(No Model.)

3 Sheets—Sheet 1.

J. A. HOHN & S. Y. HIGH.

COAL MINING MACHINE.

No. 309,225. Patented Dec. 16, 1884.

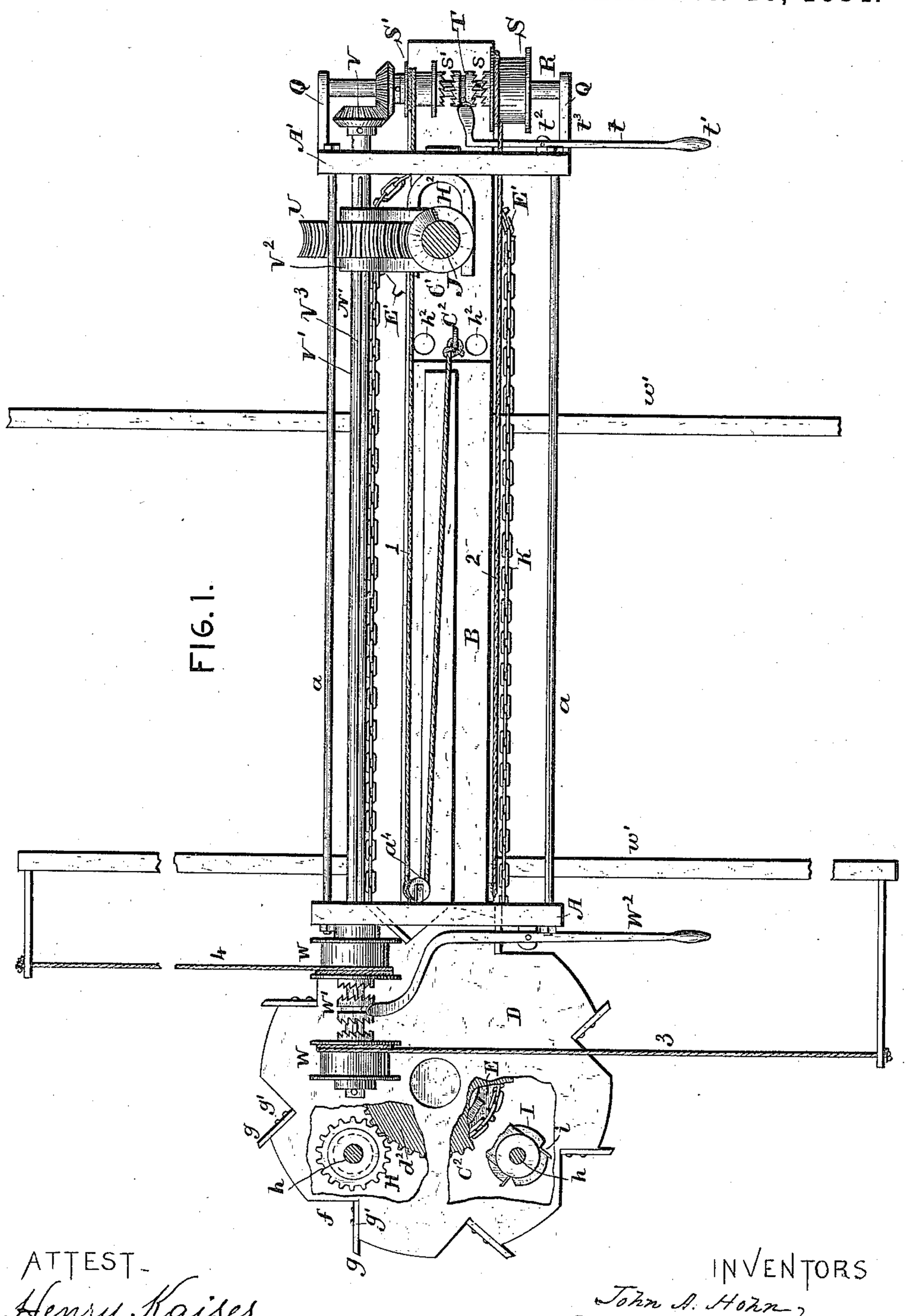

FIG. 1.

ATTEST-

J. Henry Kaiser.

Geo. P. Smallwood

INVENTORS

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Samuel Y. High } by Connolly Bros Attys

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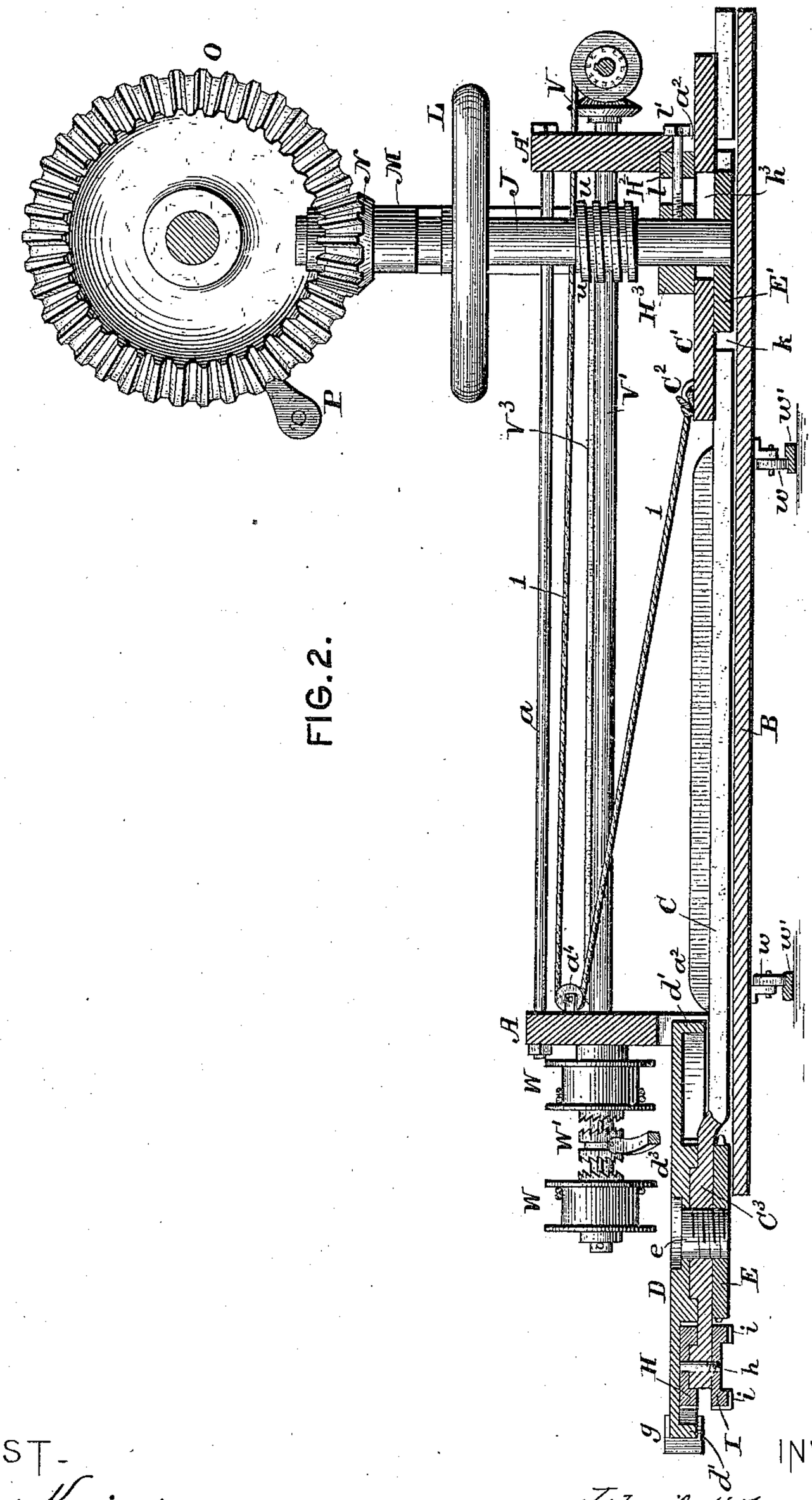

FIG. 2.

ATTEST-
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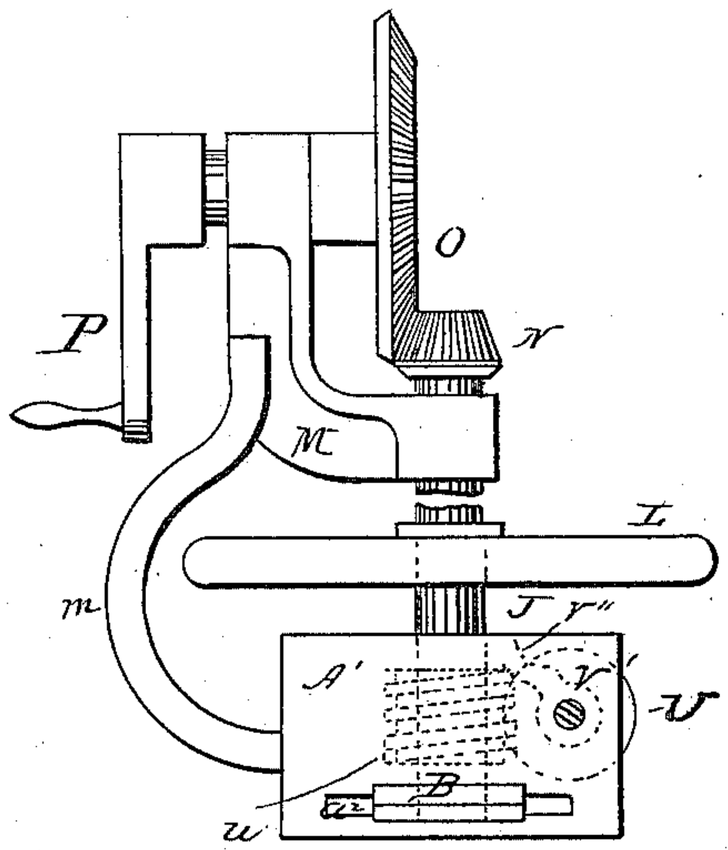

Fig. 3

Witnesses
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A. Connolly.

John A. Hohn } Inventors
Sam'l Y. High }

by Connolly Bro Attys

UNITED STATES PATENT OFFICE.

JOHN A. HOHN AND SAMUEL Y. HIGH, OF NORRISTOWN, ASSIGNORS OF ONE-HALF TO SIMON B. BENSON, OF WATERFORD, PENNSYLVANIA.

COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 309,225, dated December 16, 1884.

Application filed February 27, 1884. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. HOHN and SAMUEL Y. HIGH, residing at Norristown, Montgomery county, Pennsylvania, have invented certain new and useful Improvements in Coal-Mining Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan view. Fig. 2 is a longitudinal vertical section, and Fig. 3 is an end view.

Our invention has relation to machines for mining coal of that class wherein a revolving cutter operates to cut a channel in the coal at the bottom or sides of the vein.

Our invention relates, primarily, to coal-cutting machines which are operated by hand-power; but it is capable, with slight modification, of being used as a power-machine in connection with a motor of any suitable class.

Our invention consists in a coal-mining machine comprising a rotary cutter mounted upon a suitable frame, and driven by an endless chain or other equivalent device, and provided with means, as hereinafter set forth, for feeding forward the cutter as the channel is formed, and retracting the same when the limit of its forward movement has been reached.

Our invention further consists in the provision of means for effecting a lateral movement of the cutter and its operating mechanism.

Our invention still further consists in the peculiar construction and arrangement of parts, as hereinafter fully described and claimed.

Referring to the accompanying drawings, A A′ represent, respectively, the front and rear plates of the frame of the machine, connected together by bolts or bars *a a*, one at each corner. In addition to said bolts a flat plate, B, is secured to the plates A A′ at the middle of their lower edges, and upon said plate B rests and slides the moving parts of the machine. The ends of plate B project some distance beyond the plates A and A′, and the last-named plates have slots a^2 a^2, through which pass a bar, upon which the cutter is supported, and an endless chain, through which motion is communicated to said cutter.

C represents a beam or bar resting upon the plate B, and carrying the cutter-head at one end and its operating mechanism at the other. The bar C is formed at its forward end with a head, *c*, and projecting arms *c′* c^2, and is elevated at that end to such extent as will render the bottom of head *c* level with the top of the rest of the bar.

D represents the cutter-head, which is composed of a disk having a depending flange, *d′*, at its edge, and a central hub, d^2, which rests upon the head *c*, a projecting boss, c^3, upon the latter fitting into a cavity, d^3, in the hub d^2, and a screw, *e*, passing through the center of the hub and the head, and screwing into a sprocket-wheel, E, below the said head. The periphery of the disk D is formed with indentations *f f*, wherein fit cutters *g g*, screwed to the depending flange *d′* by bolts *g′ g′*. These cutters *g g* project outwardly beyond the edge of cutter-head D, and are slightly wider than the flange *d′*, so as to cut a channel of sufficient width to permit the entrance of the cutter-head. The hub d^2 is cogged upon the outside, and its teeth work into the teeth of cogged wheels H′ H′, which are journaled upon the arms c^2 by screws *h h*, passing through said arms and screwing into the supplemental cutter-heads I I, whose cutters *i i* are of such width as to project slightly below the sprocket-wheel E. The other end of the bar C is cut out, so as to leave a space, *k*, which is spanned by a block, C′, secured in position by bolts h^2 h^2, and formed with a slot, h^3, through which passes a vertical shaft, J, to whose lower end is attached a sprocket-wheel, E′, similar to the sprocket-wheel E, and around the sprocket-wheels E E′ passes the endless driving-chain K.

Upon the top of block C′, and outside of slot h^3, is formed a V-shaped flange, H^2, whose arms embrace and guide a collar, H^3, through which passes the vertical shaft J, a bolt, *l*, and nut *l′* serving to hold the collar at any desired point, thereby regulating the tension of the driving-chain K. The shaft J has a fly-wheel, L, secured above the top of plate A′, and passes through the arm of an L-shaped bracket, M, which is held in position by a brace, *m*, that passes around the fly-wheel L,

and is secured to the block C′. To the upper end of the shaft J is secured a beveled gear-wheel, N, that meshes with a larger beveled gear, O, journaled in the upright arm of bracket M, and provided with a handle, P, through which power is applied to drive the machine.

Having described the cutting mechanism and its connections, we will now describe the devices for effecting the forward feed and the retraction of the same, and we will here remark that, the feeding mechanism being connected to and operated from the same shaft as the cutting mechanism, the rate of forward motion of the cutter will be proportionate to its rate of revolution. While the forward movement of the cutting mechanism is necessarily slow and dependent upon the power applied, the backward movement of the same is not necessarily so, and in fact a rapid retraction of the cutter-head is desirable. To accomplish this end we proceed as follows: To the back of plate A′ are secured two brackets, Q Q, in which is journaled a horizontal shaft, R, carrying a drum, S, and a smaller drum, S′, both loose on said shaft, and provided with teeth *s s′*, that take into the teeth on a sliding clutch, T, and turn therewith as the clutch is moved to one side or the other, the movement of the clutch being effected by an L-shaped lever, *t*, provided with a handle, *t′*, and pivoted at t^2 to a projection, t^3, on plate A′. Motion is communicated to the shaft R through the medium of worm-wheel U, and a worm, *u*, and a beveled pinion, V, upon a shaft, V′, which runs from end to end of the machine, and is journaled in the plates A A′. The shaft V′ receives motion from the vertical shaft J through the medium of worm *u* upon the latter, which meshes with a worm-wheel, U, upon the former. The worm-wheel U is held in position by a bracket, V″, upon block C′, whose forked ends embrace the said worm-wheel and keep it in mesh with the worm *u*. A feather, v^3, upon the shaft V′, and extending from the plate A to plate A′, permits the worm-wheel U to move that distance along said shaft, thereby imparting motion thereto, while itself moving forward with the cutting mechanism.

1 represents a rope, which is fastened to drum S′, passes forward to plate A, around a pulley, a^4, thereon, and back to a pin, C^2, upon the block C′. 2 is a similar rope, wound upon drum S in the reverse direction to rope 1, thence forward to the head C, to which it is fastened.

The operation of our invention is as follows: Motion being communicated to the shaft J through the handle and gear-wheels N O P, the sprocket-wheel E′ is caused to turn and its motion communicated to the sprocket E, thereby operating the cutters *g g* and *i i*, the former cutting the main channel, and the latter widening it and permitting the entrance of the driving-chain K. It may be observed that the latter operates to clear away and carry off the coal as it is cut away by the cutters *g g* and *i i*, and that it may have cutters attached at intervals along its length, thereby dispensing with the supplemental cutters *i i*. As the shaft J revolves it turns the worm-wheel U and the shafts R and V′, and the clutch T being moved over into contact with drum S′, the latter winds up the rope 1 and causes the cutting mechanism to move gradually forward. When the cutting mechanism has reached the limit of its movement, the clutch T is moved over to the opposite side, and the drum S′ being now loose on its shaft, the rope 2 is wound up upon the larger drum, S, and the cutting mechanism drawn back to its original position.

The mechanism for effecting the lateral movement of the machines, and which may be desirable or necessary under certain conditions, I have illustrated at Fig. 1 of the drawings. In this case the frame of the machine is provided at bottom with suitable rollers, *w w*, that run upon tracks *w′ w′*, set upon the ground.

To the projection end of shaft V′ are attached two drums, W W, and a double-acting clutch, W′, provided with a lever, W^2, the arrangement being similar to that of the drums and clutch at the rear of the machine, with the exception that the drums are of equal size.

3 and 4 represent ropes, which are wound upon the drums W W, and whose free ends are secured to the opposite ends of the forward rail, *w′*.

To effect a lateral feed in either direction, the clutch W′ is moved over and caused to engage with the ratchet on one side, thereby causing the drum on that side to revolve and wind up its rope, thus drawing the machine to one side. While this lateral movement is being effected the clutch T should be set midway between the drums S and S′, so that neither will be revolved, and there will be no forward or backward movement of the machine.

We claim—

1. In a coal-mining machine, the combination, with suitable cutting mechanism, of means for feeding the cutters forward at a certain rate and retracting them at a more rapid rate of speed, said means comprising a pair of differential pulleys with hubs having clutch-teeth, a double clutch on the shaft of said pulleys, and a set of ropes or cables attached to said pulleys and to the cutter-carriage, substantially as described.

2. In a coal-mining machine comprising a rotary cutter-head driven from the main shaft by means of sprocket-wheels and driving-chain, the combination, with a movable frame upon which said cutter-head and driving mechanism are mounted, of a pair of cable-drums mounted on a horizontal shaft, a double clutch engaging alternately with said drums, and a pair of cables winding upon said drums, respectively, and connected to the frame, so that as the drums are in engagement with the

clutch the frame and cutter-head will be moved forward or backward, substantially as described.

3. In a coal-mining machine comprising a main rotary cutter-head and mechanism for rotating the same and feeding it toward and from its work, the combination, with said main cutter-head having a toothed hub, of supplementary rotating cutters arranged within the periphery of the main head, and having pinions on their shafts engaging with said toothed hub, substantially as described.

4. In a coal-mining machine comprising a carriage to move forward as well as backward, the combination, with the main shaft carrying pulleys upon which are wound ropes or cables to move the carriage laterally, of a supplemental shaft geared to the main shaft, and carrying pulleys connected with ropes or cables for moving the carriage forward and backward, both of said shafts being provided with double clutches to engage with the pulleys, substantially as described.

5. The combination, with cutter-head D, having depending flange *d'* and cutters *g g*, of a bar supporting the same, said bar being bent out of its normal line inside the peripheral flange of the cutter-head, so as to enter the channel cut by the latter, and having journaled at its forward end the supplemental cutters *i*, constructed and arranged so as to enlarge said channel and admit the extreme portion of said bent bar, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 15th day of February, 1884.

JOHN A. HOHN.
SAMUEL Y. HIGH.

Witnesses:
JAS. W. SCHRACK,
CHAS. E. FREAG.