

K. WEBSTER.
AUTOMATIC LATHE.
APPLICATION FILED NOV. 17, 1904.

4 SHEETS—SHEET 1.

Fig. 1.

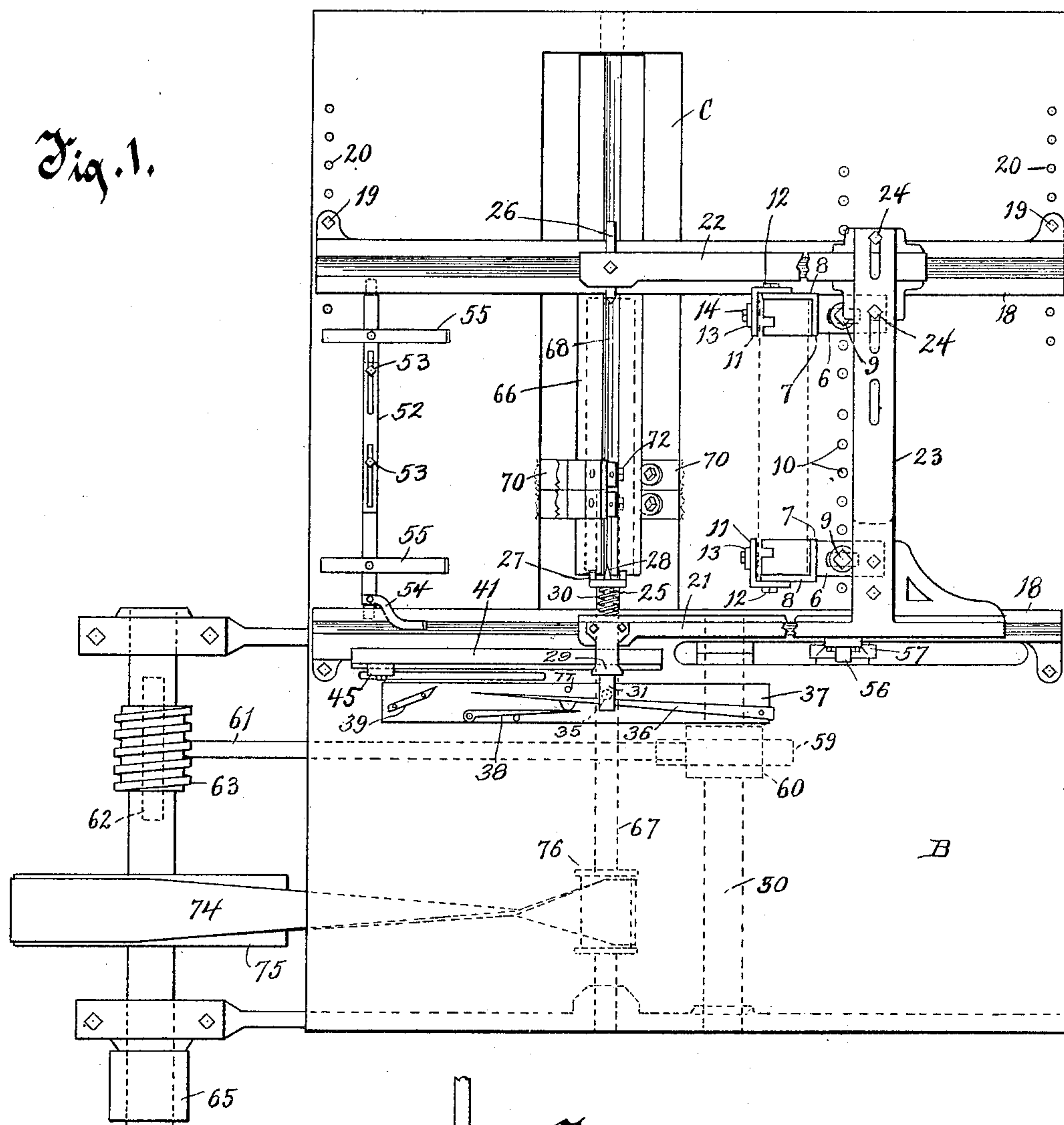
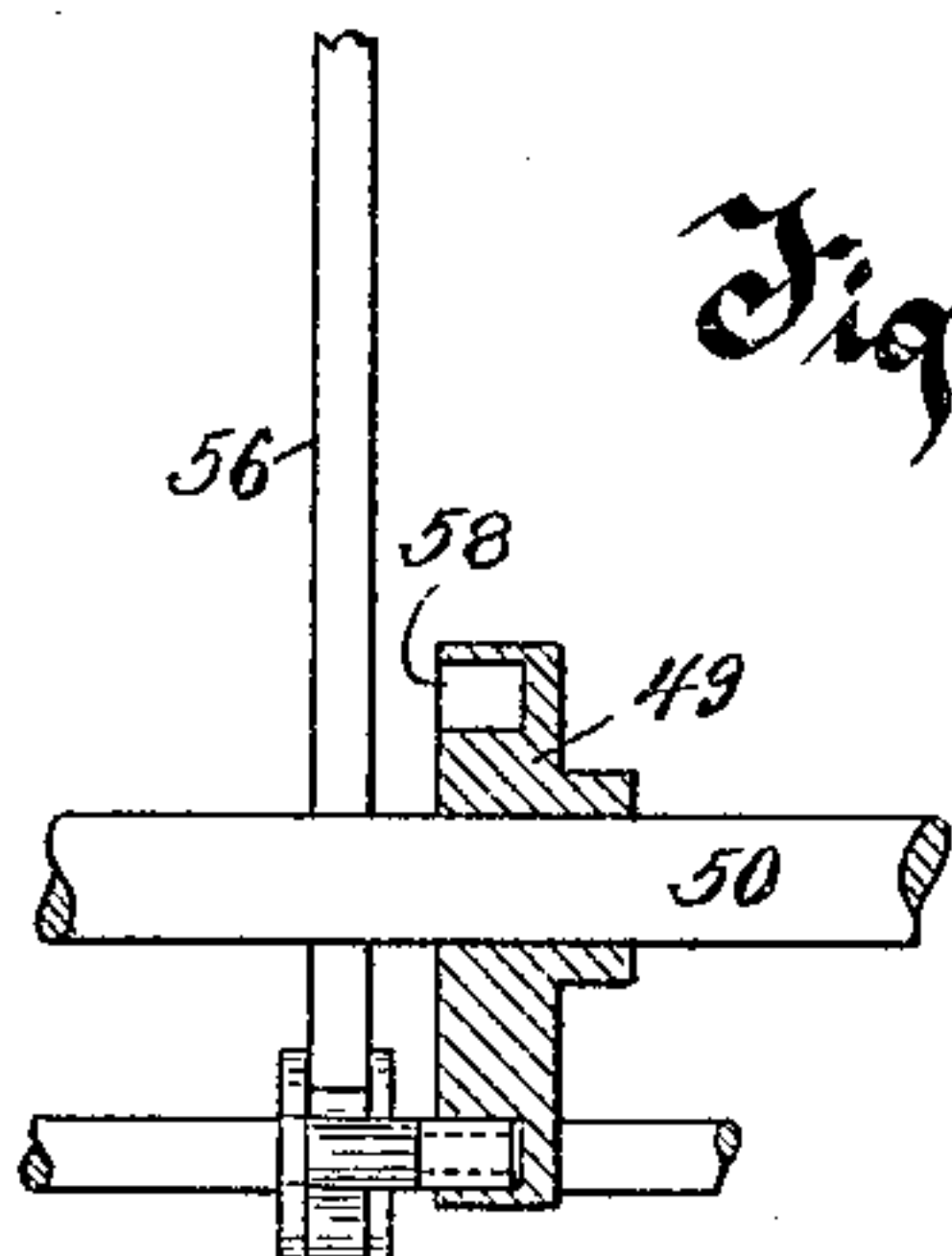


Fig. 9.



Witnesses.

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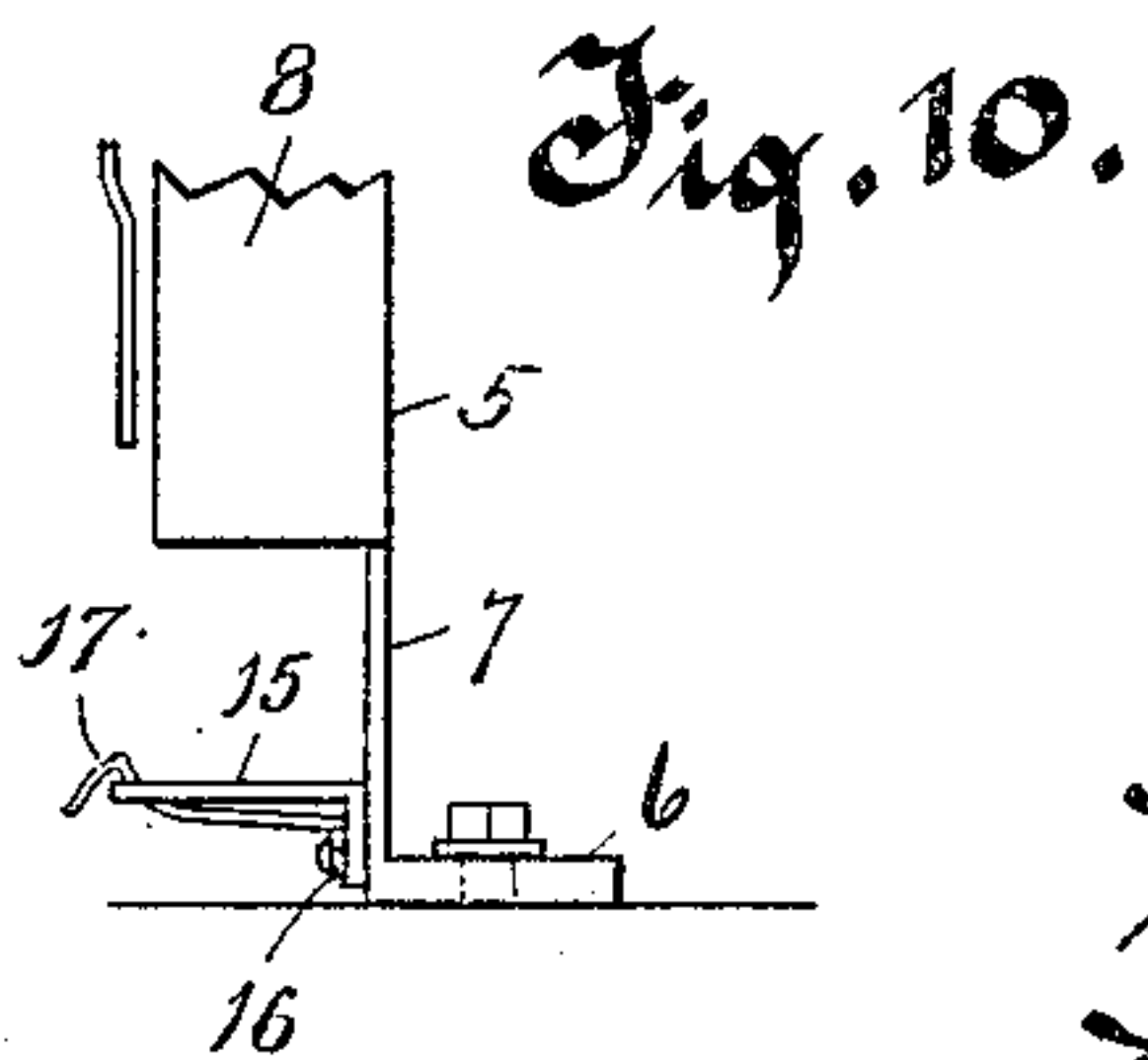
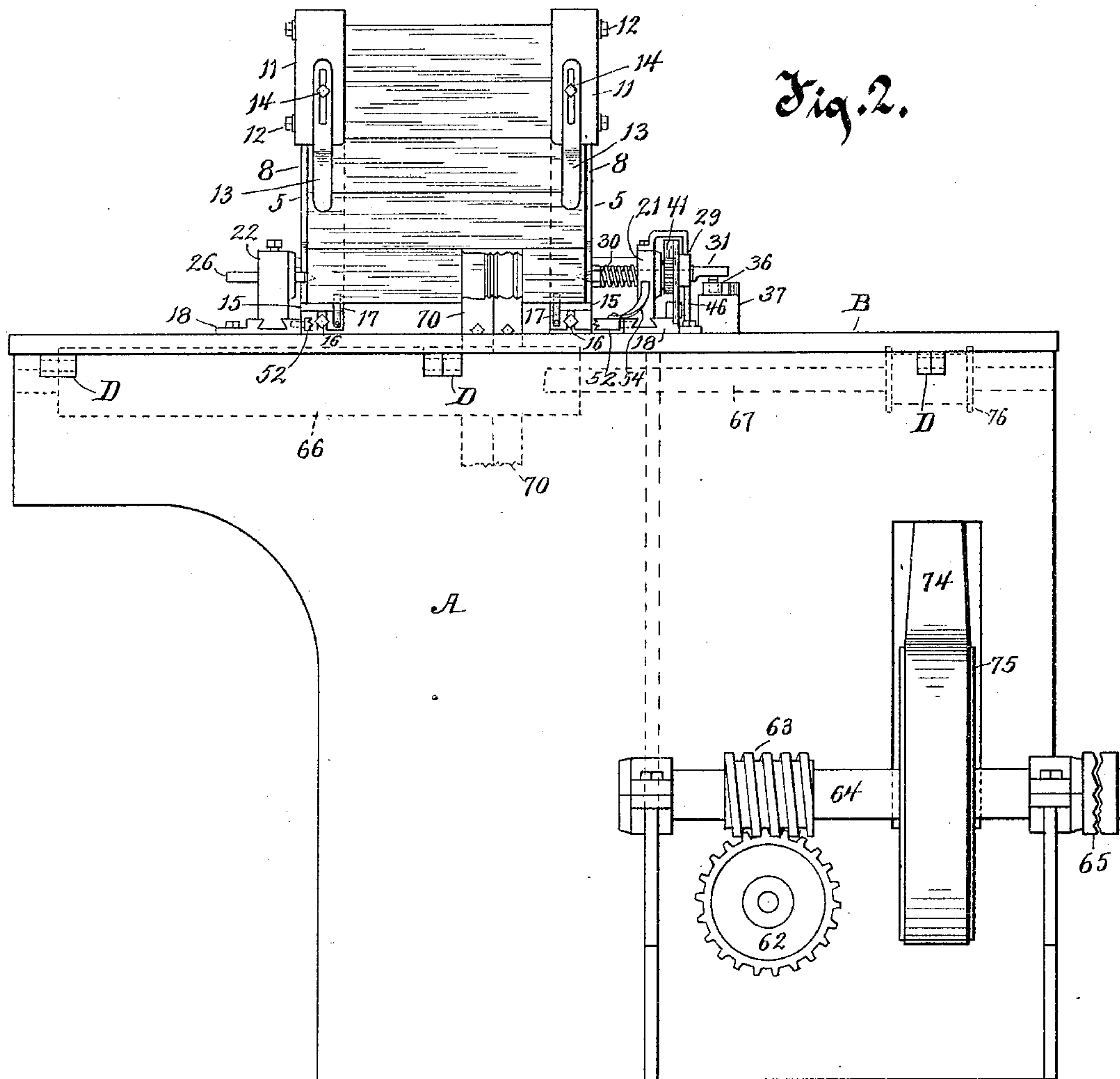
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No. 803,202.

PATENTED OCT. 31, 1905.

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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 3.

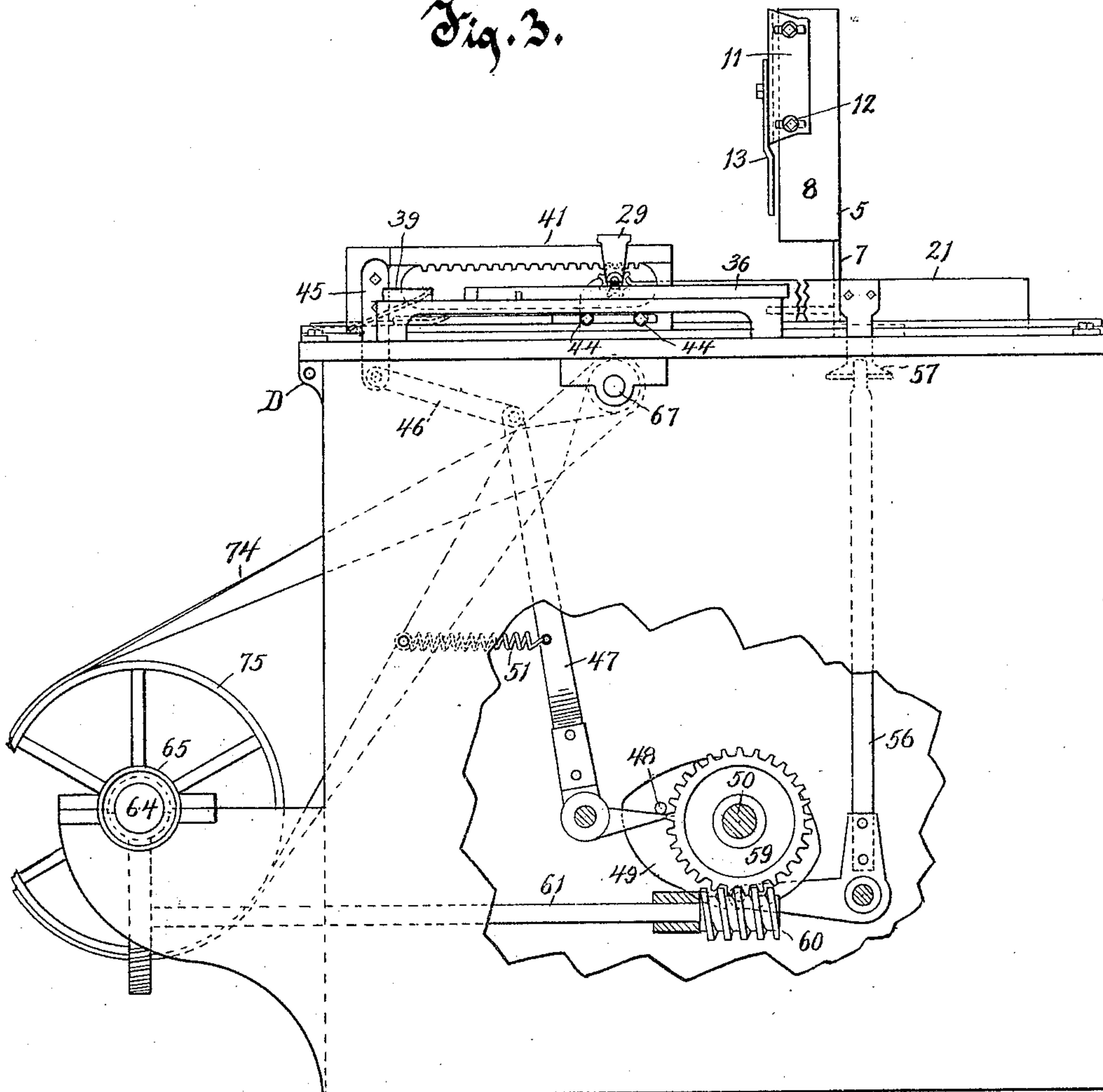
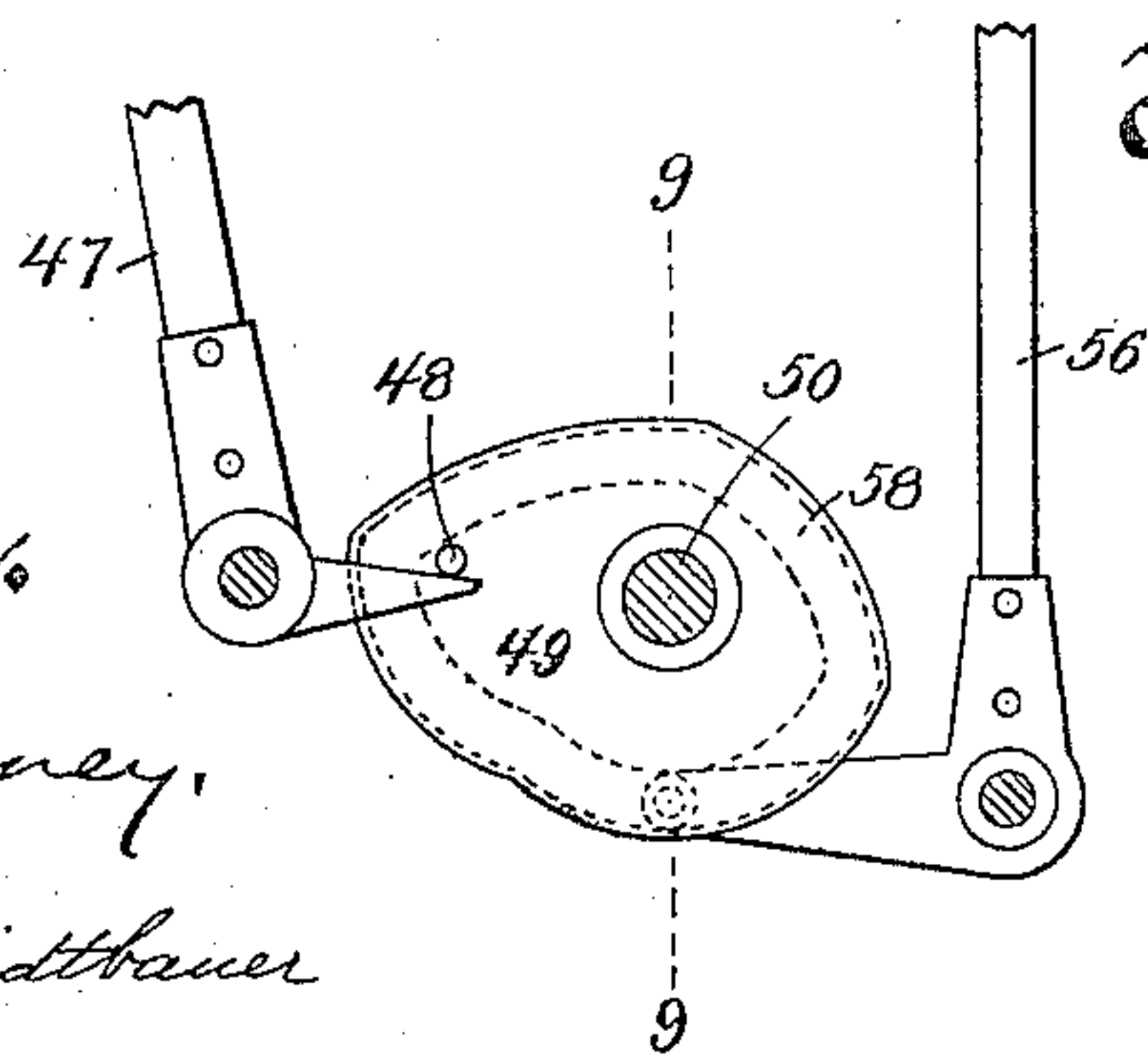


Fig. 8.



Witnesses.

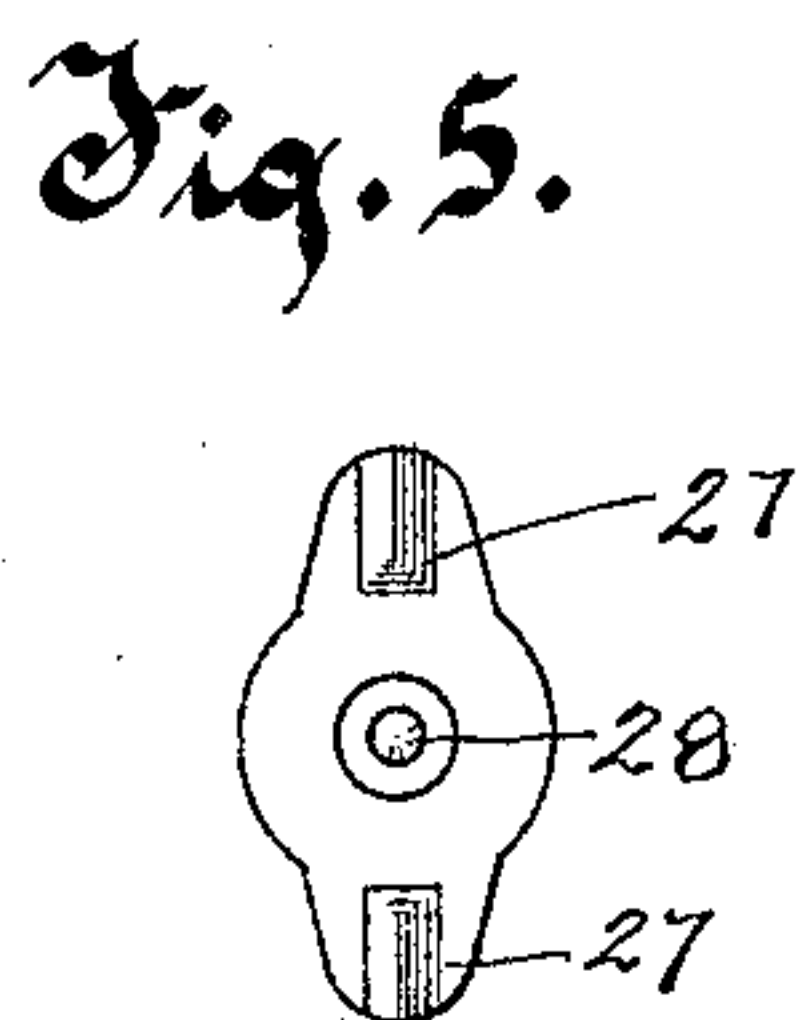
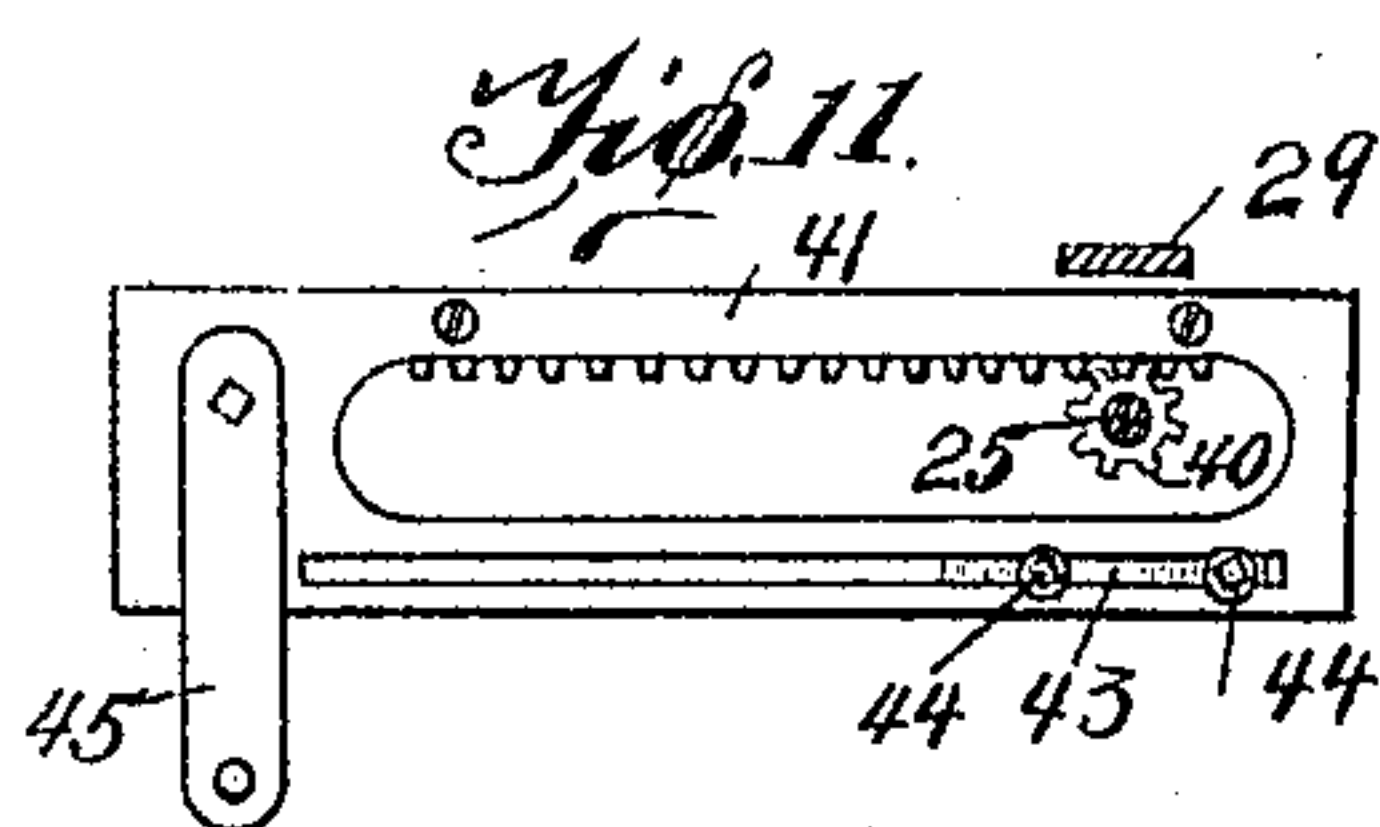
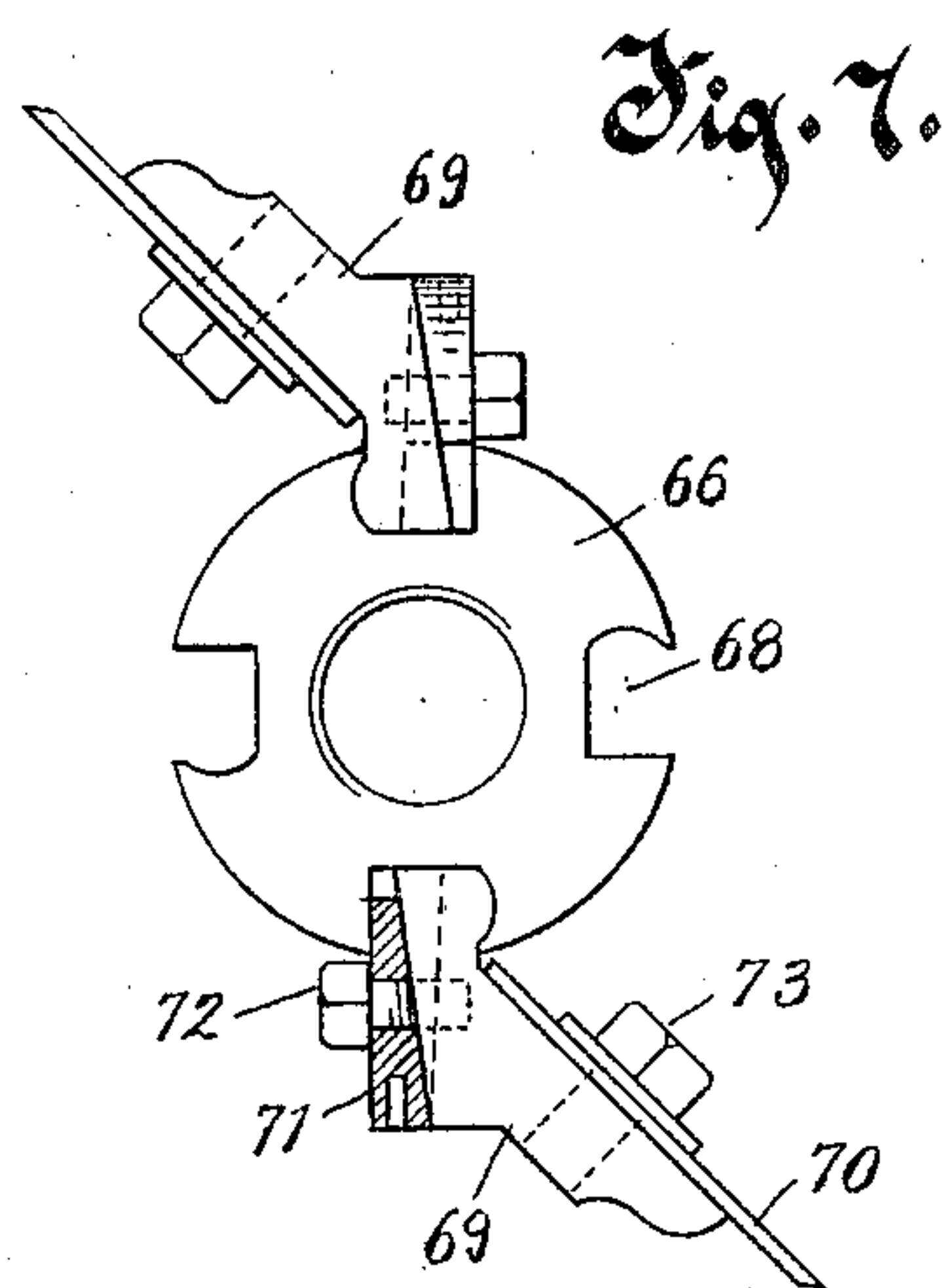
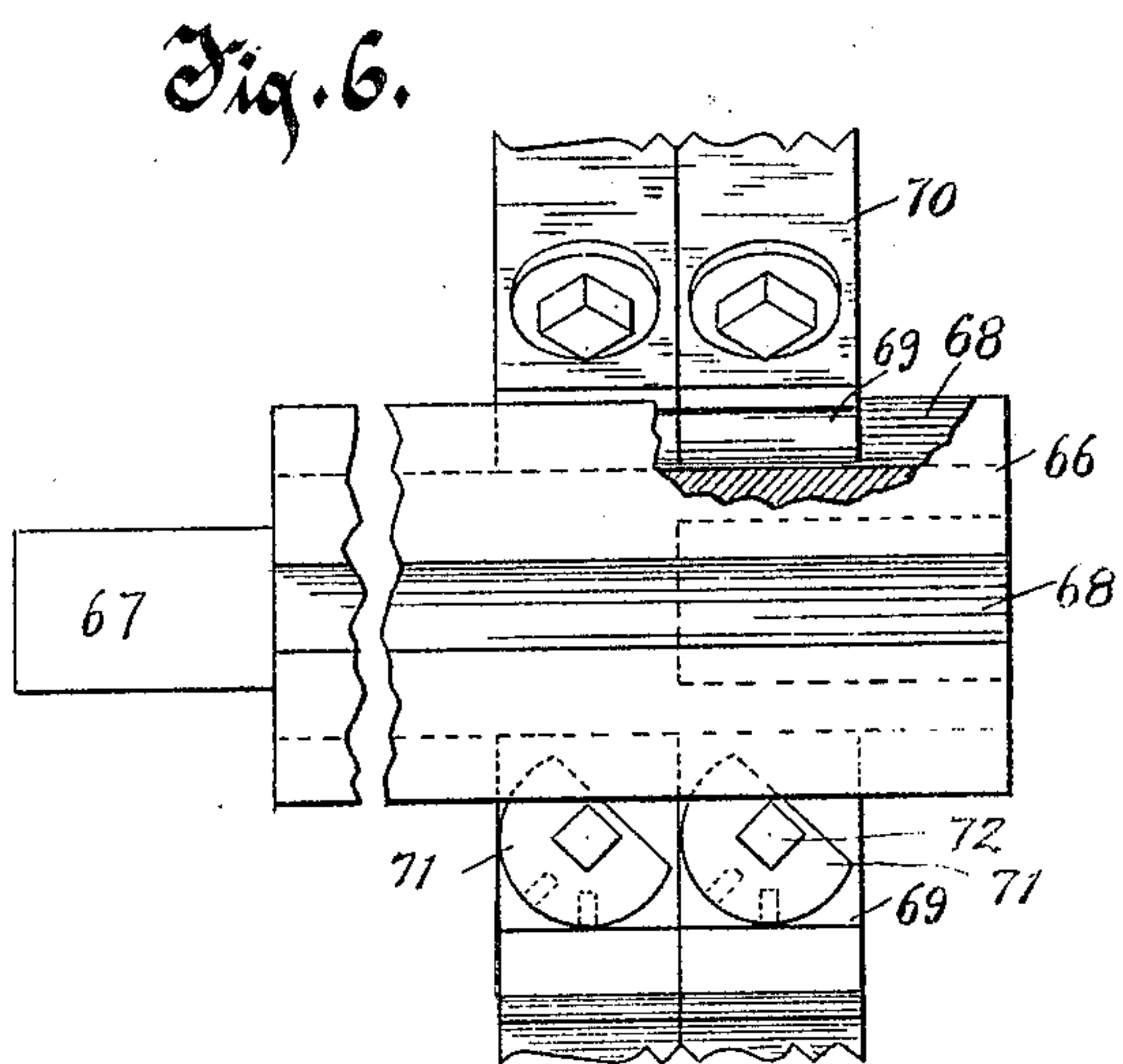
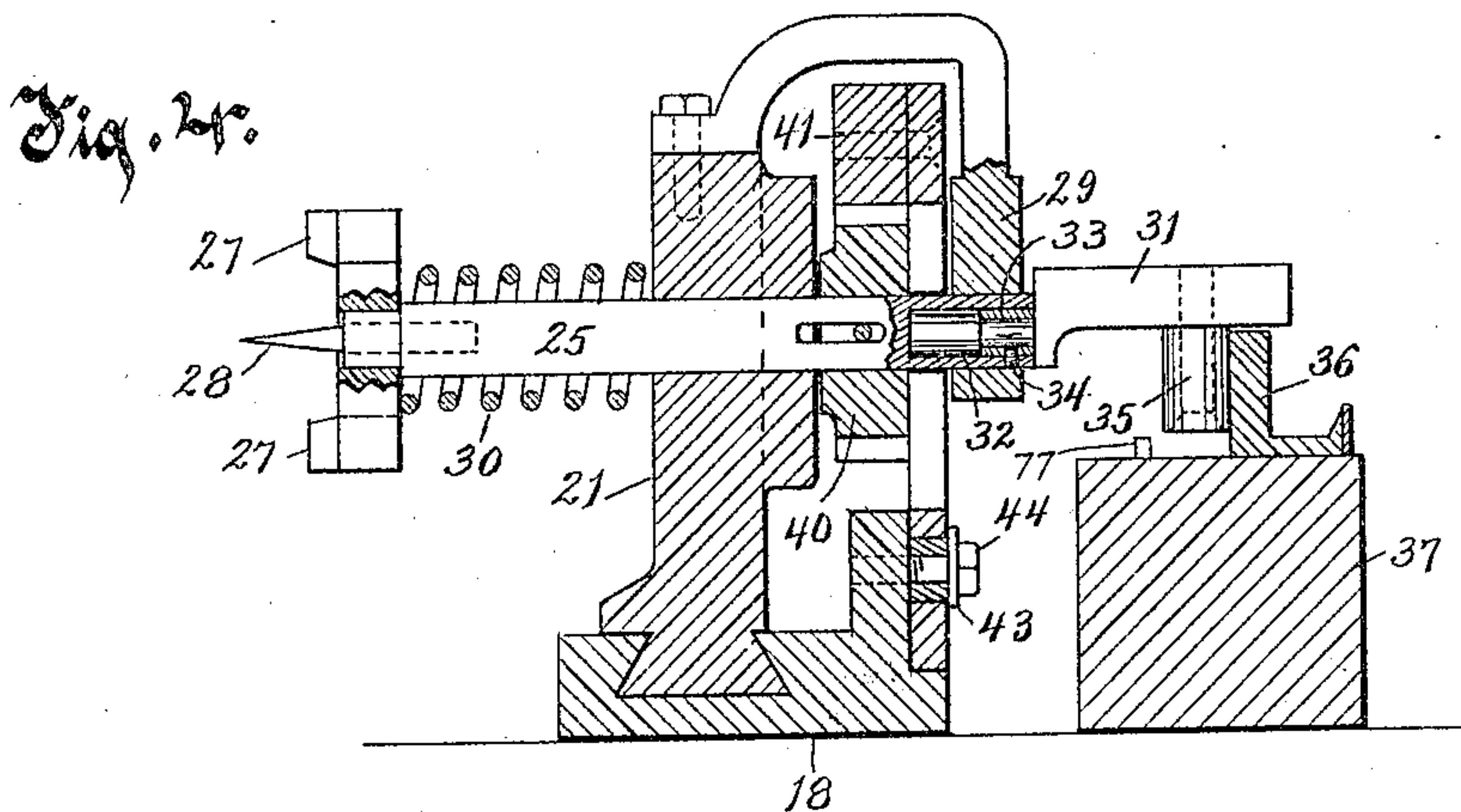
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4 SHEETS—SHEET 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

KIMBALL WEBSTER, OF BELOIT, WISCONSIN, ASSIGNOR OF ONE-HALF
TO LAWRENCE E. CUNNINGHAM, OF BELOIT, WISCONSIN.

AUTOMATIC LATHE.

No. 803,202.

Specification of Letters Patent.

Patented Oct. 31, 1905.

Application filed November 17, 1904. Serial No. 233,066.

To all whom it may concern:

Be it known that I, KIMBALL WEBSTER, residing in Beloit, in the county of Rock and State of Wisconsin, have invented new and
5 useful Improvements in Automatic Lathes, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in
10 automatic lathes of a class adapted for turning balusters, spindles, and other cylindrical articles of varying diameters.

The invention consists of the machine, its parts, and combinations of parts, as herein
15 described and claimed, or the equivalents thereof.

In the drawings, Figure 1 is a top view or plan of the machine embodying my invention. Fig. 2 is an elevation of that side of the machine at the left in Fig. 1. Fig. 3 is an elevation of that end of the machine which is
20 toward the bottom of the sheet in Fig. 1, parts being broken away and parts being shown in section for convenience of illustration. Fig. 4 is an illustration, mostly in section, of a head-stock in the machine and related parts. Fig. 5 shows the front end or
25 face of the chuck of the head-stock. Fig. 6 shows a fragment of the cutter-head with two of each of two sets of knives or cutters thereon. Fig. 7 is an end view, a part being in section, of the cutter-head and two sets of knives thereon. Fig. 8 is a detail of a cam and related devices employed to shift the carriage and to rotate the baluster-blank. Fig.
35 9 is a section on line 9 9 of Fig. 8. Fig. 10 shows a detail of construction in connection with the magazine for holding baluster-blanks, and Fig. 11 is a representation in detail of a reciprocating rack and some related
40 parts.

In the drawings, A represents a frame of such size, proportions, and form as is adapted for suitably supporting and carrying the
45 operative mechanism, and the frame includes a table or top B, provided with an elongated opening C, which top may be hinged to the main frame at one side, as shown at D.

A magazine for holding the material or
50 blanks that are to be turned into balusters, spindles, or other articles is mounted on the top of the table and may consist of heavy sheet-metal standards 5 5, located a little distance apart and opposite each other, each

standard consisting of a foot 6, an upright 55 flat member 7, forming the back or rear of the magazine, and a wing 8, forming the end of the magazine and at a right angle to the upright 7. The foot 6 rests on and is secured adjustably to the table B by a bolt 9, which
60 passes through an elongated slot therefor in the foot and through one of the series of bolt-holes 10 in the table. An angle-plate 11 is secured adjustably to the wing 8 by means of bolts 12 through horizontally-elongated slots
65 in the angle-plate and fixed in the wing 8, whereby the angle-plate can be adjusted toward or from the back of the magazine, thus providing for increased or diminished capacity of the magazine in a direction toward the front
70 and rear. On the outer face of the angle-plate 11 there is a flat spring 13, secured to the angle-plate by a bolt 14 through a vertically-elongated slot in the spring and fixed in the angle-plate, whereby the spring can be adjusted
75 vertically. The spring projects downwardly below the angle-plate and is adapted to bear yieldingly against the front surface of a blank or blanks as such blank or blanks by gravity go down in the magazine until just preceding its
80 reaching its lowest position. By this means the blank is held to and movably against the back of the magazine formed by the inner surfaces of the uprights 7 as the blanks come down to the stocks on the carriage, by which stocks
85 they are to be engaged and supported during the process of the manufacture of the baluster or balusters. The lower ends of the wings 8 are cut away to provide opportunity for the stocks or the centers thereof to engage the
90 lowest blank and to carry it forward to the position in the lathe where the blank is converted into a baluster. A bracket 15 is secured adjustably, by means of a bolt 16, to the inner face of each upright 7 and projects
95 therefrom, forming a ledge or platform on which the lowest blank rests when it comes to position between and opposite the centers or chucks of the stocks to be engaged thereby. Retaining-springs 17 are also secured one to
100 each upright 7 and project forwardly therefrom and at the front end slightly upwardly, so as to be just in front of the lower front edge of the lowermost blank in the magazine, the springs being adapted to retain the blank
105 releasably in the bottom of the magazine and against the rear walls thereof until the blank shall have been engaged by the centers or

chucks of the stocks and carried out over the retaining-springs.

Two rails 18 or carriage-ways arranged parallel with each other rest on and are secured to the table B, one of which rails is advisably secured adjustably to the table by means of bolts 19, that pass through the base of the rail and through complementary holes of the series of bolt-holes 20 in the table. By this means the rail can be adjusted toward or from the complementary rail, so as to widen or narrow the space between the rails, as desired. These rails are provided with ways, advisably dovetailed or undercut in cross-section, for the travel of the feet of the carriage therein.

A material or blank holding carriage is composed of two complementary blocks 21 22, fitted slidable endwise in the ways in the rails 18, the block 21 being provided with a rigid cross-bar 23, that extends to and rests on the block 22 and is secured adjustably thereto by bolts 24 passing through elongated slots in the bar 23 and fixed in the block or in projecting portions thereof. The block 21 is provided with the rotatable mandrel or head-stock 25, and the block 22 is provided with the pin or center 26, secured adjustable endwise in the block 22, and forms the tail-stock of the carriage. The front end of the head-stock 25 has radially-disposed chuck-blades 27 and a center 28, adapted to engage the blank and compel its rotation with the head-stock. The head-stock 25 is rotatable and movable endwise in its bearings in the block 21 and in a hanger 29, mounted on the block 21. The head-stock is held up to its work yieldingly by a spring 30. This head-stock is also provided with a non-revoluble tang 31, which is connected to the rotatable mandrel 25 by a headed pin 32, which enters a bore therefor in the rear end of the mandrel and is secured in place therein by a collar 33 about the neck of the pin and held in and to the mandrel by a set-screw 34. The mandrel, with the collar, rotates about the headed pin 32 and is compelled to movement endwise with the tang 31 by this connection. The tang 31 is provided with a pin 35, having an antifriction rotatable sleeve thereon, which pin bears against and travels on the inner face of the elongated guide 36 and over pin 77 in the pedestal when the carriage moves toward the left or rear in Fig. 1 and on the outer surface of the same guide when the carriage travels toward the front. The guide 36 is pivoted at one end on the top surface of a pedestal 37, fixed on the table B, and is held yieldingly toward the low pin 77 by a spring 38, also mounted on the pedestal 37. In the rear of the rear end of the guide 36 there is an inclined guide 39, adapted when the pin 31 contacts therewith as the carriage moves toward the rear to withdraw the mandrel 25 outwardly against the action of the spring 30 and pull the chuck from the blank or baluster. As the carriage retreats toward the right in

Fig. 1 the pin 35 passes behind or outside of the guide 36 and travels on its outer surface to its front end, when it is suddenly released opposite the magazine, causing the chuck of the mandrel to engage the blank and hold it to the center 26 in the tail-stock.

For rotating the head-stock or mandrel 25 a pinion 40 is splined on the mandrel, and this pinion gears with the teeth of a slidable rack 41, that reciprocates on a track 43, held to a flange of the track 18 by bolts 44. The slidable rack is an elongated frame having an upper and a lower bar parallel horizontally with each other and connected rigidly together at their ends, an overhanging portion of the upper bar having on its lower edge the rack-teeth, that gear with the pinion 40, and the lower horizontal bar having a longitudinal slot that receives the track 43 therein, so that the lower bar straddles and travels horizontally on the track. An arm 45, secured rigidly to the rack 41, is connected by a link 46 to one arm of a bell-crank lever 47, the other arm of which lever engages intermittently a pin 48 of an eccentric 49 on a shaft 50. A spring 51, anchored to the frame and connected to the bell-crank 47, is adapted to return that crank and the rack 41 to initial positions.

A device for discharging the balusters or finished articles from the machine, and particularly from the head and tail stocks when released therefrom, consists of a rock-shaft 52, advisably made in two parts overlapping each other and connected together adjustably, so as to be capable of being lengthened or shortened by set-screws 53 through slots therefor in one of the members and turning into the other member, which rock-shaft is mounted between and conveniently in the rails 18 at the rear of the cutters, the rock-shaft being provided with an actuating-arm 54, adapted to be contacted by the block 21 as it travels rearwardly from and beyond the position shown in Fig. 1, where it is holding the blank to be turned into a baluster. The arm 54 contacts against an inclined surface of the block 21, whereby the arm 54 is lifted and the rock-shaft 52 is correspondingly rotated. The rock-shaft 52 is provided with transversely-disposed discharging-arms 55, adapted when the baluster in the stocks is brought to position over the front ends of these arms by the travel of the carriage rearwardly and when lifted by the contact of the arm 54 with the incline on the block 21 to take the baluster as it is released from the stocks and lift it to a certain extent and permit the baluster to slide down the arms 55, whereby it is discharged from the machine. The rock-shaft 52 and arms 55 are so disposed that the baluster is released from the stocks or centers just at the time that the baluster is over the front ends of the arms 55. When the carriage goes back toward the front, the rock-shaft and the arms 55 assume their initial positions by gravity.

For reciprocating the material-supporting carriage forward and back at varying speeds and with suitable periods of rest a bell-crank 56 is employed, which bell-crank is pivoted 5 on the frame, and its long arm enters loosely a socket therefor in a hanger 57, secured rigidly to and depending from the block 21 of the carriage, and the other arm of the bell-crank is provided with a pin and an antifric- 10 tion-sleeve, which rides in an irregular eccentric groove 58 in the surface of the eccentric 49. The route and form of this groove 58 are such that the carriage is caused to travel to such position at the front of the machine as 15 brings the centers or stocks to opposite a blank resting on the brackets 15 at the bottom of the magazine and then moves the carriage toward the front until this blank is brought to a position over the cutters, where 20 it rests for a period sufficient for the turning of the blank into a baluster and then again moves forward to the discharging device, where the stocks are released from the baluster, and is then returned to its initial position 25 at the front of the machine. During this reciprocation of the carriage the pin 35 on the tang of the head-stock travels along the inner surface of the guide 36 to its rear end, where the pin 35 engages the inclined guide 39 and 30 by the movement of the carriage rearwardly withdraws the head-stock from the baluster, and then as the carriage moves toward the front the pin 35 contacts with and travels along the outer surface of the guide 36, which 35 in the meantime has been shifted inwardly by the action of the spring 38 to the front end of the guide 36, which is about opposite the magazine, and when the pin 35 comes to and escapes from the front end of this guide 36 40 the head-stock, being actuated by the spring 30, is forced forward into a blank at the bottom of the magazine.

The shaft 50 is provided with a worm-wheel 59, which meshes with a worm 60 on a shaft 45 61, which in turn is provided with a worm-wheel 62, that meshes with a worm 63 on the driving-shaft 64, provided with a pulley 65, adapted to carry a belt from a source of power-supply.

For turning the blanks into balusters of varying diameters a revoluble cutter-head 66, carried on a shaft 67, is located at the rear of the magazine and mostly below, but so as to be in the opening C of the table B, and this 55 cutter-head is provided with a plurality, advisably four, longitudinal grooves 68, adapted to receive therein cutter or knife stocks 69, to which knives or cutters 70 are secured. The grooves 68 may be undercut in curved 60 form in one wall thereof, and the cutter-stocks are provided severally with a foot that is adapted to fit and be slid into the groove, whereby the stock is held in position against displacement revolubly or otherwise. Any 65 number of cutters and their stocks may be

employed within the limit of the length of the cutter-head, and such cutters and stocks may be used in one or more of the grooves of the cutter-head, as desired. As a desirable means of securing the cutter-stocks 69 in the grooves 68 each 70 stock is made thinner than the narrowest width of the grooves 68 and is provided with a pivoted button-key 71, advisably cam-faced, which being turned into the groove alongside the cutter-stock locks it in place, the key being 75 secured in position by a screw 72. The cutters 70 are thin blades secured to the stocks 69 by means of screws 73. The face of the stock is so disposed that the blade is at a tangent to the axis of the cutter-head, and the cutting 80 edges of the blades are in such form as desired to turn a baluster or other article of the shape contemplated.

A belt 74, running on a large pulley 75 on shaft 64, runs also on a small pulley 76 on the 85 cutter-head shaft 67, whereby the cutters are given rapid rotation.

What I claim as my invention is—

1. In an automatic lathe, a magazine for blanks, a carriage reciprocable past rotating 90 cutters, head and tail stocks on the carriage, means for rotating the head-stock, means for holding the head-stock yieldingly up to its work, means for withdrawing the head-stock 95 from its work against the action of the yielding means for holding the stock up to its work, permanently-located rotating cutters, and means for reciprocating the carriage and giving it a rest in the midst of its travel in one direction during the period and in the 100 place for turning the blank.

2. In a lathe, a supporting-table, an upright magazine for blanks fixed on the table, a carriage having elongated side blocks extending 105 toward the front, the blocks being disposed to straddle the magazine, head and tail stocks opposite each other on the side blocks, cutters mounted on the table below the path of the carriage, material-discharging devices in the path and in front of the carriage, and means 110 adapted to reciprocate the carriage causing the head and tail stocks to move from opposite the magazine to over the cutters, to rest over the cutters, and to move thence to the discharging devices and then to return by a 115 continuous movement to opposite the magazine.

3. In a lathe, parallel rails having grooves forming trackways, a carriage composed of elongated blocks fitted and slidable in said 120 trackways and a cross-bar securing the blocks to each other near their rear ends from which cross-bar the blocks extend a considerable distance toward the front, head and tail stocks in the carriage at a distance from and in front of 125 the connecting cross-bar, means adapted to reciprocate the carriage and give it a rest in the midst of its reciprocating movement forwardly, rotating cutters located in the frame and between the head and tail stocks when 130

said carriage is at its rest, and means beyond said cutters for releasing the finished material.

4. In a lathe, a reciprocable elongated carriage provided with head and tail stocks near its front end, a bell-crank lever one arm of which is connected to the carriage, an actuated eccentric with which the other arm of the bell-crank lever is connected operatively, the eccentric being formed to reciprocate the carriage and to give it a period of rest in the midst of its movement in one direction, rotating cutters located in the frame and between the head and tail stocks when said carriage is at its rest, and means beyond said cutters for releasing the finished material.

5. In a lathe, a reciprocable carriage, a head-stock mounted shiftable endwise in the carriage, a spring holding the head-stock yieldingly up to its work, a guide extending in the direction of the path of the carriage and pivoted and having limited swing on a fixed support adjacent to the carriage, means on the head-stock disposed to contact with the guide and pull out the stock while the carriage is going toward initial position, a spring to hold the guide yieldingly in initial position, and a second fixed inclined guide disposed to contact said means and to quickly withdraw the head-stock as it approaches the limit of its travel rearwardly.

6. In a lathe, a reciprocable carriage, a rotatable head-stock mounted shiftable endwise in the carriage, means for rotating the head-stock, a non-revoluble tang extending from the head-stock in the direction of its axis to which tang the head-stock is connected rotatively, a spring holding the stock yieldingly forward, an elongated inclined guide, extending alongside and in the direction of the travel of the carrier, and means on the tang adapted to contact with said guide as the carriage returns to initial position and to withdraw the stock against the action of the spring.

7. In a lathe, a reciprocable carriage, material-holding stocks in the carriage, a rock-shaft at the rear in the path of the carriage, radial uptilting discharging-arms on the rock-shaft, and an actuating-arm on the rock-shaft adapted to be engaged and tilted by the advancing carriage.

8. In a lathe, a track-support, parallel tracks on the support, means permitting and adapted to receive the adjustment of one track nearer to or farther from the other track, a

carriage mounted and adapted to travel on the tracks, a head-stock and a tail-stock mounted in the carriage opposite and complementary to each other, means in the carriage for permitting and securing the members of the carriage and the head and tail stocks nearer to or farther from each other, and a material-holding magazine composed of two members mounted on the track-support and adjustable toward and from each other on their support and in the direction of the permissible adjustment of the track and the carriage members.

9. In a lathe, a reciprocating carriage, a rotatable head-stock in the carriage, a pinion on the head-stock, a reciprocable rack meshing with the pinion, and means for reciprocating the rack.

10. In a lathe, a reciprocable carriage, means for reciprocating the carriage and giving it a rest in the midst of a movement of reciprocation, a rotatable head-stock in the carriage provided with a pinion, a reciprocable rack gearing with said pinion, and means for reciprocating the rack while the carriage is at rest in the midst of a movement of reciprocation.

11. In a lathe, a rotatable head-stock, a pinion on the head-stock, a reciprocable rack meshing with said pinion, a bell-crank, one arm of which is connected to the reciprocable rack, a shaft, an eccentric plate on the shaft provided with an eccentric-pin adapted to contact with the other arm of the bell-crank and swing the bell-crank, and a spring adapted to return the bell-crank and rack to initial positions.

12. In a lathe, a reciprocating carriage provided with material-holding stocks, a rock-shaft, mounted in the track and transversely of the path of the carriage, material-lifting arms fixed on the rock-shaft parallel with the path of the carriage, and an arm on the rock-shaft adapted to contact with and be shifted by the carriage rotating the rock-shaft limitedly and correspondingly uptilting the arms thereon.

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

KIMBALL WEBSTER.

Witnesses:

DON VAN WORT,
J. A. LOVE.