(No Model.)

3 Sheets—Sheet 1.

H. C. SCHULZ.

BORING MACHINE.

No. 528,307. Patented Oct. 30, 1894.

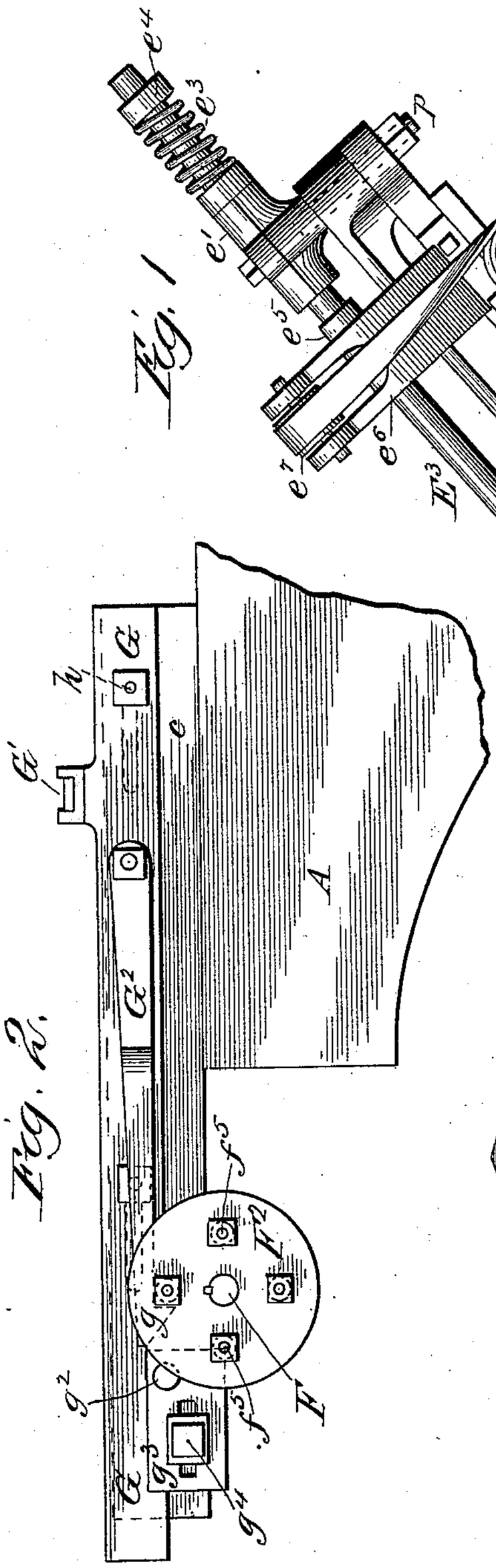

Fig. 2.

Fig. 1.

Fig. 7.

Witnesses
Louis W. Holcklead.
Fredk. H. Miles

Inventor
Herman C. Schultz.
By Dayton, Poole & Brown
Attys

(No Model.)

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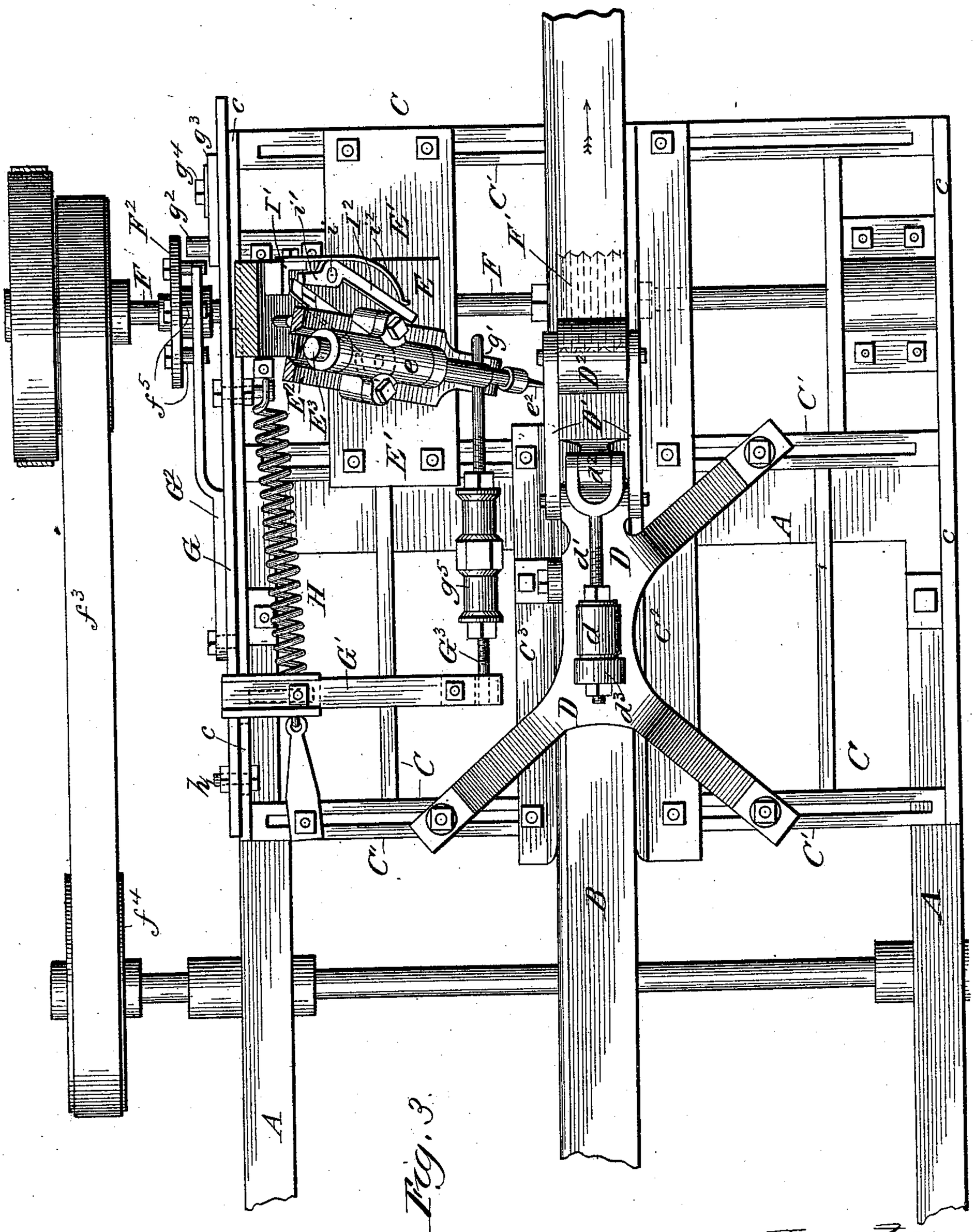

Fig. 3.

Witnesses.
Louis A. Holcklead.
Fred'k. N. Miles.

Inventor:-
Herman C. Schultz.
By Dayton, Poole & Brown
Attys

(No Model.)

3 Sheets—Sheet 3.

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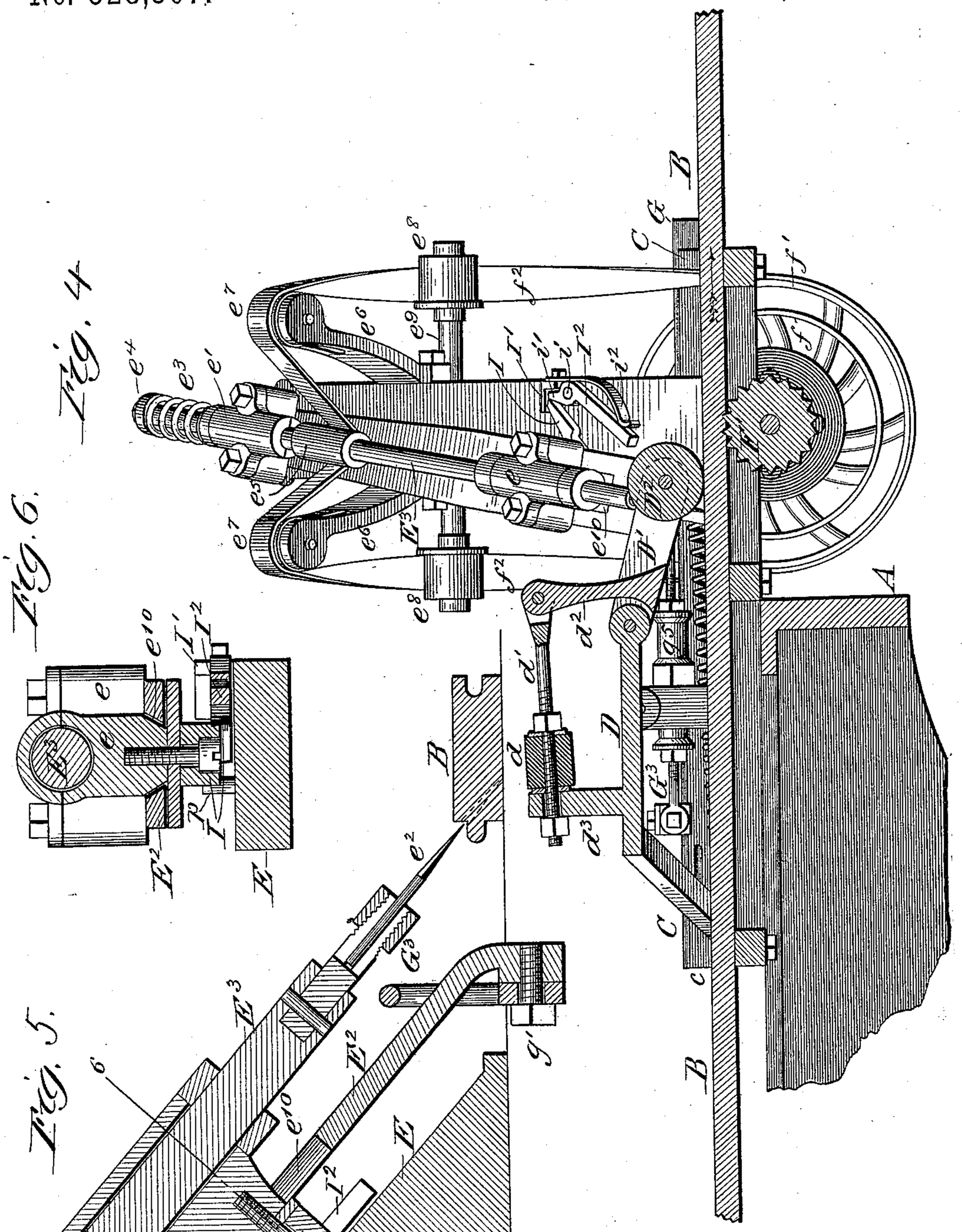

UNITED STATES PATENT OFFICE.

HERMAN C. SCHULZ, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LUMBER DISTRICT MILL COMPANY, OF SAME PLACE.

BORING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,307, dated October 30, 1894.

Application filed October 24, 1891. Serial No. 409,652. (No model.)

To all whom it may concern:

Be it known that I, HERMAN C. SCHULZ, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Boring-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to machines of the class more commonly employed for boring hard wood flooring, and it has for a primary object to provide a construction by which the boring may be performed while the board is in lengthwise motion.

The invention may therefore be applied to a tonguer and groover, and, when so applied, the several operations of planing and boring, or of planing, tongueing, grooving and boring, may be performed in one passage of the stuff through the machine.

The accompanying drawings illustrate my invention as an attachment to a planer or tonguer and groover, only a portion of the main machine being shown.

Figure 1, is an end view of the machine as attached to a planer. Fig. 2, is a partial side view of the boring machine obtained by a section in the line 2—2 of Fig. 1. Fig. 3, is a plan view of the bed of the boring machine as applied to a planer, and a section of a part of the mechanism, in the line 3—3 of Fig. 1. Fig. 4, is a side view of the boring device obtained by a section in the line 4—4 of Fig. 1. Fig. 5, is an enlarged longitudinal section of some of the parts connected with the boring mandrel, and of the tool-clutch attached to the latter. Fig. 6, is a transverse section in the line 6—6 of Fig. 5. Fig. 7, is a perspective view of a board after being bored by the machine.

A A represent the side beams of a flooring machine the operating mechanisms of which are not shown.

B represents a board in the act of passing from the flooring machine through the boring machine or attachment which forms the subject of this invention.

C represents the bed frame of the boring machine, consisting, as here shown, of a series of three longitudinally slotted beams or bars C′, connected with each other at their outer ends by side bars *c c*, and arranged transversely to the direction of the movement of the board B, and in position to allow the said board to pass over their middle portions, as shown in Fig. 3. Upon these cross-bars C′ of the boring machine frame are secured the lateral board guides C^2 and C^3, one or both of which are adjustable to accommodate boards of different widths between them. Upon two of the cross beams C′ is also secured the tripedal frame D of a presser mechanism. Upon this frame D is pivotally mounted a vertically movable yoke D′, carrying a presser roller D^2, which bears upon the upper surface of the board and which is caused to press and hold the board firmly down upon the subjacent roller through the medium of a spring *d*, applied to a rod *d′*, which is pivoted to an arm d^2 of the pivoted yoke D′, and bears against a rigid standard d^3, that rises from the frame D.

The boring mechanism is arranged on the tongued side of the board B. Of this mechanism E is an inclined supporting arm, rigidly fixed at its lower end to a base piece E′, that is adjustably secured to two cross beams C′, as indicated in Figs. 1 and 3.

To the outer end of the inclined support E, is pivoted by a pivot P at right angles to the inclined plane of said arm, the outer end of a tool-carrying arm E^2, arranged parallel with the support E, and carrying two long bearings *e e′*, in which rotates the mandrel E^3, which in turn carries the bit or boring tool e^2. The mandrel E^3 has a longitudinal movement in the bearing *e′*, and is provided with collars at opposite ends of the bearing *e*, by which the latter bearing shares the longitudinal movement of the mandrel. To permit this movement of the bearing *e*, the latter is fitted to a longitudinal guiding slot e^{10}, in the carrier arm E^2, as indicated in Figs. 3, 4, 5, and 6. The lengthwise movement of the mandrel is to provide for the insertion and withdrawal of the bit into and from the board B, the withdrawal of the bit, or the retraction

of the mandrel, being provided for by a spring e^3, interposed between the outer bearing e', and the head or nut e^4, on the outer prolongation of said mandrel, and its advance by means hereinafter to be described. Between its bearings e e', the mandrel E^3 is provided with a belt pulley e^5, and on each side of the latter a standard e^6, rising from the supporting arm E, carries a guide pulley e^7. Other guide pulleys e^8, are mounted on a shaft e^9, supported by and arranged transversely to the supporting arm E, as shown in Figs. 1 and 4.

Beneath the inclined boring tool support E, is arranged a transverse shaft F, upon which, at a point beneath the board B, is mounted a cylinder F', provided with peripheral teeth or spurs, which are engaged by the under surface of the board as the latter is forced forward by suitable feeding mechanism, which, in this case, is the feeding mechanism of the planer. When the board B strikes the spurred cylinder F', therefore, said cylinder and its shaft F are rotated. On the outer and protruding end of the shaft F, are mounted two pulleys f f', which are loose upon the shaft but are secured to each other. Over one of these pulleys is trained a belt f^2, which passes over the guide pulleys e^8 and e^7 and beneath the pulley e^5, upon the boring mandrel E^3. The pulleys f and f' are in constant motion through the medium of a belt f^3 leading from a continuously rotating belt pulley f^4, which, in this case, is mounted in the frame of the planer and may be one of the feed shafts or other shaft, of the latter machine.

On the side of the boring machine bed frame C, adjacent to the protruding end of the shaft F, is mounted a longitudinal slide G, (Figs. 2 and 3) having an inwardly projecting arm G' to the free end of which is connected a rod G^3, which at its opposite end is pivoted at g' to the lower and free end of the mandrel-carrying arm E^2. A lengthwise reciprocation of the slide G, consequently produces a vibration of the arm E^2, and of the boring mandrel mounted thereon. As a means for swinging the mandrel and its bit in the direction in which the board B is traveling, a vertically movable hooked pawl G^2, is secured to the slide G, and upon the shaft F, is secured a disk F^2, provided with pins f^5 which project beneath the pawl G^2 to engage the hook g on the latter. Said pawl G^2 has an inclined surface at its hooked free end, and in a proper position on the frame C, is placed a pin or projection g^2, which is encountered by the inclined end of the pawl and therefore lifts the pawl out of engagement with the pin f^5, to arrest the advance of the slide and of the tool-carrier. A contractile spring H, connected at one end with the slide G, and at its opposite end with the fixed frame C, serves to retract said tool carrier immediately upon such disengagement of said pawl from the actuating pin f^5.

It has already been pointed out, that the longitudinally retracting or outward movement of the boring tool mandrel E^3 is produced by the spring e^3. The opposite or advancing movement of the mandrel, by which the bit e^2 is thrust into the board gradually as the bit and the board advance, is produced by a self tripping mechanism that will now be described. Of this mechanism I is a pawl pivoted to the under side of the movable mandrel-bearing e, as best seen in Figs. 5 and 6, said pawl having its free end directed outwardly and upwardly, as shown in Fig. 3. I' is a stationary stud, preferably in the angular form shown in Fig. 3, attached to the support E, and in position to be engaged by the end of the pawl I, when the latter is at its normal outward inclination from the tool or mandrel carrier E^2, and when the tool carrier is itself inclined or retracted laterally preparatory to boring a hole, as indicated in Figs. 3 and 4. The outward inclination of the pawl I, with respect to the mandrel carrier, is effected by its gravity, or it may be produced by a spring. As the carrier arm E^2 is vibrated in the direction in which the board B is moving, the inclined pawl, having its outer end stationary and resting against the stop or stud I', gradually assumes a direction more or nearly parallel with the tool carrier, and consequently forces the bearing e, to which it is pivoted, downwardly or toward the board.

Suitable means are provided for automatically tripping or throwing the pawl I, out of engagement with the stud I', and thus allowing the spring e^3 to retract the mandrel E^3 and withdraw the bit from the hole after the latter has been bored. As shown in the drawings, such means consist of a lever I^2 (Figs. 3 and 4), which lever is pivoted between its ends at i, to the support E, and has the end of its short arm i' adjacent to the end of the pawl I, when the latter engages the stud I'. The longer arm i^2 of said lever I^2 stands in the path of the heel of the pawl I, and, being struck by the latter as the mandrel vibrates forwardly with the board, swings upon its axis and by its short arm ultimately forces the free end of the pawl I, out of engagement with the stud I'. Upon the disengagement of the pawl I, the spring e^3, at once fully and directly retracts the bit, whereupon the spring H, promptly vibrates the tool and its vibrating support against a suitable stop h, and into position to begin the next hole. The stop h in this instance is either of the pins or bolts which project from the slide G through guiding slots, indicated in dotted lines in the frame piece c; but any other suitable stop may be employed.

The pivoted lever I^2 has some advantages over a fixed stud placed in position to encounter the pawl I between its ends, but the latter device will obviously accomplish the object of releasing the pawl from the stud I', and, together with any other suitable means for advancing, or of advancing and retracting the

mandrel, is to be regarded as included in my invention.

It is manifest that the intervals between the holes bored by the device described, will depend upon the intervals between the pins f^5. To meet the usual requirements in the present practice of locating joists to receive flooring, the disk F^2, is shown provided with four pins f^5, at such uniform distance apart and from the axis of the shaft F, as to give a space of four inches between adjacent borings. The removal of alternate pins will give a distance of eight inches between holes, while the employment of one pin only, will give a distance of sixteen inches. A board bored at intervals of four inches may be laid on joists either four, eight or twelve inches apart, and with holes eight inches apart it may be laid upon joists eight or sixteen inches apart, while if bored at intervals of sixteen inches it can only be laid on joists sixteen inches apart.

To provide for adjustment of the pin g^2 by which the pawl G^2 is released from engagement with the pin or pins f^5, said pin g^2 may be desirably attached to a slotted plate g^3, adjustably secured to the side of the frame by a clamping bolt g^4.

As a means of adjusting the length of the rod G^3, said rod is shown as being made in two parts, as seen plainly in Fig. 3, said parts having oppositely directed screw threads and being connected by a corresponding nut g^5. An efficient mode of adjusting the tension of the pressure spring d, is sufficiently indicated without description, in Figs. 3 and 4.

It will be understood that the position of the tripedal frame D, may be adjusted on the bars of the frame according to the width of the board to be bored.

I do not wish to be restricted to the particular details of construction shown and described, inasmuch as these may be variously modified without departure from my invention.

By relying upon the board to set the tool-vibrating mechanism in motion, it is plain that if, for any reason, the board ceases to advance, the lateral motion of the boring tool also ceases and breakage of the bit is avoided.

In the construction illustrated wherein the mandrel which carries the boring tool vibrates, the bit changes its angle with the board as it enters and leaves the latter, and, as a consequence, the hole bored by the bit will be slightly elongated lengthwise of the board, as indicated in Fig. 7.

I claim as my invention—

1. In combination with a continuous feed for a board, and a rotating, laterally movable and lengthwise reciprocating mandrel carrying a boring tool, a rotatable shaft carrying a roller arranged in position to peripherally engage a surface of the board and adapted to be rotated by movement of the latter, a disk fixed to said shaft and provided with one or more pins or projections, a slide having means for its engagement with and disengagement from said pin or pins and connected with the mandrel, whereby, when so engaged the mandrel may move with the board, a spring arranged to move the mandrel sidewise in a direction opposite to that in which the board moves, means for forcing the mandrel toward the board while it is laterally moving in the same direction as the board and adapted to cease its action at a predetermined time, and a spring arranged to retract the mandrel lengthwise, when the means for forcing it in the opposite direction ceases to act.

2. In combination with a continuous feed for a board, an arm directed toward the board and so pivoted at its outer end as to vibrate along the path of the board, a rotating mandrel mounted on said arm and adapted to reciprocate thereon, a spring arranged to move the arm laterally in a direction opposite to that in which the board moves, a spring arranged to retract the mandrel lengthwise away from the board, mechanism actuated by the board for moving the arm in the same direction as that in which the board moves, and a self-tripping mechanism for moving the mandrel toward the board simultaneously with its lateral movement in the same direction as that of the board.

3. In combination with a laterally and longitudinally movable mandrel carrying a boring bit, means for reciprocating said mandrel, consisting of a vibrating pawl as I, connected at its pivoted end with the mandrel, a stop for the engagement of the free end ofthe pawl, means for disengaging the pawl from the stop, and a spring for retracting the mandrel upon such disengagement of the pawl.

4. In combination with a continuous feed for a board, a pivoted tool-carrying arm having its free end directed toward the board to be perforated; a rotating mandrel mounted on said arm, said mandrel carrying a boring bit and being adapted to have a longitudinal movement; a slide adapted to reciprocate in a path parallel with the board; a rotatable shaft adapted to be set in motion by the board, a ratchet fixed to said shaft; an automatically disengaging pawl connected with the slide and adapted to engage the ratchet; a connection between the slide and the tool-carrier and a spring arranged to retract the tool-carrier laterally.

5. In combination with a continuous feed for a board, an inclined arm E, supporting guide pulleys e^7 e^8 for a belt, a vibratory arm E^2 pivoted to the arm E at its outer end, a mandrel E^3, supported on the arm E^2, having a belt pulley e^5, and adapted to reciprocate with respect to the arm E^2, a slide G carrying a pawl G^2, and provided with a lateral arm G′, a rod, as G^3 connecting the arm G′ with the free end of the arm E^2, a shaft F, adapted to engage the board and to be rotated thereby, a disk F, provided with one or more pins arranged to be engaged by the pawl G^2, for

advancing the arm E^2 laterally, a tripping stop for disengaging the pawl, a spring H, for retracting the arm E^2 laterally, means for advancing the mandrel lengthwise as it advances laterally and means for retracting the mandrel lengthwise, preparatory to its lateral retraction.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

HERMAN C. SCHULZ.

Witnesses:
M. E. DAYTON,
TAYLOR E. BROWN.