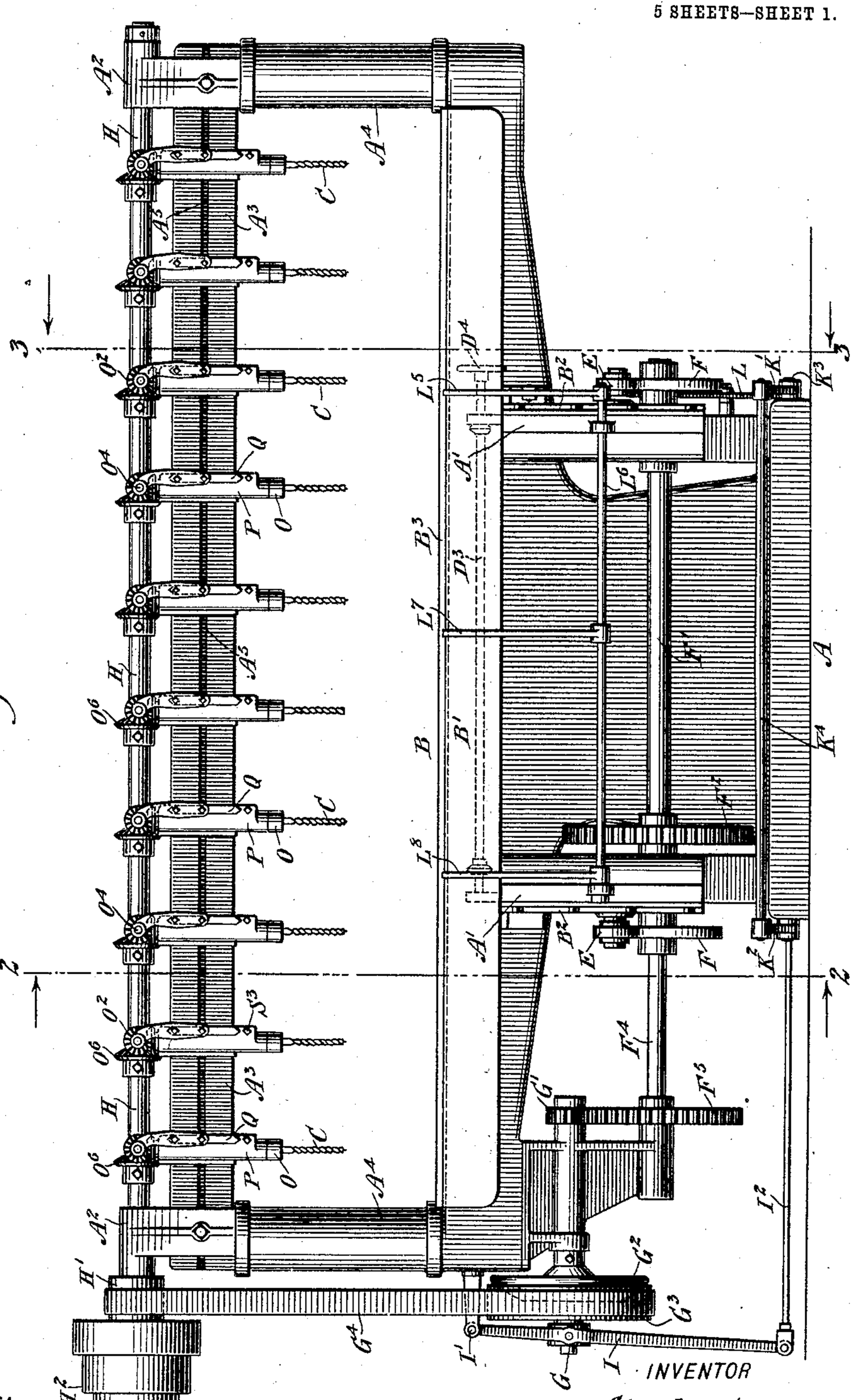
No. 765,601. PATENTED JULY 19, 1904.

C. SEYMOUR.

MULTIPLE SPINDLE BORING MACHINE.

APPLICATION FILED JAN. 22, 1904.

NO MODEL. 5 SHEETS—SHEET 1.



WITNESSES:

Edw. Thorpe

Henry Hoskins

INVENTOR

Charles Seymour

BY Munn & Co

ATTORNEYS

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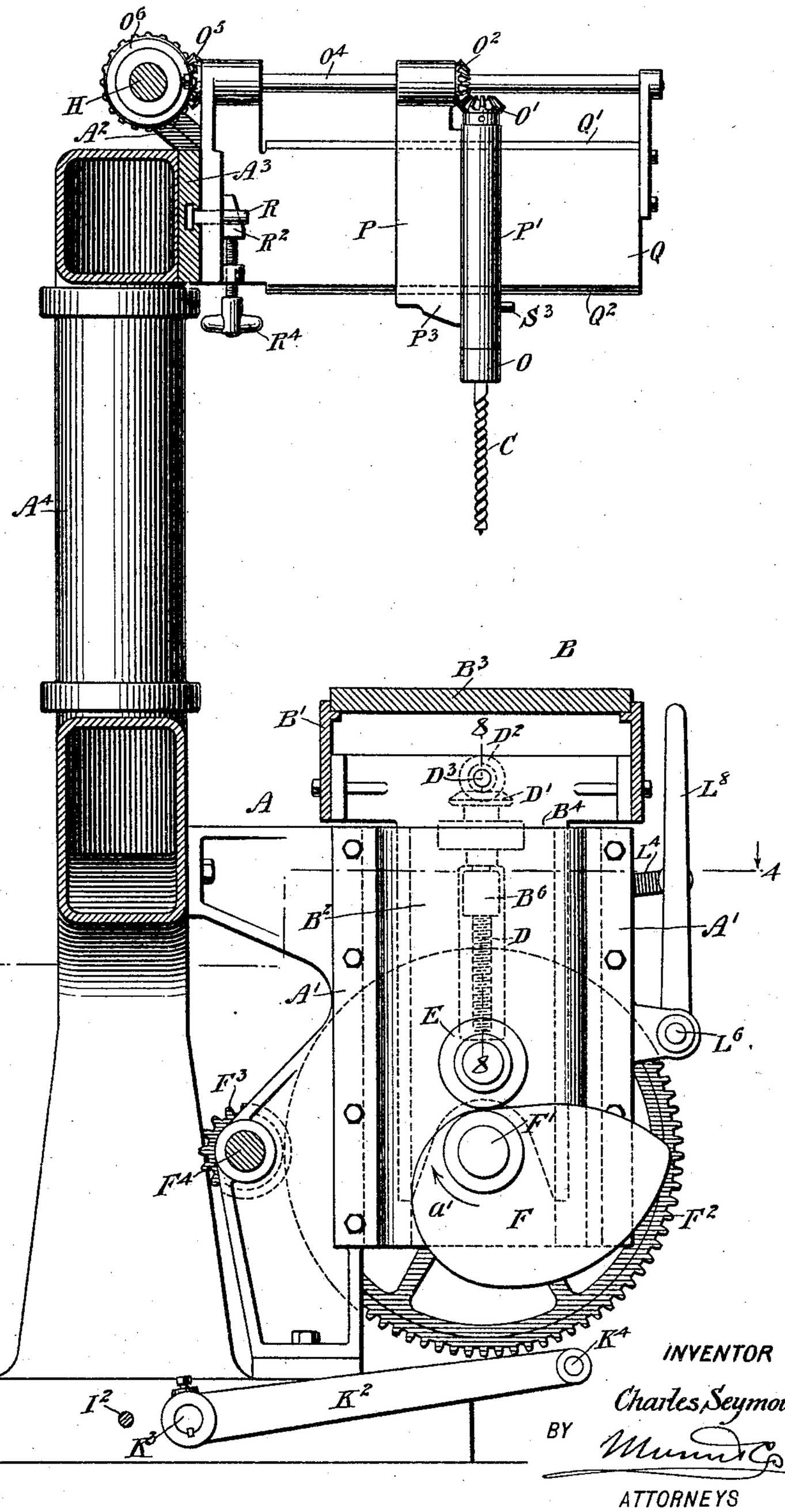
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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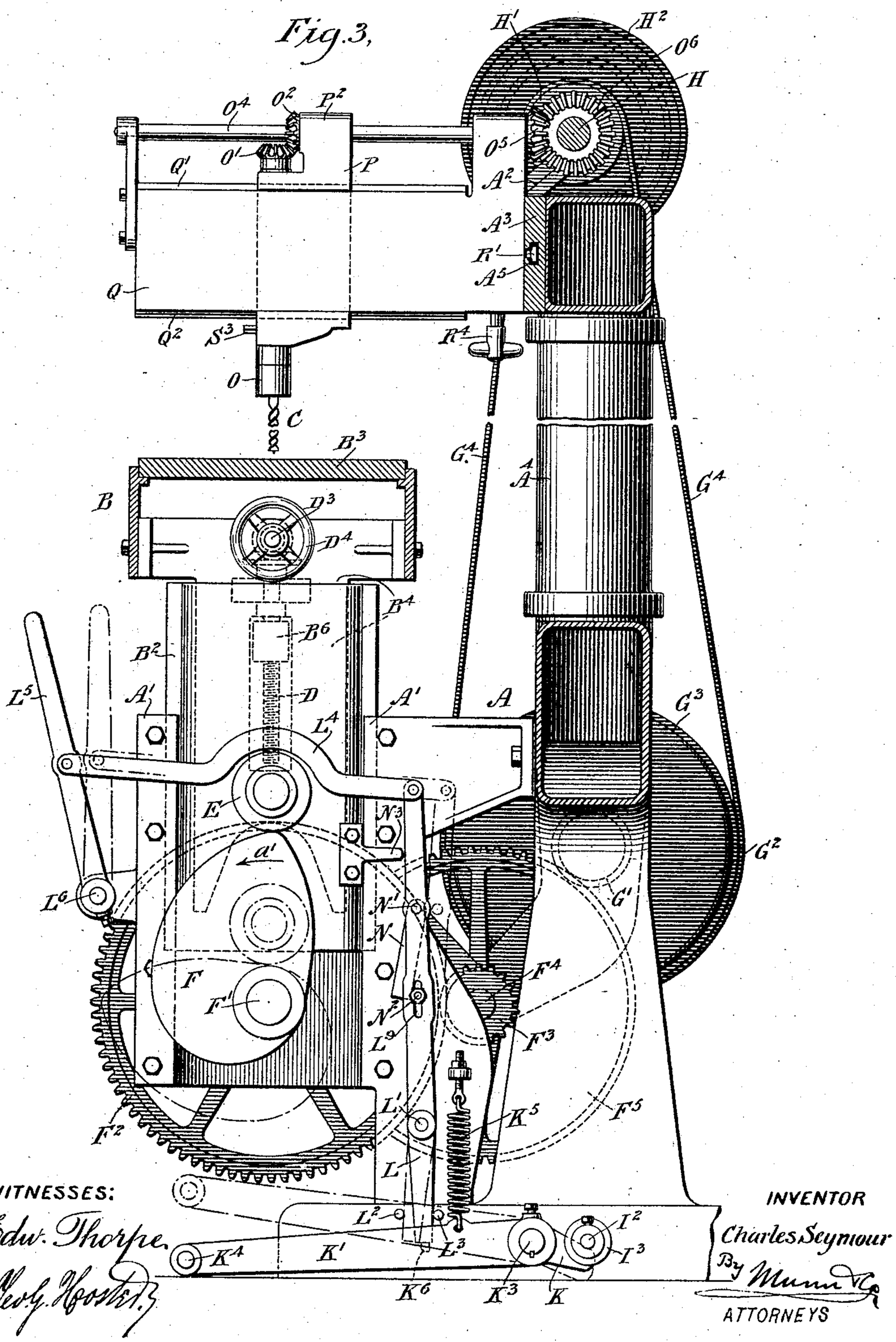
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 5 SHEETS—SHEET 4.

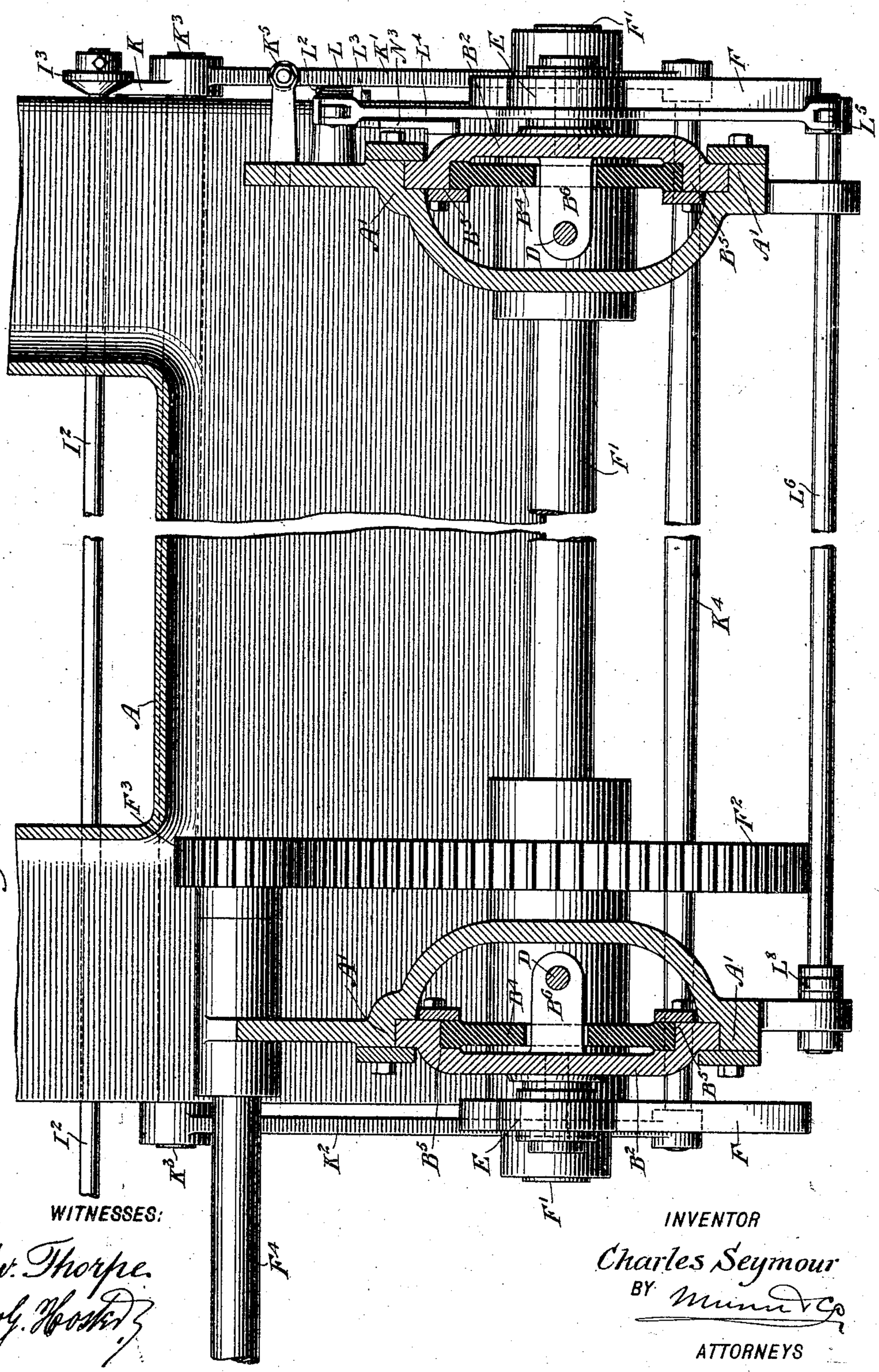

Fig. 4.

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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 5.

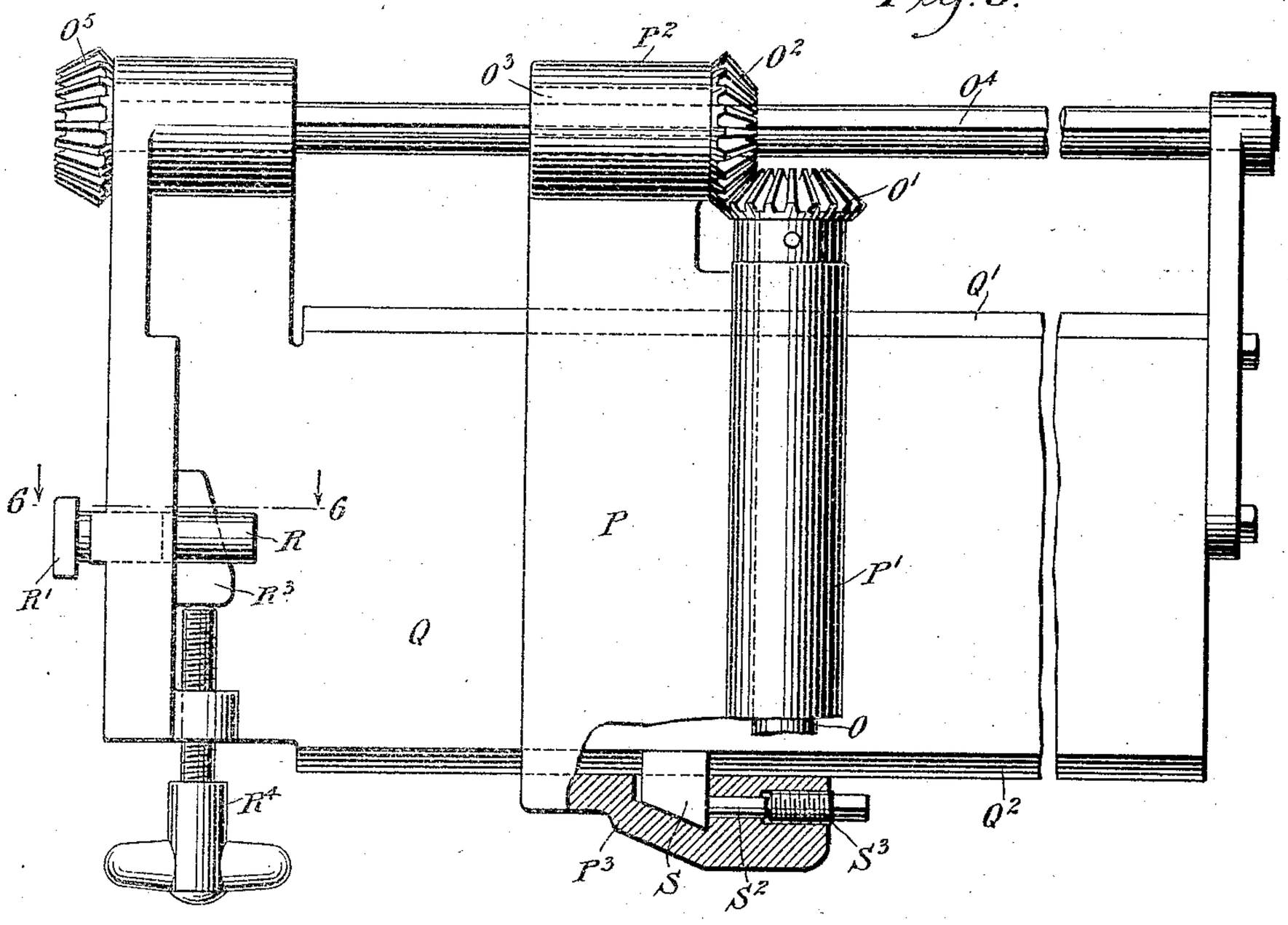


Fig. 6,

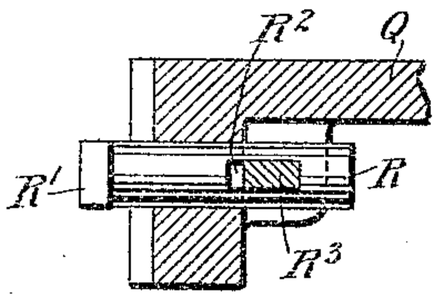


Fig. 7,

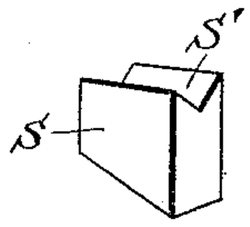
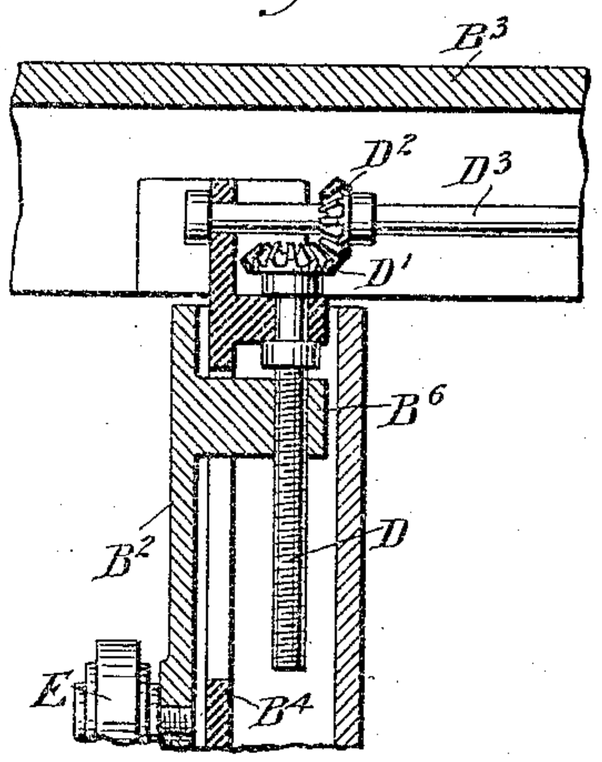


Fig. 8.



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ATTORNEYS

No. 765,601. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

CHARLES SEYMOUR, OF DEFIANCE, OHIO, ASSIGNOR TO THE DEFIANCE MACHINE WORKS, OF DEFIANCE, OHIO.

MULTIPLE-SPINDLE BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,601, dated July 19, 1904.

Application filed January 22, 1904. Serial No. 190,162. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEYMOUR, a citizen of the United States, and a resident of Defiance, in the county of Defiance and State of Ohio, have invented a new and Improved Multiple-Spindle Boring-Machine, of which the following is a full, clear, and exact description.

The invention relates to woodworking machinery; and its object is to provide a new and improved multiple-spindle boring-machine arranged to permit a convenient adjustment of the boring-tools relative to the work, to bore a number of holes simultaneously and in a desired predetermined order, and to allow adjustment of the work-carrying table relative to the boring-tools to bore holes of a desired depth without varying the throw of the work-carrying table.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the improvement, showing the work-carrier in a lowermost position. Fig. 2 is an enlarged transverse section of the same on the line 2 2 in Fig. 1. Fig. 3 is a similar view of the same on the line 3 3 in Fig. 1, showing the work-carrier in a raised position. Fig. 4 is an enlarged sectional plan view of the improvement on the line 4 4 in Fig. 2. Fig. 5 is an enlarged side elevation of the adjustable guideway and the spindle-carrier, part of which is shown in section. Fig. 6 is a sectional plan view of the fastening device for securing the guideway in position on the frame-beam. Fig. 7 is a perspective view of the wedge-block for locking the spindle-carrier in place on its guideway; and Fig. 8 is a sectional front elevation of the adjusting mechanism for the table, the section being on the line 8 8 of Fig. 2.

On a suitably-constructed main frame A is mounted to reciprocate up and down a work-carrier B for moving the piece of wood to be bored first up into engagement with a boring-tool C for the latter to bore the desired holes and then the work moves downward with the work-carrier to move the work away from the boring-tools for the latter to pass out of the bored holes, so as to permit the operator to shift the work for boring another set of holes or for removing the finished work and replacing it by another piece of wood to be bored.

The work-carrier B consists, essentially, of a table B′, held vertically adjustable on slides or cross-heads B^2, mounted to slide in vertical guideways A′, forming part of the main frame A. The table B′ is provided at its top with a removable table-board B^3, made of wood and on which the work rests, and the said table B′ is provided with depending arms B^4, mounted to slide vertically in suitable guideways B^5, arranged on the slides B^2, as plainly illustrated in Fig. 4.

In the arms B^4 are mounted to turn vertically-disposed screw-rods D, screwing in nuts B^6 on the slides B^2, and the upper ends of the said screw-rods D are provided with bevel gear-wheels D′, (see Fig. 2,) in mesh with bevel gear-wheels D^2, secured on a longitudinally-extending shaft D^3, journaled in the table B′ and provided with a hand-wheel D^4, adapted to be taken hold of by the operator to permit the latter to turn the shaft D^3 to impart a simultaneous turning motion to the screw-rods D in either direction, according to the direction in which the hand-wheel D^4 is turned. By turning the hand-wheel D^4 in one direction the screw-rods D cause an upward movement of the table B′ on the slides B^2, and by turning the hand-wheel D^4 in an opposite direction the table B′ is moved downward on the slides B^2. Thus by the arrangement described the table B′ is held vertically adjustable on the slides B^2.

As the slides B^2 have a fixed up-and-down throw, it is evident that the table B′ can be so adjusted to the slides B^2 that the work is fed

a greater or less distance to the boring-tool C to bore holes of more or less depth, as required. It will also be seen that by the arrangement mentioned work of varying heights and resting on the board B^3 may be bored to a desired depth without requiring up-and-down adjustment of the boring-tools C or variation in the up-and-down reciprocating motion of the work-carrier B.

In order to impart an up-and-down reciprocating motion to the slides B^2, and consequently to the work-carrier B, the following device is provided: On each of the slides B^2 are journaled friction-rollers E in peripheral contact with cams F, secured on a shaft F', journaled in suitable bearings on the main frame A. The shaft F' is adapted to turn in the direction of the arrow *a'*, (see Figs. 2 and 3,) and the cams F, secured on the said shaft, are so shaped that a slow upward-feeding motion is given to the work-carrier B while the holes are bored by the boring-tools C, and the cams also allow a quick return movement of the work-carrier after the holes are bored, it being understood that the weight of the work-carrier and the work thereon is sufficient to hold the friction-rollers E in firm contact with the peripheral faces of the cams F for the work-carrier to slide downward by its own weight.

On one end of the cam-shaft F' is secured a gear-wheel F^2, in mesh with a pinion F^3, fastened on a shaft F^4, journaled on the main frame and carrying a gear-wheel F^5, in mesh with a pinion G', secured on a clutch-shaft G, provided with a clutch G^2, adapted to be engaged by a clutch-pulley G^3, connected by a belt G^4 with a pulley H' on the main shaft H, journaled in suitable bearings A^2, attached to a frame-beam A^3, connecting the upper ends of frame-standards A^4 with each other. On the shaft H is secured a cone-pulley H^2, connected by belt with other machinery for imparting a rotary motion to the shaft H. The latter, by the pulley H' and belt G^4, imparts a rotary motion to the clutch-pulley G^3, held loosely on the shaft G, but adapted to be moved by a shifting-lever I into engagement with the clutch G^2, so as to transmit its rotary motion to the clutch G^2 and the shaft G, which, by the pinion G', the gear-wheel F^5, shaft F^4, pinion F^3, and gear-wheel F^2, imparts a rotary motion to the cam-shaft F' for the cams F to act on the friction-rollers E to give the desired up-and-down reciprocating motion to the work-carrier B.

In order to return the clutch-pulley G^3 relative to the clutch G, a shifting device and an actuating device for the shifting device are provided and arranged to allow the operator to move the clutch-pulley G^3 at will in or out of contact with the clutch G^2 or to lock the clutch-pulley in position when in contact with the clutch G^2 for any length of time to insure a continuous reciprocation of the work-carrier B or to throw the clutch-pulley G^3 automatically out of engagement with the clutch G^2 each time the work-carrier B moves into a lowermost position for stopping the work-carrier at this point.

For the purposes described the shifting-lever I is fulcrumed at its upper end at I' on the main frame A, and the lower end of the shifting-lever is pivotally connected with a shifting rod I^2, extending longitudinally and mounted to slide in bearings arranged on the main frame A. On the free end of the shifting rod I^2 (see Figs. 3 and 4) is secured a cone I^3, adapted to be engaged at its bevel side by the free end of an arm K, forming part of a treadle under the control of the foot of the operator. The treadle is provided with side arms K' and K^2, of which the arm K' carries the arm K, and the said arms K' and K^2 are attached to a shaft K^3, journaled in suitable bearings in the rear portion of the main frame A. The front ends of the arms K' and K^2 are connected with each other by a treadle-bar K^4, and to the side arm K' is attached a spring K^5 (see Fig. 3) to normally hold the treadle in an uppermost position. The treadle-bar K^4 is adapted to be engaged by the foot of the operator for swinging the treadle downward, so that the arm K' moves upward and in engagement with the cone I^3 to push the same from the left to the right, thus moving the shifting rod I^2 in the same direction to impart a swinging motion to the shifting-lever I for the latter to move the clutch-pulley G^3 in contact with the clutch G^2. Now when this takes place the rotary motion of the clutch-pulley G^3 is transmitted to the clutch G^2, which by the gearing described rotates the cam-shaft F', so that the cams F impart an up-and-down reciprocating motion to the work-carrier B for the purpose previously described.

The up-and-down reciprocating motion of the work-carrier B continues as long as the operator keeps the treadle-bar K^4 pressed in a lowermost position by the foot; but as soon as the operator releases or removes the foot from the treadle-bar K^4 then the treadle is swung upward by the action of the spring K^5, and consequently the pressure on the clutch-pulley G^3 is released and the latter moves out of frictional engagement with the clutch G^2, and the rotation of the shaft G and cam-shaft F' ceases to stop further reciprocating of the work-carrier B.

From the foregoing it will be seen that by the arrangement described the operator is enabled to move the clutch-pulley G^3 at will in or out of contact with the clutch G^2.

When it is desired to lock the clutch-pulley G^3 in engagement with the clutch G^2 at the time the operator has removed the foot from the treadle-bar K^4, the following device is provided: On the side arm K' of the treadle is secured a pin K^6, (see Fig. 3,) adapted to

be engaged by the lower end of a lever L at the time the treadle is in a lowermost position, so as to hold the treadle against rising, and consequently hold the clutch-pulley G^3 in frictional contact with the clutch G^2. The lever L is fulcrumed at L′ on the main frame, and its swinging motion is limited between stop-pins L^2 and L^3, held on the main frame. The upper end of the lever L is pivotally connected by a link L^4 with a hand-lever L^5, secured on a shaft L^6, extending longitudinally and journaled in suitable bearings on the front of the main frame A, the said shaft L^6 also carrying several other hand-levers L^7 and L^8, as illustrated in Fig. 1, to allow the operator to take hold of either one of the levers L^5, L^7, or L^8 to impart a rocking motion to the shaft L^6. When one of the said levers L^5, L^7, or L^8 is swung forward immediately after the treadle-bar K^4 has been pressed by the operator, then the link L^4 imparts a swinging motion to the lever L, so that the lower end thereof swings over the pin K^6, thus locking the treadle in a lowermost position. When one of the levers L^5, L^7, or L^8 is swung rearwardly, as indicated in dotted lines in Fig. 3, then the lever L is swung out of the path of the pin K^6 to allow the treadle to rise by the action of its spring K^5.

From the foregoing it will be seen that as long as the lever L holds the treadle down the clutch-pulley G^3 remains in engagement with the clutch G^2, and the work-carrier B is continually reciprocated as long as the lever L is in engagement with the pin K^6.

In order to allow of throwing the clutch-pulley G^3 automatically out of engagement with the clutch G^2 at the time the work-carrier B moves into a lowermost position, the following device is provided: On the lever L (see Fig. 3) is pivoted at N′ a cam-arm N, adapted to rest with its lower end on a bolt N^2, held vertically adjustable on the lever L by extending through a slot L^9 in the said lever. The cam-arm N when resting against the bolt N^2 is in the path of a projection N^3, secured to the adjacent slide B^2 of the work-carrier, so that when the several parts are in the position shown in Fig. 2 and the lever L engages the pin K^6 and the work-carrier moves downward into a lowermost position then the projection N^3 engages the cam-arm N and pushes the same rearwardly, thereby imparting a swinging motion to the lever L to move the lower end thereof out of engagement with the pin K^6, so that the treadle is unlocked and immediately returns to an uppermost position by the action of its spring K^5. When the treadle moves into this position, the clutch-pulley G^3 is released of pressure, and consequently moves out of contact with the clutch G^2, and reciprocation of the work-carrier B ceases at the time the work-carrier moves into a lowermost position.

When it is not desired to stop the reciprocation of the work-carrier B automatically, as just described, then it is only necessary for the operator to loosen the bolt N^2 and slide the same downward in the slot L^9, so as to move out of engagement with the free end of the cam-arm N, and as the latter now swings by its own weight into a vertical position on the lever L it is out of the path of the projection N^3, and consequently the latter does not affect the cam-arm N on the lever L at the time the work-carrier B moves into a lowermost position.

The boring-spindle O for each boring-tool C is journaled in a suitable bearing P′, held or formed on a spindle-carrier P, mounted to slide transversly on bearings Q′ and Q^2, arranged on the top and botton of a guideway Q, projecting forwardly from the front face of the frame-beam A^3 and held longitudinally adjustable on the said beam, as hereinafter more fully explained. The several spindles O and their tools C are driven in unison from the main shaft H and for this purpose the upper end of each spindle O is provided with a bevel gear-wheel O′, in mesh with the bevel gear-wheel O^2, having its hub O^3 mounted to turn in a bearing P^2, formed on the spindle-carrier P. The hub of the bevel gear-wheel O^2 is mounted to slide on and to turn with a transversely-extending shaft O^4, journaled in suitable bearings arranged on the guideway Q, and the rear end of the said shaft O^4 is provided with a bevel gear-wheel O^5, in mesh with a bevel gear-wheel O^6, adjustably secured on the main shaft H. When the latter is rotated, the several gear-wheels O^6 rotate the bever gear-wheels O^5, and consequently the transverse shafts O^4, which by the bevel gear-wheel O^2 and the bevel gear-wheel O′ rotate the spindles O and the boring-tools C.

In order to adjustably secure each guideway Q in position on the frame-beam A^3, the latter is provided on its front face with a longitudinally-extending dovetail groove A^5, engaged by the head R′ of a pin R, held to slide transversely in the corresponding guideway Q, as plainly indicated in Figs. 2 and 5, and the said pin R is provided with an elongated slot R^2, into which projects a wedge-shaped key R^3, resting on the guideway Q and pressed on at its base end by a screw-rod R^4, screwing in the guideway Q and under the control of the operator. By unscrewing the screw-rod R^4 the key R^3 can be loosened in the pin R to loosen the latter, so as to permit of shifting the guideway Q longitudinally on the frame-beam A^3 until the desired position is reached, and then the operator screws up the screw-rod R^4 to cause the key R^3 to pull the pin R forwardly for the head R′ to securely clamp the guideway Q to the front face of the frame-beam A^3.

By the arrangement described the guideways Q can be readily adjusted in a longitu-

dinal direction to bring the same into a desired position, according to the location of the holes to be bored in the work.

A transverse adjustment of the boring-tool C is had by shifting the spindle-carriers P transversely on the guideways Q until each boring-tool C is in the proper transverse position relative to the hole to be bored.

In order to securely fasten each spindle-carrier P in position after the desired adjustment is made, a wedge S is provided, fitted to slide on an inclined bearing P^3, formed on the bottom of the spindle-carrier B, as plainly illustrated in Fig. 5. The top of the wedge S is provided with a V-shaped groove S′, fitting the correspondingly-shaped bottom bearing Q^2 of the guideway Q, and the front end of the wedge S is engaged by a pin S^2, adapted to be moved alternately by a screw-rod S^3, screwing in the front lower portion of the spindle-carrier P. By screwing up the screw-rod S^3 after the spindle-carrier P has moved to the desired position on the guideway Q the pin S^2 forces the wedge S rearwardly up the incline P^3, thus causing the wedge S to bind the guideway Q to securely lock the spindle-carrier P in position on the guideway. By unscrewing the screw-rod S^3 the wedge S is released from its binding action to allow of shifting the spindle-carrier P laterally whenever it is desired to do so.

It is understood that although but one spindle-carrier P is shown as mounted on one guideway Q it is evident that two or more such spindle-carriers may be mounted on one guideway and geared with the shaft O^4 to allow of drilling two or more holes simultaneously and in transverse alinement with each other.

The operation is as follows: When the several guideways Q and the spindle-carriers P have been adjusted to bring the boring-tools C in the desired position, according to the holes to be bored in the work, and the work-carrier B is in a lowermost position, then the work is placed on the table-board B^3 and, if desired, fastened thereto by suitable clamping means or the like, and then the operator presses the treadle-bar K^4, so that the clutch-pulley G^3 is thrown into engagement with the clutch G^2 to set the actuating mechanism for the work-carrier B into motion to move the work-carrier upwardly, thereby feeding the work to the rotating boring-tool C. The upward throw of the work-carrier B is uniform; but, as previously explained, the table B′ is adjusted relative to the slides B^2, so that the holes bored by the spindle C are of a desired depth, which depth can be varied by adjusting the table B′ up or down on the slides B^2. After the holes are bored the work-carrier moves downward, and in case it is desired to automatically stop the carrier at the time it reaches its lowermost position then use is made of the cam-arm N, resting against the bolt N^2, so that the descending projection N^3 unlocks the treadle by imparting a swinging motion to the lever L, as previously explained. In order to restart the machine after the work has been changed for boring a new set of holes, the operator again presses the treadle-bar K^4 for starting the work-carrier B on its second upstroke.

When it is desired to run the work-carrier B continually up and down, the cam-arm N is set out of action, as before explained, and the treadle is locked in a lowermost position by the locking-lever L engaging the pin K^6. In this case the work is changed by the operator during the time the work-carrier B moves into its lowermost position and after the lower ends of the boring-tool C are out of the drilled holes, it being understood that ordinarily sufficient time is had by the operator for making the desired change of the work previous to the work-carrier B starting on its upward stroke.

If it is desired for any reason whatever to stop the reciprocating of the work-carrier B, the operator can throw one of the levers L^5, L^7, or L^8 into a rearward position to unlock the treadle for shifting the clutch-pulley G^3 out of frictional contact with the clutch G^2 to stop the actuating mechanism for the work-carrier.

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

1. A boring-machine having a work-carrier, consisting of reciprocating slides, a table connecting the slides with each other and held adjustable thereon in the direction of the movement of the slides, a shaft mounted to turn on the said table, screw-rods geared with the said shaft and mounted to turn on the table, and nuts fixed on the slides and in which screw the said screw-rods, as set forth.

2. A boring-machine provided with a work-carrier mounted to slide, an operating mechanism for the said work-carrier, a driving device for the said operating mechanism, provided with a driven clutch-pulley, a manually-controlled shifting device for the said clutch-pulley, and a manually-controlled locking device for the said shifting device, as set forth.

3. A boring-machine provided with a work-carrier, mounted to slide, an operating mechanism for the said work-carrier, a driving device for the said operating mechanism, provided with a driven clutch-pulley, a manually-controlled shifting device for the said clutch-pulley, a locking device for the said shifting device, and means on the said work-carrier, for automatically actuating the locking device, to unlock the said shifting device, as set forth.

4. A boring-machine provided with a work-carrier mounted to slide, an operating mechanism for the said work-carrier, a driving device for the said operating mechanism, provided with a driven clutch-pulley, a manually-

controlled shifting device for the said clutch-pulley, provided with a foot-lever having a pin, a lever adapted to engage the said pin, and a cam-arm on the said lever, adapted to be engaged by a projection on the said work-carrier, as set forth.

5. A boring-machine provided with a work-carrier mounted to reciprocate, an operating mechanism for the work-carrier, a driving device for the said operating mechanism, and a shifting device for the said device, automatically controlled from the said work-carrier, to automatically stop the operating mechanism at the time the work-carrier moves into a lowermost position, as set forth.

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

CHARLES SEYMOUR.

Witnesses:

GEORGE W. DEATRICK,

JOS. BAUER.