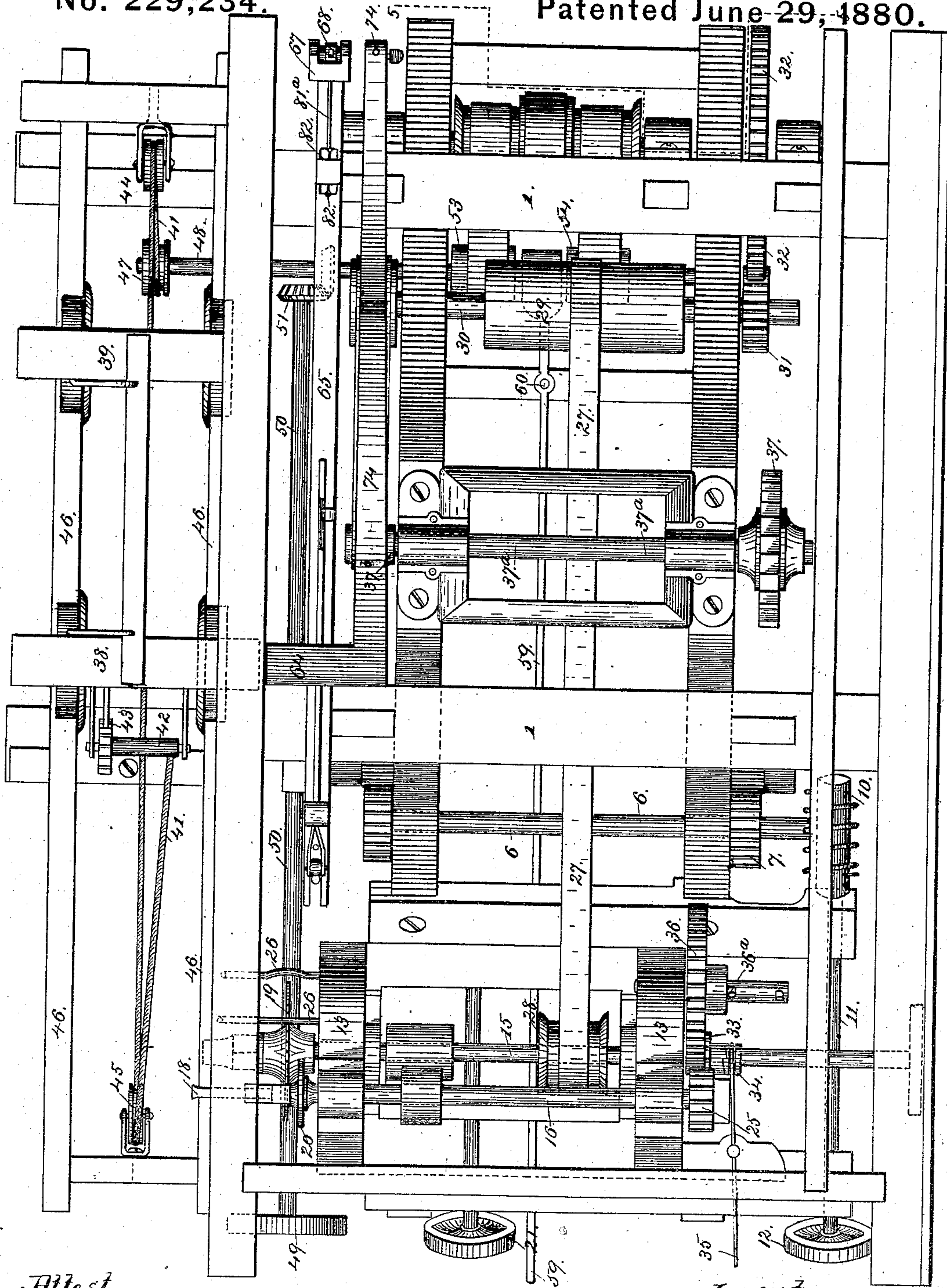


H. BOERSTLER.  
Combined Boring, Sawing, Grinding, and  
Rabbeting Machine.

No. 229,234.

Patented June 29, 1880.

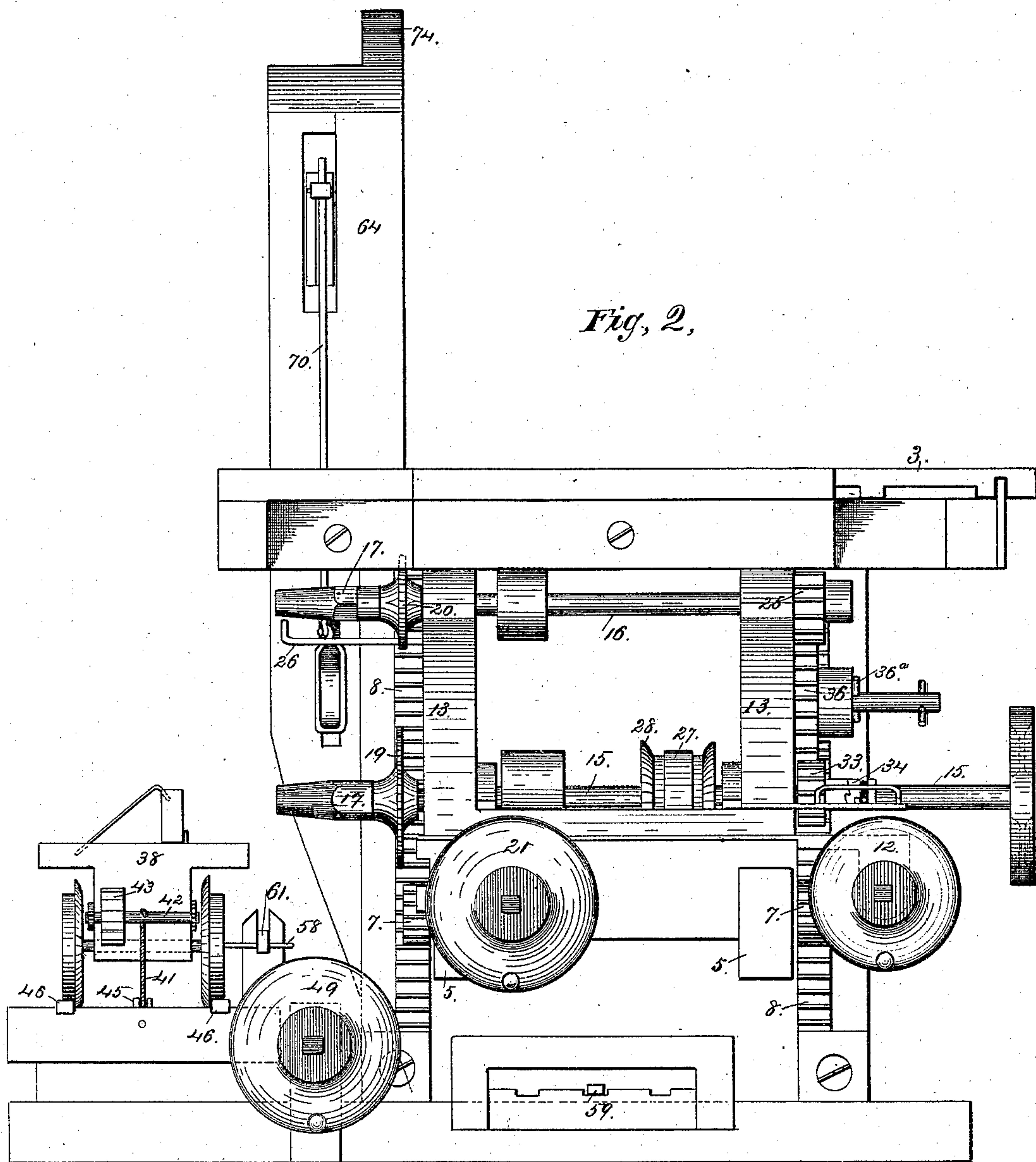


Attest  
Geo. T. Smallwood Jr.  
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Fig. 1,

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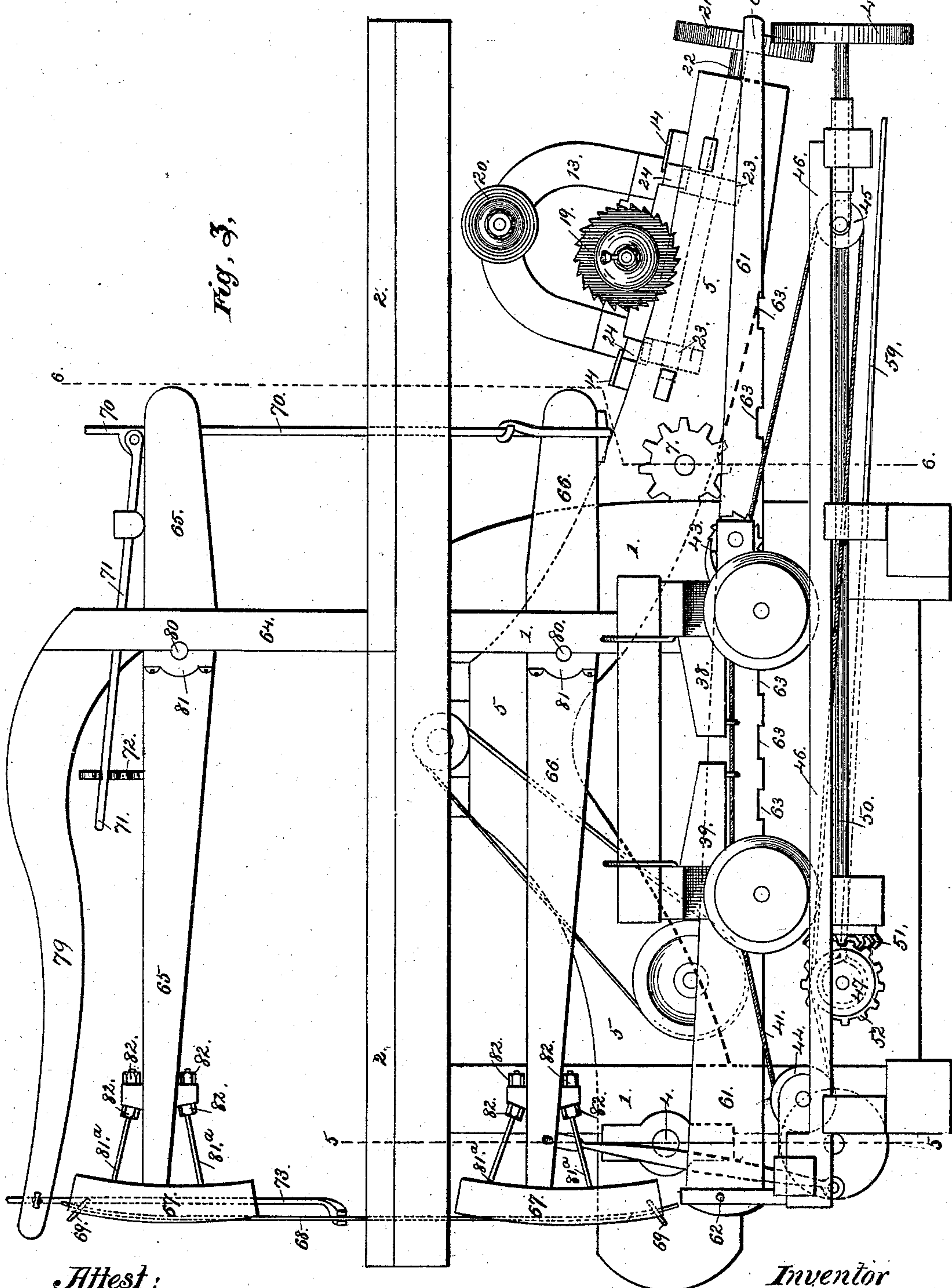


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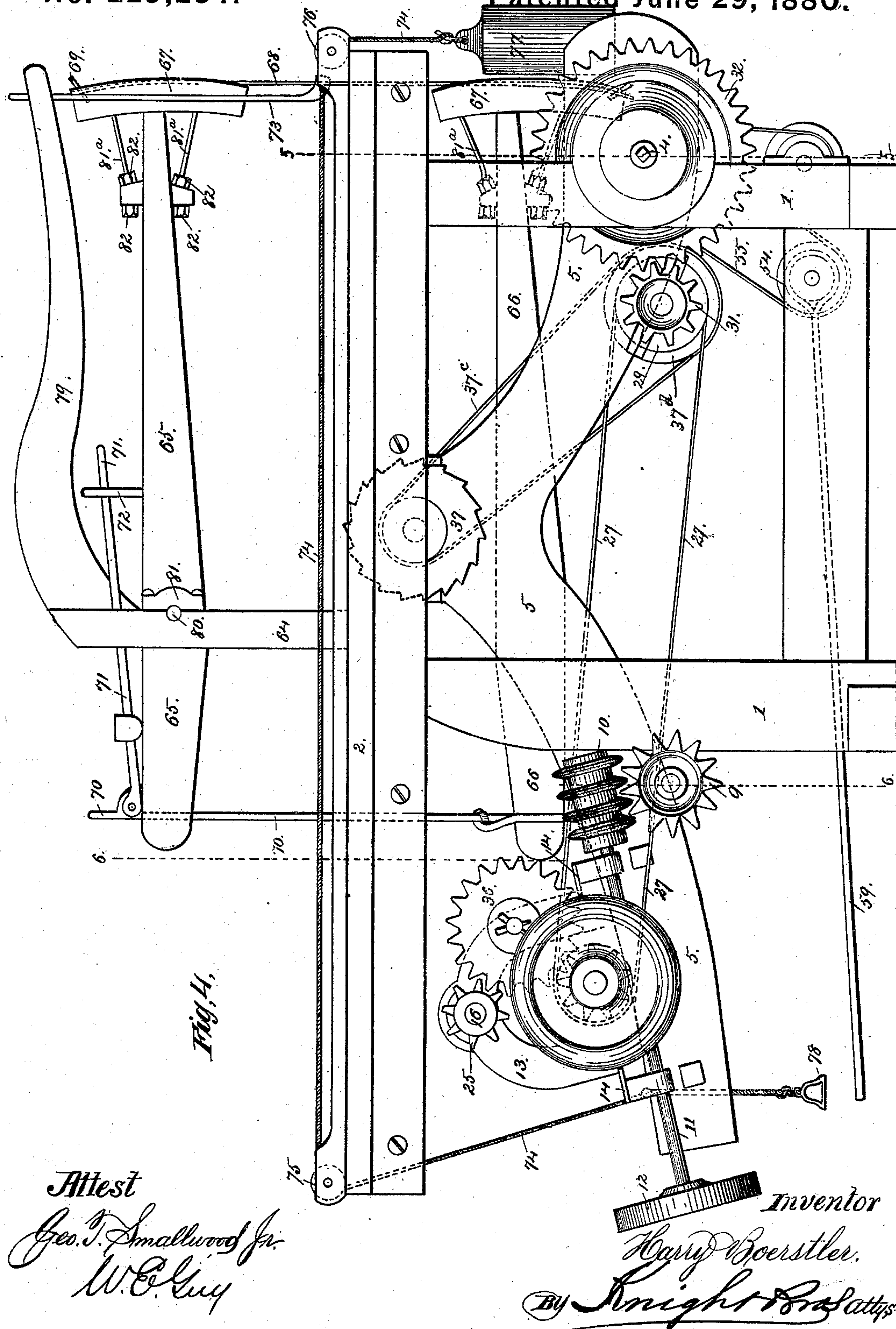
*Inventor*

Harry Boerstler.  
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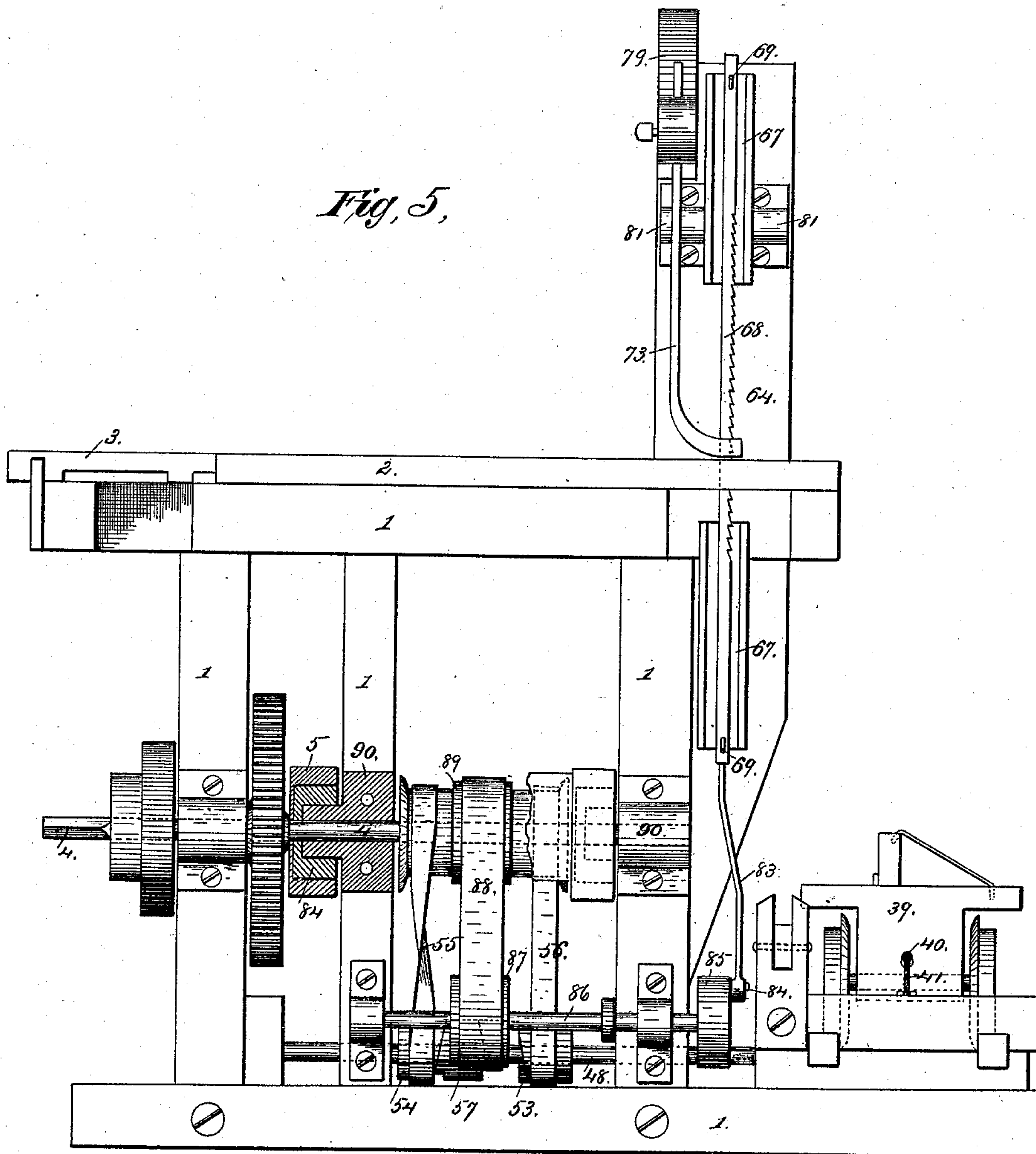


H. BOERSTLER.  
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*Fig. 5,*



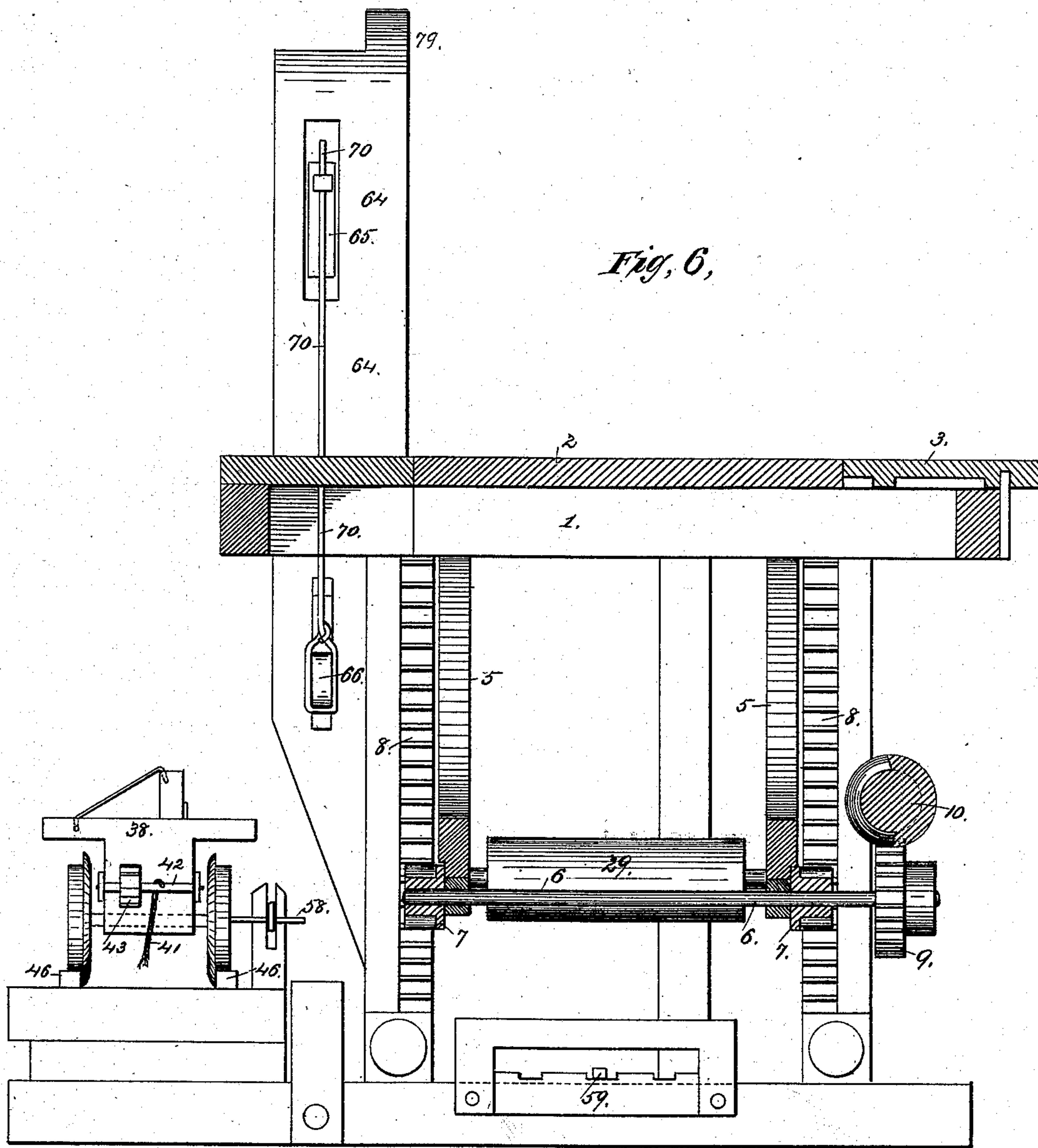
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Combined Boring, Sawing, Grinding, and  
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# UNITED STATES PATENT OFFICE.

HARRY BOERSTLER, OF HAMBURG, OHIO.

COMBINED BORING, SAWING, GRINDING, AND RABBETING MACHINE.

SPECIFICATION forming part of Letters Patent No. 229,234, dated June 29, 1880.

Application filed July 23, 1879.

*To all whom it may concern:*

Be it known that I, HARRY BOERSTLER, of Hamburg, in the county of Fairfield and State of Ohio, have invented a new and useful Combined Boring, Sawing, Grinding, and Rabbeting Machine, of which the following is a specification.

My machine is constructed with a frame mounted in double boxes, so as to be vertically adjustable around a main driving-shaft running in suitable bearings in the main frame. The vertically-adjustable frame carries a horizontally-movable slide, in which are mounted one or more mandrels, to which augers, circular saws, or grinding-wheels may be fixed at will. The movement of the slide, being longitudinal to the shafts, serves to impart the feed-movement to the augers when the machine is used for boring. The vertical adjustment of the hinged frame is effected by means of a worm-shaft mounted therein and engaging with a worm-wheel on a counter-shaft, also mounted in the hinged frame, and carrying pinions which mesh in stationary vertical racks, so that the rotation of the worm-shaft will move the hinged frame up and down, and the worm will hold it rigidly in any position to which it may be set. The longitudinal movement of the slide for feeding the augers or adjusting the saw or grinding-wheel is imparted directly by pinions meshing with racks on the slide. Where two auger-mandrels are used one or both are so connected with the driving mechanism that they may be placed in or out of gear at will. On the upper part of the hinged frame is a rabbeting-tool, which is brought into working position by the elevation of said frame.

Material to be bored or sawed is fixed to a carriage, which may be moved continuously in either direction by connection with the driving-shaft, under control of a suitable clutch, or, being disconnected therefrom, may be adjusted by hand. In the latter case I employ a hinged gage-bar, engaging with said carriage so as to regulate the extent of its movements, for the purpose of determining the distance and length of holes or mortises to be produced by the augers.

The machine is further provided with a gig-

saw, mounted on the same table which forms the upper part of the main frame, and driven by connection with the main shaft, on which the hinged frame is adjusted.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a plan of the machine with the table removed. Fig. 2 is a front view of the machine. Fig. 3 is an elevation of the side on which the carriage is placed. Fig. 4 is an elevation of the opposite side. Fig. 5 is a vertical section on the line 5 5, Fig. 1. Fig. 6 is a vertical section on the line 6 6, Figs. 3 and 4, looking backward.

1 1 represent various parts of the stationary frame of the machine. 2 is a table mounted thereon. 3 is a slide forming part of the table, and working flush therewith for feeding the staff to a rabbeting-tool, hereinafter described. 4 is the main driving-shaft, running in boxes 90, attached to the rear end of the main frame, and extended laterally to form hollow journals fitting in boxes 84 in the adjustable frame 5, which is thus hinged upon the main frame concentrically with the shaft 4, and extends horizontally to the forward end of the machine.

The hinged frame 5 is adjusted vertically and held in any position by means of a counter-shaft, 6, carrying pinions 7 7, gearing with stationary vertical racks 8 8 on the main frame, and operated and held by means of a worm-wheel, 9, on the said pinion-shaft 6, controlled by a worm, 10, on a shaft, 11, operated by a hand-wheel, 12.

13 represents a sliding frame guided in ways 14 14 on the hinged frame 5, and supporting in suitable bearings mandrels or shafts 15 16, provided at their extremities with nuts or chucks 17 for the reception of auger-bits 18, of various sizes, the said nuts 17 being further employed to clamp upon their respective shafts 15 16 circular saws 19 or grinding-wheels 20, as may be desired. The horizontal movement of the slide 13 being longitudinal to the shafts 15 16 carried thereby, said sliding movement is employed to impart feed-motion to the augers or endwise adjustment to the saws or grind-



ing-wheels. This horizontal sliding movement is imparted by the hand-wheel 21 on the shaft 22, mounted in the hinged frame 5, and carrying pinions 23 23, which gear with racks 24 24 on the face of the slide.

26 26 represent gages to determine depth of boring. The auger-shaft 15 is driven by a belt, 27, running on a pulley, 28, on said shaft and a pulley, 29, on a shaft, 30, having a pinion, 31, which is driven by a multiplying-wheel, 32, on the main driving-shaft 4, the pulley 29 being of sufficient length to properly run the belt 27, when the shaft 15 is moved endwise to any necessary extent.

33 is a pinion mounted loosely on the shaft 15, and connected thereto, when required, by a clutch, 34, operated by a lever, 35. When thus driven the pinion 33 rotates an intermediate wheel, 36, gearing with the pinion 25 on the second auger-shaft, 16.

37 represents a rabbeting-tool mounted on a shaft, 37<sup>a</sup>, running in suitable bearings on the upper part of the hinged frame 5, and adapted to be elevated into working position with its cutting-edge slightly above the surface of the table 2 when the said frame 5 is raised to its highest position. On the end of shaft 37<sup>a</sup> is a pulley, 37<sup>b</sup>, operated by a band, 37<sup>c</sup>, extending to a pulley, 37<sup>d</sup>, on the shaft 30.

38 39 are the two parts of a carriage, adjustable to any preferred distance apart, and so held by a key or set-screw, 40, engaging with a rope, 41, which passes through the axle or frame of the second truck, 39, of the carriage. The said rope is fixed and wound upon a reel, 42, on the truck 38, so as to be drawn tight, and held by a pawl and ratchet, 43. The said rope passes around separate pulleys 44 45 at the extremities of the railway 46, on which the carriage 38 39 runs, and around a driving-pulley, 47, on a shaft, 48, by which the said carriage may be moved in either direction, either automatically, as hereinafter described, or by hand by means of a wheel, 49, on a horizontal shaft, 50, carrying a beveled pinion, 51, gearing with a smaller beveled pinion, 52, on the shaft 48.

To impart horizontal movement to the carriage automatically in either direction, I employ pulleys 53 54 running loosely on the shaft 48 and driven by belts 55 56, one reversed, connecting said pulleys with the main shaft 4, so as to drive them in opposite directions, either one or the other of the pulleys being connected to the shaft, so as to run the same in either direction required, by means of a clutch, 57, working on a spline on the shaft 48, and placed in gear with either pulley 53 or 54 by means of a lever, 59, fulcrumed at 60 and extending to the forward end of the machine, within convenient reach of the operator.

To determine the extent of movement of the carriage while adjusting it by hand, I employ a bar, 61, hinged at 62, at the rear end of the railway 46 and extending to the front

in reach of the operator, and having on its under surface a series of notches, 63 63, to engage successively with a stud, 58, projecting from the truck 38.

64 is a standard extending from the base of the main frame up through the table to any necessary height above the same, and affording bearings for a pair of arms, 65 66, with segment-heads 67, for the attachment of a gig-saw, 68, the ends of which are furnished with eyes, and simply hooked over inclined studs 69 near the extremities of the segment or arc-shaped heads 67; or, in the case of a very thick saw, the ends of the saw are attached to flexible steel straps, which are attached at their extremities to the segment-heads and accommodate themselves to the curvature thereof. The arms 65 66 are securely held against lateral motion by their stud-shafts 80, which turn in suitable boxes 81 in the standard 64. The segment-heads 67 67 are adjusted in angle on the ends of the arms 65 66 by means of rods 81<sup>a</sup> 81<sup>a</sup> and nuts 82 82, so as to cause the saw to run accurately in the desired line. For straining the saw the heels of the arms 65 66 are drawn together by a stirrup and rod, 70, connected to the short arm of the lever 71, which lever is fulcrumed near the heel of the upper arm, 65, and secured by a rack, 72, on said arm. 73 is a saw-guide depending from a horizontal rigid arm, 79, on the standard 64.

The connecting-rod 83, wrist 84, crank-wheel 85, driving-shaft 86, pulleys 87 89, and band 88 are the means I employ for connecting the saw to the main shaft 4.

The operation is as follows: The end of the machine where the hand-wheels are located being considered the front, the operator sits facing this front end, with the carriage 38 39 and railway 46 to his left. Supposing it is desired to use the machine for boring fence-posts, the post is fixed on the carriage and the latter drawn forward until the gage-bar 61 drops on the stud 58 in one of the notches. The operator now takes hold of the worm-shaft hand-wheel 12 and turns it so as to raise or lower the hinged frame 5 until the auger comes to the center of the post. He then turns the hand-wheel 21 to advance the auger-slide 13 until the auger takes hold of the work. The gage being set to the required depth and fixed by a set-screw, the hole will be bored to the depth required, when the hand-wheel 21 is turned to the right to withdraw the auger. The hand-wheel 49 connected with the carriage is then turned to the right, which moves the carriage forward the length of the notch in the gage-bar 61. The next hole is then bored in the same manner, and the center of the mortise may then be bored out. The gage-bar 61 is then raised and the carriage 38 39 moved forward until the bar 61 again drops on the stud 58, which indicates the place to bore the first hole for another mortise, which mortise is then completed as before. The gage-bar 61



can be changed to suit distances or lengths of mortises, as many levers being used as the distances or lengths require.

If it be desired to operate on large timber, the key or set-screw 40 is removed and the trucks run to any necessary distance apart. By setting them twenty feet apart the machine may be used to advantage with a stick of timber forty feet long, which leaves ten feet projecting at each end, thus reducing the length of track required.

Where it is desired to produce two kinds of mortises of different-sized holes in the same work, the augers on the two shafts may be brought into play alternately by raising or lowering the hinged frame, the augers being far enough apart to permit the one not in use to pass above or below the work, as the case may be.

If it be desired to move the carriage forward automatically for boring out mortises, or for using the circular saw, or for other purposes, the operator controls the automatic feed by means of the hand-lever 59, placing it to the right for feeding the carriage forward or to the left for moving the carriage back. When said lever is placed in a central position the automatic feed mechanism is out of gear, leaving the carriage free to be moved by hand.

If it be desired to use very small bits, the hinged frame 5 is raised to bring the upper auger-shaft, 16, on top of the table by removing the large part of the table.

For using an emery or other grinding-wheel, 20, the nut 17 is removed and the wheel placed in position. For using the circular saw 19 the said saw is placed in position in the same manner, and the upper shaft may be thrown out of gear by removing the pin 36<sup>a</sup>, which holds the gear-wheel 36 on its stud-shaft, and slipping said wheel endwise out of gear with the auger-shaft pinions.

The two shafts 15 16 are furnished, as shown, with separate pulleys, so that they may either of them be driven independently by its own belt. The lower auger-shaft is set either in or out of gear, as desired, by means of the clutch 34.

For use as a circular sawing machine or for slitting boards a joist is laid on the carriage-truck 38 39 to form a table, on which the stuff to be ripped is secured in the customary manner. The saw on the lower auger-shaft, 15, is then brought to the proper height and the carriage is connected with the main shaft as before described, so as to be fed automatically as the saw runs. For large machines fast and slow feeds are provided.

The ready means provided for adjusting the saw endwise permits the operator to rip the stuff on successive lines without readjustment of the stuff on the carriage.

For cutting tenons in heavy timber, run the carriage back far enough to bring the end of the timber up to the saw, cut in as far as desired, run the carriage back, move the

saw over the thickness of tenon, and rip in again.

For cross-cutting, lay the stuff on the carriage and regulate the saw to cut down the required depth. This is handy for making nailing-ties or cutting anything to a desired length.

For a wood-sawing machine, take off the top auger, the frame of which is put on with bolts, and slip the worm-wheel 9 out of gear, pass a rope, 74, from the auger-frame over pulleys 75 76 on top of the table to the rear end, and apply to its extremity a sufficient weight, 77, to overbalance the hinged frame, so as to keep it in its uppermost position when at rest, and permit the operator, by applying his foot to the stirrup 78, to draw the frame down. The wood is then laid on the table and the frame allowed to rise, causing the saw to come up through the slot in the table and cut the stick in two. The saw is then again drawn down with the foot and the stick moved forward and again cut off as before. By this arrangement the wood lies perfectly still, and any binding on the saw is avoided, which is a great advantage as compared with the common mode of feeding the wood to the saw.

For use as a rabbeting, tonguing, or grooving machine, the hinged frame 5 is adjusted so as to bring the thick saw or groover head 37 above the surface of the table. The ready means of adjusting the height of the tool 37 by moving the hinged frame 5 up or down enables the operator to cut the rabbet or groove to any required depth with the greatest facility, the depth being gaged by the height of the rabbeting-tool above the surface of the table.

The stuff is set against a suitable gage and carried by the sliding table, or may be simply fed forward against the face of the gage in the customary manner, the gage being regulated to suit the width.

Having thus described my invention, the following is what I claim as new and desire to secure by Letters Patent:

1. The horizontal frame 5 5, hinged around the main driving-shaft 4 at one end and provided at the other end with a counter-shaft, 6, constructed with pinions 7 7, gearing with vertical racks 8 8 on the main frame, and operated by means of a wheel, 12, shaft 11, worm 10, and worm-wheel 9, substantially as set forth.

2. The combination of the frame 5 5, driving-shaft 4, counter-shaft 6, pinions 7 7, racks 8 8, worm-wheel 9, rabbeting-tool 37 37<sup>a</sup>, and suitable connections to the driving-shaft, as set forth.

3. The combination of the auger-frame 13, constructed with racks 24 24, the horizontal frame 5 5, hinged around the main driving-shaft, constructed with ways 14 14, the shaft 22, carrying pinions 23 23, and an operating wheel, 21, as set forth.

4. The combination of the horizontal frame



5 5, hinged around the main driving-shaft, the  
auger-frame 13, auger-shaft 15, carrying pul-  
ley 28, the band 27, the shaft 30, constructed  
with a driving-pulley, 29, and a pinion, 31,  
5 multiplying gear-wheel 32, and main driving-  
shaft 4, as set forth.

5. The combination of the two-part car-  
riage 38 39, the rope 41, passing therethrough

and around sheaves 44 45, and a key, 40,  
adapted to lock one truck at a suitable dis- 10  
tance from the other truck, as and for the pur-  
pose set forth.

HARRY BOERSTLER.

Witnesses:

JAS. T. HUFFORD,  
JOHN ABBOTT.