No. 675,107. Patented May 28, 1901.

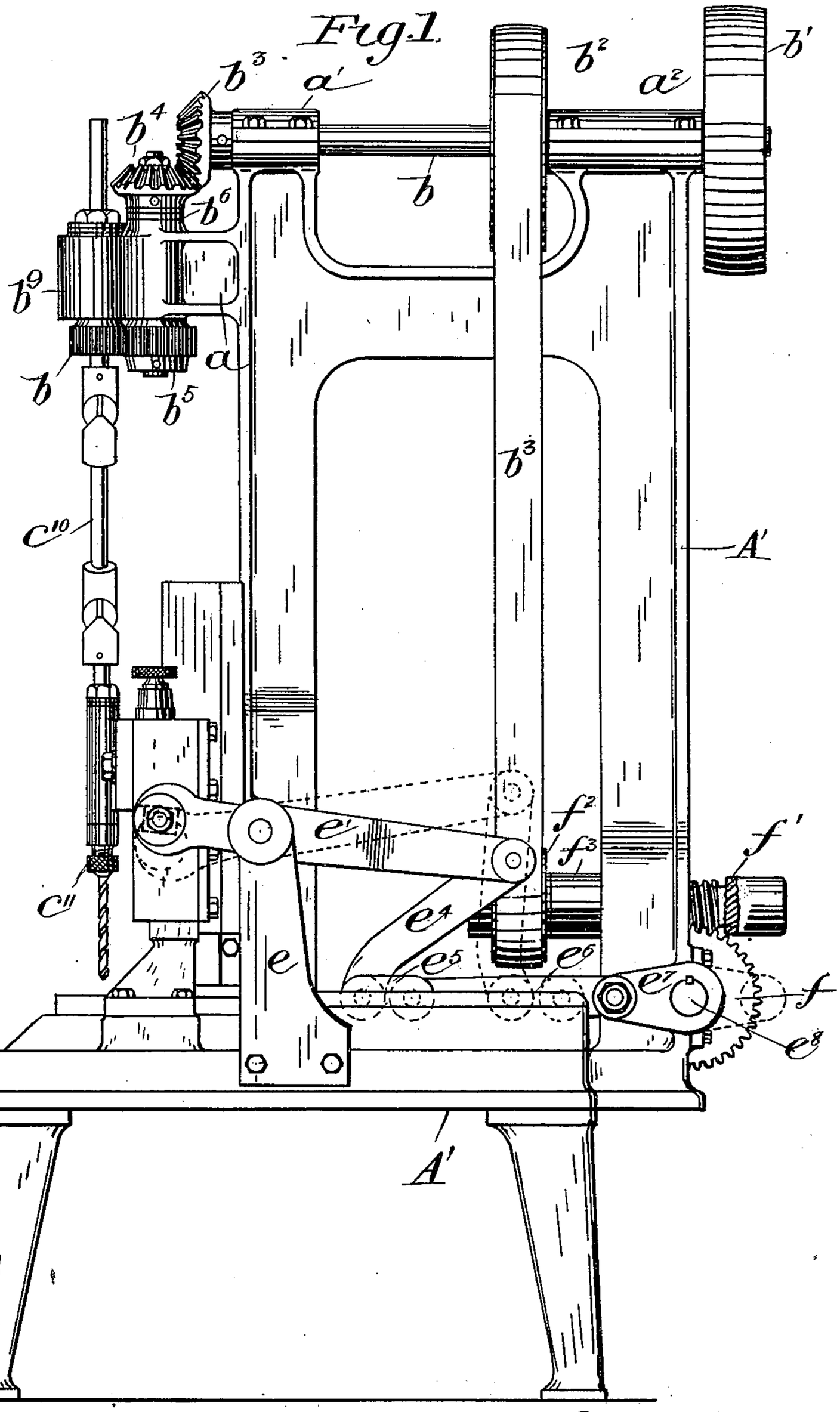
G. W. PACKER.

DRILLING OR BORING MACHINE.

(Application filed Sept. 1, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses
D. G. Edelin.
J. E. Hutchinson.

Inventor
Geo. W. Packer
By Pennie & Goldsborough attys

No. 675,107. Patented May 28, 1901.

G. W. PACKER.

DRILLING OR BORING MACHINE.

(Application filed Sept. 1, 1900.)

(No Model.) 3 Sheets—Sheet 2.

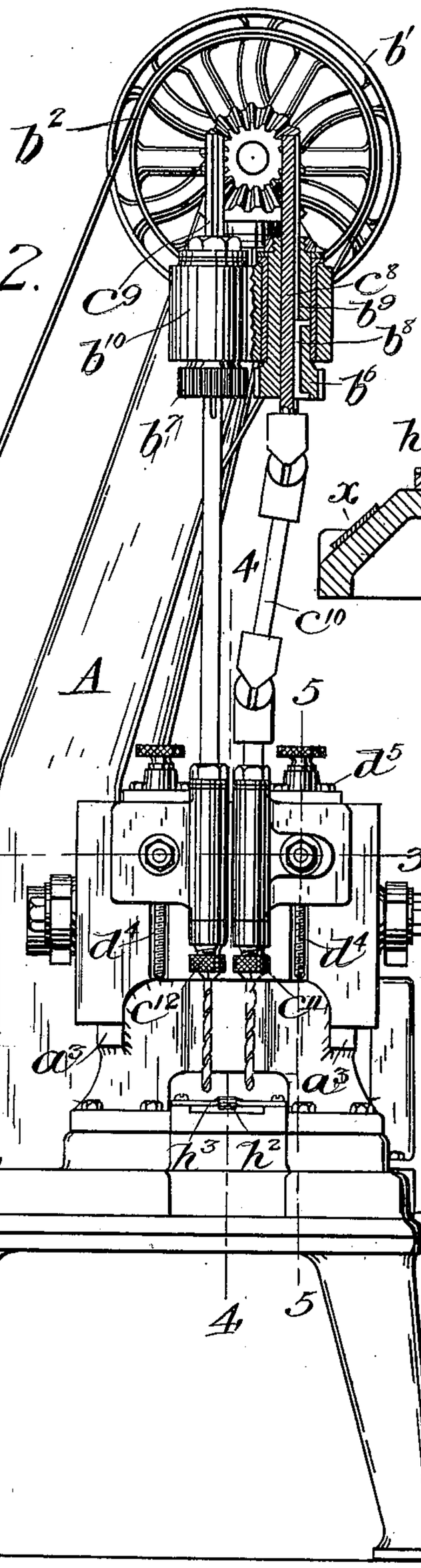


Fig. 2.

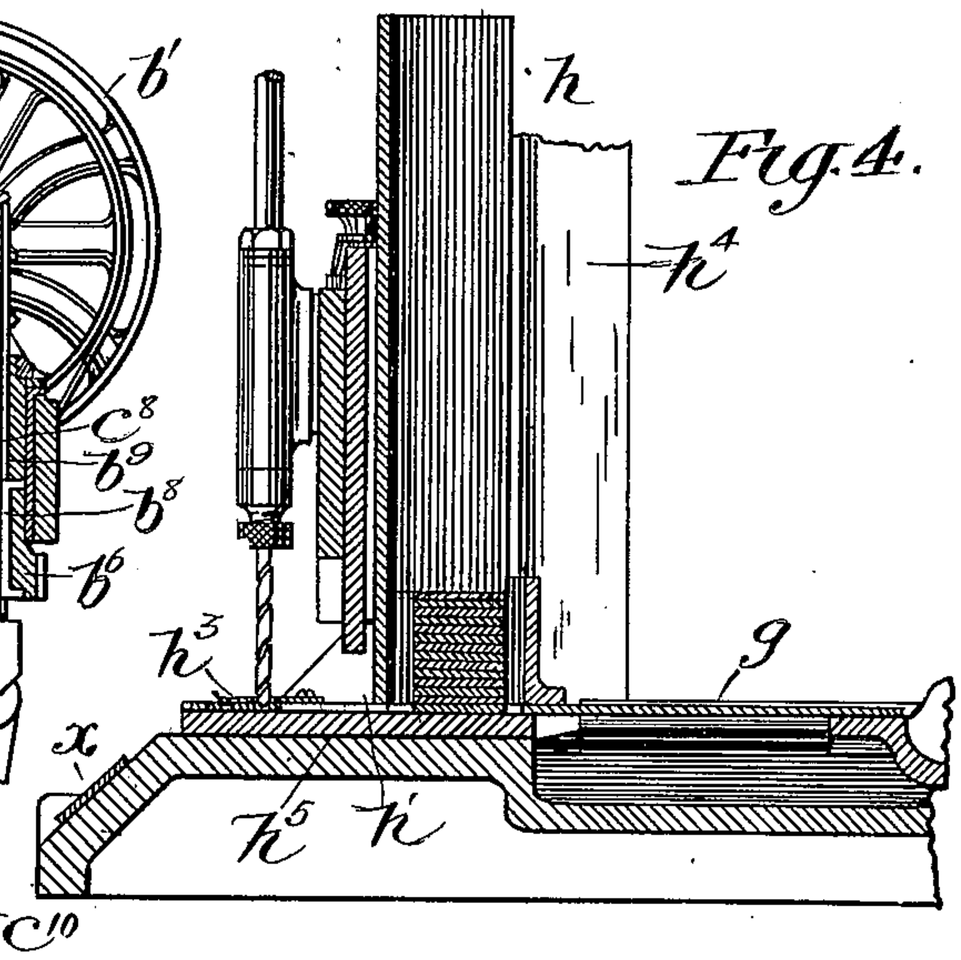


Fig. 4.

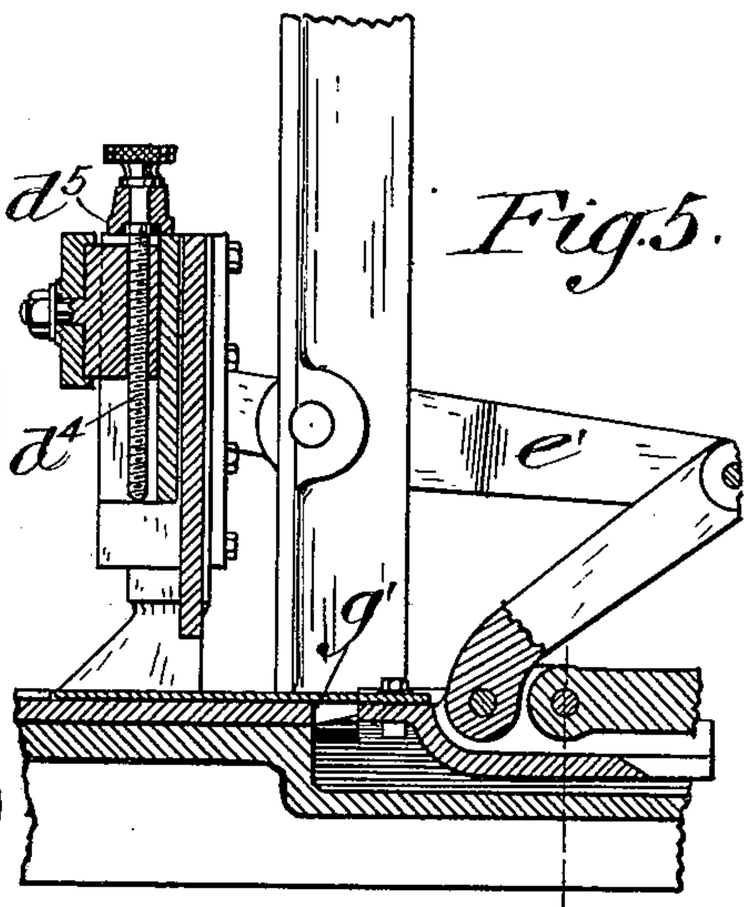


Fig. 5.

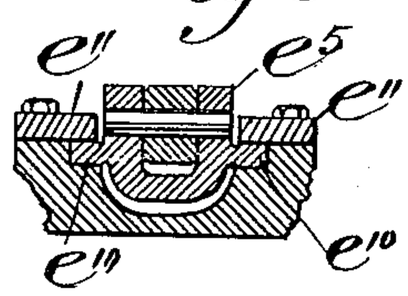


Fig. 9.

Witnesses
D. W. Edelin.
J. E. Hutchinson Jr.

Inventor
Geo. W. Packer
By Bruce & Goldsborough
Attys.

No. 675,107. Patented May 28, 1901.

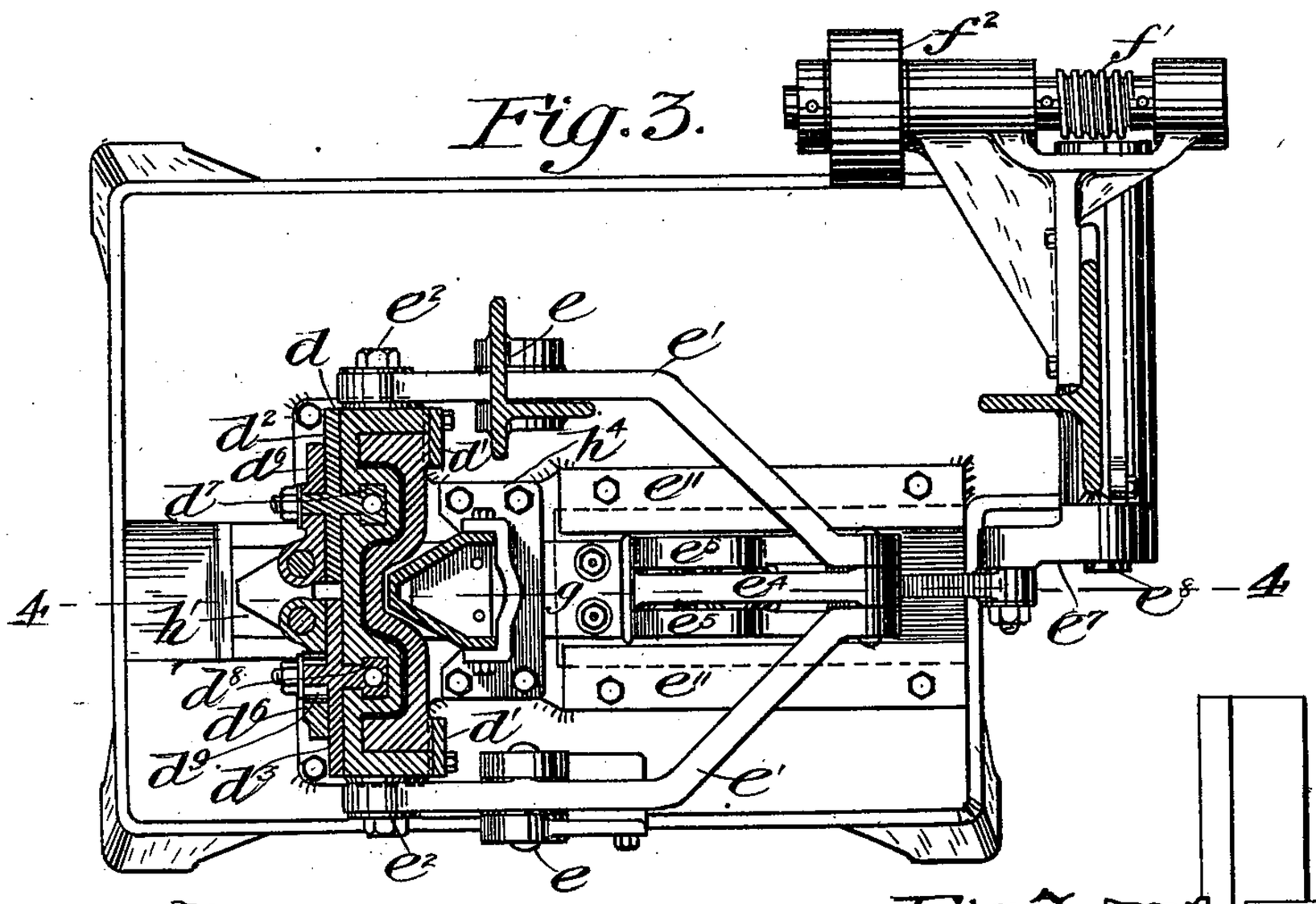
G. W. PACKER.

DRILLING OR BORING MACHINE.

(Application filed Sept. 1, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.



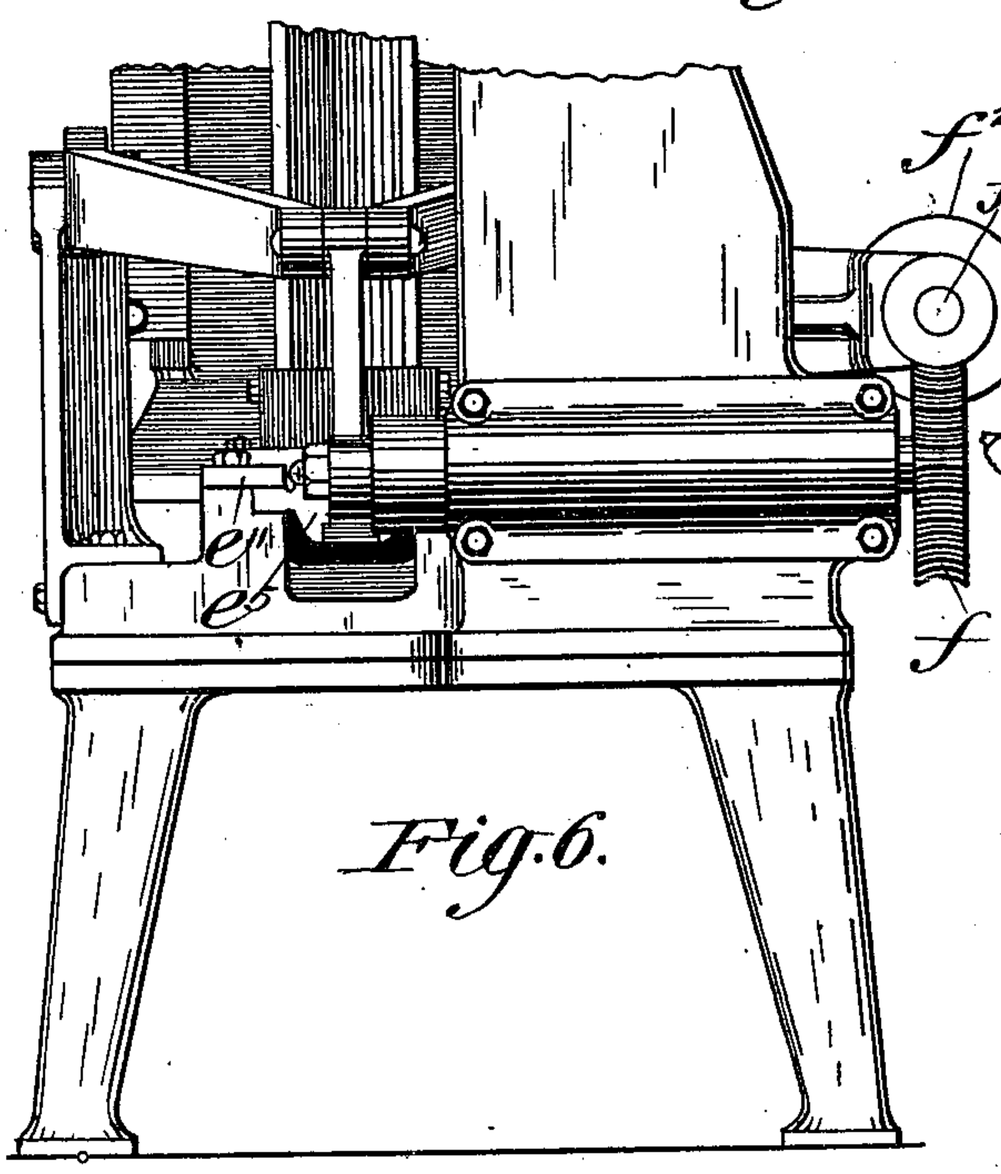


Fig. 6.

Fig. 7.

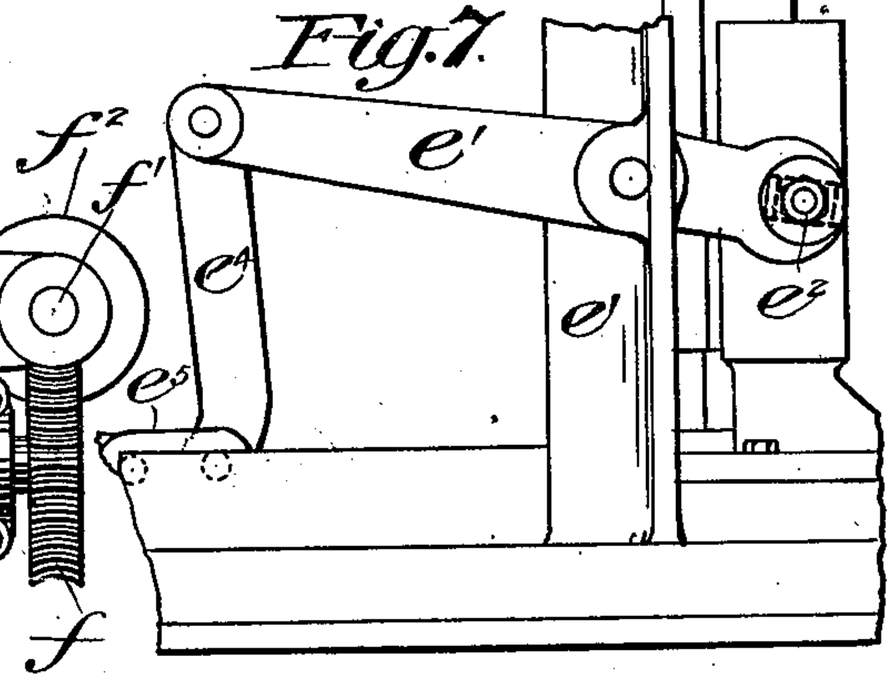
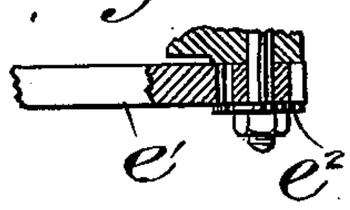


Fig. 8.



Witnesses
D. W. Edelin.
J. E. Hutchinson Jr.

Inventor
Geo. W. Packer
By Bowie & Goldsborough
Attys

UNITED STATES PATENT OFFICE.

GEORGE W. PACKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE DEERING HARVESTER COMPANY, OF SAME PLACE.

DRILLING OR BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,107, dated May 28, 1901.

Application filed September 1, 1900. Serial No. 28,845. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. PACKER, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Drilling or Boring Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to automatic boring-machines, and particularly to that class of machines where a gang of vertical boring-spindles are advanced and retracted from the work, which is automatically fed from a hopper or receptacle into position to be operated upon during the retractile movement of the boring-tools.

While the machine in its broad embodiment is capable of general application as a multiple drilling or boring device designed to operate, as indicated, upon metal sections or blanks of any character, in the form illustrated it is designed particularly for automatically feeding and counterboring the knives or cutter-sections of harvester or mower sickles.

Heretofore it has been the practice to countersink the punched rivet-holes of the knives by operating upon said holes separately in an ordinary type of boring-machine, the knife-sections being fed to the machine manually.

It is characteristic of this invention that the sections to be operated upon are placed in a receptacle and are automatically fed forward from the bottom of the receptacle into proper position under two drill-holding spindles, which are so mounted and driven as to permit them to work sufficiently close together to insure proper registry with the punched holes in the knife-sections.

The invention also provides for independent adjustment of the drill-spindles, so that they may be moved longitudinally to compensate for drills of different lengths or sections of varying thickness and corresponding depths of the counterbores.

The invention is illustrated in the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a vertical side elevation of the boring-machine. Fig. 2 is a front elevation with part in section, showing the manner of mounting the spindles to secure close relation of the boring-tools. Fig. 3 is a horizontal cross-section of the machine, taken on the line 3 3 of Fig. 2. Fig. 4 is a partial vertical section on the line 4 4 of Fig. 2, showing the relation of the receptacle containing the knife-sections and the feeding-slide with the boring-tools. Fig. 5 is a vertical section on the line 5 5 of Fig. 2, showing the adjusting means for the spindles. Fig. 6 is a partial rear elevation showing the actuating means for the feeding mechanism. Fig. 7 is a detail view showing the connection between the spindle-carriage and the actuating-levers therefor. Fig. 8 is a cross-sectional detail view of the pivotal connection between the lever and the slide, and Fig. 9 is a sectional detail view of the cross-head connecting the feeding-slide and the actuating-lever.

Referring to the drawings, A represents the supporting-frame of the machine, comprising a base or table portion A′ and a generally rectangular frame A″. Journaled in the top of the frame A″ is a power-shaft b, provided with a belt-pulley b' at one end and a bevel-gear b^3 at the opposite end. A bracket-piece a, cast integrally with the frame-piece b^2 and in juxtaposition to the main shaft, is provided with bearings for the bit-spindles and a counter-shaft for connecting the same with the main shaft. This connecting mechanism is characterized by a vertical counter-shaft provided with a bevel-gear b^4, meshing with the bevel-gear b^3 upon the shaft b, and a pinion b^5, adapted to simultaneously actuate the bit-spindle pinions b^6 and b^7. Said pinions b^6 and b^7 form part of two stub-shafts b^9 and b^{10}, which are journaled in the bearings above named and are cast with a throughway to accommodate the bit-spindles and permit them to reciprocate, as in machines of this type. Rotation of the bit-spindles with the driving-gears b^6 and b^7 is secured by means of splines b^8 of ordinary construction.

In operating upon blanks of the character designated where the counterbore or the drill-holes are necessarily close together provision must be made for bringing the bits

into proper relation to register with the holes. In my machine this is accomplished by providing one of the bit-spindles with a tumbler-shaft c^{10} intermediate its upper portion, engaging the driving-pinion, and its lower portion, which is secured to the carriage. By this means lateral adjustment of the bits with respect to each other is possible.

Heretofore it has been the general practice to mount a gang of drills upon a common carriage, which is reciprocated or fed toward the work by means of a rotating screw-shaft engaging with the carriage. A feed mechanism of this character is objectionable in automatic machines of the character shown in my invention because the bits would be advanced at a constant speed and a sudden check and reversal of the motion when the counterbore is finished would be likely to produce objectionable burs in the hole. In my machine this objection is obviated by a reciprocating means connected with the carriage which insures a gradual retardation of the bits as they approach the end of their reciprocation. This is accomplished by the following means: Securely bolted to the frame of the machine is a bracket-piece provided with guideways a^3, upon which is mounted a carriage d, embracing the bracket-piece and secured thereon by overlapping strips d', which are bolted to the carriage. Pivotally mounted in brackets e, which are bolted to the base of the machine, are two rocking levers e', secured at their outer ends by means of a suitable pin-and-yoke connection, as illustrated, to the spindle-carriage. These levers are connected at their inner ends by means of a link e^4, pinned thereto, with the reciprocating cross-head e^5, sliding in suitable guideways e^{10} in the main frame of the machine. Motion is imparted to said cross-head and correspondingly to the rocking levers by means of a crank-shaft e^8, journaled in the lower frame of the machine and having thereon a crank e^7, which crank is operatively connected with the cross-head by a link or connecting-rod e^6. On the opposite end of the crank-shaft is secured a worm-wheel f, engaged by a worm f' upon a suitable countershaft f^3, properly journaled on the frame and having on its opposite end a pulley f^2, which is connected by a belt with a suitable drive-pulley b^2 upon the main shaft b.

The means for automatically feeding the blanks to the bits comprise a vertical receptacle or hopper h, which is secured to the base of the machine by a suitable bracket-piece h^4 in juxtaposition to the bit-spindles. The bottom of said hopper is open and offers an outlet for a single blank into a guideway h', in which slides a suitable feeder-plate g, which is securely bolted to the cross-head e^5, above referred to. Spanning the guideway h and in a suitable position under the bits is a templet h^3, provided with a projecting spring-lip h^2. The function of this templet is to properly center the bits and secure the blanks in proper position while they are being operated upon.

In a machine of this character it is found necessary to adjust the position of the bits with respect to each other and the work to be operated upon, and to permit this adjustment the bit-spindles are mounted in bracket-journals d^6, which are secured upon integral screw-studs projecting from face-plates d^2 and d^3. Either one or both of said journal-brackets may be provided with an elongated slot d^9 to permit of lateral adjustment of said brackets. Projecting inwardly from the face-plates d^2 and d^3 are dovetailed or tenon-shaped ribs d^7 and d^8, which engage corresponding grooves formed in the body of the carriage. Suitably swiveled on the top of the carriage by means of a cap-plate d^5 are two adjusting-screws d^4, engaging the respective ribs d^7 and d^8, which are provided with suitable internally-threaded counterbores to receive the adjusting-screws. By this arrangement the plates may be adjusted vertically with respect to each other or to accommodate different thicknesses of the metal to be operated upon.

The operation of the machine is as follows: The hopper g is first filled with the blanks to be operated upon (in this case the cutter-sections or knives of harvester-sickles, which have already been provided with punched rivet-holes) and the machine started by connecting up the power source through the pulley b'. The lowermost blank in the hopper rests in the guideway h'. The first forward stroke of the cross-head e^5, which is actuated through the crank-shaft and its connecting mechanism, advances the feeder-plate g', which engages the lowest blank-section and moves it forward to a position under the templet h^3, where it is securely held by the spring-lip of the templet as the feeder-plate is retracted. Upon the reverse stroke of the crank e^7 the rock-shaft e' is actuated through the link e^4, connected with the cross-head, to advance the spindle-carriage in such position that the bits passing through the templet h^3 engage the blank beneath and the said bits being rotated at a constant speed through the gearing mechanism will quickly and effectively counterbore the rivet-holes. As the carriage approaches the end of its stroke the movement of the lever is gradually retarded and the advance of the drills into the metal checked, thereby preventing burring. The reverse movement of the carriage is simultaneous with the advance of the feeder-plate to operate upon the second blank, which is then pushed forward, displacing the first blank, which has been properly counterbored and which then slides from the machine into a receptacle provided therefor, as indicated at x in Fig. 4. Thus it will be seen that the operation of the machine is entirely automatic, comprising, as it does, a continuous rotation of a gang of spindles at a uni-

form speed and the alternate and gradually-retarded advance of the spindle-carriage and the feed mechanism to operate upon the individual blanks. The work of the machine is smooth and efficient and requires little or no supervision when it is started.

While I have illustrated the principles of my invention as applied to a counterboring-machine employing a series or gang of bits, it must be distinctly understood that the mechanism shown is not limited to such application, but is capable of being applied in part or in whole to drilling or boring machines broadly.

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

1. In a machine for drilling, boring and the like, a supporting-frame, a rotary bit-spindle or series of spindles a reciprocating carriage on which said spindles are adjustably mounted, a blank-retaining hopper, means coöperating with said hopper for feeding the blanks, and automatic means having a gradually-retarded movement for reciprocating the spindle or spindles, and the feeding means.

2. In a machine for drilling, boring, and the like, a supporting-frame, a rotary bit-spindle or series of spindles, a blank-retaining hopper in juxtaposition thereto, means coöperating with said hopper for feeding the blanks, a reciprocating carriage on which said spindles are adjustably mounted, means for rotating said spindles, and automatic means for successively advancing said carriage and said feeding means with a gradually-retarded movement.

3. In an automatic machine for drilling, boring and the like, a supporting-frame, a rotary bit-spindle or series of spindles, a reciprocating carriage, means for adjustably mounting said spindles on said carriage, a blank-retaining hopper on said frame, a reciprocating blank-feeding device coöperating with said hopper, and means for actuating said carriage and said feeding device, whereby they are alternately advanced with a gradually-retarded movement to operate upon the blanks.

4. In a machine for drilling, boring, and the like, a supporting-frame, a reciprocating carriage mounted on said frame, rotary bit-spindles adjustably supported on said carriage, means for rotating said spindles, rocking levers pivoted to said frame, and attached to said carriage, a blank-retaining hopper, a reciprocating feeder-plate coöperating with said hopper, and actuating means connected to said levers and said feeder-plate, whereby the feeder and the bit-spindles are alternately advanced to operate upon the blanks.

5. In a machine for drilling, boring, and the like, a supporting-frame, a reciprocating carriage and guides therefor mounted on said frame, rotary bit-spindles adjustably mounted on said carriage, means for rotating said spindles, rocking levers pivoted on said frame and attached to said carriage, a blank-retaining hopper, a reciprocating feeder-plate coöperating with said hopper, a channeled guide-plate under said hopper in which said feeder-plate works, means on said guide-plate to hold the blank in position under the bits, and means coöperating with said rocking lever and said feeder-plate, whereby the feeder and the bits are alternately advanced to operate upon the blanks.

6. In a machine for drilling, boring, and the like, a supporting-frame, a vertical guide on said frame, a reciprocating carriage coöperating with said guide, rotary bit-spindles independently adjustable on said carriage, gears rotatably and slidably connected to said spindles, a main shaft journaled on said frame, gearing connecting said shaft and said spindle-actuating means, a blank-retaining hopper, means coöperating therewith for feeding the blanks, means for reciprocating the drill-carriage and the blank-feeding means, and means driven from the main shaft for actuating said reciprocating means.

7. In a machine for drilling, boring, and the like, a supporting-frame, a vertical guide on said frame, a reciprocating carriage coöperating with said guide, rotary bit-spindles independently adjustable on said carriage, gears rotatably and slidably connected to said spindles, a main shaft journaled on said frame, gearing connecting said shaft and said spindle-actuating gears, a blank-retaining hopper, means coöperating therewith for feeding the blanks, a cross-head guided in the frame to which the feeding means is attached, a crank-shaft operatively connected to the main shaft, and links connecting said cross-head with the crank and the carriage respectively.

8. In a machine for drilling, boring, and the like, a supporting-frame, a vertical guide on said frame, a reciprocating carriage coöperating with said guide, rotary bit-spindles independently adjustable on said carriage, gears rotatably and slidably connected to said spindles, a main shaft journaled on said frame, gearing connecting said shaft and said spindle-actuating gears, a blank-retaining hopper, means coöperating therewith for feeding the blanks, a cross-head guided in the frame to which the feeding means is attached, a crank-shaft and a counter-shaft journaled on the frame, worm-gearing connecting the crank-shaft and the counter-shaft, connecting means between the main shaft and the counter-shaft, and link connections between the cross-head and the crank and the cross-head and the carriage-reciprocating means, respectively.

9. In a drilling or boring machine, a spindle-carriage and means for adjusting the spindle on the carriage comprising a slidable face-plate, a spindle-bracket, on said face-plate, and internally-threaded studs on the rear of said face-plate engaging a corresponding guide-slot in the carriage, and an adjusting-

screw swiveled on said carriage and engaging said stud on the face-plate.

10. In a drilling or boring machine, a spindle-carriage, adapted to slide, a guide-frame therefor, means for operating said carriage comprising rock-levers connected to said carriage and pivoted adjacent thereto, a reciprocating cross-head connected to the power mechanism, and a link connecting said rocking lever and said cross-head.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. PACKER.

Witnesses:

ARTHUR JOHNSON,

ALFRED G. FOSTER.