into the path of the boring mechanism.

6. In a machine of the class described, the combination of two parallel-disposed, complementary sections transversely adjustable to various widths, lateral stile-supports, means including a reciprocating conveyer for delivering rails between said sections preparatory to being bored, borers on reciprocating carriers, actuating mechanism for said carriers, clamp means for the rails and stiles, and means for operating said clamp means coördinately with the movement of the borer-carriers.

7. In a boring-machine, the combination of two opposed complementary sections adjustable to and from each other, means intermediate of said sections and at the outer sides thereof for supporting material to be bored, carriers upon each of said sections reciprocal between said supporting means of each section, double-ended boring mechanism on said carriers, means for operating said carriers simultaneously in opposite directions, and means including a reciprocating conveyer for delivering material into the path of the boring mechanism.

8. In a boring-machine the combination of a support, separate and parallel work-supports, carriers reciprocal between said work-supports and a double-ended boring mechanism supported and carried by said carrier, said boring mechanism comprising a motor, a motor-shaft, journal-boxes for each end of said shaft, and lateral parallel shafts interengaging with each end of the motor-shaft.

9. A boring-machine having in combination two opposed complementary structures, each comprising a base, a bed horizontally adjustable thereon, a reciprocating carrier, a double-ended boring-machine and a motor on the carrier intermediate the ends thereof and actuating the boring devices, and means in the path of the boring devices and carried by the beds for supporting the materials to be bored.

10. A boring-machine having in combination two opposed complementary structures, each including a base, a bed movable on the base, a carrier movable on the bed, a vertically-adjustable platform mounted on the carrier, a double-ended boring mechanism and a centrally-located incased motor both mounted on the platform, means for operating the beds oppositely and simultaneously, means for reciprocating the carriers oppositely and simultaneously, and means rigid and movable with the beds and arranged on both sides of the beds in the path of the carriers for supporting material to be bored.

11. In a boring-machine, the combination of two opposed complementary structures, each structure including a base, a bed movable thereon transverse to the axis of the machine, a carrier reciprocal on said bed parallel with the movement of the latter, a vertically-adjustable boring-mechanism support on said carrier, boring mechanism, rail-supports on the adjacent sides of the beds, a carriage reciprocal between said beds to deliver rails into position between the borers, and clamping means operatable coördinately with the boring mechanism to hold the rails while they are being bored.

12. In a boring-machine, the combination of two opposed complementary structures, each structure including a base, a horizontally-adjustable bed, a reciprocating carrier, boring mechanism, rail-supporting means on the adjacent sides of the beds, tracks disposed relative to said supporting means, a carriage reciprocal on said tracks, means on the carriage to engage a rail to advance it, stop means in the path of the rail so advanced, and means for disengaging said stop.

13. In a boring-machine, the combination with axially-alined oppositely-reciprocating borers and suitable supporting means therefor, of means intermediate of said borers for supporting a door, vertically-adjustable

clamps situated relative to said supporting means, a reciprocating door-carriage, stop means operatable by the movement of the carriage to clamp the door endwise, and means for operating said vertical clamps and releasing said stops conjunctively with the movement of the borers.

14. In a boring-machine, the combination with axially-alined oppositely-reciprocating borers and suitable supporting means therefor, of means intermediate thereof for supporting material to be bored, a reciprocating carriage or conveyer situated relative to said supporting means, stop means operatable by said conveyer to engage and clamp endwise the material conveyed, and means in the path of the borers to release automatically said stops.

15. In a boring-machine the combination with oppositely and simultaneously reciprocating borer-carriers and means for effecting such reciprocation, of a movable conveyer traversing the space between said borer-carriers in a line at right angles to the direction of movement of said carriers, stops in the path of said conveyer to clamp material to be bored, and means in conjunction with the borer-carriers to release said stops after the material has been bored.

16. In a boring-machine, the combination with oppositely and simultaneously reciprocating borer-carriers and means for reciprocating said carriers, of a movable conveyer intermediate of said carriers, stops operatable by said conveyer to clamp material during the boring operation and means for releasing said stops.

17. In a boring-machine, the combination of oppositely-reciprocating borer-carriers, means for effecting such reciprocation, a movable conveyer intermediate of said carriers, stops operatable by said conveyer to clamp the material in the line of movement of the conveyer and means in conjunction with the borer-carriers for automatically releasing said stops.

18. In a boring-machine, the combination of two opposed complementary structures, each including a base, a bed movable thereon, a carrier reciprocal on said bed, boring mechanism on said carrier, means for supporting material to be bored intermediate of said structures, a carriage reciprocal between said structures, and several driving mechanisms for the beds, carriers and carriage located adjacent to one end of the machine.

19. In a boring-machine, the combination of two opposed complementary structures, each including a base, a movable bed, a reciprocating boring-mechanism carrier, boring mechanism on said carrier, said mechanism including a motor, a motor-shaft, journal-boxes for each end of said shaft, and lateral parallel shafts provided with bits engageable with each end of the motor-shaft, and means for supporting material to be bored in relation to said carriers, a carriage traversing the space between the carriers, respective connective means between the beds and between the carriers for reciprocating said beds and carriers, said connective means between the former including a worm-shaft journaled in the bases and having oppositely-pitched threads at its two ends, and means on the beds engaging the threaded portions of said shaft whereby the beds are drawn toward or moved from each other simultaneously.

20. In a boring-machine, the combination of two opposed complementary structures each including a base, a movable bed, a reciprocating boring-mechanism carrier, boring mechanism on said carrier, said mechanism including a motor, a motor-shaft, journal-boxes for each end of said shaft, and lateral parallel shafts provided with bits engageable with each end of the motor-shaft, means for supporting material to be bored relative to said carriers, means including a reciprocating conveyer for delivering material between the carriers, connective means between the beds and between the carriers for reciprocating them simultaneously said means for the carriers including a feather-shaft 48, beveled gears slidable on said shaft and crank mechanism operatable through engagement with said gears.

21. In a boring-machine, the combination of two opposed complementary structures, each including a base, a movable bed and a reciprocating boring-mechanism carrier, means rigid with a bed for supporting material relative to said carriers, several operative connective means between the beds and between the carriers, a conveyer reciprocal intermediate of said structures, and actuating means for said conveyer including a gear as 52 engaging a rack on the under side of said conveyer.

22. In a boring-machine, the combination of two opposed complementary structures, each including a base, a movable bed and a reciprocating boring-mechanism carrier, means carried by the bed for supporting material relative to the carriers of each structure, a rail-conveyer reciprocal between the carriers, dogs as 17 for engaging a rail to carry it into the path of the carriers, stops 19 interposable in the path of the rail so conveyed, and means for operating said dogs and stops relative to the movement of the conveyer and to the carriers.

23. In a boring-machine the combination of a suitable support, boring mechanism reciprocal thereon, rests to support the material to be bored and disposed in the path of the boring mechanism, a vertically-reciprocal guide as 39 intermediate of a rest, and the corresponding end of the boring mechanism, clamping means for holding the material upon the rests while being bored, and means for operating said clamp and guide conjunctively with the approach and retreat of the boring mechanism.

24. In a boring-machine, the combination with a suitably-supported reciprocating boring-mechanism carrier, of rests relatively disposed in relation to said carrier upon which material to be bored is supported, a vertically-reciprocal guide movable in relation to a rest and disposed intermediate of the rests and the carrier, clamping means for holding the material upon a rest while being bored, connections between said clamp means and said guide by which the two are operated in unison, and means interposable in the path of the carrier for actuating said clamp means.

25. In a boring-machine, the combination of a suitable support, reciprocating boring mechanism thereon, means for effecting such reciprocation, rests to support material to be bored disposed in the path of said boring mechanism, clamps relative to said rests, said clamps including a vertically-sliding stem 27 on a part rigid with said boring-mechanism support, a vertically-reciprocating lateral guide-bar 39 and connective means between said guide-bar and stem substantially as described.

26. In a boring-machine, a boring mechanism comprising a motor, a motor-shaft, journal-boxes for each end of said shaft, and lateral parallel shafts interengaging with each end of the motor-shaft.

27. In a boring-machine, the combination of a motor, a shaft therefor, journal-boxes for the ends of the shaft, a double series of oppositely-extending shafts provided with boring-bits, a gear on the motor-shaft and gears on the series of shafts engaging and driven by the gear on the motor-shaft.

28. In a boring-machine, the combination of opposite rows of journal-boxes; opposite rows of shafts provided with boring-bits, said shafts provided with driven gears; a motor located centrally between the rows of journal-boxes; a motor-shaft; journal-boxes for opposite ends thereof; and a gear on said motor-shaft and disposed between and engaging with the said driven gears.

29. In a boring-machine, the combination of opposing rows of journal-boxes; parallel shafts mounted in each row of boxes and provided with driving-gears and boring-bits; a motor located centrally between the rows of boxes; a motor-shaft and journal-boxes for the opposite ends thereof, said shaft provided with a gear-wheel in operative connection with the gear-wheels of the first-named shafts; supplemental shafts parallel with the motor-shaft; journal-boxes for the ends of the supplemental shafts and boring-bits carried by the ends of the supplemental shafts; a second gear on the motor-shaft; and gears on the supplemental shaft engaged and driven by the said second gear.

30. In a boring-machine, the combination with a motor, a gang of boring-tools at each side thereof, and interengaging gears between the motor and the boring-tools; of supplemental boring-tools, parallel shafts for the supplemental tools said shafts removably secured, and a supplemental train of gearing between said motor and the supplemental boring-tools.

31. In a boring-machine provided with a suitable base and adjustable frames mounted upon said base and upper reciprocating sections adjustably mounted upon said frames, tracks formed within the upper sections, suitable carriages, adjusted within said tracks and having bits, and means to operate said bits, said means including a motor on each carriage and provided with a motor-shaft, journal-boxes for each end of said shaft and lateral parallel shafts engageable with each end of the motor-shaft.

32. In a boring-machine having two reciprocating tools carrying sections mounted upon adjustable frames having suitable base, lateral work-supports secured to said frames and a central work-support secured between said frames, a boring-mechanism carrier reciprocal between said central work-support and a lateral work-support, boring mechanism provided for said carrier and including a motor, a motor-shaft and lateral shafts removably engageable with each end of said motor-shaft and having bits in combination with means for adjusting said frames consisting of a suitable rod secured to the base and having right and left handed threads cut thereon, nuts secured to the frames engaging with the threads of the rod and means for rotating said rod.

33. A boring-machine having two parallel sections each reciprocating upon an adjustable frame and a central and two lateral work-seats mounted upon suitable base, in combination with double-ended spindles adjustably secured upon the parallel sections, and having bits secured at their ends and means for transmitting power to each spindle, said means including a motor on each double-ended spindle and intermediate the ends thereof, and lateral parallel spindles interengaging with each end of said double-ended spindles and provided with bits.

In witness whereof I have hereunto set my hand.

LINCOLN BRODT.

Witnesses:
F. F. PORTER,
A. A. PORTER.