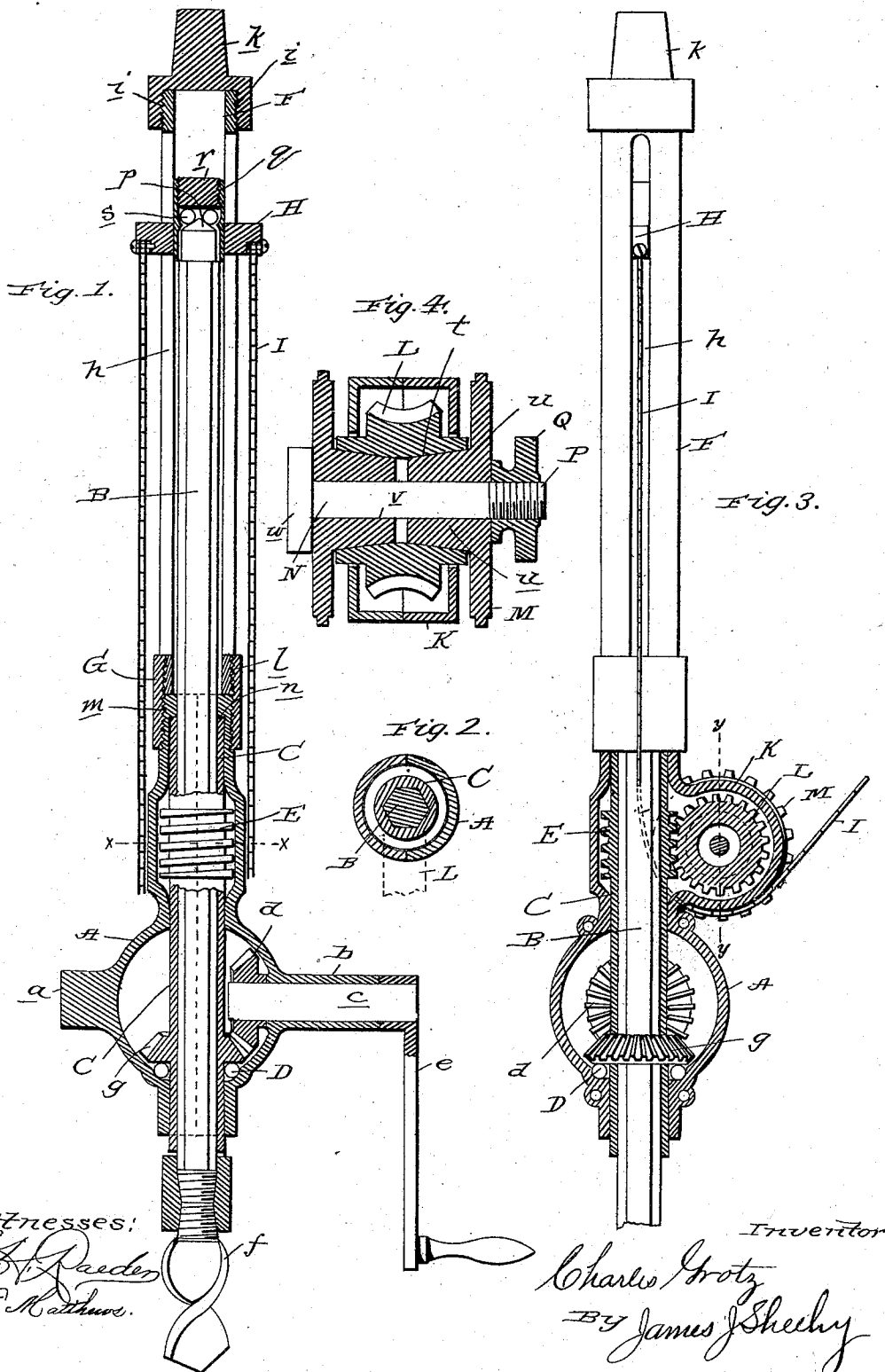


(No Model.)

C. GROTZ.
DRILL.

No. 505,199.

Patented Sept. 19, 1893.



Witnesses:
W. F. Mathews.

Inventor
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UNITED STATES PATENT OFFICE

CHARLES GROTZ, OF OTTUMWA, IOWA, ASSIGNOR OF ONE-HALF TO GEORGE W. THAYER, OF SAME PLACE.

DRILL.

SPECIFICATION forming part of Letters Patent No. 505,199, dated September 19, 1893.

Application filed April 17, 1893. Serial No. 470,657. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GROTZ, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Drills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has relation to an improvement in drills and is designed more particularly for use as a coal drill.

The object of the invention is to provide a device which will be very effective for the purposes designed and will be of a durable and compact construction.

A further object of the invention is to provide a means for regulating the speed of the drilling tool so that it may be driven fast or slow as desired.

Other objects and advantages will appear from the following description and claims when taken in connection with the accompanying drawings, in which—

Figure 1, is a longitudinal, sectional view of my improved drill. Fig. 2, is a cross sectional view taken in the plane indicated by the dotted line *x, x*, on Fig. 1. Fig. 3, is a side elevation partly in section, and taken in a plane at right angles to Fig. 1, and Fig. 4, is a sectional view taken in the plane indicated by the dotted line *y, y*, of Fig. 3.

Referring by letter to said drawings:—A, indicates a shell or casing of my improved device. This shell is designed to inclose the operating gears or pinions, and is provided at one side with a lug *a*, and at its opposite side with a boss or extension *b*, which is hollow to receive a shaft *c*, having fixed to its inner end and within the shell, a bevel gear or pinion *d*, and carrying at its outer or opposite end, an operating handle *e*, whereby the same may be turned by hand, although it is obvious that should it be desired to use the device for heavy work, power may be applied to this handle or shaft *c*; the invention in its present illustration being designed for hand-work only.

B, indicates the drill rod or shaft. This

shaft is of a polygonal or angular form in cross section, and carries at its outer end the drilling point or tool *f*.

C, indicates a sleeve for the operating shaft. This sleeve has its bore of a form corresponding to the angular surface of the operating rod or shaft, which is placed therein, and has fixed to it, or formed upon it, a bevel gear or pinion *g*, which meshes with the gear or pinion *d*, and is also inclosed within the shell or casing A.

D, indicates anti-friction balls, which are placed within the shell A, in suitable seats therein so as to form an anti-friction bearing for the gear or pinion *g*, and consequently the sleeve or tube C. This tube or sleeve is provided at a suitable point in its length and upon its outer side with a worm gear E, for a purpose which will be presently described.

F, indicates a tube or casing. This tube may be composed of gas pipe or other suitable material, and is provided in opposite sides with longitudinal slots *h*. This tube is furthermore provided at its outer end with external threads *i*, to receive a screw tapped cap *k*, and the opposite or inner end of said tube is externally threaded, as shown at *l*; the inner end of the shell or casing A, being similarly threaded, as shown at *m*, and both of these contiguous ends are connected by means of an internal threaded union or coupling G. The shell A, may be provided with an internal shoulder *n*, to furnish a bearing or stop for the inner end of the tube or sleeve C, as shown.

H, indicates a longitudinally movable bearing for the inner end of the operating rod B, which rod may be beveled as shown at *p*. This bearing is designed to slide or move in the slots *h*, within the tube F, and as a convenient form of construction, it may be screw tapped at one end as shown at *q*, to receive a threaded plug *r*, and balls *s*, are interposed between this plug and the beveled end *p*, of the operating rod. The branches of this slidable bearing which pass through the slots in the tube F, have secured to them one end of sprocket chains I, as shown.

The casing or shell A, is provided with a laterally extending chamber K, which may be

formed integral with said shell or fixed thereto in any suitable manner so as to furnish a bearing for parts which I shall now describe.

L, indicates a gear with the face of its teeth beveled as shown. This gear has its bearing within the chamber K, and is journaled therein so as to mesh with the worm gear E, upon the tube or sleeve C. This gear has its bore flaring from its center to opposite ends, or in other words has a double conical bore *t*.

M, indicates sprocket wheels which are designed to receive the sprocket chains I, secured to the slidable bearing H. These sprocket wheels are each provided with a conical hub *u*, which bears in the double conical bore of the gear L, and are each provided with a central aperture *v*.

N, indicates a bolt or rod. This bolt is provided at one end with a head *w*, and at its opposite end with an externally threaded portion P, to receive a thumb-nut or hand wheel Q. The bolt is passed through the apertures of the sprocket wheels, and by manipulating the hand wheel or nut on one end of said bolt, said sprocket wheels may be tightened or loosened in the conical bearings of the gear L. Any suitable means might be provided for preventing lateral displacement of the chains upon the sprocket wheels.

In operation, it will be seen that when the hand crank has been turned, it will impart motion to the shaft *c*, and through the medium of the beveled pinion *d*, fixed to said shaft, motion will be communicated to the pinion or bevel gear *g*, and consequently to the tube or sleeve C, to which said latter pinion is fixed, when motion will be communicated from the worm gear E, on the tube or sleeve C, to the gear L, and from thence to the sprocket chain-wheels M, when by the sprocket chains, the bearing H, will be drawn against the bevel ends of the operating shaft, and will travel in the slots of the tube F, so that it will be observed when the sleeve or tube C, has been rotated, the operating shaft, will be also rotated, and simultaneously with the rotary motion, longitudinal movement will be imparted to the shaft and drilling tool. When it is desired to operate the drill very fast, it is simply necessary to turn the hand-wheel Q, in one direction, so as to increase the frictional contact between the conical hubs of the sprocket wheels and the conical bore of the gear L, while to slow the movement of the drill, it is necessary to turn the wheel in the opposite direction so as to diminish the frictional contact. This means of adjusting the sprocket wheels in their bearings, will be found very convenient in taking up wear of such parts after use.

While in the detailed description of the parts, I have limited myself to the use of a sprocket chain or chains, yet it is obvious that a belt rope or other connection might be used for the purpose desired.

Having described my invention, what I claim is—

1. In a coal drill, the combination with a rotatable and endwise-movable drill rod or shaft, and a rotatable sleeve surrounding and engaging said rod or shaft and having a worm screw; of a slide bearing for the drill rod or shaft, a shaft N, having a gear wheel meshing with the worm screw of the rotatable sleeve, and gearing intermediate of said shaft N, and the slide bearing, substantially as specified.

2. In a coal drill, the combination with a rotatable drill shaft; of a shell or casing, a gear wheel journaled in the casing and adapted to receive a rotary motion; said gear having a double conical bore, or flaring from its center to opposite ends, sprocket wheels having conical hubs and bearing in the flaring bore of said gear, a slide bearing for one end of the drill shaft, and flexible connections for the sprocket wheels and bearing, substantially as specified.

3. In a coal drill, the combination with a drill rod or shaft adapted to be rotated within a tube or casing; of a sleeve or tube rotatable with the shaft and having an external worm gear, a gear in engagement with the worm gear, sprocket wheels adapted to receive rotation from said gearing, a bearing for one end of the drill shaft, slidable in the tube or casing, and sprocket chains connecting the bearing with the sprocket wheels, whereby the drill shaft will be given a simultaneous rotary and reciprocating movement, substantially as specified.

4. The shell or casing, having one end threaded as described, in combination with the sleeve arranged therein, and having an angular bore, and also having the bevel gear and the worm gear, respectively, the crank shaft, also having a bevel gear or pinion, the slotted tube or sleeve, the coupling for the shell and sleeve, the bearing for the drill rod or shaft, the sprocket chains secured to said bearing, the gear meshing with the worm gear, and having the double conical or flaring bore, the sprocket wheels having the conical hubs, the rod or bolt passing through said hubs, and the hand wheel on one end of said bolt, and the drill rod of an angular form in cross section, all adapted to operate, substantially as specified.

5. In a drill, substantially as described, the combination with the shell or casing; of the drill rod, the slide bearing for one end thereof, the anti-friction balls carried by said bearing and receiving the inner end of the rod, the gear fixed to the sleeve, and the ball bearings interposed between the gear and casing, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES GROTZ.

Witnesses:

D. A. EMERY,
GEO. W. THAYER.