

No. 694,783.

Patented Mar. 4, 1902.

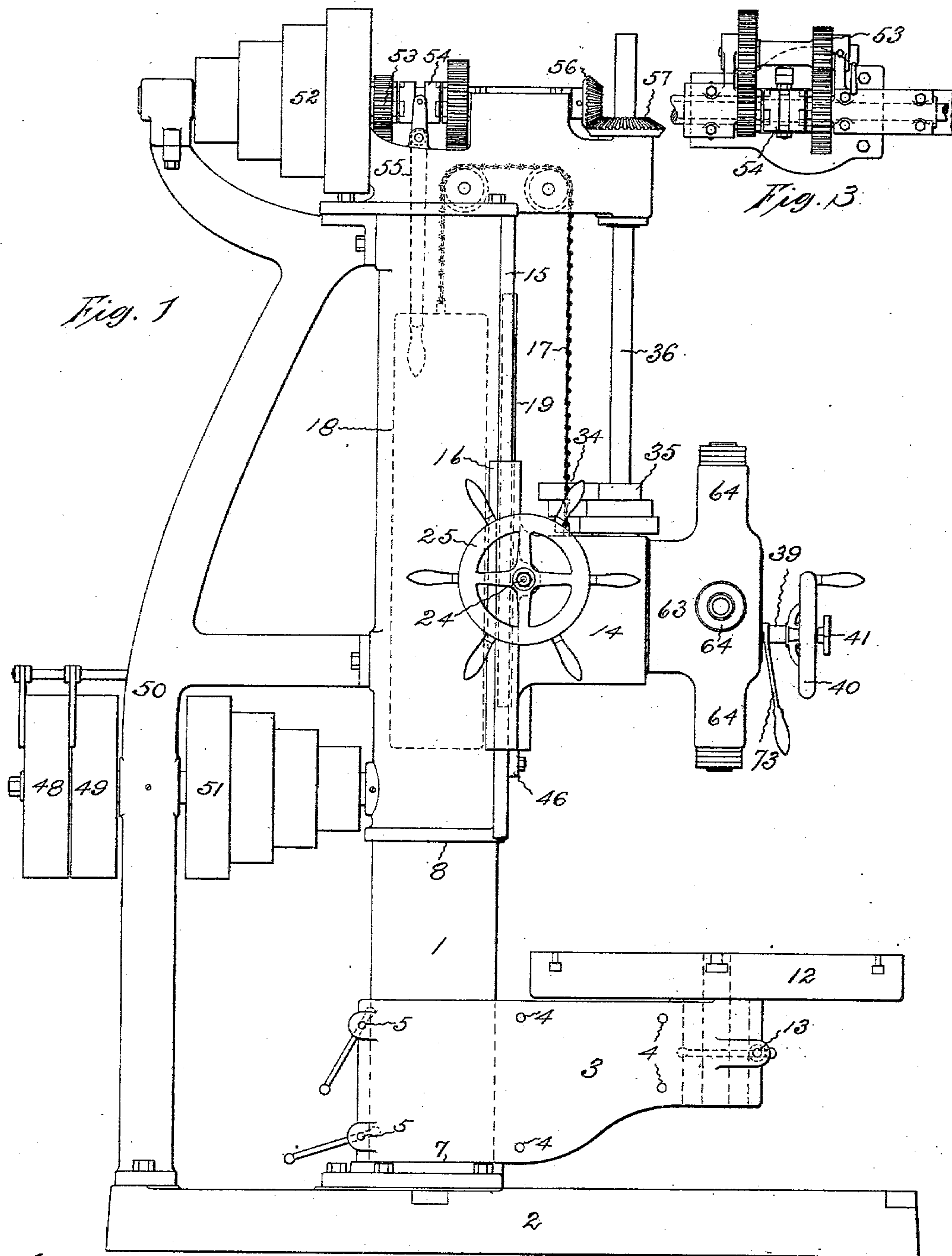
A. D. QUINT.

TURRET DRILLING, MILLING, AND TAPPING MACHINE.

(Application filed June 12, 1900.)

(No Model.)

4 Sheets—Sheet 1.



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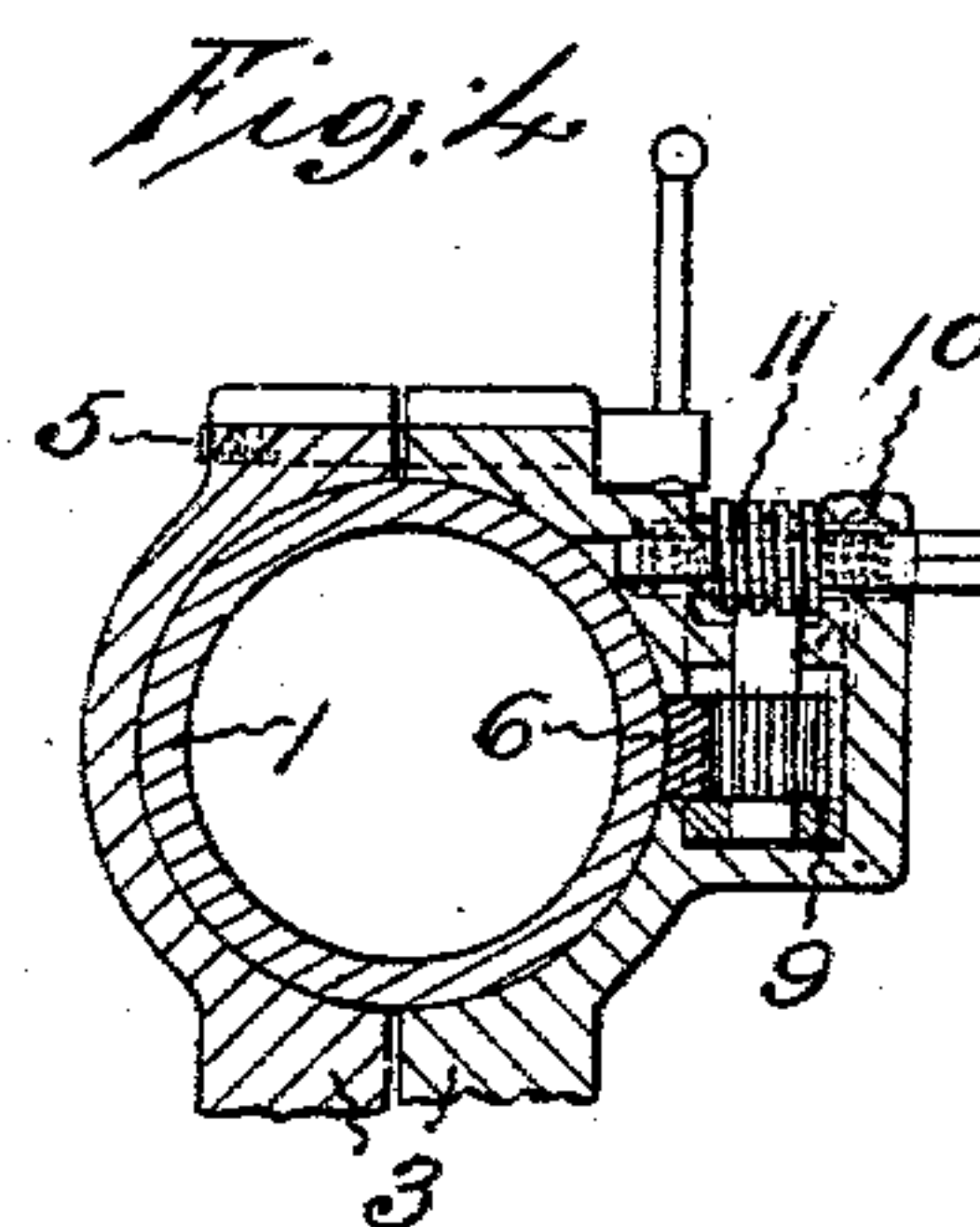
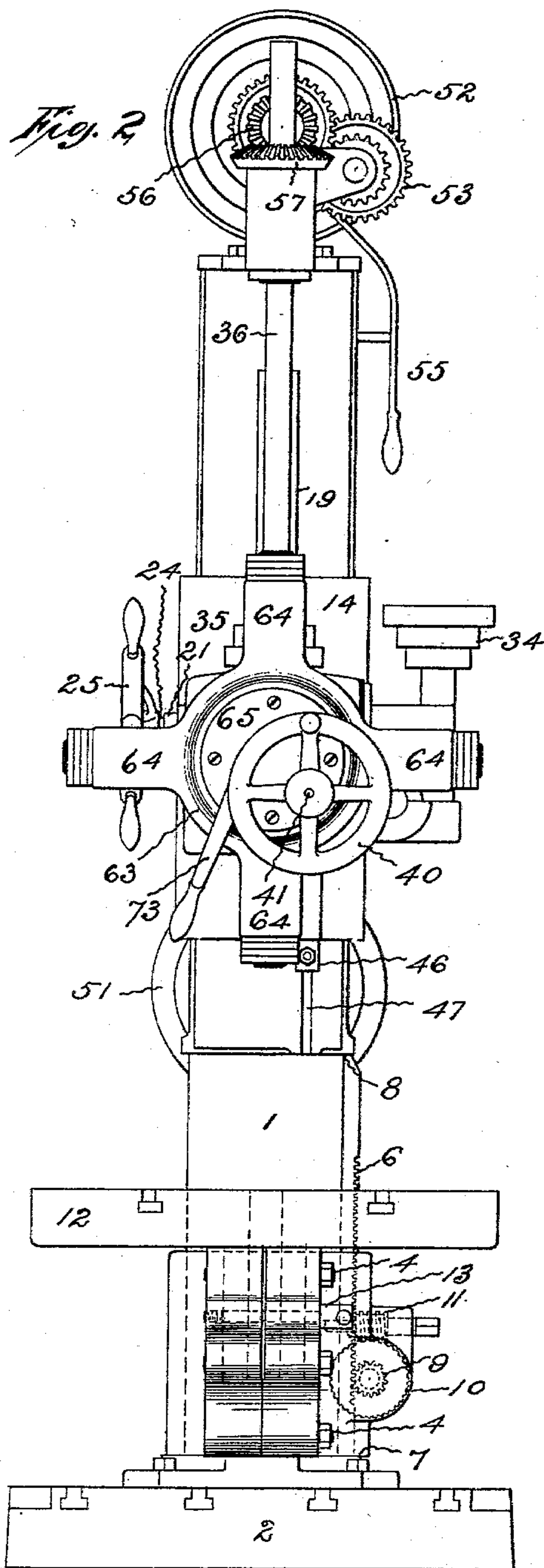
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(No Model.)

4 Sheets—Sheet 2.



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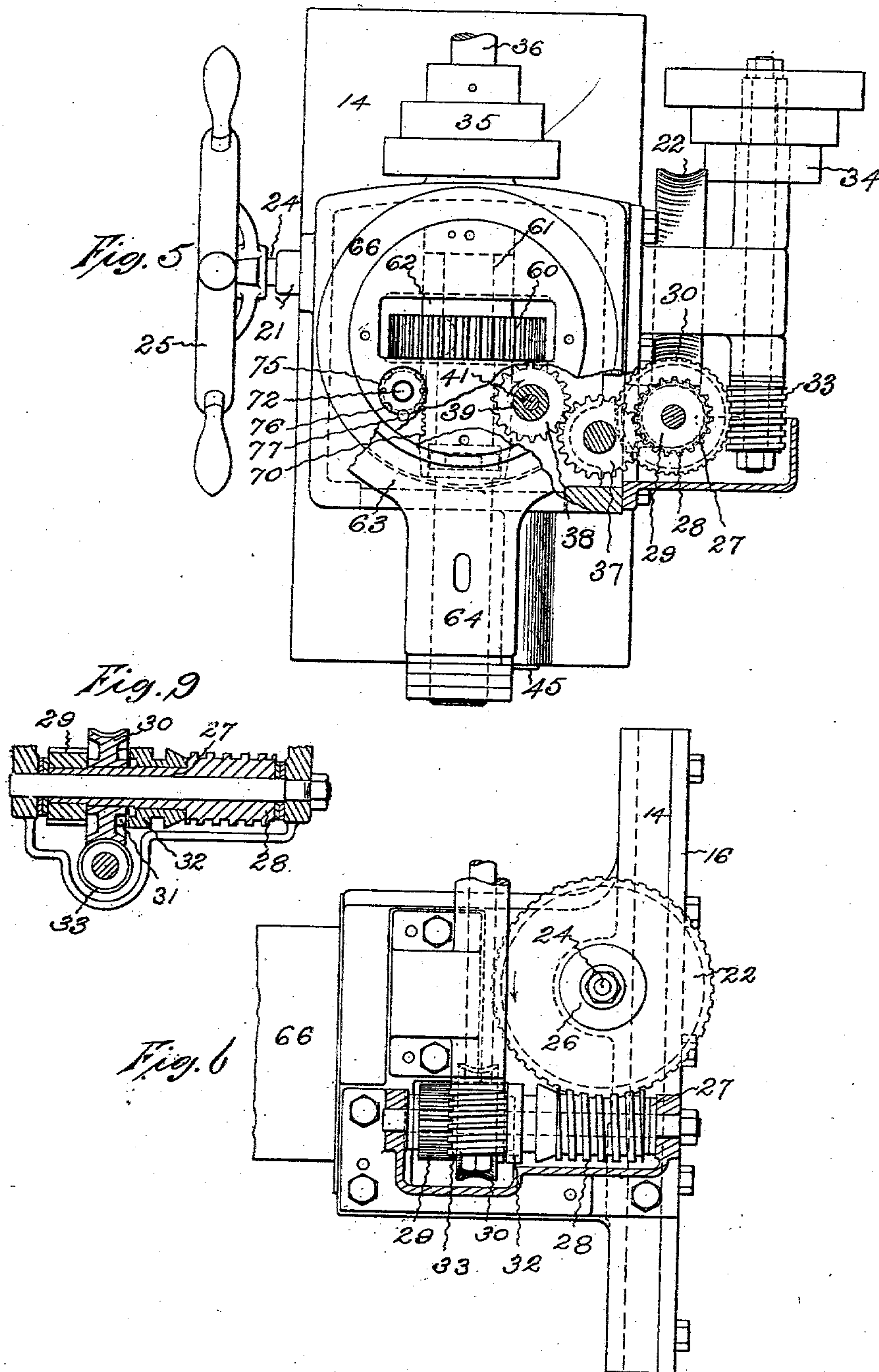
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4 Sheets—Sheet 3.



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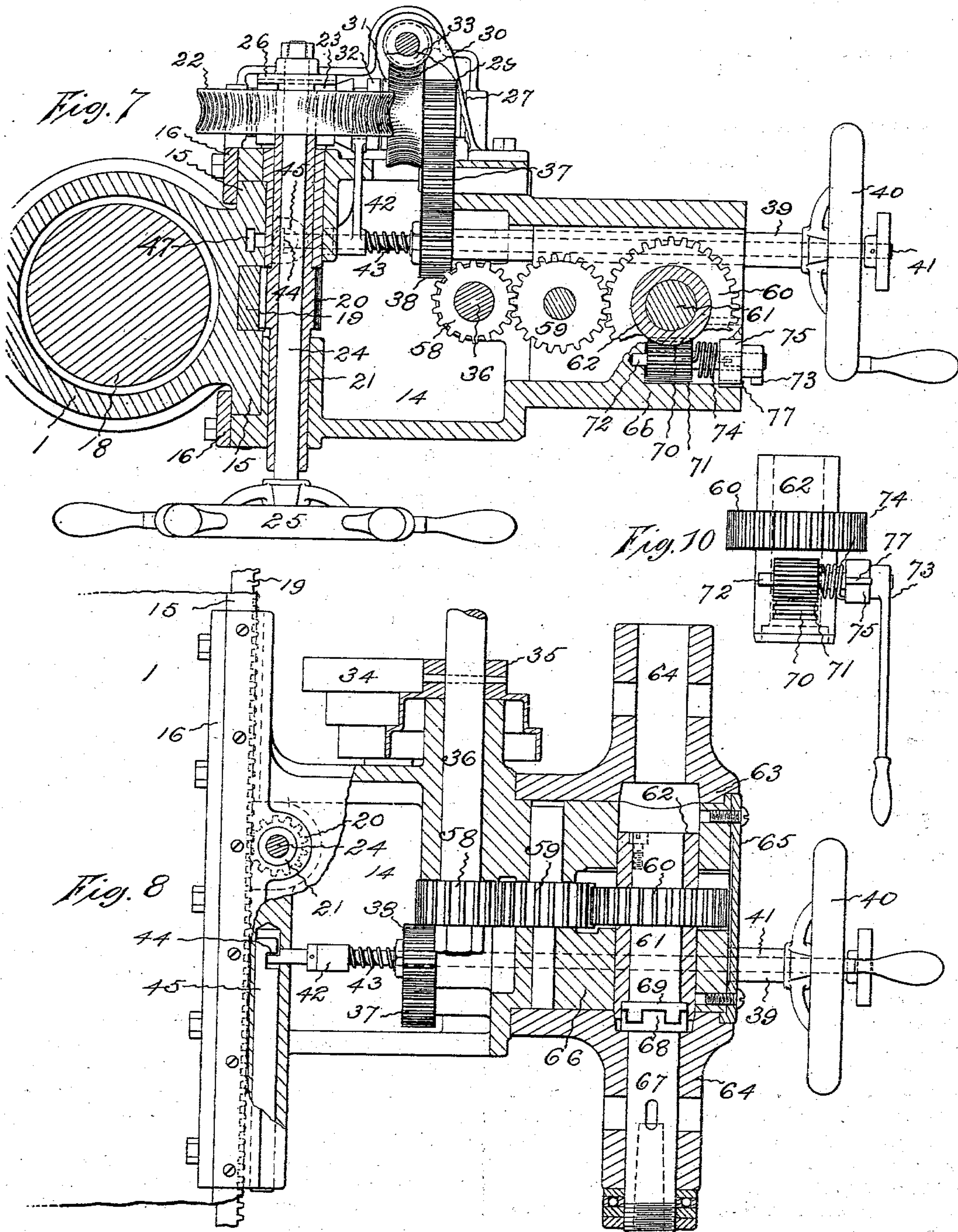
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(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

ALANSON D. QUINT, OF HARTFORD, CONNECTICUT.

TURRET DRILLING, MILLING, AND TAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 694,783, dated March 4, 1902.

Application filed June 12, 1900. Serial No. 19,986. (No model.)

To all whom it may concern:

Be it known that I, ALANSON D. QUINT, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Turret Drilling, Milling, and Tapping Machines, of which the following is a specification.

This invention relates to those machine-tools which have rotatable turrets that carry a number of rotatable tools arranged for successively drilling, milling, tapping, or performing other operations upon metal or wood.

The object of the present invention is to construct a machine of this nature in which the rotatable turret carrying the several rotatable tools may be fed slowly or rapidly toward and from the work either by power or by hand and the successive tools brought into operation without stopping the machine.

The machine illustrated in the accompanying drawings as embodying the invention is arranged so that the turret moves vertically toward and from the work; but the machine can without departing from the invention be arranged so that the turret will move horizontally.

The machine shown has a column rising from the base with a rotatable table supported by an arm that is mounted upon the column so that it may be swung around for locating the work and may be raised or lowered to bring the work to the desired level below the turret. The turret arranged to bear the different tools is mounted upon a head that can be fed vertically along the column by a feed mechanism that moves with it and that can be operated rapidly or slowly by hand or by power and can be automatically stopped without in any way interfering with or stopping the running of the tool-spindle-driving mechanism or the rotation of the head for bringing either tool into operative position.

Of the views, Figure 1 is a side elevation of a vertical-turret machine that embodies the invention. Fig. 2 is a front elevation of the same machine. Fig. 3 is a plan of a portion of the driving mechanism at the top of the machine. Fig. 4 is a detail section showing the mechanism for elevating and lower-

ing the work-table. Fig. 5 is an enlarged front elevation of the turret-head with parts broken away to better show the construction. Fig. 6 is a side elevation of the turret-head with parts broken away. Fig. 7 is a horizontal section of the turret-head. Fig. 8 is a vertical section of the turret-head and turret. Fig. 9 is a detail section of a portion of the feed mechanism, and Fig. 10 is a detail elevation of the turret registering and locking mechanism.

The column 1 is secured to the base 2 in any suitable manner. The table-arm 3 is formed in two parts, that are held together on one side of the column by bolts 4 and on the other side of the column by clamp-screws 5. With the clamp-screws loose the arm is free to be swung around and raised or lowered on the column; but when the clamp-screws are tightened the arm is fastened in position, Figs. 1, 2. In a mortise in one of the arm parts is a rack 6, that is free to revolve about the column with the arm, but that is held from downward movement by the shoulder 7 at the bottom of the column and from upward movement by the shoulder 8, part way up the column. A pinion 9, carried by the arm, meshes with this rack, and on the pinion-arbor is a worm-gear 10, in mesh with which is a worm 11 on a spindle adapted to be rotated by a common wrench or handle. The rotation of the worm through the worm-gear, pinion, and rack causes a change of elevation of the arm, and as the rack moves about the column with the arm change of elevation may be effected with the arm extending in any direction, Figs. 2, 4. The shank of the table 12 is fastened in a recess in the outer end of the arm by manipulating the clamp-screw 13, Figs. 1, 2.

The turret-head 14 is held to the front of the column and guided in its up and down movements by flanges 15, that extend from opposite sides of the upper part of the column into grooves formed between the plates 16 and the back of the head, and it is supported by the chain 17, that is attached to the counterbalancing-weight 18 in the interior of the column, Figs. 1, 7.

In a mortise in the front of the column is a rack 19, and meshing with this rack is a

pinion 20, formed on a hollow shaft 21, that is carried by the turret-head. Rotation of this pinion moves the head up and down, Fig. 7.

A worm-gear 22, having a clutch part 23, is loosely mounted upon one end of the hollow shaft 21, and extending through this hollow shaft is a spindle 24, that at one end has a hand-wheel 25 and at the other end a clutch part 26. The spindle and hollow shaft are keyed so as to rotate together, but allow the spindle an independent longitudinal movement. When the hand-wheel 25 is pulled out from the head, the clutch part on the spindle is engaged with the clutch part on the worm-gear, so that the rotation of the gear will rotate the spindle and hollow shaft with the pinion that engages the rack, thus causing the head to be fed vertically; but when this hand-wheel is pushed toward the head the clutch parts disengage, so as to disconnect the worm-gear, leaving the spindle free to be rotated by its hand-wheel for feeding the head up and down, Fig. 7.

Extending below and at right angles to the hollow shaft 21 is a hollow shaft 27, formed on which is a worm 28, that meshes with the worm-gear 22. A spur-gear 29 is fastened upon and a worm-gear 30 is loose upon this hollow shaft 27. A clutch part 31 is formed on the face of the worm-gear, and a clutch-part 32 is splined upon the hollow shaft and arranged to engage the clutch part on the gear, Figs. 6, 9. The worm-gear 30 is engaged and driven by a worm 33 on a vertical shaft that is provided with pulleys 34, which are arranged to be belted to pulleys 35 upon the vertical driving-shaft 36, Figs. 5, 6. Meshing with the spur-gear 29 is a spur-gear 37, in mesh with which is a spur-gear 38 on the tubular shaft 39, that is provided with a hand-wheel 40, Figs. 5, 7. When the clutch part 32 engages the clutch part 31, the worm-gear 30 drives the horizontal worm 28 and causes the rotation of the worm-gear 22 on the hollow shaft 21, bearing the pinion 20, that meshes with the feed-rack 19; but when these clutch parts are disengaged the worm-gear 30 is disconnected, so that the horizontal worm may only be rotated by means of the hand-wheel 40 and gears 38, 37, and 29. Thus if the clutch parts on the horizontal worm-shaft are engaged the head may be fed by power; but if the clutch parts are disengaged the head may be fed by hand.

A rod 41 passes through the tubular hand-wheel shaft 39 and is provided with an arm 42, which is arranged to engage the clutch part 32 on the horizontal worm-shaft. A spring 43 tends to thrust this rod so that the arm will cause a disengagement of the clutch parts. The end of this rod when pulled outwardly is adapted to be engaged by a shoulder 44 near the upper end of a stop-plunger 45, Figs. 7, 8.

When the head has been fed down the required distance, the plunger engages a block 46, fixed the predetermined height along the

slot 47, formed in the front of the column, Figs. 1, 2. This holds the plunger with relation to the head until the clutch-rod is free to be drawn in by its spring, so that the arm will disengage the clutch parts and cause the feed to be discontinued. When the clutch-rod is held by the plunger, a slight rotation will disengage it from the plunger, so that the spring will thrust the rod in and cause the clutch parts to be disengaged, Fig. 8.

A counter-shaft with fast pulley 48 and loose pulley 49 is supported by bearings formed in the column and in the back-brace 50. On this counter-shaft between the column and the back-brace are driving-pulleys 51, arranged to be belted to pulleys 52, supported by a shaft held in bearings in the top of the back-brace and top frame. This top shaft is provided with a common back-gearing mechanism 53 and clutch 54, that may be operated in the usual manner by the lever 55 for throwing in and out the back gearing, Figs. 1, 3.

On the top shaft and adapted to be rotated directly or to be rotated indirectly by the back gearing, according to the position of the clutch, is a bevel-gear 56, that meshes with a bevel-gear 57 on a sleeve held by a vertical bearing in the top frame. The vertical driving-shaft 36 extends through and is splined to the bevel-gear sleeve so that it will be rotated by the sleeve, but may have a free vertical movement through it as the turret-head is fed up and down, Figs. 1, 2.

On the vertical shaft 36, above the turret-head, are the pulleys 35, that are belted to the pulleys 34, which drive the power feeding mechanism, while at the lower end of this shaft in the head is a gear 58, that meshes with a gear 59, which is in mesh with a gear 60. The gear 60 is fixed upon a spindle 61, that is supported diametrically of the turret by bearings 62, which are vertically movable in the head, Figs. 7, 8.

The turret-head 63, with a number of radially-projecting tool-hubs 64, is rotatably held by a plate 65 upon a hub 66, projecting from the front of the head. Each tool-hub is arranged to receive a tool-spindle 67. The inner end of each tool-spindle is provided with a clutch part 68, that is adapted to be engaged by a clutch part 69, formed on the end of the head-spindle 61. When these clutch parts are engaged, the rotation of the gear 60 causes the rotation of the lower tool-spindle and tool held by that spindle, Fig. 8.

The lower end of the bearing 62 is arranged to project into an opening in the turret about the tool-spindle that is to be rotated for the purpose of registering and locking the turret in position just before the clutch parts 68 and 69 are engaged. When the head-spindle and gear are raised and the clutch parts disengaged, the lower end of the bearing is withdrawn from the registering opening about the tool-spindle, so that the turret may be rotated. The vertical movement of this gear,

head-spindle, clutch part, and bearing and the rotation of the head when these parts are raised can be performed without stopping the tool-driving or head-feeding mechanism, Fig. 8.

A rack 70 is formed in one side of the vertically-moving bearing 62, and meshing with this is a pinion 71, mounted upon an arbor 72, that is provided with a hand-lever 73, Figs. 7, 10. One end of a spiral spring 74 is connected with the pinion 71, and the other end of this spring is connected with an adjustable nut 75. When the hand-lever is turned in one direction, the pinion and rack lift the bearing and clutch on the gear-shaft, so that the turret may be rotated. This movement of the hand-lever puts the spring under tension, so that when the turret is revolved to the next position the spring will automatically cause such a rotation of the pinion that the end of the bearing will enter the registering and locking opening that next comes into position and the clutch parts will engage, Fig. 10. The tension of the spring is determined by adjusting the nut, which has notches 76 in its periphery, that cooperate with a notch in the head to form a recess for receiving a locking-pin 77, which will prevent the rotation of the nut, Fig. 5.

I claim as my invention—

1. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously rotatory shaft supported by the head, a spindle carried by the head and extending diametrically in the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, and means for connecting the spindle with either one of the tool-holders in the turret, substantially as specified.

2. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-spindles borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and means for holding the turret fixed with relation to the head when the spindle is connected with a tool-holder, substantially as specified.

3. A turret-machine having a frame, a head

movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and driving means supported by the frame and connected with the feed mechanism and the shaft-rotating mechanism, substantially as specified.

4. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, means carried by the head for operating the feed mechanism by hand, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head for rotating the spindle, and means for connecting the spindle with either one of the tool-holders in the turret, substantially as specified.

5. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, means carried by the head for operating the feed mechanism by hand, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and driving means supported by the frame and connected with the feed mechanism and the shaft-rotating mechanism, substantially as specified.

6. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, in-

dependent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, driving means supported by the frame and connected with the feed mechanism and the shaft-rotating mechanism, and means carried by the head for connecting and disconnecting the driving means and the feed mechanism, substantially as specified.

7. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head for feeding the head, means carried by the head for operating the feed mechanism by hand, a turret mounted upon a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, driving means supported by the frame and connected with the feed mechanism and the shaft-rotating mechanism, and means carried by the head for connecting and disconnecting the driving means and the feed mechanism, substantially as specified.

8. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head for feeding the head, means carried by the head for operating the feed mechanism rapidly by hand, means carried by the head for operating the feed mechanism slowly by hand, a turret mounted on a hub projecting radially from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and driving means supported by the frame and connected with the feed mechanism and the shaft-rotating mechanism, substantially as specified.

9. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head for feeding the head, means carried by the head for operating the feed mechanism rapidly by hand, means for connecting and disconnecting the rapid hand operating means and the feed mechanism, means carried by the head for operating the feed mechanism slowly by hand, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the

head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, driving means supported by the frame and connected with the spindle-rotating mechanism, and means carried by the head for connecting and disconnecting the driving means and the feed mechanism, substantially as specified.

10. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head for feeding the head, means carried by the head for operating the feed mechanism by hand, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, driving means supported by the frame and connected with the feed mechanism and the spindle-rotating mechanism, means carried by the head for connecting and disconnecting the driving means and the feed mechanism, and a stop mechanism carried by the head for disconnecting the driving means from the feed mechanism, substantially as specified.

11. A turret-machine having a frame, a head movable on the frame, mechanism carried by the head for feeding the head, means carried by the head and projecting through the turret to the front of the machine for operating the feed mechanism slowly by hand, means carried by the head and projecting to one side of the head for operating the feed mechanism rapidly by hand, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a spindle in the head extending diametrically of the turret, tool-spindles borne by and projecting radially from the turret, mechanism carried by the head for rotating the spindle in the head, means for connecting the spindle in the head with a tool-spindle in the turret, and driving means supported by the frame and connected with the feed mechanism and the spindle-rotating mechanism, substantially as specified.

12. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head for feeding the head, means carried by the head for operating the feed mechanism rapidly by hand, said means having a longitudinal movement for the purpose of connecting and disconnecting it with the feed mechanism, means carried by the head for operating the feed mechanism slowly

by hand, a turret mounted on a hub projecting radially from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the head, driving means supported by the frame and connected with the spindle-rotating mechanism, and means carried by the head for connecting and disconnecting the driving means and the feed mechanism, substantially as specified.

13. A turret-machine having a frame, a table movable on the frame, means for elevating and lowering the table on the frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame, for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, and means for connecting the spindle with either one of the tool-holders in the turret, substantially as specified.

14. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame, for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and mechanism for disconnecting the feed mechanism when the head reaches a fixed limit of movement, substantially as specified.

15. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame, for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, mechanism in the head for registering and locking the turret in position, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent ro-

tatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, and means connecting the spindle with either one of the tool-holders in the turret, substantially as specified.

16. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, and mechanism carried by the head for registering and locking the turret in position and simultaneously causing a connection between the spindle in the head and one of the tool-holders, substantially as specified.

17. A turret-machine having a frame, a head movable on the frame, mechanism for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a spindle in the head extending diametrically of the turret, tool-spindles borne by and projecting radially from the turret, mechanism carried by the head for rotating the spindle in the head, means carried by the head for registering and locking the turret, and a clutch carried by the registering and locking means for connecting and disconnecting the spindle in the head with a tool-spindle in the turret, substantially as specified.

18. A turret-machine having a frame, a head movable longitudinally on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, turret registering and locking means carried by the head, hand operating mechanism for disengaging the registering and locking means from the turret, and a spring for causing the registering and locking means to engage the turret, substantially as specified.

19. A turret-machine having a vertical frame, a head movable vertically on the frame, a weight for counterbalancing the head, mech-

anism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and driving means supported by the frame and connected with the feed mechanism and the spindle-rotating mechanism, substantially as specified.

20. A turret-machine having a vertical frame, a head movable vertically on the frame, mechanism carried by the head and operated by means supported by the frame for feeding the head, a turret mounted on a hub projecting from the head and rotatable in a plane parallel with the plane of movement of the head, a continuously-rotatory shaft supported by the head, a spindle carried by the head and extending diametrically within the turret, independent rotatory tool-holders borne by and projecting radially from the turret, mechanism in the head and connecting the shaft and the spindle, for rotating the spindle, means for connecting the spindle with either one of the tool-holders in the turret, and driving means supported by the frame and connected

with the feed mechanism and spindle-rotating mechanism, substantially as specified. 35

21. In a metal-working machine, a supporting-frame having a guide and power feed mechanism, a slide movable longitudinally upon said guide and subject to said feed mechanism, a rotary turret mounted on said slide and carrying rotary tool-holders, hand feed mechanism mounted upon and controlling the slide and operatively associated with the power feed mechanism, and means within said turret to throw the power feed mechanism into and out of operative condition, substantially as specified. 40 45

22. In a metal-working machine, a supporting-frame, a head movable longitudinally on the frame, a rotatory turret mounted on said head and carrying rotatory tool-holders, rotatory mechanism within the head arranged to be directly connected with either of the tool-holders, power feed mechanism and hand feed mechanism, both mounted upon and controlling the movement of the head and operatively associated with each other, and means carried by the head and extending through the turret for throwing the power feed mechanism and the hand feed mechanism into and out of operative condition, substantially as specified. 50 55 60

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