

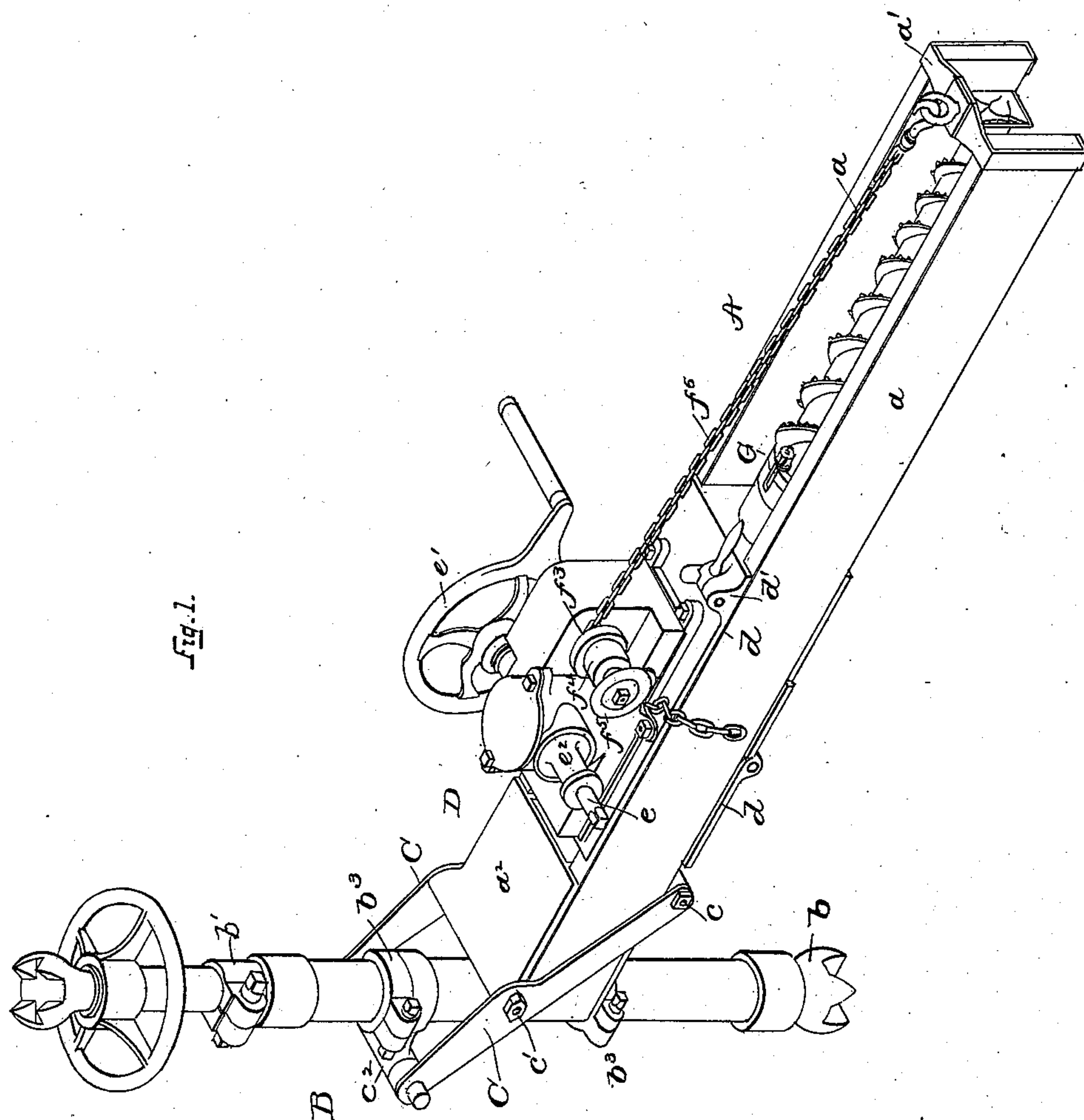
(No Model.)

5 Sheets—Sheet 1.

E. MOREAU.
MINING MACHINE.

No. 376,719.

Patented Jan. 17, 1888.



Witnesses:

N. W. Mortimer,
L. A. Harris,

by

Inventor :

Eugene Moreau,

A. S. Dyrenforth,
his Attorney.

(No Model.)

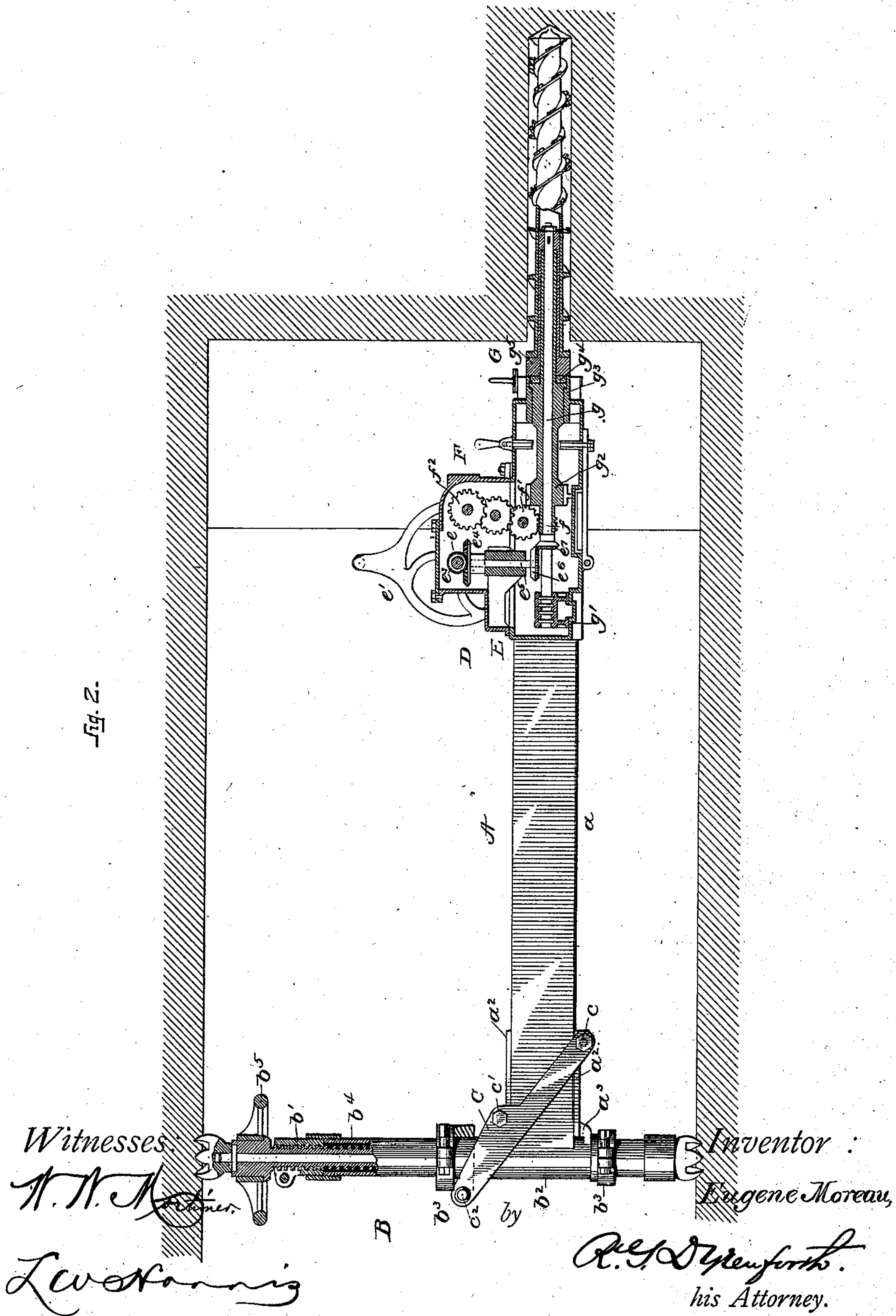
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Fig. 2.



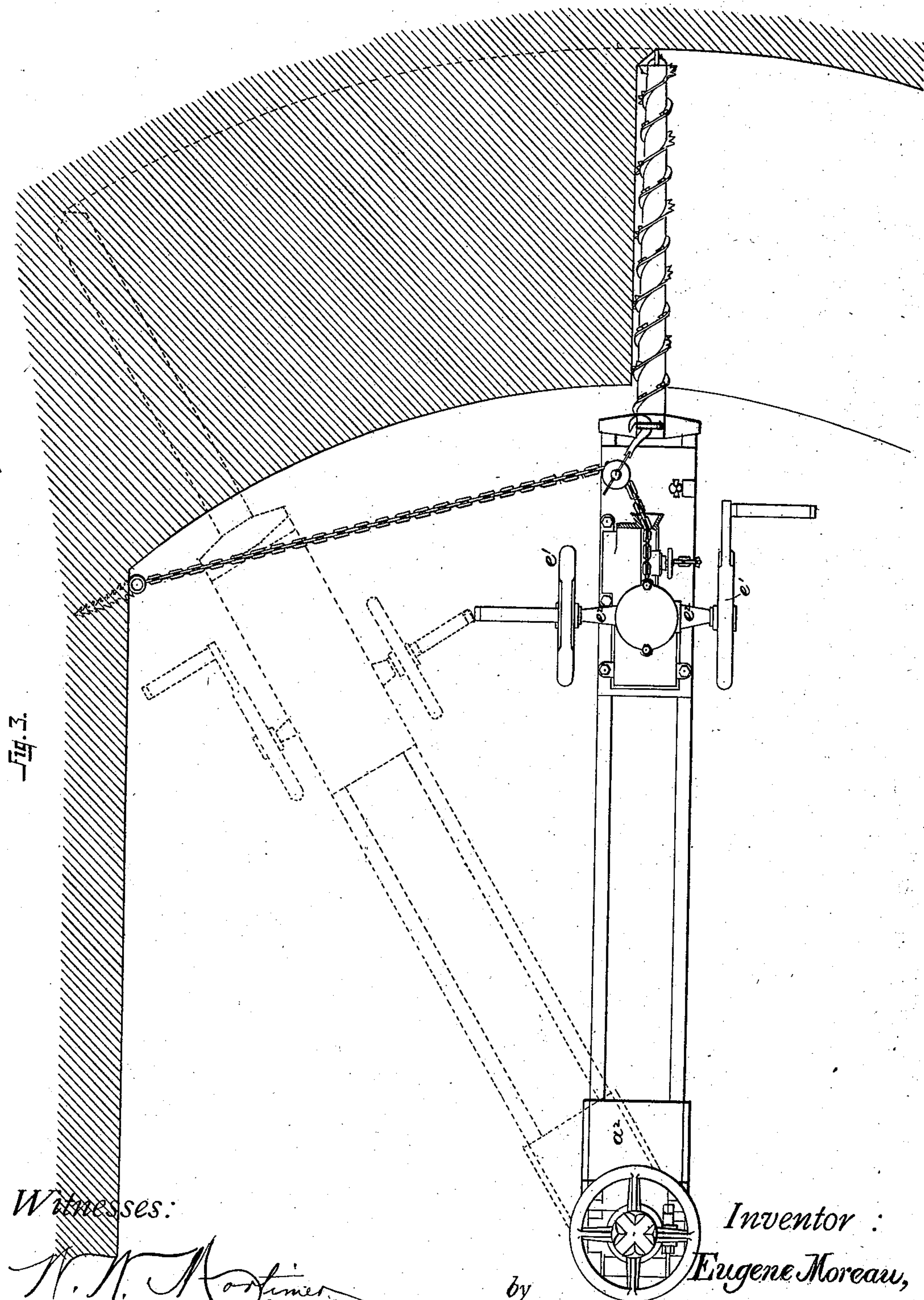
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Fig. 4.

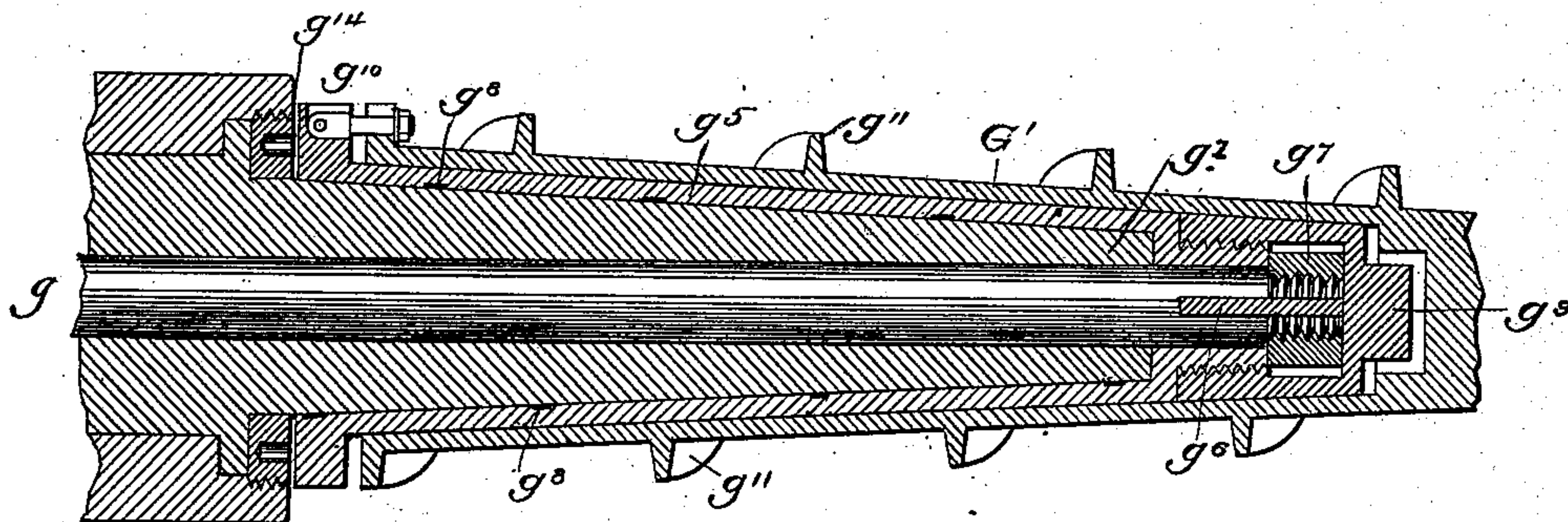
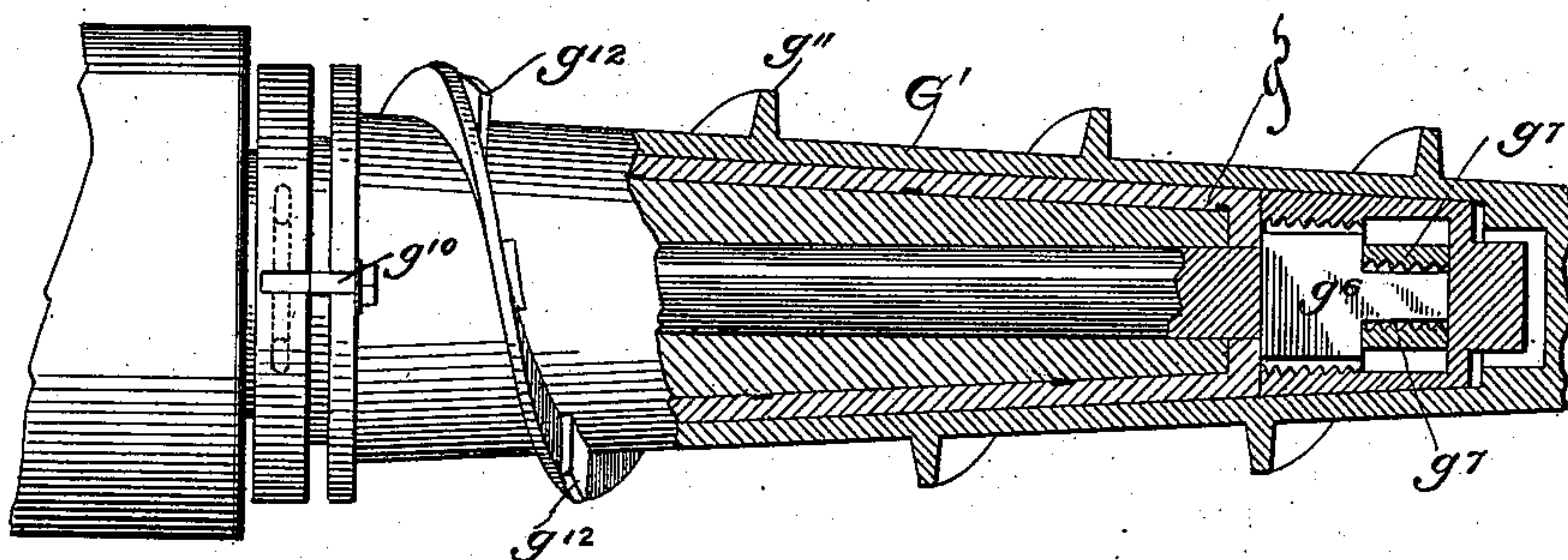


Fig. 5.



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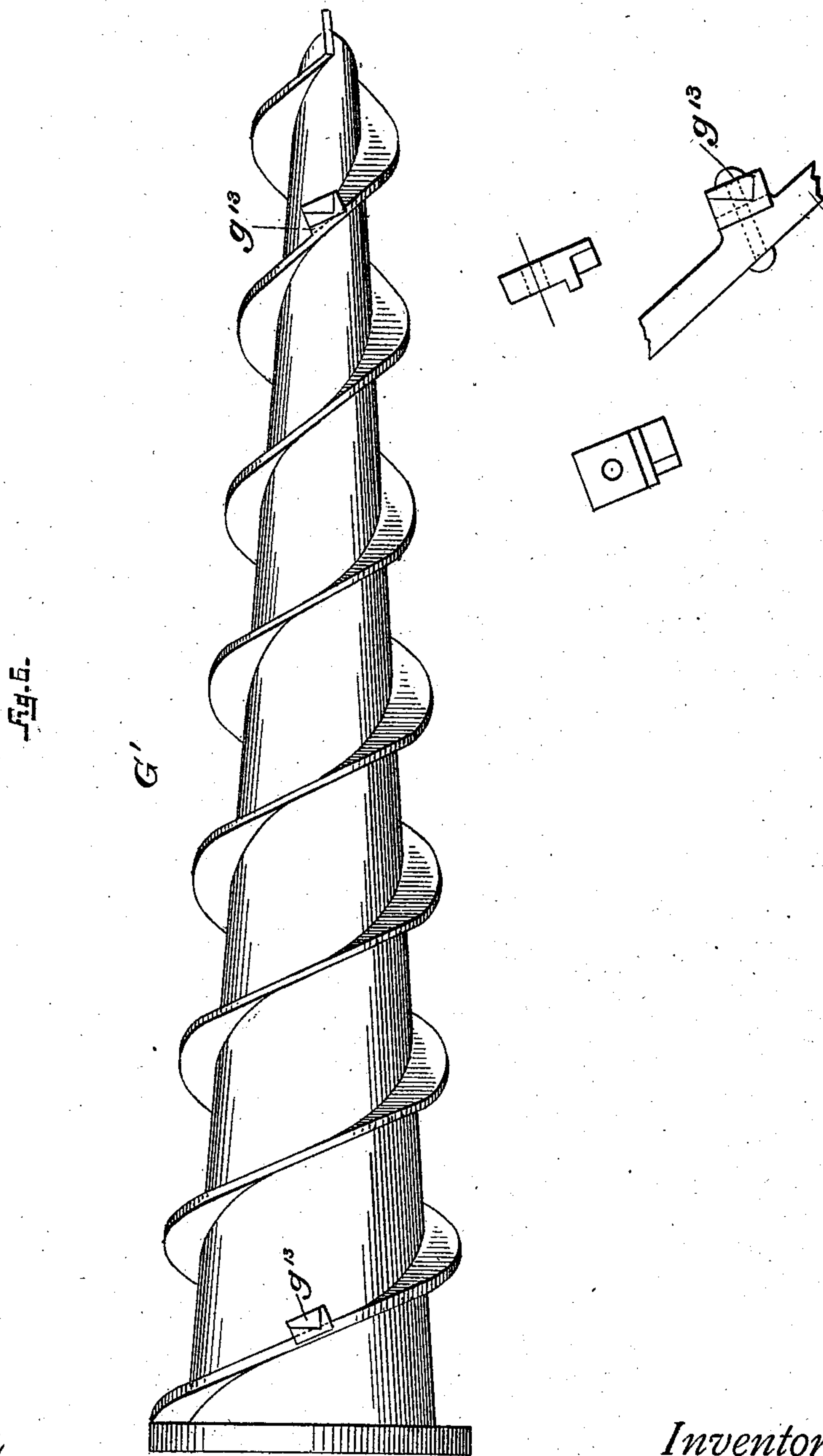
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5 Sheets—Sheet 5.

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UNITED STATES PATENT OFFICE.

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RICHARD B. WESTBROOK, OF SAME PLACE.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 376,719, dated January 17, 1888.

Application filed January 3, 1887. Serial No. 233,215. (No model.)

To all whom it may concern:

Be it known that I, EUGÈNE MOREAU, a citizen of the Republic of France, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Mining-Machines; and I do hereby 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.

My invention relates to machines for mining coal, and more particularly to those which have revolving augers to penetrate the coal, and also to cut horizontal or vertical channels in the same, to separate it and extract it in portions from the surrounding mass.

The object of my invention is to improve the construction of machines of this kind, lessen their weight, and diminish the coefficient of friction, protect the mechanism from injury, and facilitate their operation.

With these objects in view my invention consists, essentially, in a horizontal guide mounted on a standard to support the operative parts of the machine and guide them in boring or channeling; furthermore, in the combination, with the driving mechanism, of automatic mechanism for causing the auger to progress in its work in boring or to channel horizontally or vertically; furthermore, in an improved construction of the auger-driving mechanism; furthermore, in a construction of the bearing of the auger-supporting part which will greatly diminish the friction and wear of such bearing; furthermore, in an improved and more compact assemblage of the different elements of the machine and their inclosure in a box or housing to protect them from injury by dust or blows; furthermore, in a construction of the auger itself whereby its removal or attachment may be facilitated; furthermore, in a construction of the auger whereby the knives may be attached to the helices in a manner best adapted to simplify the manufacture of these knives, and, finally, in certain novel details of construction.

In the accompanying drawings, which form a part of this specification, and in which like letters of reference indicate corresponding parts, Figure 1 is a perspective view of a ma-

chine embodying my invention, showing the horizontal guides mounted upon a standard in a manner to be horizontally and vertically movable, and supporting the operative parts of the machine, (shown housed,) and showing the shaft and clutch of the automatic auger-directing mechanism with the warp chain or cable, the auger portion being retracted. Fig. 2 is a side elevation with portions in section, showing the horizontal guides on the standard, the auger portion being extended, and showing the construction of the driving mechanism and a portion of the automatic auger-directing mechanism for causing progression or lateral or vertical cut of the auger, showing the revolving auger-spindle and its bearing and the fixed spindle with its tapering projection, the auger-bearing sleeve, and the auger proper, and showing the means for lengthening or shortening the standard. Fig. 3 is a plan view of the machine, showing the machine making a lateral cut, and in dotted lines the position of the machine after having cut a horizontal channel to the left of the starting-point. Fig. 4 is a longitudinal vertical section of the auger portion of the machine, displaying in detail its construction, showing at the center the revolving spindle; showing, also, the outer bearing of the fixed spindle, with a part of the body and the tapering portion of the fixed spindle and the means for holding this spindle in place; showing, also, the auger-bearing sleeve and the means for fixing this to and causing it to turn with the revolving spindle and for retaining it and the fixing means in place, as well as the means for keeping the fixing and retaining means in place and for preventing escape of oil, and also showing the auger proper and the means for attaching this to the auger-bearing sleeve. Fig. 5 is a longitudinal vertical section of the auger portion of the machine, taken on a plane at a right angle to that at which Fig. 4 was taken, showing, in addition to what is displayed by Fig. 4, a key in the slot cut through the ends of the revolving spindle and the auger-bearing sleeve, serving as the means to cause the auger-bearing sleeve to revolve with the revolving spindle. Fig. 6 is a side elevation of the auger proper, showing more particularly the construction for attaching the knives.

In the drawings, A represents a horizontal guide, consisting of two side pieces, a , held together by an end piece or strap, a' , and by plates or castings a^2 .

5 B represents a standard consisting of a fixed portion, b , having a claw on the outer end, a fixed screw-nut, b' , at its other end, and an intermediate sleeve, b^2 , provided with collars or clamp-rings b^3 , and of a movable portion or
10 screw, b^4 , having a claw on its outer end and bearing a hand-wheel, b^5 , by which it can be turned in the nut to lengthen or shorten the standard. The screw-nut b' is preferably split and provided with a bolt by means of which
15 sufficient pressure may be exerted upon the screw to hold it in place when desired.

The horizontal guide A is slung or swung to the standard by means of arms C, which are attached to the top and bottom plates a^2 at c
20 c' , and are pivoted to the standard upon its sleeve by a bolt passing through a boss, C^2 , integral with the upper collar or clamp-ring of the sleeve. A heel-piece, a^3 , on the under
25 sleeve b^2 . The sleeve can be secured at any height on the standard by means of the clamp-rings b^3 . It will be obvious that by the attachment of the guide to the standard this can be swung laterally on the standard or be raised
30 vertically on the same.

Between the sides of the horizontal guide is the operating mechanism of the machine, and this is contained in a box or housing which serves to protect it from injury by dust or by
35 blows. D designates this box or housing, and it is composed, preferably, of two castings held together by bolts. The box is retained in the guide A by longitudinal flanges d at its upper and lower margins, which are planed to
40 work smoothly upon the edges of the sides a of the horizontal guide. A tightening or locking device, $d' d'$, of any suitable construction, holds the box and the operating mechanism firmly in position at any desired point on the
45 guide. The upper part of the box is provided with a removable cover to enable examination of the internal parts of the machine and facilitate their lubrication.

As before remarked, the box contains the
50 operating mechanism of the machine, and this consists of two groups—one, E, for driving the auger, and one, F, for guiding it—causing it to progress longitudinally or penetrate, or to cut horizontally or vertically—that is to say, lat-
55 erally or up and down.

Referring to the driving group, e designates a main shaft, having crank-wheels e' fixed at each end and passing through bosses e^2 , bored out to receive it and located immediately un-
60 der the cover. Within the box and fixed upon the shaft e is a bevel-wheel, e^3 , which engages with another bevel-wheel, e^4 , fixed upon the upper end of a counter-shaft, e^5 , to the lower end of which is fixed another bevel-wheel, e^6 ,
65 which meshes with a further bevel-wheel, e^7 , fixed upon a shaft or revolving spindle, g , belonging to the auger portion G of the machine.

Referring to the guiding group, on the spindle g is a worm, f , which engages the teeth of a gear-wheel, f' , which gear-wheel is the first
70 of a train ending at the shaft f^2 . This shaft carries a chain or cable gear, f^3 , connected with it by means of a friction-clutch, f^4 , operated by a hand-wheel, f^5 . A warp chain or cable, f^6 , runs at one end through the chain
75 gear, and is secured at the other end either at the upper and outer extremity of the guide A, as shown in Fig. 1, or at any other place convenient for the desired movement of the
80 auger.

It will be clear that as the crank-wheels e'
are turned rotary motion will be imparted through the intermediate gear to the spindle
85 g , and that this in turn will give motion to the shaft f^2 through the intermediate gear, causing this, when the warp-chain is properly held, to wind and pull upon it.

The revolving spindle g is held at its rear end, where it is also provided with thrust-col-
lars in bearings bored out to receive it in a
90 bracket, g' , at the rear of the box, and at its front end is held in a stationary spindle, g^2 , which is fitted to and runs through the forward part of the box and through a bracket, g^3 , a nut, g^4 , holding it firmly in position. A
95 part of the stationary spindle g^2 projects considerably beyond the front end of the box, and this part has the shape of an elongated cone in order to serve as a bearing for a tapering
100 sleeve, g^5 , which revolves upon it. This tapering sleeve g^5 is fastened to the spindle g by means of a key, g^6 , which fits into a slot cut through the end of each. To hold the key in
105 place and thus keep the sleeve fixed to the spindle, a nut, g^7 , is screwed on the end of the spindle g against the key, and to prevent the assembled nut, sleeve, shaft, and key from coming apart, and also to form a tight joint, so that oil fed to the inner part of the tapering
110 sleeve g^5 , as hereinafter described, cannot escape, but will be led from the tapering sleeve g^5 upon the revolving spindle g through a spiral groove, g^8 , a cap, g^9 , is screwed upon the end of the tapering sleeve.

The auger proper is designated by the letter
115 G'. It is so turned on its interior as to fit the outside of the tapering sleeve, and is held in place upon this sleeve by means of a hinged bolt, g^{10} . The auger has regular helices g^{11} , and to these helices are riveted the knives g^{12} .
120

In a tapering auger the angle of the helix with the axis varies from end to end, provided the thread of the screw remains constant. Therefore a form of knife suitable for the rear
125 end of the auger could not be of the proper shape for the outer end if the helices were of a uniform pattern throughout its whole length.

In order to use only one standard knife, the difference in the angle of the helix at each point where a knife or cutter is attached must be
130 corrected by shaping the helix at that point according to the variation. To this end a boss, g^{13} , is provided at each point where a knife or cutter is to be riveted, and the face of each

boss is provided with an incision forming an angle that will be equal to and have its sides parallel with those of any one of the others, the angles of the faces of the bosses thus being constant with the axis, and so capable of holding the knives with their cutting-edges always set at the proper angle with the axis of the auger. This correction of the shape of the helices at the point of fastening of each knife or cutter permits the use of only one pattern of these knives or cutters, and thus greatly simplifies the manufacture of these knives or cutters.

The auger portion of the machine is properly supplied with oil at the circular space g^{14} between the rear end of the tapering sleeve and the stationary spindle, and the oil is fed forward by the movement of the sleeve on the stationary spindle between it and the supporting-spindle along a spiral groove, g^8 , into the cap, whence it passes backward along the revolving spindle.

The operation of my coal-cutting machine is as follows: The standard B is first placed in position at the proper distance from a bank of coal, as shown in Figs. 2 and 3, and the warp chain or cable f^6 , which engages the chain gear f^3 , is fastened at the end of the guide A—say on a ring there. The box D is left free to move upon the horizontal guide by release of the tightening or locking device d' , which releases the pressure of the clamp or other form of retaining device, holding the box D in place. The friction-clutch f^4 is made to act by means of the hand-wheel f^5 , and then the operator turns the crank or cranks e' . As the auger rotates, the chain gear pulls upon the warp chain or cable f^6 , thus forcing the mechanism and the auger forward and causing the auger to penetrate the bank, the debris resulting from the penetration being fed out by the action of the helices. After the auger has been allowed to bore nearly its entire length the motion of the crank e' is stopped, and the box is fixed in position by means of the tightening or locking device d' . The warp chain or cable is then detached from the end of the horizontal guide, is passed around a pulley on the box, and is attached to any suitable point adjacent to the machine, either to a wall of the bank or to a post. If the crank be now again set in motion, the movement of the machine will be one of rotation upon the axis of the standard B, the drawing upon the warp-chain f^6 by means of the chain gear f^3 effecting this result.

It is evident that by simply attaching the chain to a point on the side of the coal-cutter opposite to that at which it has just been attached the movement of the machine may be reversed; hence the movement of translation of the machine is always toward the point to which the fixed end of the warp-chain is secured.

If it be desired to cut a vertical channel, the warp-chain should be fastened to the roof above the outer end of the horizontal guide,

and the auger would then rise, describing a vertical circular channel having the axis of the boss c^2 for a center.

It is clear that with the warp-chain and chain gear the auger can be made to bore the coal, and also to channel it vertically or laterally, simply by guiding the said warp-chain and attaching its fixed end according to the work to be done.

It will be apparent that the chain feed will be equally effective should the machine be placed upon a guiding device other than the horizontal guide A and the standard B, and I do not therefore limit myself to its connection with either of these particular parts.

All the gearing which is used to transmit the motion of the cranks to the auger and also to the warp-chain being entirely inclosed, the dust of the coal cannot enter the bearings and interfere with the lubrication; and, furthermore, by being so inclosed the mechanism is perfectly protected from blows and other causes of injury.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for mining coal, the combination, with a standard, of a horizontal guide-arm pivotally connected thereto and capable of lateral and vertical swing during the operation of cutting, and serving to support the operative parts and guide them in making the cut, substantially as described.

2. In a mining-machine, in combination with the driving mechanism, mechanism connected therewith and driven thereby to direct the auger in boring and guide its vertical and lateral movements, substantially as described.

3. In a mining-machine, the combination, with the revolving spindle driven by suitable means, said spindle mounted in a bearing at the rear, of the fixed spindle serving as an additional bearing to the revoluble spindle and elongated to serve as a bearing for a revoluble sleeve, and the revoluble sleeve fixed to the revoluble spindle, substantially as described.

4. In a mining-machine, the combination, with the revoluble spindle driven by suitable means, said spindle being mounted in a bearing at the rear, of the fixed spindle serving as an additional bearing to the revoluble spindle and elongated to serve as a bearing for a revoluble sleeve, the revoluble sleeve fixed to the revoluble spindle, and the auger proper upon the revoluble sleeve and secured to the same, substantially as described.

5. The combination of the revoluble spindle, having the bearing at its rear, with the fixed spindle serving as a bearing at its front, and provided with a conical elongation which forms a bearing for the revoluble sleeve that carries the auger proper, substantially as described.

6. The combination of the spindle with the automatic guiding mechanism driven by said spindle, and consisting of a train of wheels, a shaft, the train extending from the spindle and

imparting motion to the shaft, and a warp chain or cable, one end of which is secured to the shaft and the other end at a point in the direction in which the auger is desired to move, substantially as described.

7. The auger proper, G' , consisting of a sleeve having helices, said helices provided with bosses g^{13} , to which the knives are secured, whereby proper inclination of the knives is obtained, substantially as and for the purpose specified.

8. In combination with the revoluble spindle, the sleeve g^5 , fixed to the spindle by means of a key, g^6 , and nut g^7 at its forward or outer end.

9. The combination, with the fixed spindle and the sleeve turning upon the same and provided with an oil-groove, of the revoluble spindle fastened at its forward or outer end to the sleeve by a key and nut, this being covered by a cap, g^9 , substantially as and for the purpose described.

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

EUGÈNE MOREAU.

Witnesses:

ALFRED S. MILLER,
GEO. E. OBERER.