(No Model.) 2 Sheets—Sheet 1.

W. F. BARNES.

DRILLING MACHINE.

No. 466,916. Patented Jan. 12, 1892.

Fig. 1.

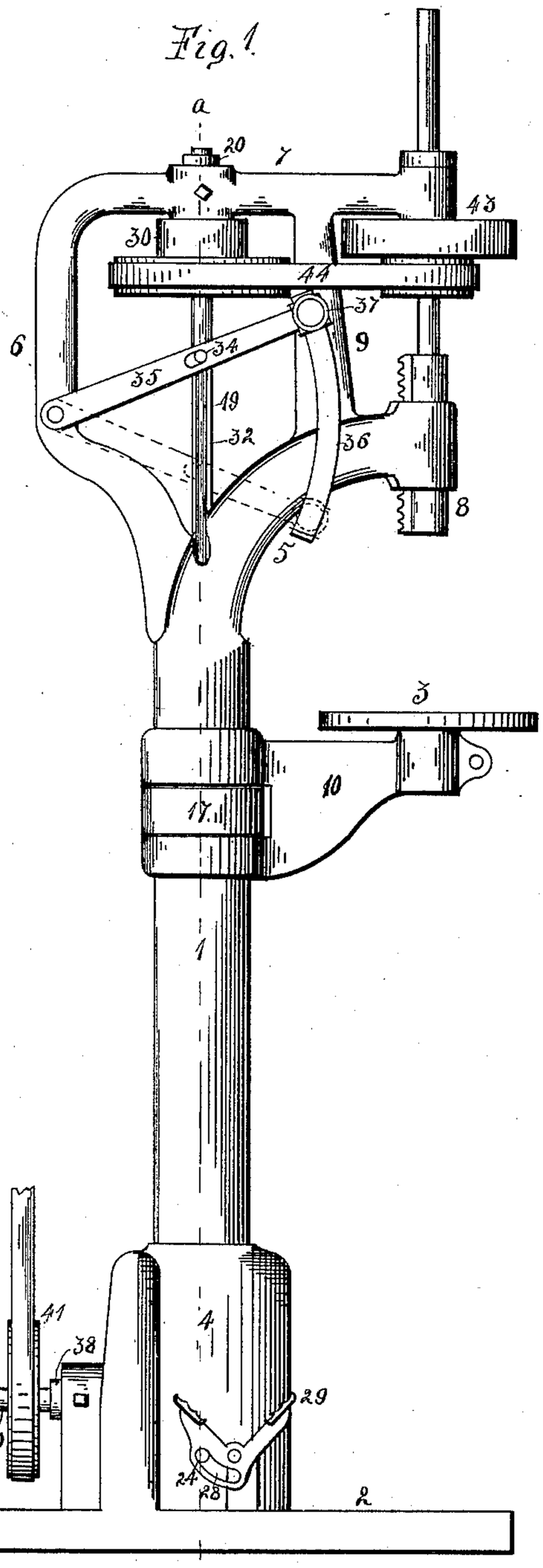
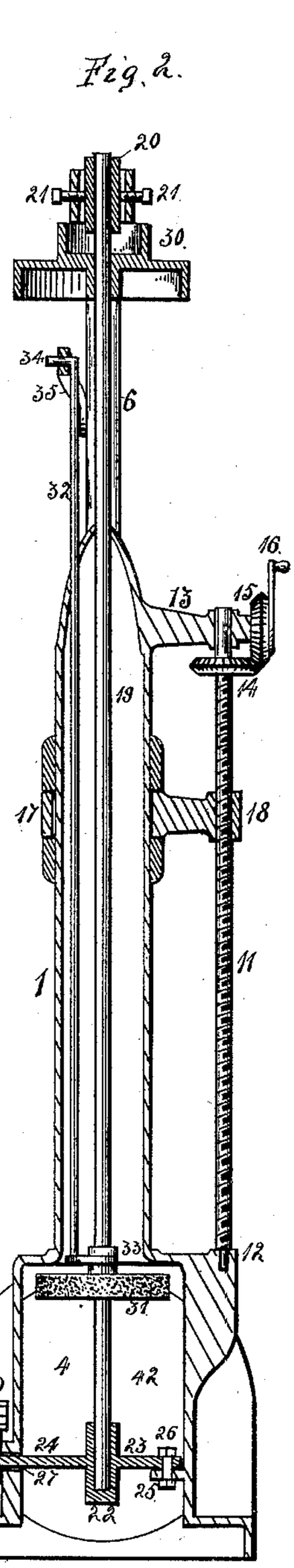


Fig. 2.



Witnesses:
Louis Clark
L. L. Miller

Inventor:
William F. Barnes
By A. O. Behel
Atty.

(No Model.) 2 Sheets—Sheet 2.

W. F. BARNES.

DRILLING MACHINE.

No. 466,916. Patented Jan. 12, 1892.

Fig. 3.

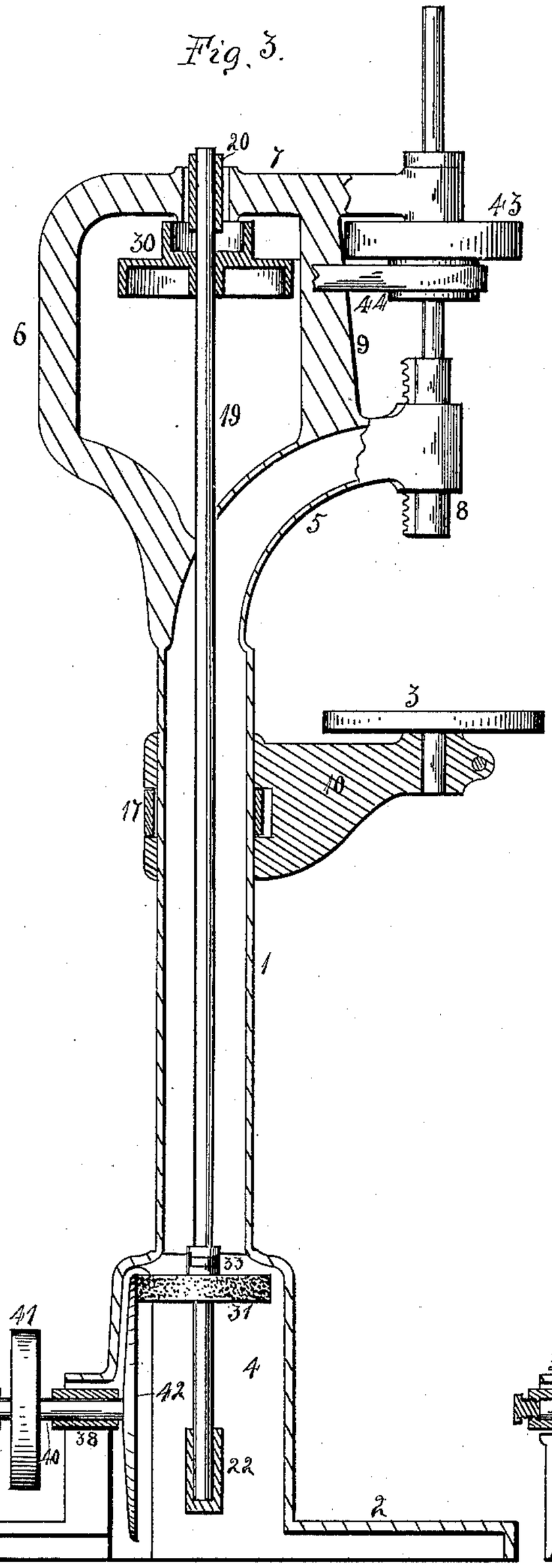
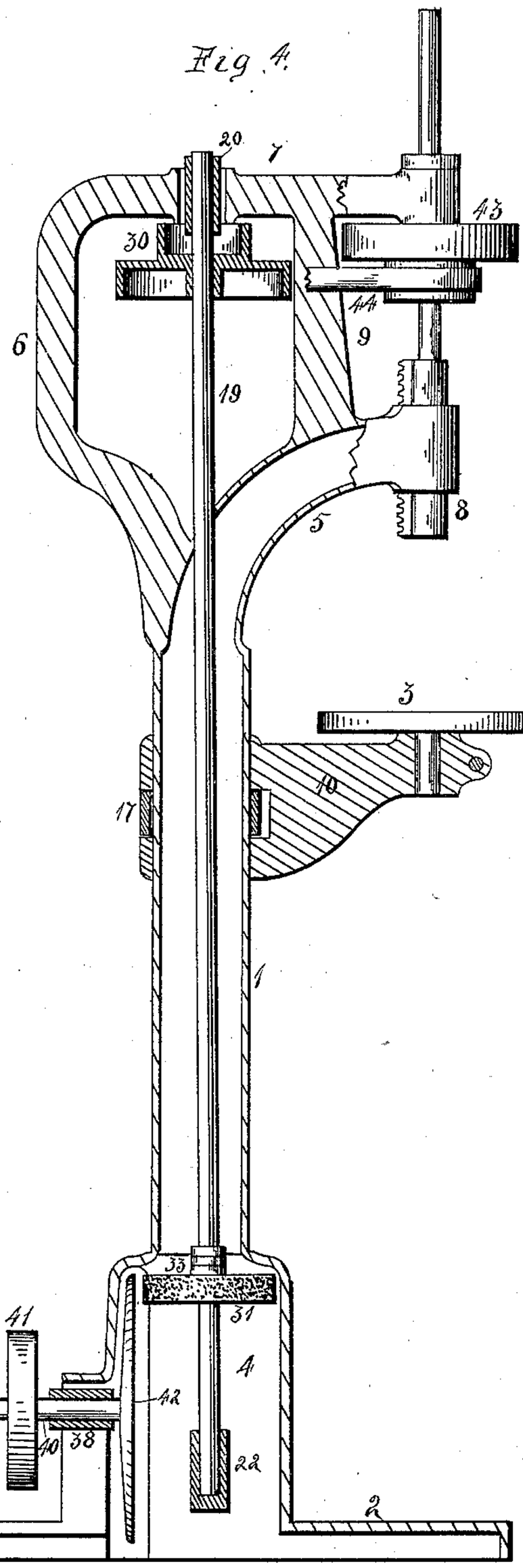


Fig. 4.



Witnesses:
Louis Clark.
L. L. Miller.

Inventor:
William F. Barnes
By A. O. Behel
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM F. BARNES, OF ROCKFORD, ILLINOIS, ASSIGNOR TO THE W. F. & JOHN BARNES COMPANY, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 466,916, dated January 12, 1892.

Application filed November 25, 1891. Serial No. 413,118. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. BARNES, a citizen of the United States, residing at Rockford, county of Winnebago, State of Illinois, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

The object of this invention is to produce a friction-driven drill the rotative speed of the spindle of which may be varied without stopping the drill, and this by changing the relative position of the frictional driving parts.

In the accompanying drawings, Figure 1 is a side elevation of a drilling-machine embodying my invention. Fig. 2 is a transverse vertical central section of the same on dotted line *a*, Fig. 1. Fig. 3 is a longitudinal vertical central section of the frictional driving mechanism. Fig. 4 represents the same parts shown in the preceding figure, the parts of the driving mechanism being thrown out of frictional engagement with each other. Fig. 5 is a horizontal section on dotted line *b*, Fig. 1.

In the construction of my drill I employ, among other parts, the upright post or column 1, the base 2 thereto, and the table 3, supported by the column. This column 1 I make of tubular form of equal diameter for a greater portion of its length, below which part next to the base is a larger part 4 of irregular form to inclose parts of the mechanism. Above this tubular portion the column separates in two diverging arms 5 and 6, the former curving forward, the latter extending upward, thence horizontally forward in a portion 7 to a point directly over the end of the arm first mentioned, and in the forward ends of these arms are formed the bearings for the drill-spindle. A vertical brace 9 extends between the two arms a distance back from the bearings before mentioned.

The base 2, upon which the column is secured and from which it rises vertically, is substantially of rectangular form and extends considerably farther forward from the base of the column than in any other direction, so that large work may rest upon it instead of upon the table and be in position to be reached by the drill-spindle 8, also forming a solid foot to support the column.

The drill-table 3 is of circular form and is supported on the outer end of a bracket 10, the opposite end of which, in the form of two rings, surrounds the tubular portion of the drill-column, being free to turn about it.

The table 3 has a short shaft extending from the center of its lower face and formed integral therewith, which enters a vertical bearing in the outer end of the bracket, thus permitting a rotation of the table in reference to the bracket.

In the rear of the drill-column and exterior thereto I provide a vertical screw-threaded shaft 11, supported in a bearing 12 in the base 4, and one at its upper end formed in an arm 13 extending from the drill-column 1. On the upper end of this screw-threaded shaft and secured rigidly thereto is a miter-gear 14, and, meshing therewith, a similar gear 15 is journaled on the end of the arm 13. I secure a crank 16 to the miter-gear 15, by means of which the screw-threaded shaft may be rotated. Between the two rings of the table-supporting bracket, which encircle the drill-column, is a collar 17, also surrounding the column, and from which collar an arm extends bearing on its outer end a nut 18 on the screw-shaft and being threaded to correspond thereto. The table is thus caused to travel up and down the drill-column by turning the crank 16 and rotating the screw-threaded shaft.

Within the drill-column I locate an upwardly-extending shaft 19, the upper end of which is journaled in a rocking bearing 20, hung between two pointed set-screws 21, which enter two corresponding depressions in opposite sides of the bearing. This bearing is located in an opening in the upper horizontal arm 7 of the drill-column and allows the upwardly-extending shaft 19 a swinging movement. This shaft extends downward from this bearing to a point near the bottom of the column, where it rests in a cup-bearing 22. This cup-bearing is provided with arms 23 and 24, extending from its opposite sides near its longitudinal center. The first of these 23 is pivoted to an ear 25, extending

from the inner surface of the drill-column, by a bolt 26, passing through perforations in both, while the opposite arm 24 extends outward through a horizontal slot 27 in the drill-column. The end of this arm 24, extending through the horizontal slot in the column, enters an eccentric-slot 28 in a bell-crank "kick-lever" 29, pivoted on one side of the column. The pivot of the kick-lever is so located in reference to the eccentric slot that by depressing that arm of the lever that extends toward the front of the drill the lower end of the upwardly-extending shaft will be moved forward. Two pulleys 30 and 31 are rigidly affixed to this upwardly-extending shaft, the first near its upper end, directly below its rocking bearing 20. The other 31, near the lower end of the shaft, is provided with a face formed of elastic material and has a sliding engagement on the shaft. To raise and lower this pulley 31, I provide a rod 32, bearing at its lower end a horizontal collar 33, which enters a groove in the hub of the wheel 31. This rod is located in vertical bearings within the drill-column, and its upper end 34 turns outward at right angles to its length, entering a slot in a lever 35, by means of which the rod and the pulley are raised and lowered. The lever is pivoted on the vertical arm 6 of the upper portion of the drill-column, while its forward end moves on a concentric circular guide-bar 36, which the outer end of the lever embraces. To lock the lever in any desired position on the guide-bar, I thread a hole extending horizontally through its outer end and turn therein a similarly-threaded pin bearing on its head a hand-wheel 37, and this screw may be turned against the circular guide-bar and thus secure the lever at any point in its throw.

Supported in bearings 38 and 39 above the rear end of the base is a counter-shaft 40, upon which are mounted a drive-pulley 41 and on its forward end a plane-face friction-disk 42, incased within the lower part of the drill-column. This friction-disk is so located in reference to the sliding elastic-face pulley 31 within the drill-column that their faces will be in engagement when the upwardly-extending shaft is in its normal position; but when the lower end of the shaft is drawn forward by means of the bell-crank kick-lever 29 the sliding wheel 31 on this shaft will be withdrawn from frictional engagement with the friction-disk 42.

The drill-spindle is of ordinary construction, being raised and lowered by means of a sleeve within which the spindle is free to revolve, but is held from lateral movement therein. This sleeve has a rack on its rear side which is engaged by a pinion operated by a lever located within easy reach of the workman. The upper end of this drill-spindle bears a two-speed cone-pulley 43, set in reference to that similar pulley 30 on the upwardly-extending drill-shaft, and a belt 44 is stretched over the two to impart the motion of the upwardly-extending shaft to the drill-spindle. A driving-belt extends from the motive power over the pulley 41 on the horizontal counter-shaft, imparting thereto a rotary motion.

To start the drill the upwardly-extending shaft is moved so that the elastic-face wheel mounted thereon is brought into contact with the face of the revolving disk, when it is apparent that motion will thereby be imparted to the former shaft and through the belt connection to the drill-spindle. To stop the drill the kick-lever is moved, throwing the lower end of the upwardly-extending shaft forward and disengaging the friction-wheel thereon from the friction-disk of the counter-shaft, and the friction parts may again be brought into contact by moving the kick-lever in a reverse direction. To change the speed of the drill-spindle when drills of different size are used, it is only necessary to loosen the hand-screw in the lever in the upper part of the drill-column and move the lever up or down, and this, through the connections therewith, raises or lowers the friction-wheel on the lower end of the upwardly-extending shaft, throwing it farther from or nearer to the center of the friction-disk, increasing or diminishing its speed in reference to the constant speed of the counter-shaft. When the friction-wheel is brought directly on the center of the disk, the motion of the drill-spindle is stopped, and if it is moved over the center the motion will be reversed and the drill-spindle driven in a contrary direction. This change of speed is accomplished without stopping the drill, and to allow a greater latitude in the change than could conveniently be accomplished by varying the relative size of the frictional parts I provide the two-speed cone-pulleys for use in transmitting motion from the upwardly-extending shaft to the drill-spindle.

I claim as my invention—

1. In a drilling-machine, the combination of a drill-spindle, a horizontal shaft, and an upwardly-extending shaft having a connection with the drill-spindle and also with the horizontal shaft, the connection with the horizontal shaft being by frictional engagement, one of the parts of the friction mechanism made adjustable to vary the velocity of the drill-spindle, the upwardly-extending shaft being capable of an oblique position.

2. In a drilling-machine, the combination of a drill-spindle, a horizontal counter-shaft located near the base of the machine, and a shaft having a connection with the drill-spindle and also a connection with the counter-shaft, the connection with the counter-shaft being by frictional engagement, one of the parts of the frictional mechanism being made adjustable to vary the velocity of the drill-spindle.

3. In a drilling-machine, the combination of a shaft, a drill-spindle, a connection between the shaft and spindle, and friction mechanism for rotating the shaft, one of the parts of the friction mechanism being made adjust-

able with relation to the other part for varying the velocity of the drill-spindle.

4. In a drilling-machine, the combination of a drill-spindle, a counter-shaft, an upwardly-extending shaft connecting the spindle and counter-shaft, and friction mechanism driving the upwardly-extending shaft, said shaft capable of a swinging movement for the purpose of starting and stopping the rotation of the drill-spindle.

5. In a drilling-machine, the combination of a drill-spindle, a counter-shaft, an upwardly-extending shaft connecting the spindle and counter-shaft, friction mechanism driving the upwardly-extending shaft, said shaft seated in a swinging frame, and a lever for moving the frame to stop or start the rotation of the drill-spindle.

6. In a drilling-machine, the combination of a drill-spindle, friction mechanism for rotating the spindle, one of the parts of the friction mechanism made adjustable with relation to the other parts, and a hand-lever for accomplishing said adjustment.

7. In a drilling-machine, the combination of a drill-spindle, a counter-shaft, a second shaft having one end rotated by friction from the counter-shaft, its other end provided with a cone-pulley, a cone-pulley on the drill-spindle, and a belt connection between the pulleys.

WILLIAM F. BARNES.

Witnesses:
ALLAN R. REA,
A. D. BEHEL.