

No. 688,508.

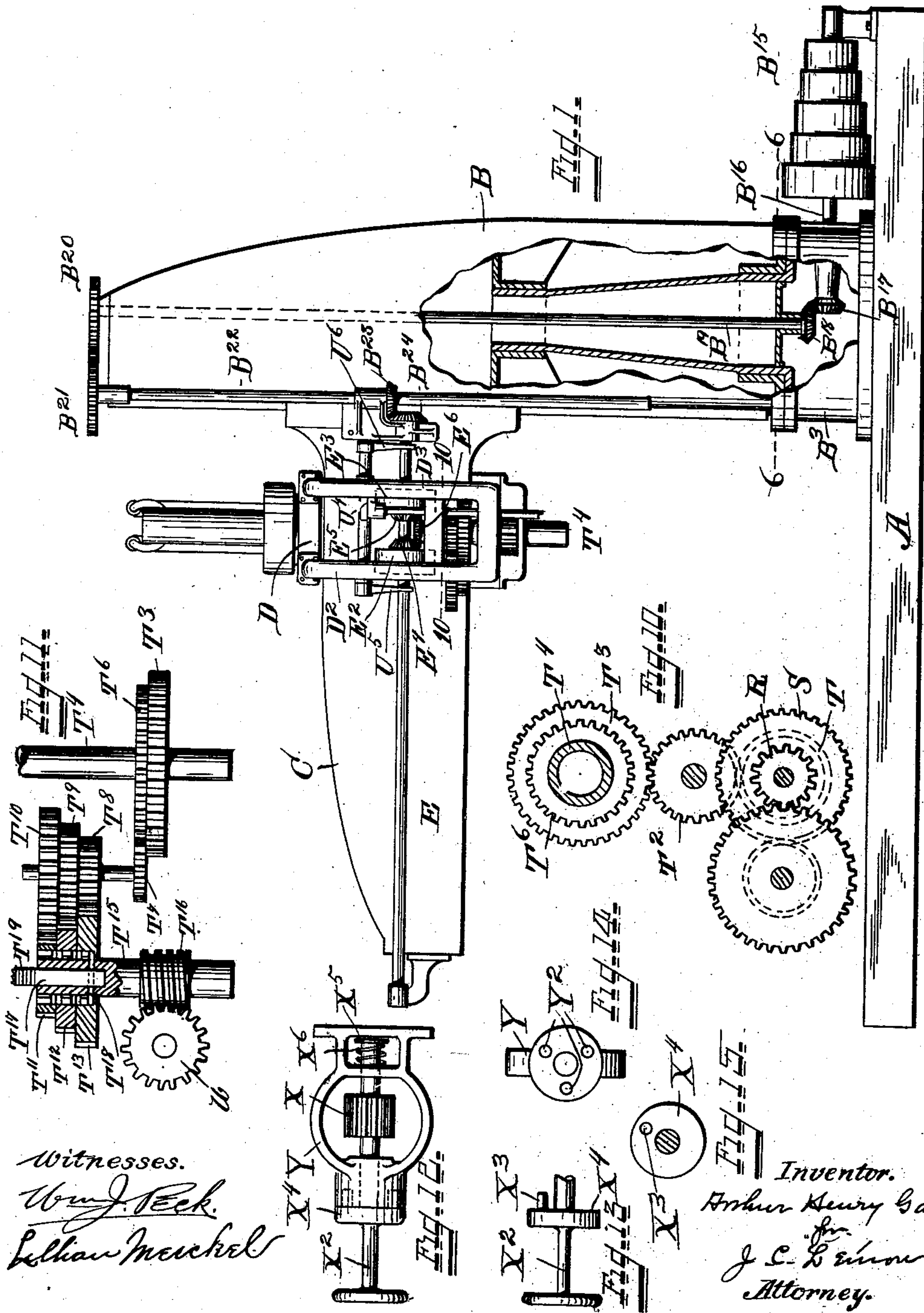
Patented Dec. 10, 1901.

A. H. GANG.
DRILLING MACHINERY.

(Application filed Apr. 20, 1901.)

(No Model.)

3 Sheets—Sheet I.



Witnesses.
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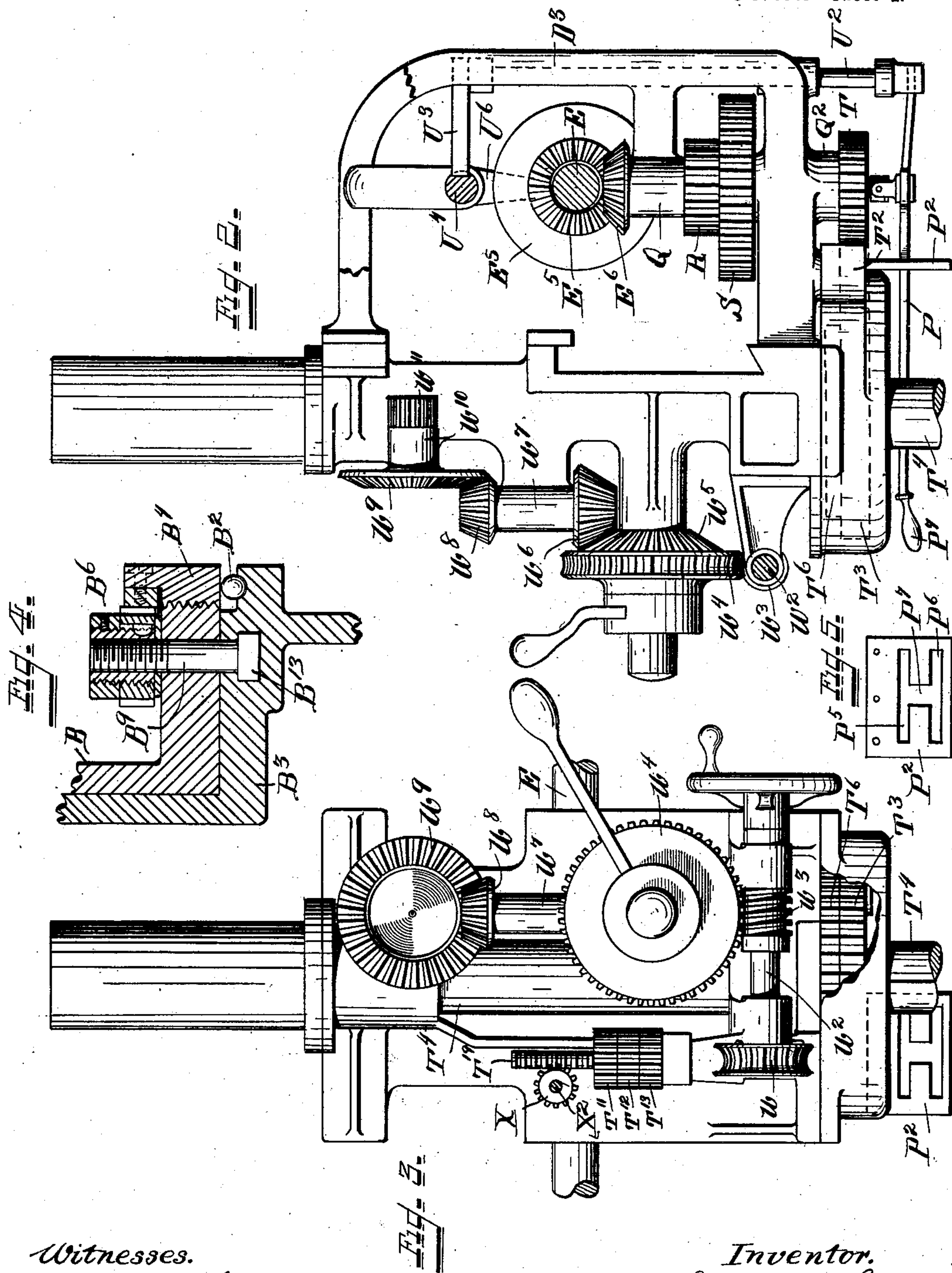
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3 Sheets—Sheet 2.



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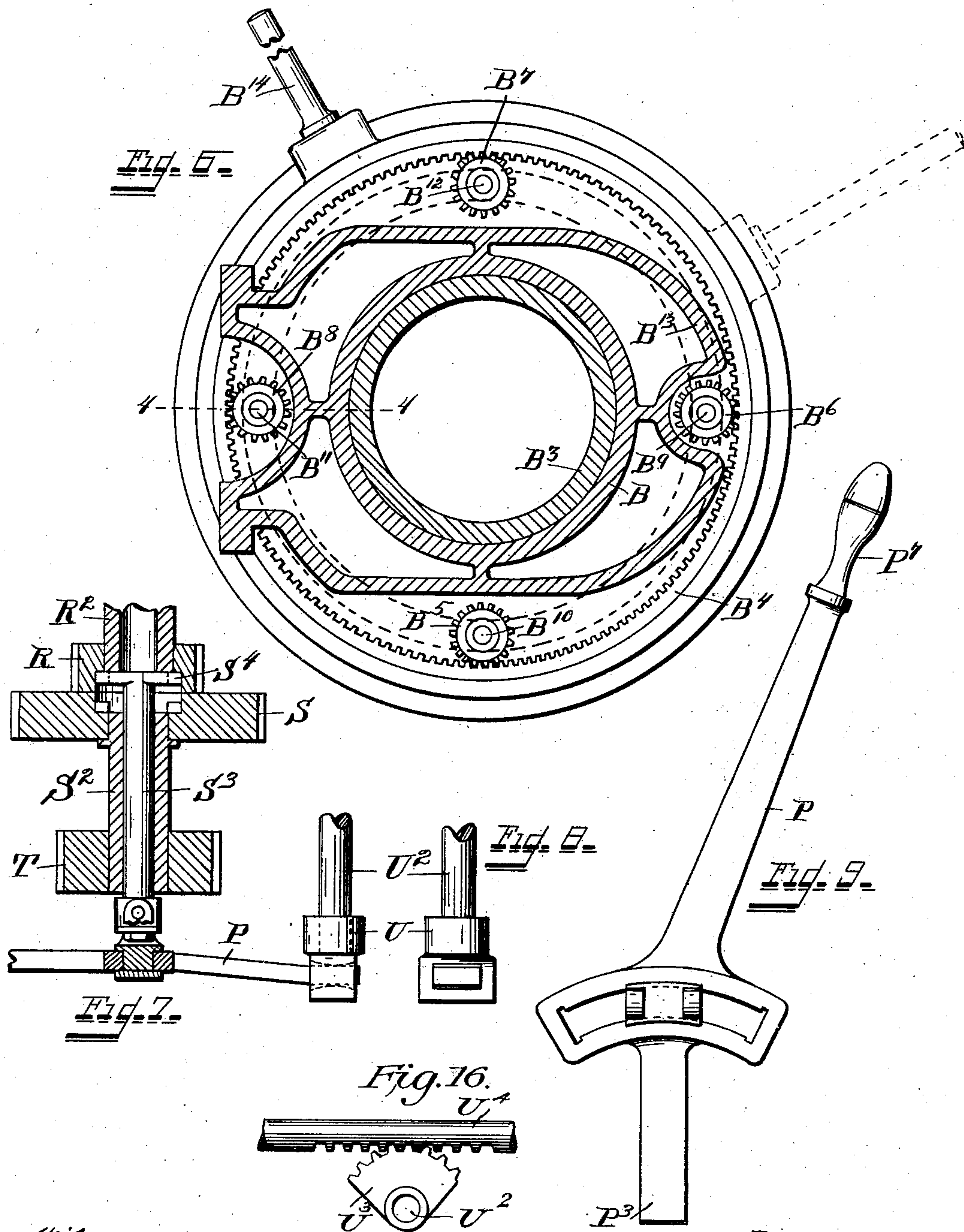
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ARTHUR H. GANG, OF CINCINNATI, OHIO.

DRILLING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 688,508, dated December 10, 1901.

Application filed April 20, 1901. Serial No. 56,789. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR HENRY GANG, a citizen of the United States of America, and a resident of No. 1634 Westwood avenue, (post-office address 1534 Queen City avenue,) in the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented an Improvement in Drilling Machinery; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention relates to drilling machinery; and it has for its object the improvement in the construction of such devices whereby they are simplified and rendered more efficient.

The novelty of my invention consists in the combination and subcombination of the parts, as will be hereinafter set forth and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a rear elevation of my drilling-machine. Fig. 2 is a side view of the head, partially in section. Fig. 3 is a front view of the head. Fig. 4 is a section on line 4 4 of Fig. 6. Fig. 5 is a support for the lever P. Fig. 6 is a section on line 6 6 of Fig. 1. Fig. 7 is a vertical section through the sleeve Q and gears R, S, and T. Fig. 8 is a front view of U, Fig. 7. Fig. 9 is a top view of lever P. Fig. 10 is a section on line 10 10 of Fig. 1. Fig. 11 is a detail showing how power is transmitted from the gear T⁵ on the spindle T⁴ to worm-gear W. Fig. 12 is a detail of frame for supporting the gear X. Fig. 13 is a detail of X², showing how pin X³ is located. Fig. 14 is an end view of frame Y, showing how holes Y² are drilled to receive the pin X³. Fig. 15 is an end view of Fig. 13. Fig. 16 is a plan view showing how the segment-gear U³ operates in the rack cut on the shaft U⁴.

Similar letters of reference indicate like parts throughout the several views of the drawings.

As shown in said drawings, A designates the base-plate of the machine, and B the column to which the horizontal arm C is attached. On the arm C is a head D, arranged to slide toward the column or from it. The head D has power transmitted to it through the shaft E. Sliding on the shaft E are two

friction-pulleys E² E³, which have bevel-gears E⁴ E⁵ attached to them. The bevel-gears E⁴ E⁵ mesh with the bevel-gear E⁶, which is attached to a sleeve R², passing through the bearing Q. The lower end of the sleeve R² has a spur-gear R attached to it. Immediately beneath the spur-gear R is another spur-gear S, which is attached to the upper end of a sleeve S². The sleeve S² passes down through the bearing Q², and the sleeve S² has also attached to its lower end a spur-gear T. The spur-gear T meshes with an idler T², which is attached to the spindle T⁴. The spindle T⁴ has also the spur-gear T⁶ attached to its lower end just above the spur-gear T³, from which power is transmitted to the worm-gear W through the intermediate gears T⁷ T⁸ T⁹ T¹⁰ T¹¹ T¹² T¹³, spindle T¹⁵, and worm-gear T¹⁶. The spindle T¹⁵ has a shaft T¹⁷ passing down through its center. The lower end of the shaft T¹⁷ has a pin T¹⁸ passing through it close to the lower end. The shaft T¹⁷ has a rack T¹⁹ cut in the upper end. The rack T¹⁹ meshes with the gear X on the shaft X². The sleeve S² has passing up through it from the bottom a shaft S³. The upper end of this shaft S³ has a T-shaped head S⁴, which engages with the gears R and S. The lower end of this shaft S³ has attached to it a lever P, by which it is raised and lowered. The lever P passes through a guide or rest P².

The lower end of the column B rests on a row of balls B². The column B rests on a stump B³, which is secured to the base A. The bottom of the column B is threaded and has a ring B⁴, which is also threaded on its lower inside, which is screwed onto the column B. The upper inside of this ring B⁴ has gear-teeth cut in it, which mesh with four small gears B⁵ B⁶ B⁷ B⁸. The gears B⁵ B⁶ B⁷ B⁸ are threaded on their insides and are screwed onto the square-headed bolts B⁹ B¹⁰ B¹¹ B¹². The lower ends of these bolts B⁹ B¹⁰ B¹¹ B¹² slide through a circular T-groove B¹³, which is cut in the stump B³. There are two holes in the periphery of the ring B⁴, in which the lever B¹⁴ can be placed for turning the ring B⁴.

The shaft X², to which the gear X is attached, passes through the frame Y. The outer end of the shaft X² has a flanged piece X⁴ attached to it. Projecting from this

flanged piece X^4 is a pin X^3 , which is parallel with the shaft X^2 . The inner end of this shaft X^2 has a pin X^5 passing through it. The pin is for the purpose of holding the spring X^6 in position. The outer end of the frame X has a flanged piece Y^3 , which is of the same diameter as the flanged piece X^4 on the shaft X^2 . In the flanged piece Y^3 are three holes Y^2 , in which the pin X^3 is arranged to fit.

Power is transmitted from the worm-gear W through the shaft W^2 to the worm W^3 , from the worm W^3 to worm-gear W^4 , from worm-gear W^4 to bevel-gear W^5 , from bevel-gear W^5 to bevel-gear W^6 , from bevel-gear W^6 through a shaft in bearing W^7 to bevel-gear W^8 , from bevel-gear W^8 to bevel-gear W^9 , from bevel-gear W^9 through a shaft in bearing W^{10} to a spur-gear W^{11} , the spur-gear W^{11} meshing with a rack on the spindle T^4 , which raises and lowers the spindle T^4 .

The outer end P^3 of the lever P passes through a slot in the lower part of the head U , which is attached to the shaft U^2 . The vertical shaft U^2 is attached to the back of the head D by suitable bearings. At the top of the shaft U^2 is secured the segment of a gear U^3 , which meshes with a rack cut in the shaft U^4 . The shaft U^4 slides in bearings attached to the arms D^2 and D^3 . At the outer ends of the shaft U^2 are arms U^5 and U^6 , which operate sleeves on the shaft E , that throw the friction-clutches E^2 and E^3 in or out.

The operation of my drill is as follows: Power is applied to the cone-pulley B^{15} , which transmits power through shaft B^{16} to miter-gears B^{17} and B^{18} , through shaft B^{19} to spur-gear B^{20} , from B^{20} to gear B^{21} , down through shaft B^{22} to miter-gears B^{23} and B^{24} to horizontal shaft E . The gears E^5 and E^4 being a part of the friction-clutches E^2 and E^3 will revolve when they do. The friction-clutches E^2 and E^3 being on the shaft E will also revolve when E revolves if the frictions are thrown in and remain stationary if the frictions are not thrown in. The friction-clutches are operated by the lever P , the lever P being pivoted to the shaft S^3 , so that when the handle P^7 is thrown to one side or the other in slots P^5 and P^6 it will cause the shaft D^3 to turn, which in turn will cause the gear-segment U^3 to turn, which meshes with rack U^4 , cause U^4 to slide back and forth in its bearings as the arms U^5 and U^6 are attached to the ends of shaft U^4 to move back and forth also. The arms U^5 and U^6 in turn cause the sleeves which operate the clutch on friction-wheel to engage and disengage frictions, the frictions being so located that they are on opposite sides of the gear E^6 that they drive. One friction will drive it in one direction, the other friction in the opposite direction; so by the agency of the lever P the drill can be caused to drive with the sun or against it. The lever P is used also to operate the shaft S^3 . The lever P being attached to the lower end

of shaft S^3 , it can be used to raise and lower the shaft, thereby causing the upper end, which has the T-piece S^4 attached to it, to engage and disengage the gears R and S , which will transmit either a high or low speed to the spindle T^4 through the intervening gears, so that through the means of the lever the drill can be caused to go forward or backward or cause the spindle to go at a slow or fast speed.

I claim as my invention—

1. In a drilling-machine, the combination with a vertical column, a horizontal arm, with a head sliding on said arm, means for having power carried to said head, friction-clutches attached to said head, for reversing the drilling mechanism, the sliding head having attached to it a shaft with a rack cut in it which meshes with the segment of a gear, the segment of a gear having a vertical shaft attached to it for operating the segment of a gear, substantially as described.

2. In a drilling-machine, the combination with a vertical column, a horizontal arm, with a head sliding on said arm, means for having power carried to said head, friction-clutches attached to said head for reversing the drilling mechanism, the sliding head having attached to it a shaft with a rack cut in it which meshes with the segment of a gear, the segment of a gear having a vertical shaft, attached to it for operating the segment of a gear, the lower end of the vertical shaft having attached to its lower end a horizontal lever for turning the vertical shaft, substantially as described.

3. The combination in a drilling-machine of a vertical spindle, having a spur-gear attached to its lower end, meshing with other gears attached to a vertical hollow shaft, the hollow shaft having a solid shaft passing down through the hollow shaft, the solid shaft having a pin through its lower end to engage with gearing on the hollow shaft, the upper part of the solid shaft having a rack cut in it, the rack to mesh with a gear which raises and lowers the solid shaft, the gearing being on a horizontal shaft which can be turned and locked when the solid vertical shaft has been placed in the desired position, substantially as described.

4. The combination in a drilling-machine of a column revolving around a stump, the lower end of the column being threaded, having a ring-thread to screw on the lower end of the column, the upper and inner part of the ring having gear-teeth cut in it, the gear-teeth meshing with pinions, the pinions being threaded on the inside to form a nut for T-bolts that are placed in an annular T-slot cut in the stump, the space between the lower side of the threaded ring and stump being filled with balls, substantially as described.

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Witnesses:

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