

No. 836,684.

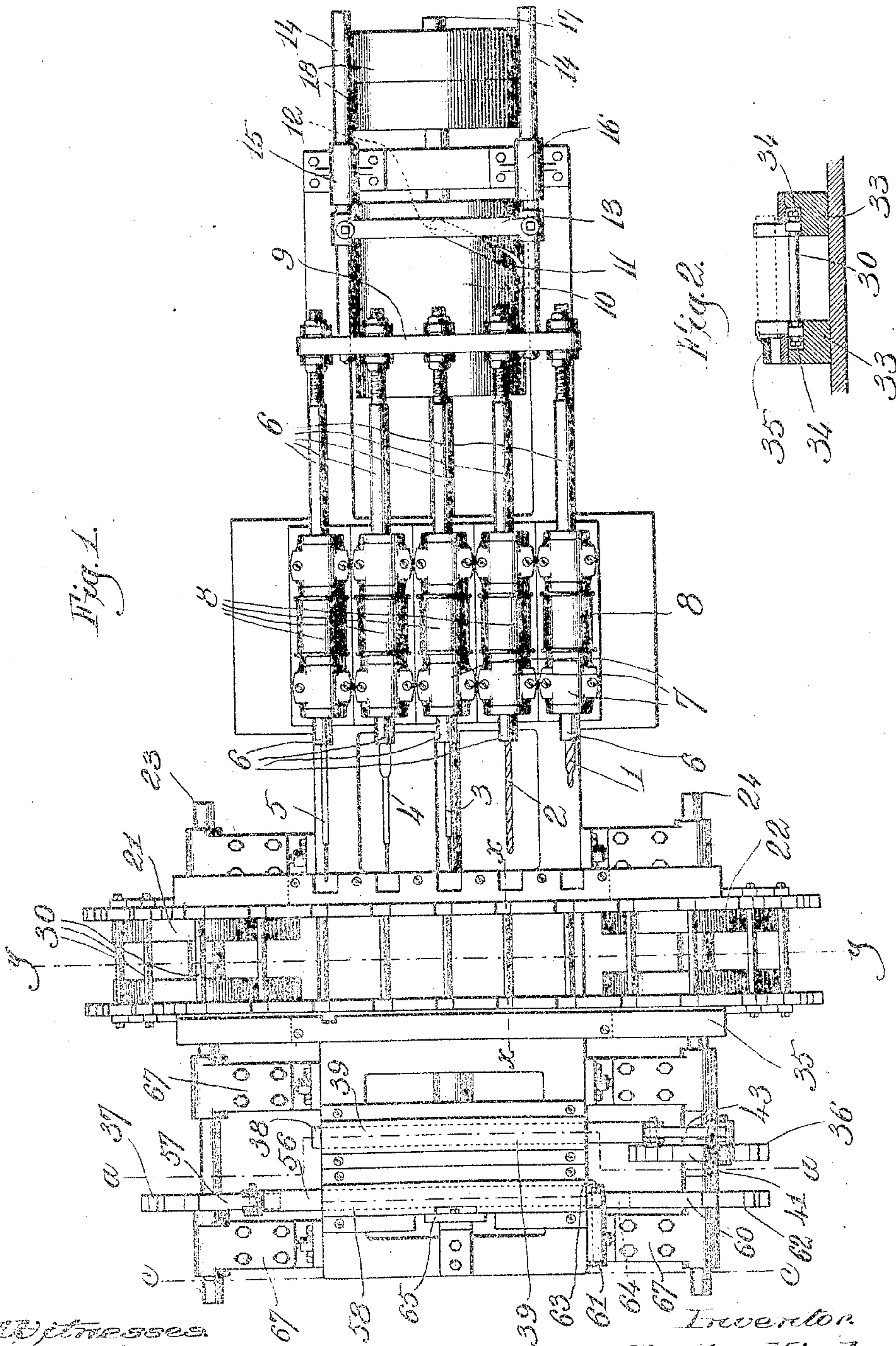
PATENTED NOV. 27, 1906.

C. HIRD.

BORING MACHINE.

APPLICATION FILED AUG. 28, 1905.

3 SHEETS—SHEET 1.



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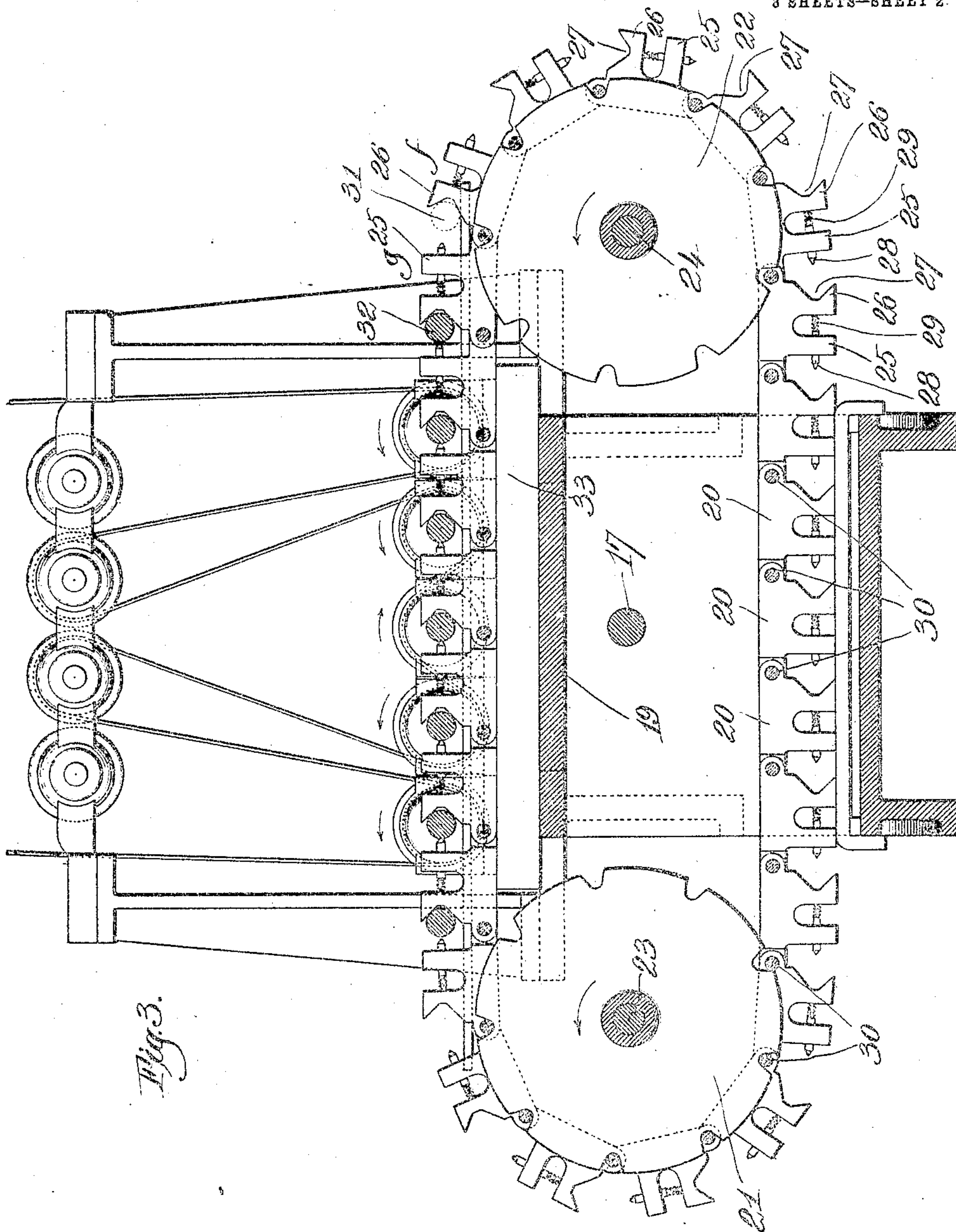


Fig. 3.

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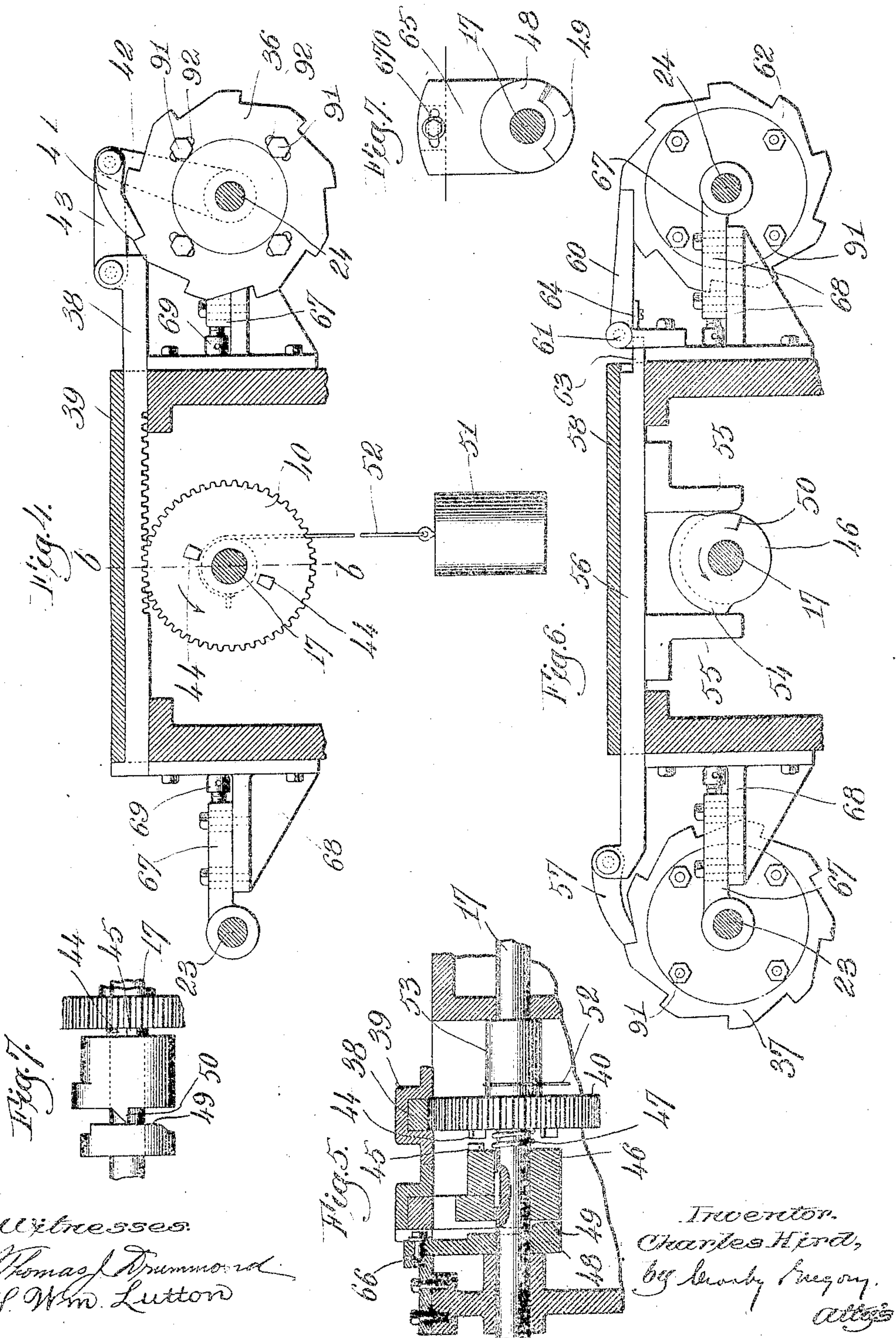
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES HIRD, OF WOONSOCKET, RHODE ISLAND, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-FOURTH TO COLIN C. BELL, OF BROOKLINE, MASSACHUSETTS, AND ONE-HALF TO GEORGE F. WILLETT, OF NORWOOD, MASSACHUSETTS.

BORING-MACHINE.

No. 836,384.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed August 28, 1905. Serial No. 276,052.

To all whom it may concern:

Be it known that I, CHARLES HIRD, a subject of the King of Great Britain, and a resident of Woonsocket, county of Providence, State of Rhode Island, have invented an Improvement in Boring-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to a boring-machine adapted for boring articles like blanks for bobbins, handles, &c.

One of the objects of the invention is to provide a novel work-holder for supporting the articles while being bored, which work-holder is simple in construction and effective in operation.

Another object of my invention is to provide a novel mechanism for advancing the work-holder intermittently to place the successive articles in position to be acted upon by the boring tool or tools.

My improved work-holder is comprised of a plurality of sections pivoted together to form an endless-chain-like device, the opposing sides of two adjacent sections being shaped to constitute a pair of jaws between which the article is gripped while being bored. By making the work-holder in the form of an endless-chain-like device and passing the sections of the work-holder around two driving-pulleys the portions of two adjacent sections, which constitute a pair of clamping-jaws, are opened from each other when passing around the driving-pulleys and are automatically closed together when said sections pass into one of the runs of the chain-like device. The articles may be fed to the work-holder as the sections thereof are passing over one of the pulleys and are opened away from each other, and after each article has been bored it is automatically released by the opening away from each other of the various sections as they pass over the other pulley.

My improved mechanism for feeding the work-holder forward intermittently comprises two independent means to advance the work-holder, one means operating to give the

work-holder its initial movement and the other to give it its final movement. The means for giving the work-holder the initial movement are herein shown as a rack and pinion, which means operate to give the work-holder a quick initial movement. The rack and pinion are released from the work-holder before the latter completes its advance movement, and a cam then comes into play to give the work-holder its final movement, said cam operating to bring the work-holder to rest with a slow movement.

Referring to the drawings, Figure 1 illustrates the plan view of a machine embodying my invention. Fig. 2 is a transverse section on the line *x x*, Fig. 1. Fig. 3 is a section on the line *y y*, Fig. 1. Fig. 4 is a section on substantially the line *a a*, Fig. 1. Fig. 5 is a vertical section on the line *b b*, Fig. 4. Fig. 6 is a transverse section on the line *c c*, Fig. 1; and Fig. 7 is a detail hereinafter referred to.

The machine herein illustrated is designed for boring blanks for bobbins, though I wish it understood that other articles can be bored on the machine as well as bobbin-blanks. Each bobbin-blank is acted upon by a plurality of drills, one drill partially boring the hole, the next drill boring it a little further, the next drill carrying the boring operation still further, and so on until finally the hole is completed. For convenience I will hereinafter refer to the article being bored as a "bobbin."

I have herein shown five different drills, each having a different shape and each adapted to perform a certain step in the operation of boring the bobbin. These drills are designated as 1, 2, 3, 4, and 5, respectively, and each is mounted in a suitable drill-chuck carried by a spindle 6. The spindles are mounted in suitable bearings 7 and are rotated by driving-pulleys 8. The pulleys 8 are splined to the spindle 6, and each spindle is connected to a cross-head 9, so that reciprocating movement of the cross-head advances the spindles through the bearings and carries the drills supported thereby forward and into the work. Each spindle is rotatably mounted in the cross-head, but is secured thereto so that it must move longitudinally therein.

The cross-head may be operated in any suitable way, and as herein shown I employ a drum-cam 10, having a cam-groove 11 in its periphery, into which enters a pin or projection 12, carried by a cross-bar 13. The cross-bar is fast with guide-rods 14, which are secured to the cross-head 9 and which play back and forth in bearings 15 and 16, mounted on the frame of the machine. The drum 10 is mounted on a driving-shaft 17 and is driven by suitable means—such, for instance, as the driving-pulleys 18.

The work-holder is in the form of an endless-chain device, which extends transversely to the frame 19 of the machine and transversely to the direction of movement of the drills. Said work-holder is made up of a plurality of sections 20, which are pivoted together to form the endless-chain device, and it is supported and rotated by driving-pulleys 21 and 22, suitably journaled on shafts 23 and 24, mounted at either side of the frame of the machine. Each section 20 is preferably made with two gripping members, and the adjacent gripping members of adjacent sections are arranged to constitute a pair of gripping members or gripping-jaws.

In the present embodiment of my invention each section 20 has projecting outwardly therefrom two arms 25 and 26, the arms 26 being recessed, as at 27, to receive a bobbin and the arms 25 each having a pointed projection 28 extending therefrom and in a direction toward the adjacent section. Each projection 28 is herein shown as being slidably mounted in its arm 25 and backed by a spring 29, thereby making each projection a yielding projection.

I prefer to provide means for holding both the top and the butt of the bobbin, and therefore I have shown two series of sections 20, the two series being connected by rods or pins 30, and for convenience I employ the rods or pins 30 as the means for pivotally connecting together the sections of each series.

The driving-wheels 21 and 22 are shown as notched in their peripheries to receive the pins or rods 30, and said wheels therefore act as sprocket-wheels for driving forward the work-holder.

The sections which are wrapped about the driving-pulleys 21 and 22 are opened away from each other, as best shown in Fig. 3, because of the fact that the arms 25 and 26 project from each section outwardly. As the sections pass off from the driving-wheels 21 and 22 and partake of the straight-line movement which they have between the driving-wheels the arms of adjacent sections close together, as will be obvious. I make use of this opening away from each other and closing together of the arms of adjacent sections to grip and release the bobbins.

Referring to Fig. 3, it will be seen that the section which has the position *f* is opened away from the section which has just left the driving-pulley 22 and has the position *g* and that there is plenty of room between the arm 26 of the former section and the arm 25 of the latter section to insert a bobbin 31, as shown in dotted lines. As soon, however, as the section occupying the position *f* in Fig. 3 has advanced one step, or into position *g*, the bobbin is clamped between the arms 25 and 26 of adjacent sections, as shown by the bobbin designated 32, and is rigidly held in such position until the sections between which the bobbin is held begin to pass over the driving-wheel 21, at which time said bobbin is released by the automatic opening away from each other of the sections.

As the sections 20 pass across the machine from one driving-wheel to the other those sections in the upper run, or those which grip the bobbins, are supported by bed-pieces 33, which have suitable grooves 34 to receive the projecting ends of the pivotal rods 30, whereby the sections containing the bobbins are steadied and guided in their movement. One of the bed-pieces 33 carries a back-stop or positioning device 35, which extends across the machine and against which the ends of the bobbins are placed and by which the bobbins are properly positioned.

The work-holder is advanced intermittently, it being advanced one step for each forward movement of the boring devices, so that after the first bobbin has been acted upon by drill No. 1 the work-holder moves said bobbin forward to be acted upon by drill No. 2 and then moves said bobbin forward again to be acted upon by drill No. 3, &c. The means I prefer for giving this intermittent movement comprises one device for giving the work-holder its initial movement at a comparatively quick speed and a second device for giving said work-holder its final movement at a slow speed. This construction has been adopted so as to insure bringing the work-holder to rest at the end of each forward movement without any jar or sudden stop such as would be liable to throw the bobbins out of the position they should occupy to be properly bored.

The means I have shown for giving the work-holder its initial movement is a rack and pinion operated from the driving-shaft 17 and adapted to actuate a ratchet-wheel 36 on the shaft 24, to which the driving-pulley 22 is fast, and the means I have shown for giving the work-holder its final movement comprises a cam on the shaft 17 and adapted to actuate a pawl which drives a ratchet-wheel 37, fast on the shaft 23, which carries the driving-wheel 21.

Referring now to Figs. 1, 4, and 5, 38 designates a rack-bar adapted to reciprocate

transversely of the frame in suitable ways 39, the teeth of said rack-bar meshing with the gear 40, mounted on the shaft 17. Said rack-bar has connected thereto a pawl 41, adapted to engage the teeth of the ratchet-wheel 36, which, as above stated, is fast on the shaft 24. The pawl 41 is shown as pivoted to the end of an arm 42, loosely mounted on the shaft 24 and pivotally connected to the rack-bar 38 by a suitable link 43. The shaft 17 has a continuously-rotary motion, and I have provided means for automatically clutching the gear 40 to said shaft at the proper time and then for automatically disengaging said gear from the shaft after the work-holder has made its initial movement. The gear 40 is shown as having clutch projections 44, which are adapted to engage an operating projection 45 on a clutch member 46, keyed to the shaft 17. Said clutch member is normally held disengaged from the gear 40 by a suitable spring 47 and is thrown into engagement with said gear by a stationary cam member 48, having a cam-surface 49, with which a projection 50 on the clutch member engages during the rotation of the shaft 17. The parts are so arranged that at the proper time in a cycle of operations—that is, when the drills are withdrawn, as shown in Fig. 1—the projection 50 on the clutch member 46 engages the cam 49, thereby moving the clutch member 46 longitudinally of the shaft and causing the projections 45 thereon to engage the projections 44 on the gear. When this occurs, the rotation of the shaft 17 is transmitted to the gear 40 and the rack-bar 38 is reciprocated, thereby rotating the driving-wheel 22 and giving the work-holder its initial advance movement. Just before the movement of the work-holder is completed the projection 50 passes off from the cam-surface 49 and the spring 47 disengages the clutch member from the pinion. The pinion is then restored to its normal position by means of a suitable weight 51, suspended by a flexible connection 52, which is wound about the hub 53 of the gear, the restoring of the gear to its initial position throwing the rack-bar 38 into its initial position, as will be obvious. The final movement of the work-holder is effected by a cam 54, which is herein shown as carried by the clutch member 50 and which engages fingers or projections 55, depending from a sliding bar 56, which carries at one end a pawl 57 to engage the ratchet-wheel 37. The sliding bar 56 reciprocates in suitable ways 58. The cam 54 is so shaped and positioned that it engages one of the fingers 55 to advance the ratchet-wheel just as the gear 40 is disengaged from the shaft 17, so that said cam picks up and continues the movement of the work-holder. The cam is so shaped that it gives a slow movement to the work-holder, thereby per-

mitting it to come to rest gradually and without any shock or sudden stop. 65

I have also provided means to limit the advance movement of the work-holder so as to bring it to rest with the bobbins carried thereby in the proper position for being bored. The means for accomplishing this is herein shown as a stop-pawl 60, pivoted to the frame at 61 and adapted to engage a ratchet-wheel 62, fast on the shaft 24. 70

During the backward movement of the slide 56 the tail 63 thereof engages a projection 64 on the stop-pawl 60 and raises said pawl out of engagement with the ratchet-wheel 62 to permit the initial movement of the work-holder. As soon, however, as the cam 54 begins to move the slide 56 to the right, Fig. 6, the stop-pawl 60 is released and allowed to fall into engagement with the ratchet-wheel 62, said stop-pawl engaging the next tooth of the ratchet-wheel as the latter is rotated, and thus limiting the movement of the work-holder. 80 85

The ratchet 36 and preferably also the ratchets 37 and 62 are made adjustable. This is herein accomplished by making the view portion of each ratchet-wheel separate from the hub portion and securing the two parts together by bolts or screws 91, which pass through slots 92 in either the view or hub portion. By means of this construction the view portions of the wheels can be adjusted to take up any lost motion. 90 95

I have herein shown the stationary cam member 48 as being adjustable, so as to vary the position of the cam-surface 49. Said cam member is provided with an arm 65, which is secured to the frame by means of a suitable bolt 66, and I provide the arm 65 with a slot 670, through which said bolt passes, so as to permit an adjustment of the cam member about the shaft 17. 100 105

The shafts 23 and 24 are shown as being mounted in adjustable bearings, so that any slack in the endless-chain-like work-holder can be taken up. The bearings for these shafts are designated by 67 and are supported by suitable brackets 68, projecting from the frame of the machine, said bearings being adjustable laterally by means of adjusting-screws 69 of any suitable pattern. The screws are herein shown with their heads against the side of the frame, so that by turning them the bearings 67 can be moved outwardly. 110 115

It will be noted that the boring of the bobbins is done while they are supported between the sections forming the upper run of the work-holder. While the bobbins are thus supported they are in a right line, and therefore the spindles 6 are arranged in a horizontal line, as herein shown. 120 125

In the operation of the device the drum reciprocates the spindles, thereby carrying

drills toward and from the work-holder. While the drills are retracted the work-holder is advanced one step, and when the work-holder has been brought to rest the drills advance and operate on the bobbins supported thereby.

It will be seen that my machine has comparatively few parts as compared with many previous machines for boring bobbins.

While I have illustrated herein one embodiment of my invention, I do not wish to be limited to the constructional details shown, as these may be varied without departing from the invention.

Although the above description has, for the sake of illustration, referred to a machine for boring bobbin-blanks, the invention is not limited to the boring of any particular article, but resides in a boring-machine for boring any article, which boring-machine has the characteristics pointed out in the appended claims.

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

1. In a machine of the class described, a work-holder, a boring-tool, means to give the work-holder a step-by-step movement, said means comprising a rack and pinion to give the work-holder its initial movement, and a cam to give the work-holder its final movement in each step.

2. In a machine of the class described, a work-holder, a boring-tool, means to give the work-holder a step-by-step movement, said means comprising one device to give the work-holder the initial movement of each step, and another device to give the work-holder the final movement of each step, and means to limit the extent of movement of the work-holder at each step.

3. In a bobbin-boring machine, a work-holder, means to give said work-holder a step-by-step movement, said means comprising a rack and pinion to give the work-holder its initial movement, and a cam to give said work-holder the final movement of each step, and a stop-pawl to bring the holder to rest at the end of each step.

4. In a boring-machine, a work-holder comprising a plurality of gripping members pivoted together to form an endless-chain-like device, driving-wheels about which said work-holder passes, and means to give said driving-wheels a step-by-step movement, said means including a device to give said wheels the initial movement of each step; and another device to give the wheels the final movement of each step.

5. In a boring-machine, a work-holder comprising a plurality of gripping members pivoted together to form an endless-chain-like device, driving-wheels about which said work-holder passes, and means to give said driving-wheels a step-by-step movement,

said means including a device to give said wheels the initial movement of each step, and a cam to give the wheels the final movement of each step.

6. In a boring-machine, a work-holder comprising a plurality of gripping members pivoted together to form an endless-chain-like device, driving-wheels about which said work-holder passes, and means to give said driving-wheels a step-by-step movement, said means including a device to give said wheels the initial movement of each step, and another device to give the wheels the final movement of each step, said means including a device to act on one driving-wheel to give the work-holder the initial movement of each step, and another device to act on the other driving-wheel to give the work-holder the final movement of each step.

7. In a boring-machine, a work-holder in the form of an endless chain having gripping members, two driving-wheels about which said chain passes, means to give said driving-wheels a step-by-step movement, said means comprising a rack and pinion to rotate one driving-wheel, thereby to give the work-holder the initial movement of each step, and a cam to actuate the other driving-wheel, thereby to give the work-holder the final movement of each step.

8. In a boring-machine, a work-holder in the form of an endless chain having gripping members, two driving-wheels about which said chain passes, means to give said driving-wheels a step-by-step movement, said means comprising a rack and pinion to rotate one driving-wheel, thereby to give the work-holder the initial movement of each step, a cam to actuate the other driving-wheel, thereby to give the work-holder the final movement of each step, and a step-pawl to stop the work-holder at the end of each step.

9. In a boring-machine, a work-holder comprising an endless-chain-like device having gripping members, two driving-wheels about which said chain passes, a ratchet-wheel rigid with each driving-wheel, means to act on one ratchet-wheel to give the work-holder the initial movement of each step, and another means to act on the other ratchet-wheel to give the work-holder the final movement of each step.

10. In a boring-machine, a work-holder comprising an endless-chain-like device having gripping members, two driving-wheels about which said work-holder passes, a pawl-and-ratchet mechanism for advancing each driving-wheel, and means to actuate said pawl-and-ratchet mechanism successively.

11. In a boring-machine, a work-holder comprising an endless-chain-like device having gripping members, two driving-wheels about which said work-holder passes, means to give the work-holder a step-by-step movement, said means comprising a separate

pawl-and-ratchet mechanism for advancing each driving-wheel, means to actuate said pawl-and-ratchet mechanisms successively, and a stop-pawl to stop the movement of the
5 work-carrier at the end of each step, said stop-pawl being controlled by one of the pawl-and-ratchet mechanisms.

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

CHARLES HIRD.

Witnesses:

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ELIZABETH R. MORRISON.