G. O. LEOPOLD.

BENCH DRILL.

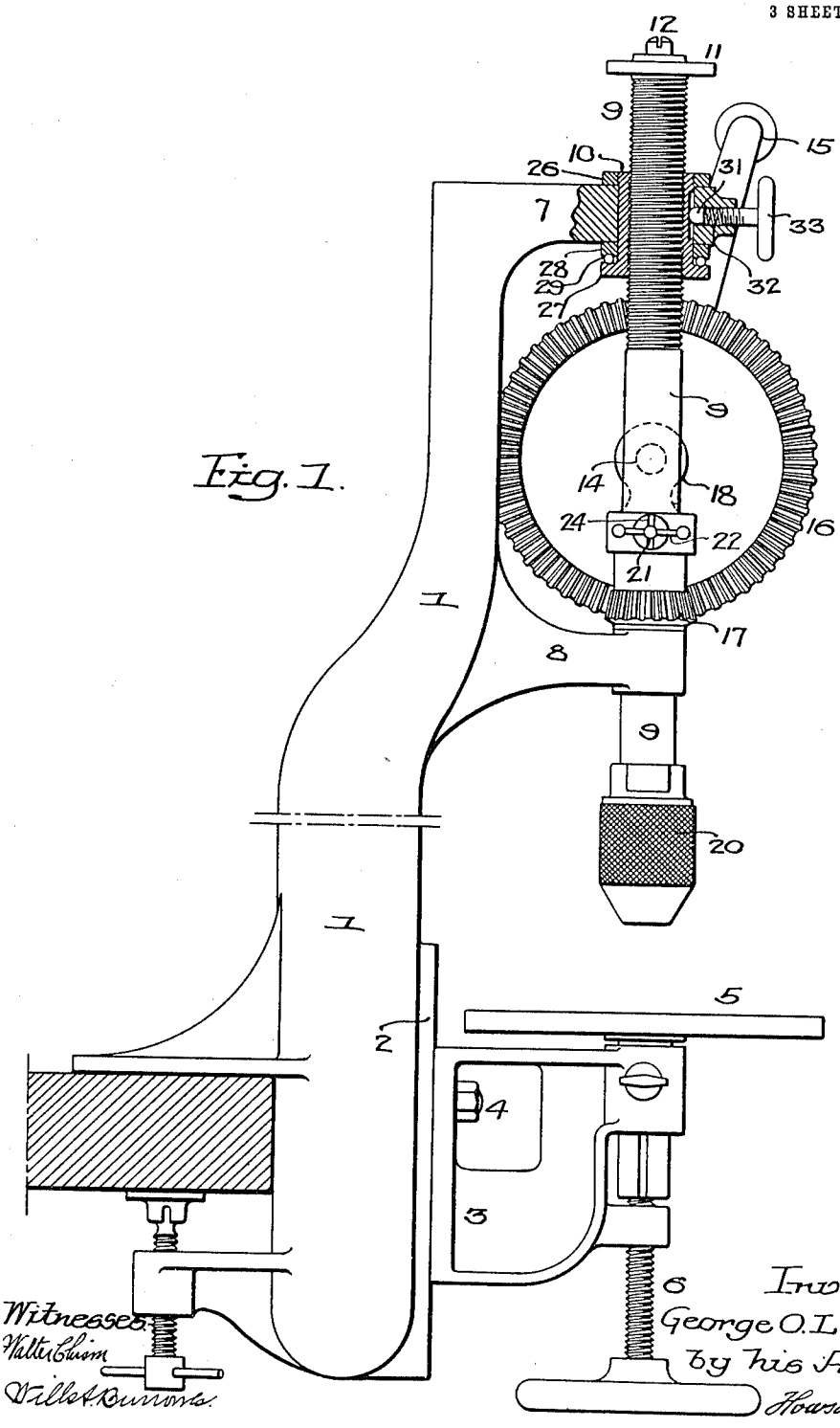
APPLICATION FILED MAR. 13, 1913.

**1,073,500.**

Patented Sept. 16, 1913.

3 SHEETS—SHEET 1.

Fig. 1.




Witnesses:
Walter Chinn
Willet & Burrows.

Inventor—
George O. Leopold.
by his Attorneys
Howson & Howson

G. O. LEOPOLD.

BENCH DRILL.

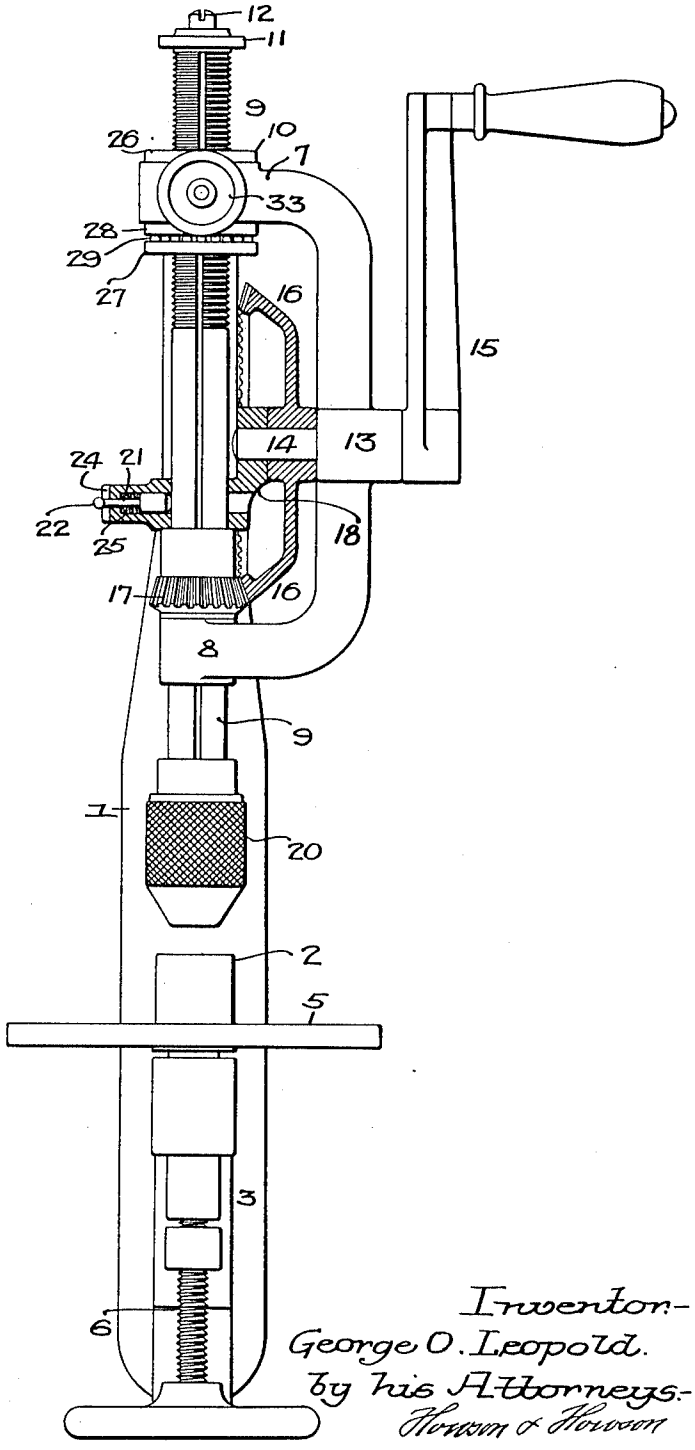
APPLICATION FILED MAR. 13, 1913.

1,073,500.

Patented Sept. 16, 1913.

3 SHEETS—SHEET 2.

Fig. 2.




Witnesses.—
Walter Chism
Willet Burrows.

Inventor.—
George O. Leopold.
by his Attorneys.—
Howson & Howson

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

G. O. LEOPOLD.

BENCH DRILL.

APPLICATION FILED MAR. 13, 1913.

**1,073,500.**

Patented Sept. 16, 1913.

3 SHEETS—SHEET 3.

Fig. 3.

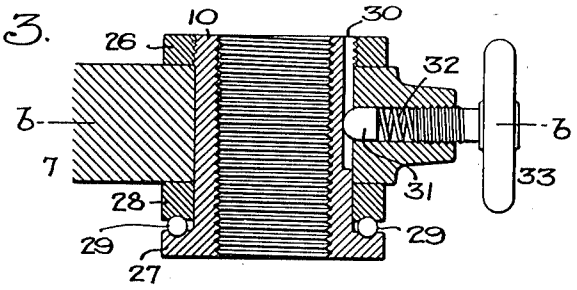



Fig. 4.

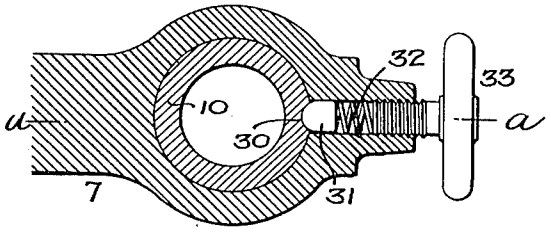



Fig. 5.

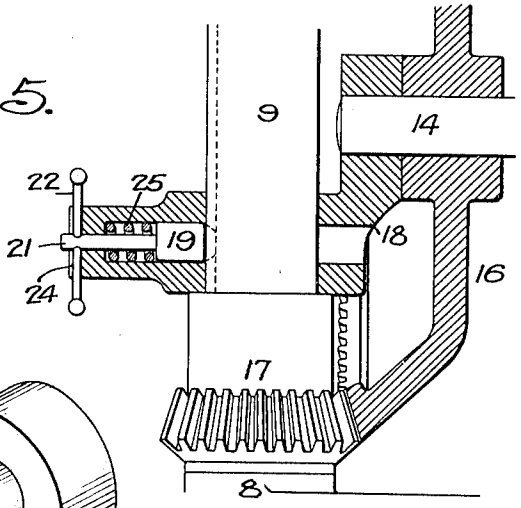
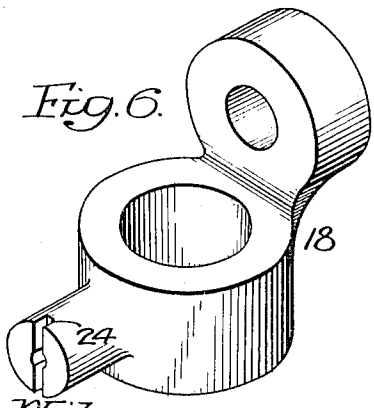



Fig. 6.



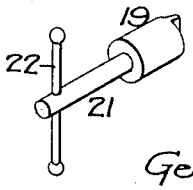




Fig. 7.

Witnesses—
Walter Chism
Willet A. Burnes

Inventor—
George O. Leopold.
by his Attorneys
Howson & Howson

# UNITED STATES PATENT OFFICE.

GEORGE O. LEOPOLD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO NORTH BRO'S M'F'G CO., OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## BENCH-DRILL.

1,073,500. Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed March 13, 1913. Serial No. 754,027.

*To all whom it may concern:*

Be it known that I, GEORGE O. LEOPOLD, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Bench-Drills, of which the following is a specification.

The object of my invention is to improve the construction of drilling machines, especially those which are adapted to be attached to a bench and turned by hand, although it will be understood that the invention can be used in connection with a power driven mechanism without departing from the essential features of the invention.

In the accompanying drawings:—Figure 1, is a side view, partly in section, of my improved bench drill; Fig. 2, is a front view, partly in section; Fig. 3, is an enlarged vertical sectional view through the upper bearing on the line *a*—*a*, Fig. 4; Fig. 4, is a sectional plan view on the line *b*—*b*, Fig. 3; Fig. 5, is an enlarged sectional view of the right angle bearing; Fig. 6, is a perspective view of the right angle bearing; and Fig. 7, is a detached perspective view of the locking bolt.

Referring to the drawings, 1 is the post having means by which it is secured to a bench, and having a slideway 2 on which is mounted a bracket 3 held to the post by a clamp screw 4.

5 is a table having a spindle mounted in the bracket and vertically adjusted by means of an adjusting screw 6.

Projecting from the post are two bearings 7 and 8.

9 is a spindle which extends through the lower bearing 8 and through a sleeve 10 mounted in the upper bearing. This sleeve has an internal screw thread and the upper portion of the spindle 9 is threaded and passes through the threaded sleeve. On the end of the spindle is a cap 11, held in place by a screw 12 which acts as a stop to limit the downward movement of the spindle.

A yoke extends from the upper to the lower frame and carries a bearing 13 for the driving shaft 14 having a handle 15, in the present instance, although a wheel may be substituted for the handle, if desired. Mounted on the shaft 14 is a beveled gear wheel 16 which meshes with a pinion 17 mounted on the spindle 9. The spindle is splined throughout its length and the beveled pinion has a key adapted to the spline, so that while the spindle can slide through the bevel gear wheel it must turn therewith.

In order to hold the pinion 17 on the bearing 8, I provide a right angled bearing 18, through one section of which extends the spindle 9; the end of the horizontal driving shaft 14 extends through the other section, Fig. 5. The bearing is thus held in position by the spindle and the shaft. The shaft 14 prevents it from lifting off the pinion and the pinion forms a seat for the bearing to give additional support to the driving shaft.

Mounted in the bearing 18 is a locking bolt 19 having a projection which enters the spline in the spindle 9 and holds the spindle from rotating when it is desired to open or close the chuck 20 which is mounted on the lower end of the spindle 9. Secured to the stem 21 of the bolt 19 is a bar 22, arranged to enter a slot 24 in the end of the projection of the bearing 18 in which the locking bolt is mounted, and between a shoulder on this projection and the bolt is a coiled spring 25. By pulling out the bolt and turning the bar 22 the bolt will be held out of contact with the spindle, the bar resting upon the end of the bearing 18. If the bar is turned to allow it to enter the slot 24, then the bolt will enter the spline and will prevent the spindle from rotating.

The sleeve 10 has a flange 26 secured to its upper end, as shown in Fig. 3, which rests on the top of the bearing 7. The sleeve also has a flange 27 at the lower end forming the lower portion of a ball race.

28 is a loose ring mounted between the under side of the bearing 7 and the lower flange 27, and between the ring and the lower flange is a series of balls 29 forming a ball bearing to take the upward thrust of the spindle.

In the body of the sleeve 10 is a vertical slot or notch 30, and mounted in the bearing 7 is a plunger 31 having a rounded end. Back of this plunger is a spring 32. The pressure of this spring can be regulated by a handled set screw 33, so that more or less pressure can be exerted on the plunger to cause it to bear upon the sleeve 10 and, when the end of the plunger is in the notch 30, the friction must be sufficient to force the plunger out of the notch before the sleeve can turn in the bearing. When the drill bit cuts into the material to a depth which will cause it to jam, the sleeve 10 will turn with

the spindle in the bearing 7 and the drill bit will not feed farther into the material, which would otherwise cause it to break. Under ordinary conditions, the plunger holds the sleeve from turning, while the spindle is fed forward as it rotates.

Work placed on the table 5 can be adjusted to the drill bit secured in the chuck, and when the shaft is turned rotary motion is imparted to the spindle and the spindle is fed toward the work as it turns in the sleeve 10; the sleeve being frictionally held by the plunger 31 and which will only yield and allow the sleeve to turn with the spindle when the resistance of the material overcomes the pressure of the spring. On the reversal of the movement of the shaft the spindle can be moved from the work. The cap limits the downward movement of the spindle and the shoulder at the end of the screw thread limits its upward movement.

I claim:—

1. The combination in a drill, of a frame having an upper and a lower bearing; a sleeve mounted in the upper bearing and having an internal screw thread; a spindle mounted in the lower bearing and having a threaded upper portion extending through the upper bearing; mechanism for frictionally holding the sleeve to the upper bearing; a pinion mounted on the spindle and splined thereto so that the spindle will rotate with the pinion but will slide therein; and means for rotating the pinion.

2. The combination of a frame having an upper and a lower bearing; a spindle mounted in the bearings; a pinion mounted on the spindle and splined thereto, so that the spindle will turn with the pinion, but is free to slide longitudinally therein; a driving shaft at right angles to the spindle; a bearing for the driving shaft; a gear wheel on the driving shaft meshing with the pinion; and a right angled bearing resting on the pinion and through which the spindle extends and into which the end of the driving shaft extends, so that the spindle is held to its seat on the lower bearing by the driving shaft through the medium of the right angled bearing.

3. The combination of a frame having upper and lower bearings; a spindle mounted in the bearings of the frame; a pinion mounted on the spindle and splined thereto so that the spindle will turn with the pinion but will be free to slide longitudinally therein; a driving shaft at right angles to the spindle; a bearing for the driving shaft; a beveled gear wheel on the driving shaft meshing with the pinion; a right angled bearing resting on the pinion and through which the spindle extends, said bearing also forming a seat for the end of the driving shaft; a locking bolt carried by the said right angled bearing, said locking bolt being adapted to rest in the spline of the spindle; and means for moving the bolt into and out of position.

4. The combination in a drilling machine, of a spindle having a spline therein; a bearing for the spindle; a driven wheel on the spindle having a key extending into the spline; a locking bolt mounted in the bearing having an extension arranged to enter the spline and lock the spindle; a spring back of the bolt; and a bar attached to the bolt, said bearing having a slot to receive the bar when the lock engages the spindle.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE O. LEOPOLD.

Witnesses:
WM. E. SHUPE,
WM. A. BARR.