

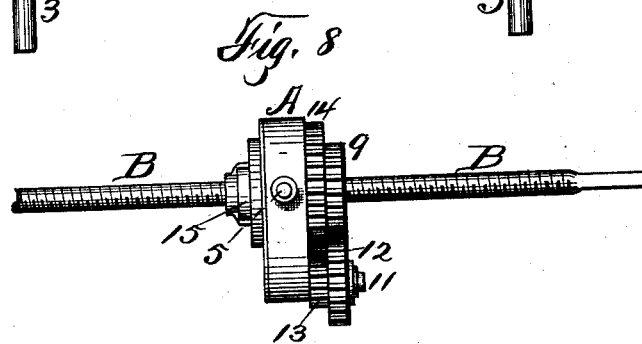
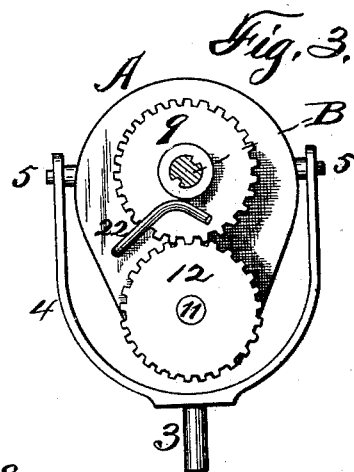
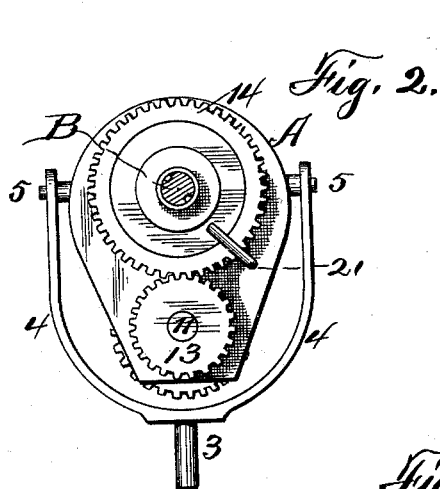
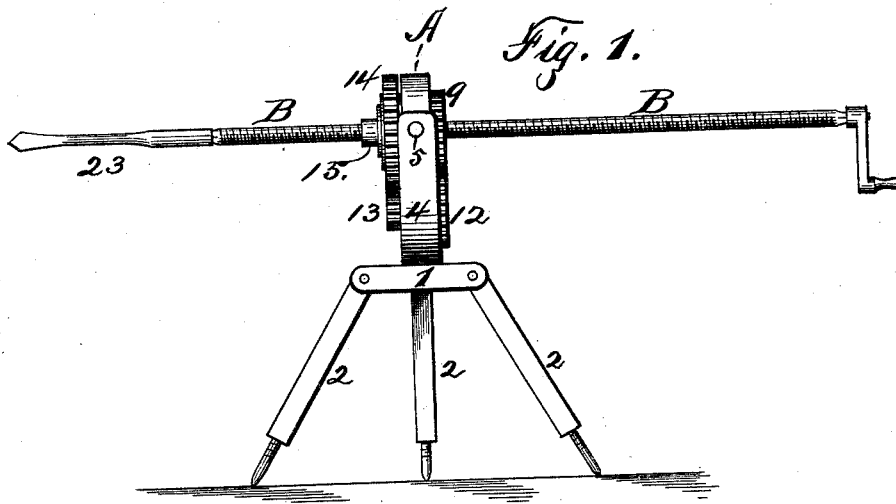
(No Model.)

2 Sheets—Sheet 1.

J. F. BUTLER.  
MINING DRILL.

No. 489,246.

Patented Jan. 3, 1893.



WITNESSES:

*H. A. Barkart,*  
*Geo. M. Blumers*

INVENTOR

*James F. Butler*  
*By Smith & Denison*  
ATTORNEYS.

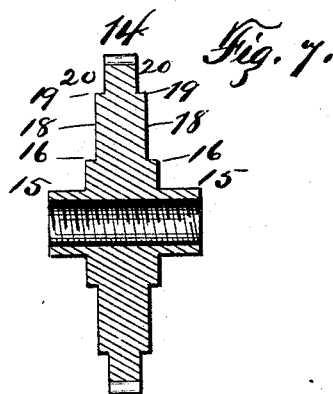
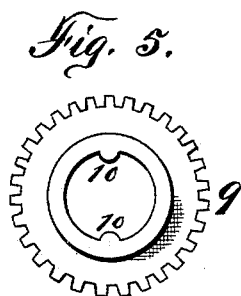
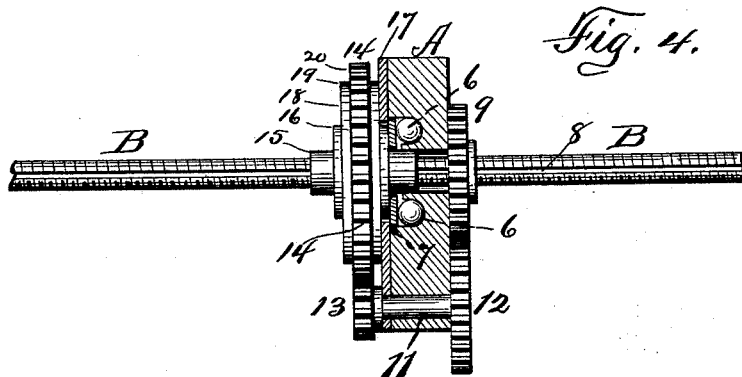
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2 Sheets—Sheet 2.

J. F. BUTLER.  
MINING DRILL.

No. 489,246.

Patented Jan. 3, 1893.



WITNESSES:

*H. A. Carhart,*  
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# UNITED STATES PATENT OFFICE.

JAMES F. BUTLER, OF SCRANTON, PENNSYLVANIA.

## MINING-DRILL.

SPECIFICATION forming part of Letters Patent No. 489,246, dated January 3, 1893.

Application filed September 2, 1892. Serial No. 444,879. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES F. BUTLER, of Scranton, in the county of Lackawanna, in the State of Pennsylvania, have invented new and useful Improvements in Mining-Drills, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to drills for boring, and which are adapted to bore at any angle, and particularly to the automatic differential feed mechanism actuated by the rotation of the drill shaft.

My object is to produce an improved drill for mining and other purposes, adapted to be swung laterally, and also to bore at different angles, and having an automatic differential feed mechanism, actuated by the rotation of the drill shaft.

My invention consists in the several novel features of construction and operation hereinafter described and which are specifically set forth in the claim hereto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which

Figure 1, is a side elevation of the drill, set up ready for use, (except such top bracing as may be deemed necessary.) Fig. 2, is an elevation of the same, looking from the left in Fig. 1, omitting the table and legs. Fig. 3, is a like view of the same looking from the right in Fig. 1. Fig. 4, is a vertical sectional elevation of the same, showing part of the drill shaft in elevation. Fig. 5, is a plan view of the drive gear, detached. Fig. 6, is a transverse section of the drill shaft. Fig. 7, is a vertical section of the feed gear, detached. Fig. 8, is a side elevation of the drill, in which the feed gears are all upon the same side of the body.

A table (1) is provided with suitable legs (2), and in this table the stem (3) of the yoke (4) is swiveled.

(A), is the rocking journal provided with trunnions (5) which have their bearings in the arms of said yoke.

(B), is the drill shaft, threaded as shown, fitting loosely through the journal body, the bore of which is not threaded. A groove is cut in said body concentric with its bore, in which the balls (6) are placed, and (7) is a washer to retain said balls in place. Said

shaft is provided with one or more feather ways (8) extending substantially the whole length, and (9) is the drive gear provided with the feathers (10) which fit into said ways and traverse them, and this gear is driven by the rotation of the shaft. A shaft (11) is mounted in said journal body, and upon it a pinion (12) is secured meshing with the drive gear (9) and here shown as of equal size therewith. A smaller drive pinion (13) is also secured upon said shaft, meshing with and driving the feed gear or geared nut (14). This gear is provided with a hub (15) fitting into the bore of the journal body through the washer (7), and interiorly threaded to fit the thread of the drive shaft loosely; with a shoulder (16) which bears against said washer and ball-bearing, and also passes through the hole in the plate (17) which holds the washer (7) in place; and having a plane surface (18) which lies close to said plate, and a shoulder (19) which creates the rim (20), which is provided with the gear teeth as shown.

When the shaft is rotated the operation of the train of gearing is to rotate the feed gear in the same direction as the shaft, but at less speed; and, therefore, as said gear hub is a revolving nut upon the shaft, the longitudinal feed of the shaft is reduced, proportional to the difference in the speed of the rotation of the shaft and said gear, whereby I am enabled to run the shaft at high speed and the feed is slow, and can be varied by changing the proportions of the feed gear and its driving pinion so as to increase or decrease the speed of the rotation of the feed gear. The feed gear is held in mesh with the drive pinion by the angular bar (21), which is pivoted in the journal body. Also the drive gear is in like manner held in mesh with the pinion by the angular bar (22) pivoted in said body. In fact, both of the bars (21) and (22) may be integral and then when I wish to retract the drill shaft, I shift the bar (22) off from the drive gear and readily slide it out of mesh with the pinion; and I can then rotate the shaft and retract it at full speed through said hub or nut. Or I can retract the shaft a short distance, then release the feed gear from the bar (21), then shove the shaft through the journal body until said gear is out of mesh with the drive pinion, and then turn said feed

gear, as a nut, by hand, running it toward the drill (23) and drawing the shaft through said journal body.

It will be seen that the journal body can be  
 5 turned in any direction upon the pivot stem of the yoke, and that the drill can be directed in any direction up or down, through the universal joint mounting; and that power can be applied to the drill draft in any manner de-  
 10 sired, according to the kind of material, size of hole, and speed desired. I also reverse the drill as follows: I turn the shaft back to make a little slack, then withdraw the shaft from the drill socket, then take the gear (9) off and  
 15 lay it down; then change the bit or drill, then draw the shaft and nut back through the body, turn the shaft around and replace it in the bearing, put on the gear (9), insert the shaft into the drill socket, and go ahead.  
 20 As above described, when the gear (9) is used, the machine is on slow feed. If I wish to give it full feed, I raise the angular bar (22), slide the gear (9) along on the shaft, drop the bar back behind the gear, and then  
 25 it will hold the gear from re-engaging with the gear (12) and then the shaft will have the full feed of the thread through the nut. In such case I can insert a pin through said nut into the journal body, or into the journal

body so as to engage with the gear and lock 30 it from turning with the shaft. Although I show the yoke (4) as pivoted upon a table, I can also pivot it upon a suitable supported bar or beam; and I can also, by removing the yoke from the trunnions mount said trun- 35 nions in bearings upon a miners "stand."

What I claim as my invention and desire to secure by Letters Patent, is

A threaded drill shaft, a rocking and swiveled journal body carrying the same, a 40 drive gear upon said shaft and rotated thereby, a double-faced and reversible geared and threaded nut upon said shaft, means to rotate said nut differentially by the rotation of the drive gear, and an angular bar pivotally 45 mounted in said body, and provided with arms, one of which detachably engages with said drive-gear to hold it in or out of engagement and the other detachably engages with said nut to retain it in proper relation to the 50 drive gear and drill shaft.

In witness whereof I have hereunto set my hand this 13th day of May, 1892.

JAMES F. BUTLER.

Witnesses:

C. B. KINNE,  
 HOWARD P. DENISON.