(No Model.) 2 Sheets—Sheet 1.

C. W. McDANIEL.

DRILLING MACHINE.

No. 410,803. Patented Sept. 10, 1889.

Fig. 1.

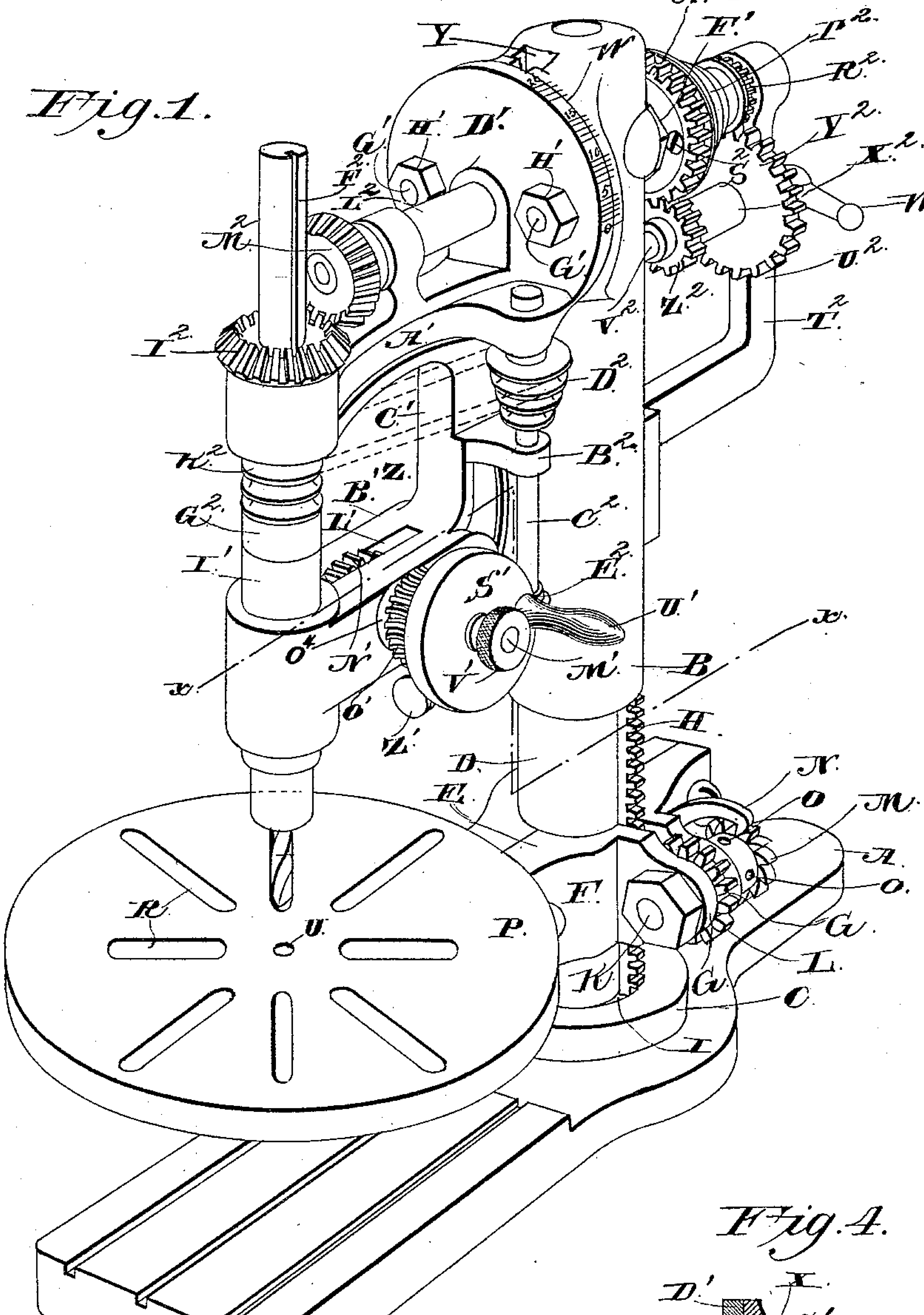


Fig. 4.

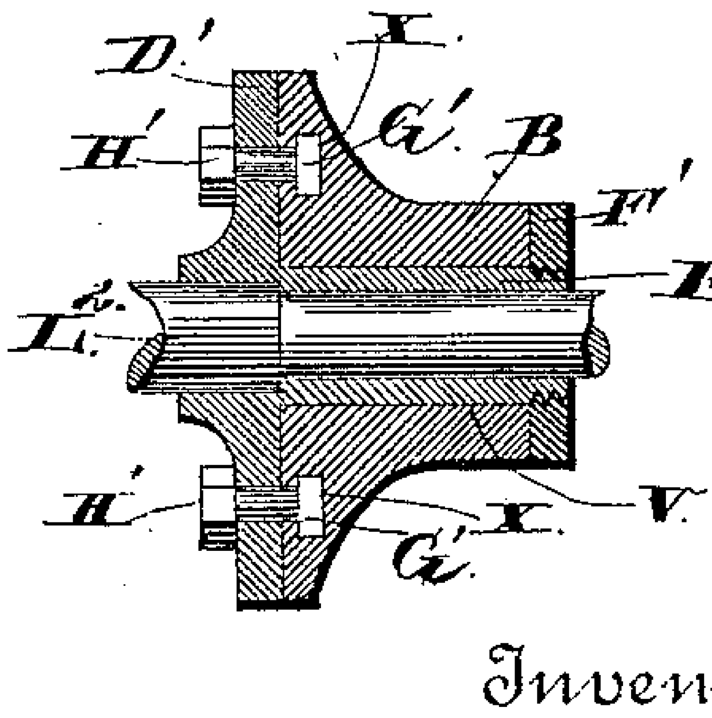
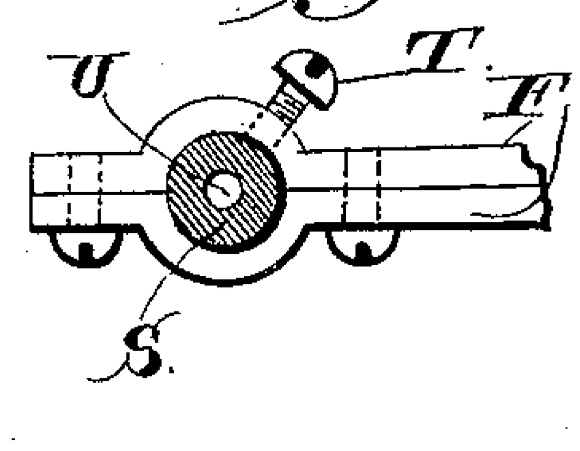


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

C. W. McDANIEL.

DRILLING MACHINE.

No. 410,803. Patented Sept. 10, 1889.

Fig. 2.

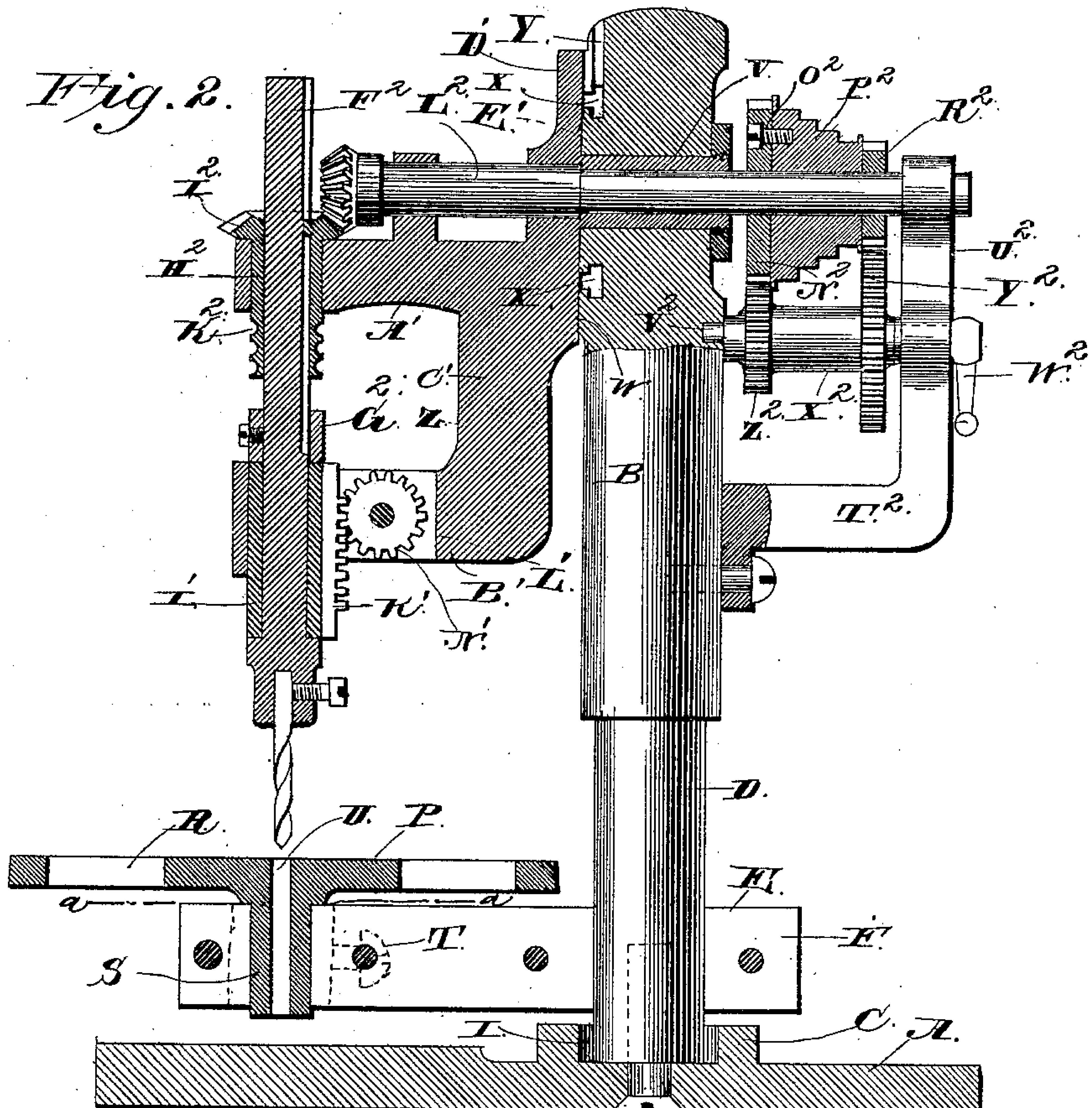


Fig. 3.

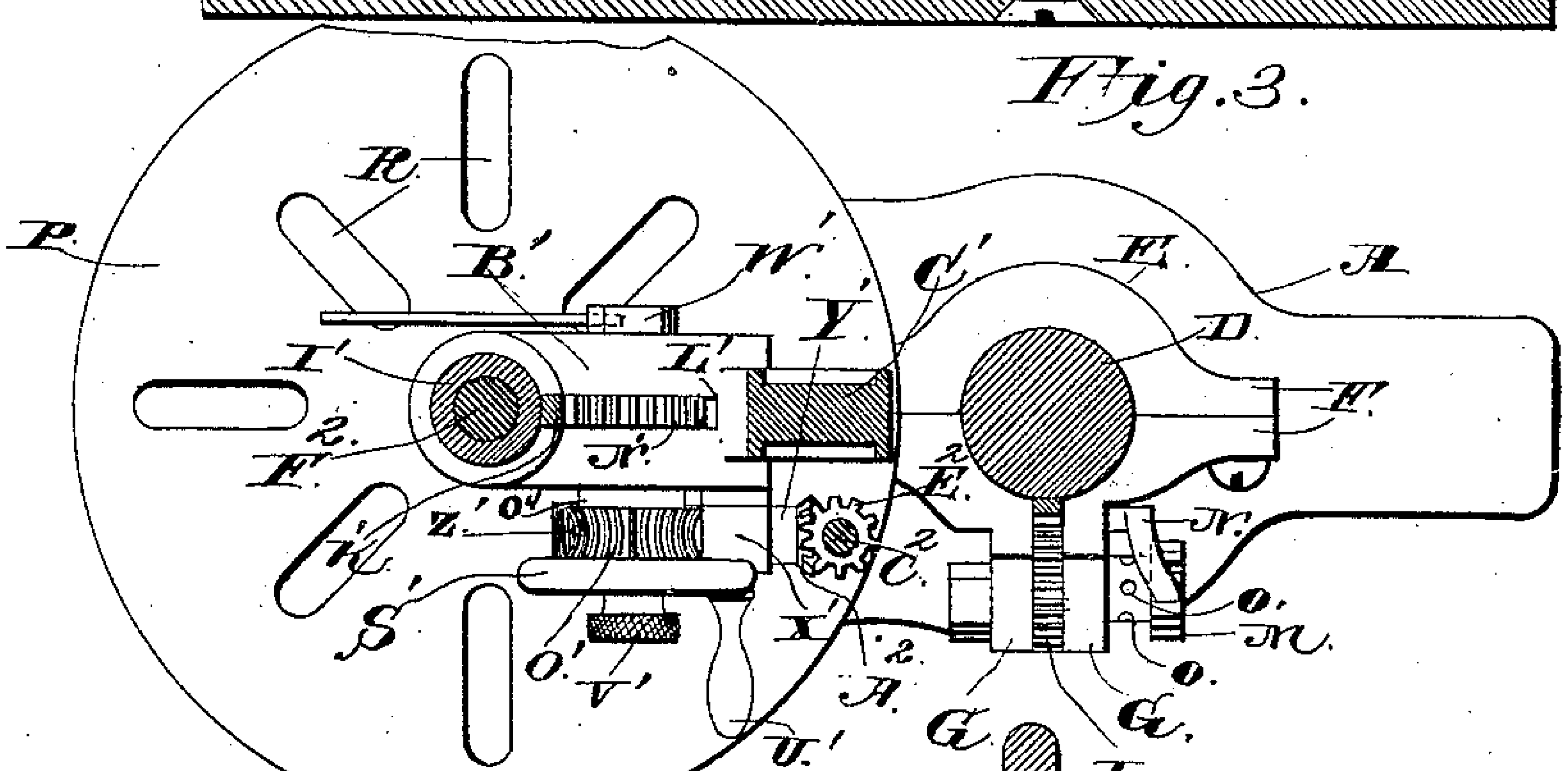
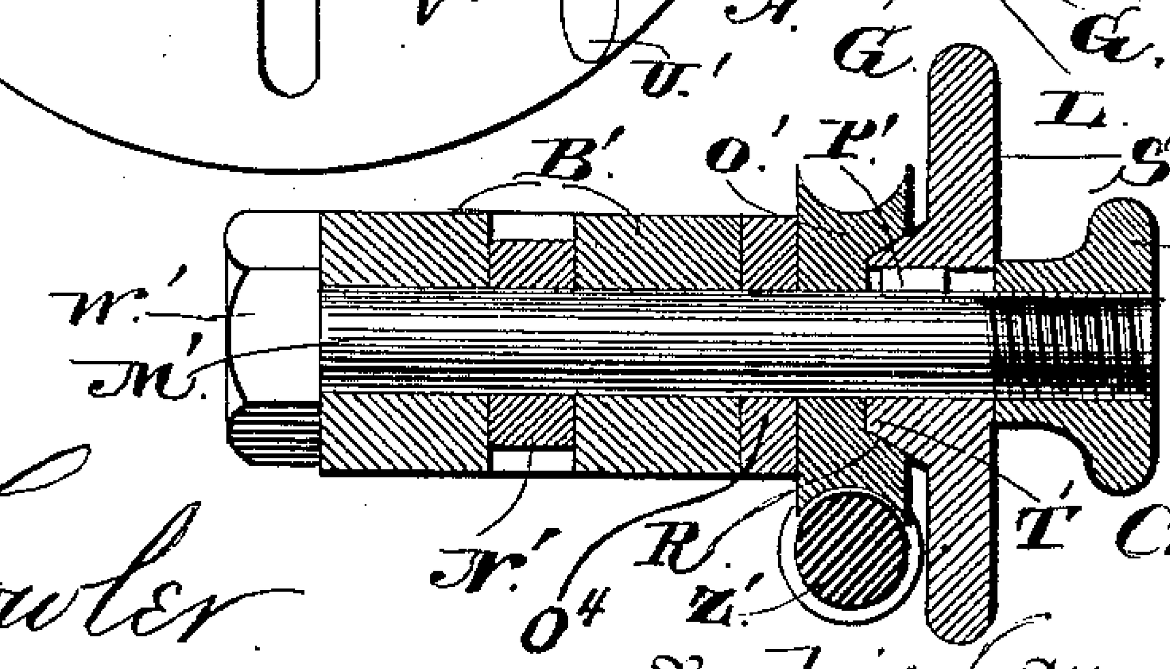


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES WILLIAM McDANIEL, OF LAKE VILLAGE, NEW HAMPSHIRE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 410,803, dated September 10, 1889.

Application filed June 21, 1888. Serial No. 277,707. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WILLIAM McDANIEL, a citizen of the United States, residing at Lake Village, in the county of Belknap and State of New Hampshire, have invented a new and useful Improvement in Drilling-Machines, of which the following is a specification.

My invention relates to an improvement in drilling-machines; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

The object of my invention is to provide a drilling-machine which is adapted to drill a hole either vertically, horizontally, or at any desired intermediate angle, and in which the drill-rod may be either fed automatically to its work or by hand-power.

In the accompanying drawings, Figure 1 is a perspective view of a drilling-machine embodying my improvement. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a horizontal sectional view taken on the line *x x* of Fig. 1. Figs. 4 and 5 are detail views. Fig. 6 is a detail view, partly in section, on the line *a a* of Fig. 2.

A represents the bed-plate, which is of the usual construction, and B represents a vertical cylindrical standard, which is secured to the bed-plate near one end thereof and rises therefrom.

Formed on the upper side of the bed-plate, arranged concentrically with the standard, is a circular boss or offset C, and the lower portion of the standard is reduced for a suitable length to form a spindle D.

E represents a horizontal bracket-arm, which has one end pivoted on the spindle D, and is adapted to move vertically thereon. The said arm is made of two longitudinal pieces F, which are bolted together, and one of which is provided with a pair of ears G.

A rack-bar H is arranged in a vertical position and bears against one side of the spindle, has its lower end guided in an annular recess I in the offset C, and said rack-bar extends between the ears G. A shaft K is journaled transversely in the said ears, and is provided with a spur-wheel L, which meshes with the rack-bar, and has a ratchet-wheel M at one end, which is engaged by a pawl N, that is pivoted to the inner end of arm E.

A pair of transverse openings O is made through the projecting portion of the shaft L on the inner side of the ratchet-wheel, which openings are adapted for the insertion of a pinch-bar or lever, by means of which the shaft may be rotated, so as to cause the rack and pinion to raise or lower the arm on the spindle. The function of the pawl is to secure the arm at any desired vertical adjustment. Inasmuch as the rack-bar bears loosely against the spindle, and is secured in the arm E, which is pivoted on the spindle, it follows that the said arm may be turned in a horizontal direction to any desired position.

P represents the drill plate or table, which is circular, as shown, has a series of radial slots R, and is provided at its center with a depending spindle S, which is journaled in a vertical opening in the outer end of arm E, thereby enabling the plate or table to be revolved on the said arm. The length of the pivotal spindle is such that it enables the table or plate to be adjusted vertically a slight distance upon the arm, and at the outer end of the arm E is a set-screw T, which is adapted to impinge against the spindle, so as to secure the plate or table in any desired position.

In the center of the plate or table and extending through the center of the spindle is a vertical bore U. In the upper end of the said standard is a horizontal opening V, and on the front side of the standard and concentric with the said opening is a circular face W, Fig. 1, which has a concentric annular groove X, Fig. 2, that is T-shaped in cross-section. A vertical slot Y, which is also T-shaped in cross-section, communicates with the upper side of the groove X and is open at its upper end, as shown.

Z represents the drill head or frame, which comprises the horizontal arms A′ B′, connected at one end by a vertical arm C′. At the upper corner of the frame or head is formed a circular disk D′, the diameter of which is equal to the diameter of the face W, and projecting from the center of the said disk is a hollow cylindrical sleeve E′, which is journaled in the opening V, and thereby pivots the drill-head to the standard. The outer end of the sleeve, which projects beyond the rear side of the standard, is screw-threaded, and a clamping-nut F′ is screwed thereon, the function of which is to cause the disk to bear snugly against the face W.

G′ represents a pair of bolts, which have T-shaped heads fitted in the annular groove X and arranged at diametrically-opposite points, and the shanks of said bolts extend forward through the diametrically-opposite openings in the disk T′, and are provided with clamping-nuts H′. By means of the said bolts and clamping-nuts the disk D′ may be clamped firmly to the face when in a vertical, horizontal, or any other desired position, thereby adapting the machine to drill holes at any desired angle, as will be readily understood. The groove Y, which communicates with the groove X, enables the bolts G′ to be inserted in or removed from the latter groove when the machine is being assembled or disassembled.

I′ represents a vertical hollow cylindrical sleeve, which is arranged in a vertical opening at the outer end of the arm B′, and is adapted to move in a vertical direction in the said arm. On the inner side of the said sleeve is secured a rack-bar K′, which works in a vertical longitudinal slot L′, with which the arm B′ is provided.

M′ represents a transverse shaft, which is journaled in a horizontal opening that is made in the arm B′ and intersects the slot L′. Fitted in the said slot and feathered on the said shaft is a pinion N′, which meshes with the rack K′.

O′ represents a worm-wheel, which is loosely journaled on the shaft M′, and is secured against longitudinal movement on the shaft by means of a key P′, that extends through the shaft, and has one end projecting beyond the same and arranged in a concaved recess R in the outer side of the worm-wheel. The extremities of the shaft are provided with screw-threads. A loose washer O^4 bears between the worm-wheel and arm B′.

S′ represents a wheel or disk, which is mounted on the shaft M′ and is feathered thereto by means of the key P′. On the inner side of the said disk or wheel is formed a concentric offset T′, which fits in the recess R′ of the worm-wheel.

From the outer side of the wheel or disk S′ projects a crank-handle U′, Fig. 3, and a nut V′ is screwed to the projecting end of the shaft M′ and bears against the outer side of the wheel or disk. To the opposite end of the said shaft M′ is screwed a clamping-nut W′, the function of which is to prevent longitudinal motion of the shaft in its bearings.

Secured to the under side of the arm B′ and arranged at right angles thereto is a bracket X′, Fig. 3, in one end of which is swiveled a shaft Y′, that has a worm Z′ formed at one end which engages the worm-wheel, and has a miter-wheel A^2 keyed to its inner end.

B^2, Fig. 1, represents a pair of ears or brackets which project from one side of the vertical arm C′ of the frame or head. A vertical shaft C^2 is journaled in the said ears, has a cone-pulley D^2 secured near its upper end, and is provided near its lower end with a miter-wheel E^2, which meshes with the wheel A^2, Fig. 3.

F^2 represents the drill-shaft, which is swiveled in the sleeve I′, and has its upper portion journaled in a vertical opening in the outer end of the arm A′. The lower end of the said shaft is enlarged to form a head and is provided with a vertical central tapered opening or socket to receive the tapered upper end of the shank of the drill.

G^2 represents a collar, which is secured to the drill-shaft by means of a set-screw and bears against the upper end of the sleeve I′, the drill-shaft being thereby prevented from moving vertically independently of the said sleeve.

H^2 represents a hollow sleeve, which is feathered on the upper portion of the drill-shaft and is journaled in the outer end of the arm A′. Formed with the upper end of the said sleeve is a miter-wheel I^2, and formed with or secured to the lower end of the said sleeve is a series of pulleys K^2, which align, respectively, with the cone-pulley, Fig. 1.

L^2, Fig. 1, represents the driving-shaft, which is journaled in the sleeve E′ and in a bearing formed on the upper side of the arm A′. To the outer end of the said shaft is keyed a miter-wheel M^2, which meshes with the wheel I^2, and to the said shaft is keyed a spur-wheel N^2. The said spur-wheel is provided in one side, near its perimeter, with an opening O^2.

P^2 represents a driving cone-pulley, which is loosely mounted on the shaft L^2, bears against the wheel N^2, and has a pinion R^2 at its smaller end.

S^2, Fig. 1, represents a screw which is adapted to pass through the opening O^2 and to engage the threaded opening in the larger end of the cone-pulley, so as to secure the latter to the wheel N^2, for the purpose to be hereinafter described.

Secured to the outer side of the standard B is a bracket T^2, having a vertical arm U^2 at its outer end. An eccentric-shaft V^2 is journaled in the said arm U^2 and in the standard B, and has a crank W^2 at its outer end, by means of which it may be turned.

X^2 represents a tubular sleeve, which is journaled on the eccentric-shaft and is provided at one end with a spur-wheel Y^2, and has a pinion Z^2 at the opposite end.

The operation of my invention is as follows: Power is applied to the driving-shaft by means of an endless belt, which engages the cone-pulley P^2 and receives its motion from the pulley on a suitable counter-shaft. (Not shown.) The miter-wheels, which connect the driving-shaft to the drill-shaft, communicate rotary motion to the latter, and the pulleys on the sleeve at the upper end of the drill-shaft being connected to the cone-pulley on the shaft C^2 by means of an endless belt rotary motion is also imparted to the said shaft C^2. When it is desired that the drill shall be fed automatically, the nut on the threaded end of the shaft M′ is tightened, so as to cause the wheel or disk S′ to be so firmly forced against the outer side of the worm-wheel as to lock the latter fast to the said disk. Inasmuch as the disk is feathered to the shaft it will be understood that when the worm-wheel is thus locked to the disk it cannot rotate independently of the shaft M′; hence, being connected to the shaft C^2 by the worm and miter wheels, said worm-wheel, disk, and shaft M′ are caused to rotate slowly, and the pinion N′, which is secured to the shaft M′, being in engagement with the rack on the inner side of the sleeve in which the lower end of the drill-shaft is swiveled, lowers the said sleeve and said drill-shaft slowly, and thereby feeds the drill automatically to its work, which is placed on the table or disk P in the usual manner.

In order to feed the drill by hand it is only necessary to turn the nut on the end of the shaft M′, so as to cause the worm-wheel to become disengaged from the shaft M′, so that the latter may be rotated independently of the worm-wheel, and the operator then grasps the crank on the wheel or disk S′, and by means of the same rotates the shaft M′, so as to feed or withdraw the drill, as may be desired.

The counter-shaft (not shown) by which the cone-pulley P^2 is driven is run at a uniform speed at all times, and when the said cone-pulley is secured to the wheel N^2 by the screw O^2 the eccentric-shaft must be turned so as to cause the wheels Y^2 Z^2 to become disengaged from the wheels R^2 and N^2, and the shaft L^2 is rotated at maximum speed, the sleeve and wheels on the eccentric-shaft being not in motion. In order to reduce the speed of the shaft L^2 to the minimum extent, the screw O^2 is withdrawn so as to disconnect the cone-pulley from the wheel N^2, and the eccentric-shaft is turned so as to cause the wheels Y^2 Z^2 to become engaged with the wheels R^2 and N^2, respectively. When thus arranged, the cone-pulley rotates independently of the shaft L^2, the pinion R^2, being of less diameter than wheel Y^2, causes the sleeve X^2 to rotate at a slower rate of speed than the cone-pulley, and the pinion Z^2, being of less diameter than the wheel N^2, which is rigid with the shaft L^2, causes said wheel N^2, and consequently the said shaft, to be rotated still more slowly, as will be very readily understood.

On the perimeter of the circular disk D′ is inscribed a graduated scale indicating the degrees of a circle, and this scale moves with reference to a fixed point on the perimeter on the face W when the drill head or frame is turned, and facilitates the arrangement of the drill-shaft at any desired angle.

Having thus described my invention, I claim—

1. The combination of the drill-head, the sleeves journaled therein, one of said sleeves having the pulleys and being geared to the driving-shaft and the other sleeve having the rack-bar, the drill-shaft feathered in the upper sleeve and swiveled in the lower sleeve, the shaft M′, having the pinion engaging the rack, the worm-wheel loose on the said shaft, the worm engaging said worm-wheel, the shaft C^2, geared to the worm and having the pulley connected to the pulley on the upper sleeve by an endless belt, the disk S′, feathered on shaft M′, and the nut V′ on said shaft to compress the disk S′ against the worm-wheel and to release the latter from the disk, whereby the drill may be fed either automatically or by hand, substantially as described.

2. In a drilling-machine, the drill-head F, the sleeves journaled thereon, the upper sleeve having the pulley K^2, the driving-shaft L^2, geared to the upper sleeve, the lower sleeve having the rack-bar, the drill-shaft F^2, feathered in the upper sleeve and swiveled in the lower sleeve, the shaft C^2, having the pulley D^2, the belt-connections between the pulleys D^2 and K^2, the pinion N′, engaging the rack-bar on the lower sleeve, the shaft M′, carrying the pinion, the shaft Y′, geared to shaft M′, and the gearing connecting the shafts Y′ and C^2, as set forth.

3. In a drilling-machine, the drill-head Z, the sleeves H^2 I′, journaled therein, the upper sleeve H^2 having the gear I^2 and the pulley K^2, and the lower sleeve I′ having the rack K′, the drill-shaft F^2, feathered to the sleeve H^2 and swiveled in the lower sleeve I′, the driving-shaft L^2, having a gear meshing with the gear I^2, the shaft C^2, having a pulley D^2, connected to the pulley K^2, the pinion N′, meshing with the rack K′, the shaft M′, for the pinion, worm-wheel O′, on the shaft, worm Z′, engaging the worm-wheel, the shaft Y′, for the worm, and the gears A^2 E^2, connecting shafts Y′ and C^2, as set forth.

4. In a drilling-machine, the drill-head Z, having disk D′, the standard B, having the face W, the diameter of which is equal to the diameter of the disk D′, the sleeve E′, projecting from the disk and journaled in a horizontal opening V of the standard, the clamping-nut F for the sleeve E′, the concentric annular groove X, made in the face W, the vertical slot Y′, also made in the face and communicating with the groove X, the bolts G′, having their heads in the groove X, the nuts H′ for the bolts, and the drill mechanism carried by the drill-head, whereby drilling at an angle can be performed, as set forth.

5. The combination, in a drilling-machine, of the vertically-movable sleeve I′, having

rack K′, the drill-shaft swiveled in said sleeve, the sleeve H^2, having pulley K^2, the shaft M′, having the pinion engaging rack K′, the worm-wheel O′, loose on said shaft, the shaft having the worm engaging the worm-wheel, the shaft C^2, geared to the worm-shaft and having the pulley D^2, connected to pulley K^2, the disk S′, feathered on the shaft M′ and having the crank U′, and the nut V′ on said shaft, adapted to engage the said disk with the worm-wheel and to disengage the same therefrom, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

CHARLES WILLIAM McDANIEL.

Witnesses:
EDGAR C. CAULL,
A. C. BUGBEE.