No. 673,205. Patented Apr. 30, 1901.

M. HARDSOCG.

COAL DRILL.

(Application filed Feb. 7, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

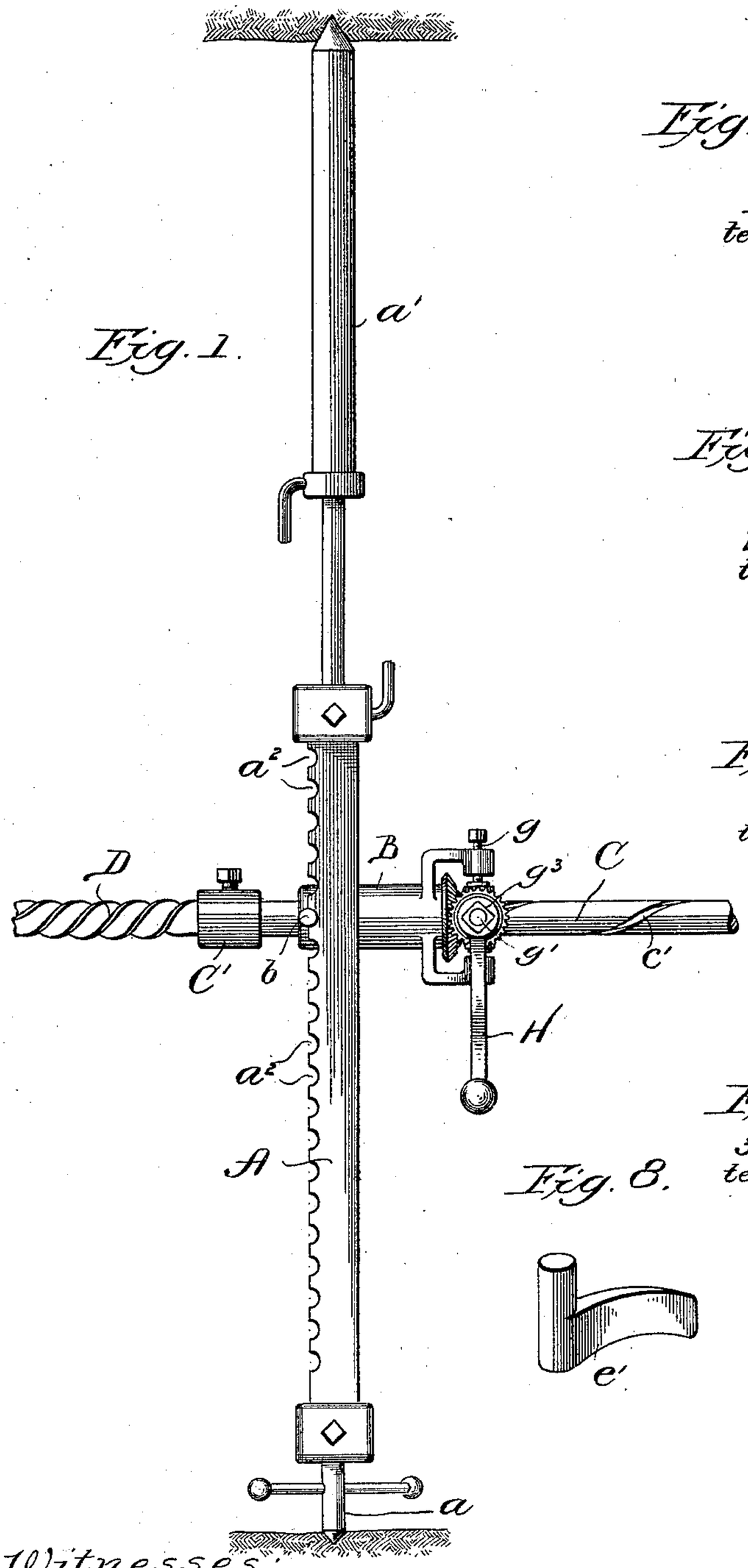


Fig. 4.

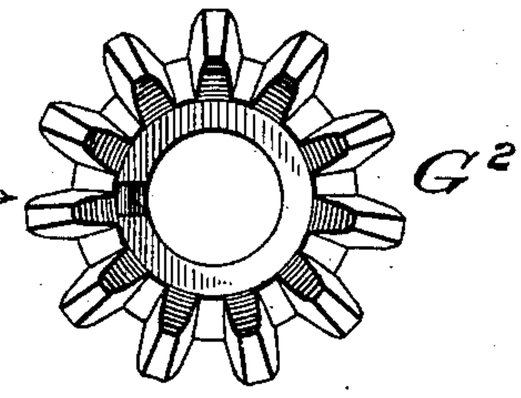


Fig. 5.

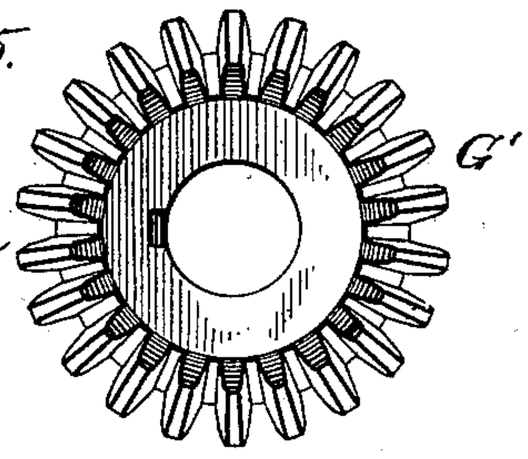


Fig. 6.

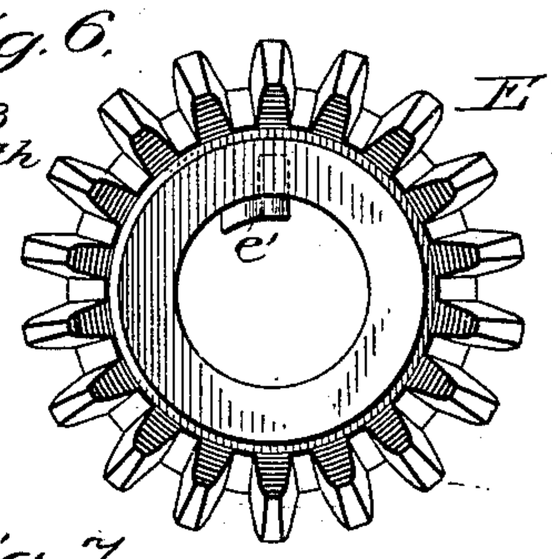


Fig. 7.

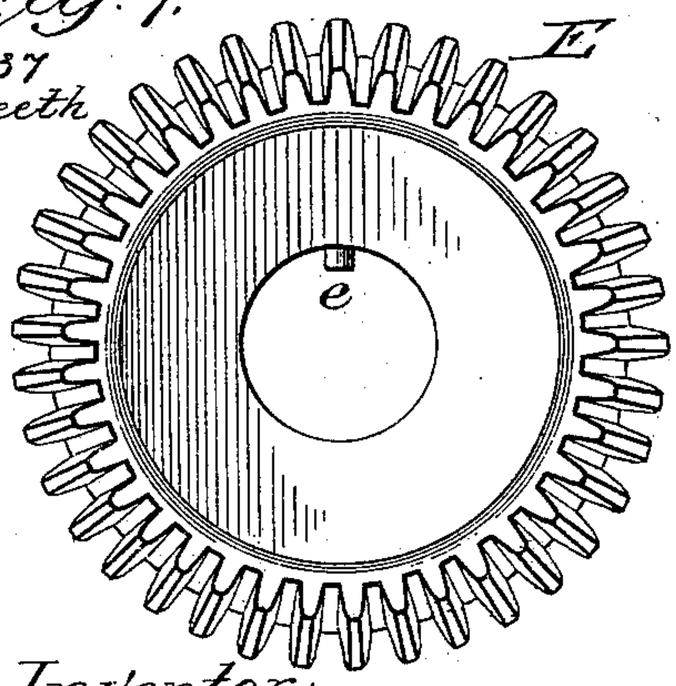


Fig. 8.

Witnesses:
Chas. E. Saylord.
John Enders Jr.

Inventor:
Martin Hardsocg.
By Banning & Banning & Shenidan.
Att'ys.

No. 673,205. Patented Apr. 30, 1901.

M. HARDSOCG.

COAL DRILL.

(Application filed Feb. 7, 1900.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

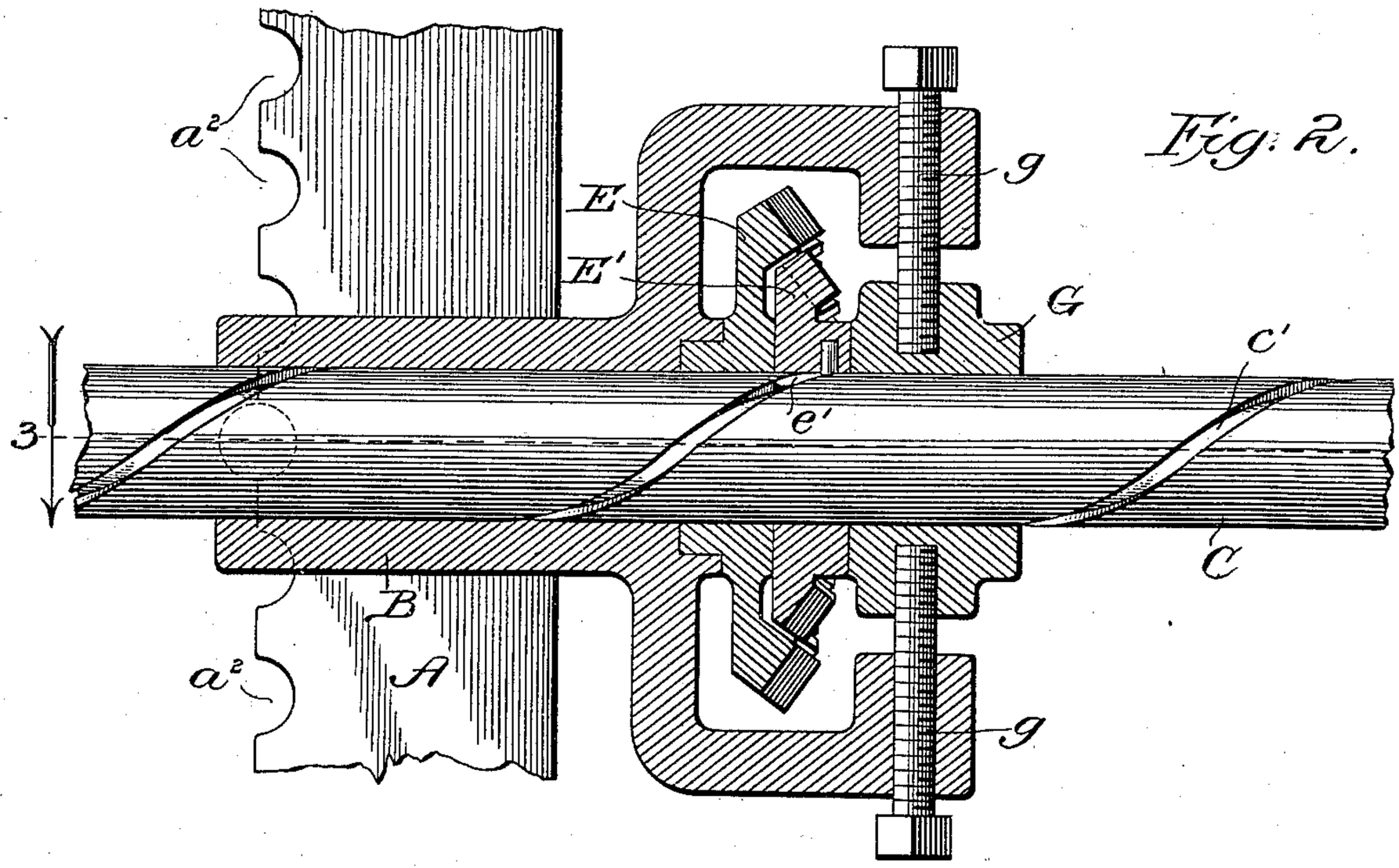
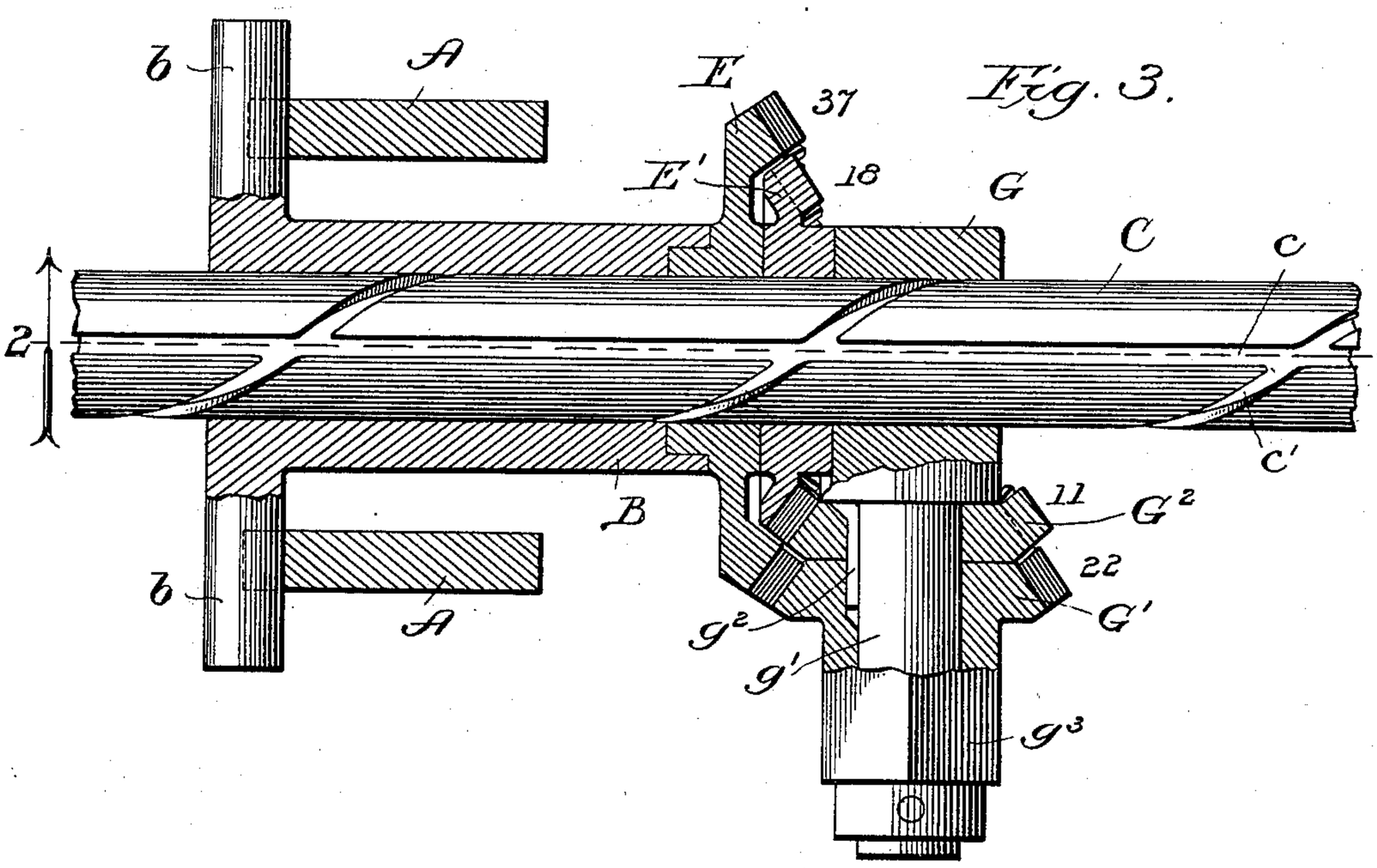


Fig. 3.



Witnesses:
Chas. E. Gaylord.
John Enders Jr.

Inventor:
Martin Hardsocg.
By Banning & Banning & Sheridan
Att'ys.

UNITED STATES PATENT OFFICE.

MARTIN HARDSOCG, OF OTTUMWA, IOWA.

COAL-DRILL.

SPECIFICATION forming part of Letters Patent No. 673,205, dated April 30, 1901.

Application filed February 7, 1900. Serial No. 4,352. (No model.)

To all whom it may concern:

Be it known that I, MARTIN HARDSOCG, 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 Coal-Drills, of which the following is a specification.

My invention relates to that class of coal-drills which is adapted to be mounted upon a supporting frame or standard and adapted to be rotated by hand, and particularly to the means by which the boring-drill is rotated and fed into the body of coal.

The object of my invention is to provide a coal-drill with simple, economical, and efficient rotating and feeding mechanism; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is an elevation of a drill, showing the means for rotating and feeding it and the standard by which it is supported and sustained in position for use; Fig. 2, an enlarged sectional detail taken on line 2 of Fig. 3; Fig. 3, an enlarged sectional detail taken on line 3 of Fig. 2. Figs. 4, 5, 6, and 7 are detail views of the gears by which the mechanism is fed and driven, all of which will more fully hereinafter appear; and Fig. 8 is a perspective view of one of the feathers or keys for feeding the rod inwardly.

In the art to which this invention relates it is well known that it is desirable to have the mechanism for rotating the coal-drill so constructed and arranged that the elements or substantially the same elements which are used for rotating the drill may be used to feed it into the body of coal. To provide such mechanism, therefore, is the principal object of this invention.

In constructing and using my invention I provide a standard formed of two bars A, arranged parallel with each other, so as to provide a space between them through which the drill body or frame may be passed. These bars are connected together at their upper and lower ends and provided with pins or projections a and a', adjustably secured thereto and adapted to enter the roof and floor of the drift in the coal-mine, so as to hold the same in place. This part of the mechanism is old, however, and forms no part of my present invention.

In constructing my improvements I use a drill frame or body, in the form of a box or sleeve B, having a perfectly smooth interior or bore and of the desired size, shape, and strength to hold the operative and other mechanisms in position. This box or sleeve has arms or trunnions b at the front end thereof, adapted to engage recesses a^2 in the standard or bars, so that as the drill is forced inwardly into the bed of coal the trunnions are forced into these grooves and the parts held in operative position. Rotatably mounted in the box or sleeve is a drill-feed rod or shaft C, provided with a longitudinal groove c and a spiral groove c' in its exterior face, which grooves leave the face of the drill-feed rod or shaft practically smooth and free to slide through the smooth interior or bore of the box or sleeve. The front end of this drill-feed rod or shaft is provided with a socket or chuck C', adapted to hold the boring tool or drill proper, D.

From the foregoing description of construction it will be seen that in order to rotate and force the boring-drill inwardly the feed-rod must also be rotated and forced inwardly. In order to accomplish this result, I provide two bevel-gears E and E', having different numbers of teeth, the driving-gear E having thirty-seven and the feed-gear E' eighteen teeth. The driving-gear has a spline pin or stud e entering the longitudinal groove in the feed-rod, so that as said gear is rotated the feed-rod is also driven or rotated, thereby rotating the boring-drill. The feed-gear has a spline or wing e', constructed in the shape of a section of a helix or curve of the spiral groove c', to enter such groove and by its rotation operate to advance and recede the drill-feed rod or shaft, according to the direction of rotation. It will be seen, however, that when both of these gears are rotated, if they are rotated at the same angular velocity there will be no forward or backward motion of the feed-drill. It therefore becomes necessary to rotate the feed-gear at a faster rate of speed than the driving-gear, so that its key or feather, relatively speaking, will ride in the spiral or helical groove, and thereby force the feed-rod backwardly or forwardly.

In order to accomplish this result, a second or supplementary sleeve or collar G is provided, secured to the main box or sleeve by means of set-screws g, passing through arms projected out from the main box or sleeve. (See Fig. 2.) To this second or supplementary sleeve or collar is secured a stud g', on which is rotatably mounted two bevel-pinions G′ and G², each having a different number of teeth. These bevel-pinions are secured together by means of the key g^2, (see Fig. 3,) so that they rotate simultaneously and at the same angular velocity, and the other one has formed therewith a sleeve g^3. This sleeve is provided with a square or polygonal exterior adapted to be engaged by a crank-handle H, by which the parts may be rotated and operated. The pinion G′ has twenty-two teeth and meshes with the large or driving gear E, having thirty-seven teeth. The pinion G² has eleven teeth and meshes with the feed-gear E′, having eighteen teeth. By having the gearing arranged in this way and of about the proportions above given it will be seen that the feed-gear rotates at a faster angular velocity than the driving-gear and that while said driving-gear is making eighteen revolutions the feed-gear makes nineteen revolutions, one revolution more than the driving-gear. This action, therefore, will force the drill-feed rod or shaft into the bed of coal one pitch of its spiral or helical groove. Supposing this groove to be of a four-inch pitch—that is, making one complete turn on the shaft in four inches of its length—said feed-shaft will be forced into the bed of coal four inches during eighteen revolutions thereof.

To extract the boring-drill, all that is necessary is to rotate the crank or handle H in the opposite direction. This will release the boring-drill, so that the drill body or frame can be pushed forward out of the recesses a^2, partially turn, and the entire drill and apparatus be withdrawn from the hole.

I claim—

1. In a mining-drill the combination of a box or sleeve having a smooth interior or bore, a drill-feed shaft passing through the box or sleeve, a longitudinal groove in the exterior of the shaft, a spiral groove in the exterior of the shaft, narrow in cross-section and wide-spaced apart with the body of the shaft for the wide spaces between the spiral of full diameter, leaving the exterior of the shaft practically a continuous smooth face to slide in the smooth interior or bore of the box or sleeve, a driving-gear journaled in the end of the box or sleeve and having a pin or stud engaging with the longitudinal groove of the shaft for rotating the shaft, and a feeding-gear mounted on the shaft of a less diameter than and nested within the driving-gear and having a curved wing engaging with the spiral groove of the shaft and operating to advance and recede the shaft according to the direction of the rotation of the gear, substantially as described.

2. In a mining-drill the combination of a box or sleeve having a smooth interior or bore, a drill-feed shaft passing through the box or sleeve, a longitudinal groove in the exterior of the shaft, a spiral groove in the exterior of the shaft, narrow in cross-section and wide-spaced apart with the body of the shaft for the wide spaces between the spiral of full diameter, leaving the exterior of the shaft practically a continuous smooth face to slide in the smooth interior or bore of the box or sleeve, a driving-gear journaled in the end of the box or sleeve and having a pin or stud engaging with the longitudinal groove of the shaft for rotating the shaft, a feeding-gear nested within and independent of the driving-gear for rotating the shaft and having a curved wing engaging with the spiral groove of the shaft to advance and recede the shaft according to the direction of rotation of the gear, and a sleeve or collar engaging the gear having the curved wing and carried by the box or sleeve, substantially as described.

3. In a mining-drill the combination of a box or sleeve having a smooth interior or bore, a drill-feed shaft passing through the box or sleeve, a longitudinal groove in the exterior of the shaft, a spiral groove in the exterior of the shaft, narrow in cross-section and wide-spaced apart with the body of the shaft for the wide spaces between the spiral of full diameter, leaving the exterior of the shaft practically a continuous smooth face to slide in the smooth interior or bore of the sleeve, a driving-gear journaled in the end of the box or sleeve and engaging with the longitudinal groove of the shaft for rotating the shaft, a feeding-gear mounted on the shaft of a less diameter than and nested within the driving-gear and engaging with the spiral groove of the shaft for advancing and receding the shaft according to the direction of rotation of the sleeve, a spindle extending out from the collar or sleeve and two bevel-gears connected together and rotatable around the spindle and engaging with the gears on the shaft for rotating the gears, substantially as described.

4. In a mining-drill the combination of a box or sleeve having a smooth interior or bore and provided at one end with arms, a drill-feed shaft passing through the box or sleeve and between the arms, a longitudinal groove in the exterior of the shaft, a spiral groove in the exterior of the shaft, narrow in cross-section and wide-spaced apart with the body of the shaft for the wide spaces between the spiral of full diameter, leaving the exterior of the shaft practically smooth to slide in the smooth interior or bore of the box or sleeve, a driving-gear on the shaft journaled in the end of the box or sleeve and engaging with the longitudinal groove of the shaft for rotating the shaft, a feeding-gear mounted on the shaft within the driving-gear and engaging with the spiral groove of the shaft for advancing and receding the shaft according to the direction of rotation of the gear, a collar or sleeve

on the shaft carried by the arms of the box or sleeve, a spindle on the collar or sleeve, bevel-gears connected together and nested one within the other and engaging the driving and feeding gears and rotatable on the spindle of the collar or sleeve, and a hub for one of the gears having a rectangular exterior to receive a handle for rotating the gears, substantially as described.

MARTIN HARDSOCG.

Witnesses:
L. K. KOONTZ,
C. R. ANDERSON.