(No Model.)

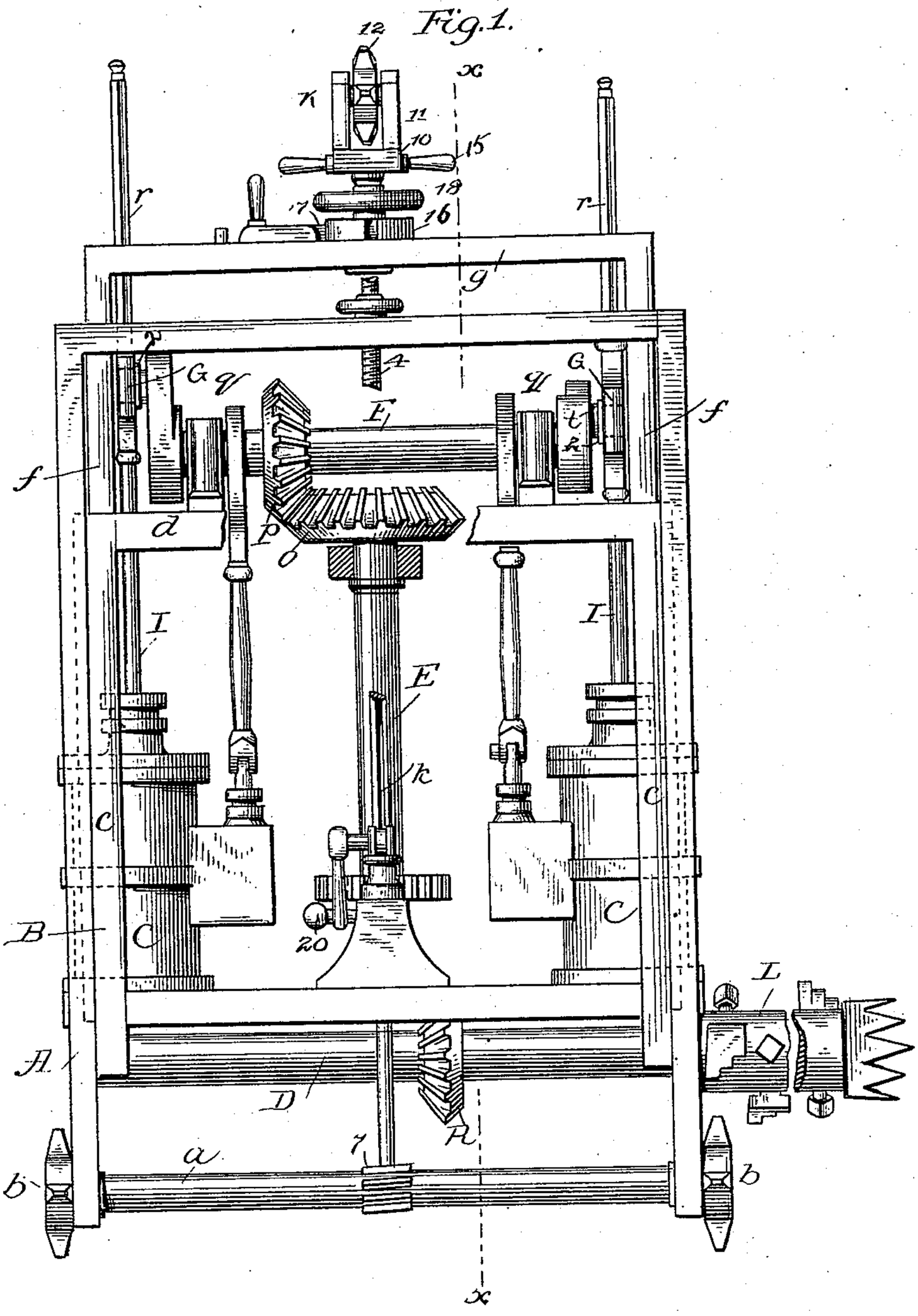
2 Sheets—Sheet 1.

W. HILTON.

COAL MINING MACHINE.

No. 287,436. Patented Oct. 30, 1883.

Fig. 1.



Attest:
Walter Dwaldson
F. L. Middleton

Inventor
Williams Hilton
by Joyce & Spear
Atty's.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

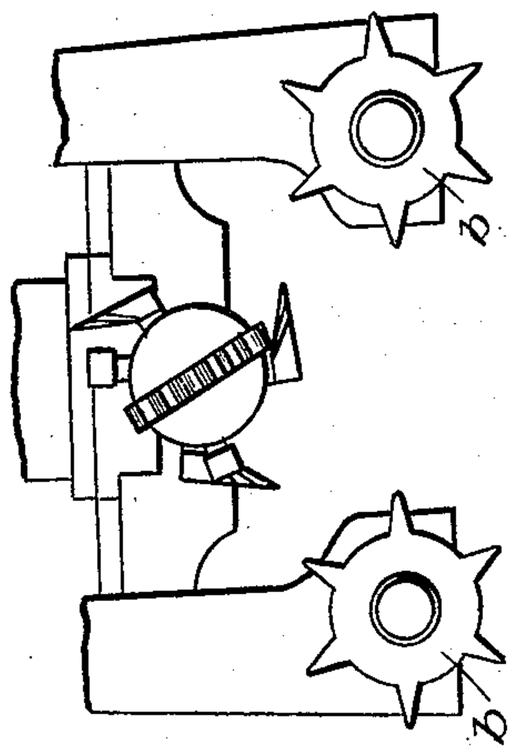


Fig. 5.

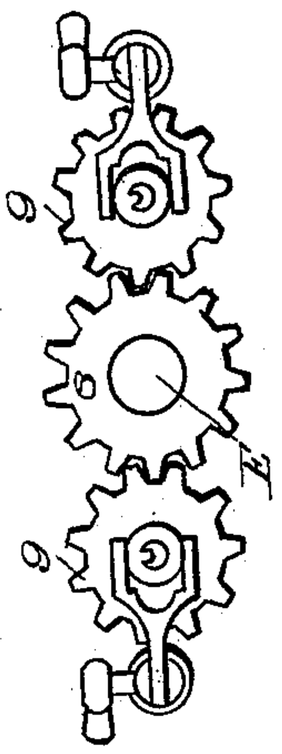


Fig. 3.

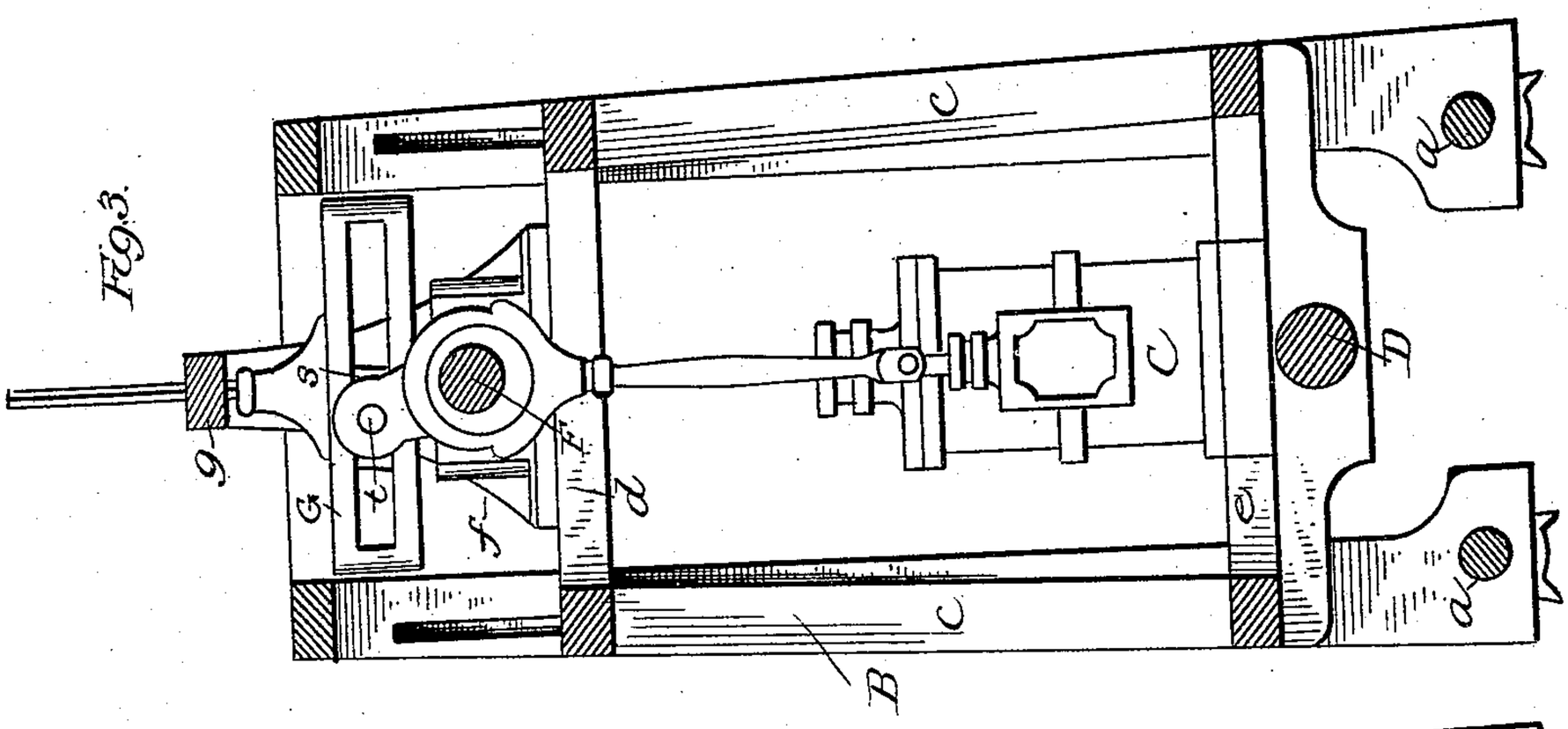
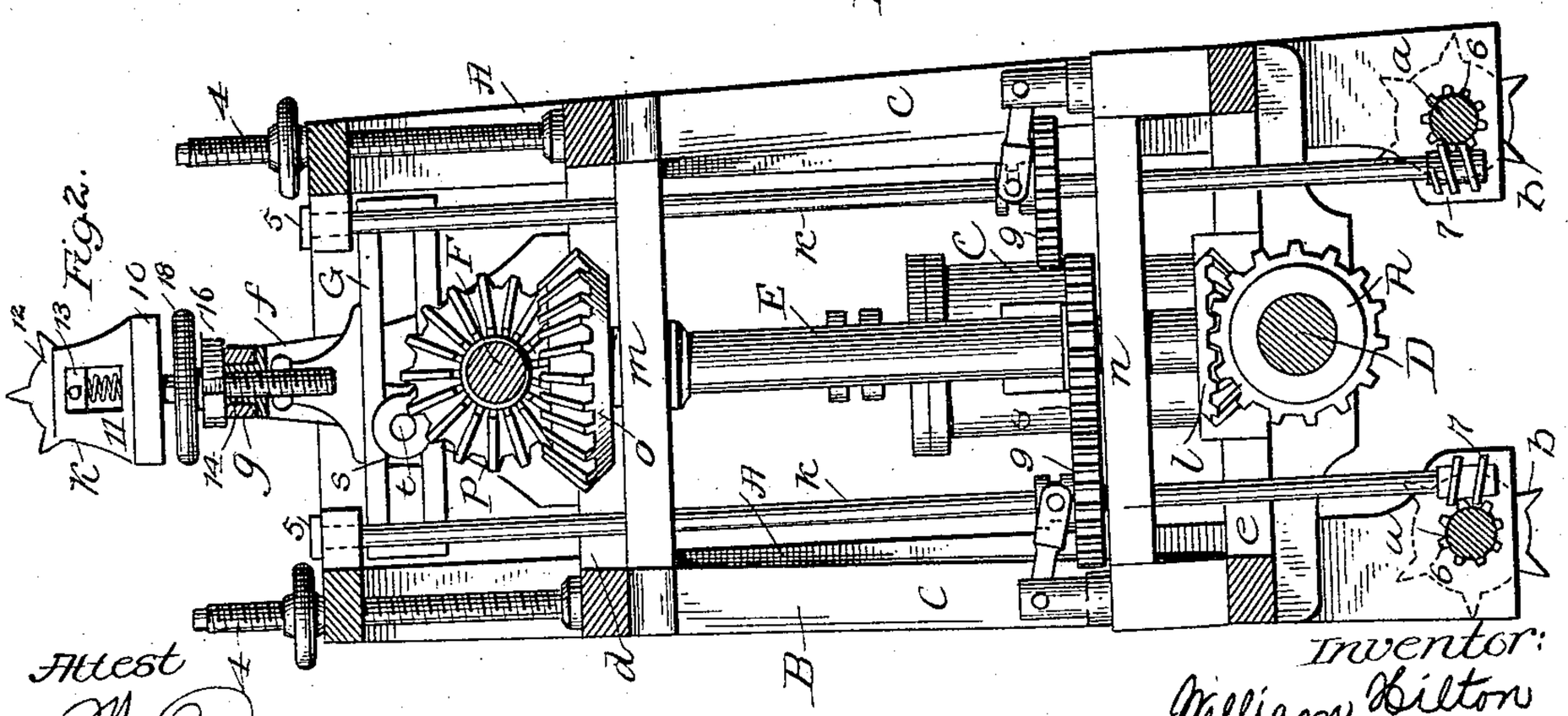


Fig. 2.



Attest

Walter Brudden

F. L. Middleton

Inventor:

William Hilton

by Joyce & Spear

Attys.

UNITED STATES PATENT OFFICE.

WILLIAM HILTON, OF BARTON, OHIO.

COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 287,486, dated October 30, 1883.

Application filed May 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HILTON, a resident of Barton, in the county of Belmont and State of Ohio, have invented certain new and useful Improvements in Coal-Mining Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention is an improved coal-mining machine of that class which are provided with revolving cutters, and are adapted to be moved parallel with the face of the material to be cut.

The apparatus, like those heretofore known, is designed for use in coal-mines, to channel the coal, in order that it may be readily removed, though it is obvious that the machine might be used in other situations for a similar purpose with the same effect.

It is my object to improve the entire structure of the machine and its operating parts, so as to keep it within reasonable limits as to size, while at the same time it is simple in construction and effective in operation.

The invention consists in the improved construction and arrangement of the various parts of the machine, whereby the object sought is attained in a comparatively simple and economical manner.

In the accompanying drawings the machine is fully represented complete and in detail.

Figure 1 represents a side elevation of the machine with the cutting-tool reduced in length. Fig. 2 is a vertical section on line *x x* of Fig. 1, looking to the left; and Fig. 3 is a like section, looking to the right. Fig. 4 is a detail view, showing the position and form of the cutters. Fig. 5 is a detail of the gearing which operates to move the machine laterally.

The frame of the machine is represented at A. It may be of any suitable size and construction; but I prefer to construct it in the manner shown, and of the following dimensions: height four feet six inches, length three feet, and breadth two feet, though, of course, these dimensions may be varied materially without departing from the spirit of the invention.

The frame A is provided with shafts or axles *a a*, extending in the direction of the length of the machine, and through the lower part of the corner-posts thereof, in which the axles have their bearings. They have upon their outer ends spur-wheels *b b*, one at each corner of the machine, and upon which it moves, as hereinafter more fully explained. Within this main frame, sliding in suitable grooves or ways, is a second frame, B, which carries the operating mechanism. I prefer to make it, as shown, with corner-posts *c c* and top and bottom pieces marked, respectively, *d d*, *e e*. To the end pieces *d d* of the upper part I secure extensions or standards *f f*, supporting a cross-piece, *g*, which acts as a guide for the piston-rods of the cylinders, and serves to sustain the devices, hereinafter described, for bearing against the roof of the mine.

I have shown the cylinders C C as supported upon the end pieces *e e* of the frame B, which is a convenient location, and as it is my intention to run the machine with compressed air I connect the cylinders, by means of a suitable coupling, to an air-engine outside of the mine, which operates in the ordinary manner.

The tool-carrying shaft extends the length of the frame B, and has its bearings in the front and rear pieces of the lower part thereof, directly below the air-cylinders in the vertical center of the machine, as this part is necessarily made very strong, to support the cylinders. This shaft is marked D, and is provided with a beveled-gear wheel, R, at the point shown, which gear meshes with a similar beveled gear, *l*, upon a vertical shaft, E, which has its bearings in the horizontal cross-bars *m n*, extending across the center of the frame B, at the bottom and top thereof, as shown. The vertical shaft has upon its upper end another but larger beveled gear, and this (marked *o*) meshes into a smaller beveled gear, *p*, upon the horizontal crank-shaft F. The shaft F has its bearings in suitable boxes on the cross-bars *q q* of the frame B, and, through the mechanism to be described, connecting said shaft with the piston-rods of the

cylinders, communicates power from said pistons to the vertical shaft E by means of the gears *o p*, before described.

The upright cylinders C C are provided with piston-rods I I, working vertically in said cylinders, and having a support for their upper ends, *r*, in guide-slots in the cross-bar *g* of the frame B. The piston-rods, at the upper ends, I prefer to make square in cross-section to correspond to the guide-slots in the cross-piece, which insures greater accuracy of movement. As these rods are alike in all respects, the description of one will suffice for a clear understanding of their construction.

At the point *x*, about half-way the length of the piston-rod, is a horizontal extension, G, slotted for nearly its whole length, as shown, and adapted to receive a sliding block, *s*, which is perforated, as shown, to receive the pin *t* of the crank-arm of the shaft F, heretofore referred to. The block is held in its position within the slot by a shoulder, 2, on the upper or lower edge of the said block. The shaft F has a similar arm and pin upon the opposite end, fitting in a similar sliding block in the slotted piston upon that side, the only difference being in the position of the crank-arms, they being secured on the shaft at right angles to each other. By this arrangement alternate depression and elevation of the crank-arms of the shaft F is accomplished, and a continuous rotary motion is communicated through the said shaft to the vertical shaft E, and from thence to the shaft carrying the cutter-bar.

As before mentioned, I make the frame B vertically adjustable in the main frame A, in order that I may begin the boring operation at any height within certain limits, (governed by the proportions of the machine and the place of working.) This is accomplished by providing suitable ways or guides for the inner frame to slide upon, and screw-threaded rods 4 4, secured in the top pieces of the inner frame, one on each side, extending up through holes in the outside frame and fitted with hand-nuts upon their ends, the adjustment of the frame being accomplished by turning these nuts either to the right or left, according to the adjustment desired.

As this machine is intended to first bore an opening in the coal-bed, and then move parallel to the face of such bed in either direction, cutting as it moves, it is desirable that this lateral movement of the machine be automatic and capable of being regulated to the movements of the other parts of the apparatus. This is accomplished in the following manner: Upon each side of the vertical shaft E is placed a rod, *k*, which extends the height of the outer frame, passing through the upper part thereof, where it is held by a boss, 5, or in any suitable way. This rod passes through the cross-pieces *m n* of the inner frame, down to the axle *a*, before mentioned, where it meshes with a gear, *b*, on the axle through a worm, 7, on its lower end. Motion is communicated to this rod, and through it to the axle, by means of a cog-wheel, 8, on the vertical shaft E above the cross-bar *n*, gearing with a pinion, 9, splined to the rod, as shown. This rod and its connections are duplicated upon the opposite side of the machine, and derive their power from the wheel 8 in a similar manner. It will be understood, however, that when it is desired to have the machine move in a certain direction the pinion upon one side must be thrown out of connection with the gear-wheel 8, when the rod upon one side only will be revolved to cause the machine to travel in the proper direction. To reverse the direction of the machine it is only necessary to place the first pinion into engagement with the teeth of the cog-wheel 8 and throw the pinion on the opposite side out of engagement therewith. This is readily accomplished by the means shown, which are of ordinary construction, and need no particular description. It is sufficient to say that the wheel or pinion, being splined to the rod, is capable of being raised clear of the teeth of the wheel 8 by the device shown, and is held in that position by a pin, 20, which prevents the return of the lever 21 after the pinion has been elevated.

The rods *k* are grooved for about half their length upon one side, in order that the adjustment of the inner frame will not interfere with the relative position of the pinions splined to such rods.

Upon the cross-bar *g* of the inner frame I adjustably secure a device, K, adapted to bear against the roof of the mine, to give additional support to the machine as it is moved. It consists of a threaded shank having a top plate, 10, and side pieces, 11, between which is placed a toothed wheel, 12, the said wheel being journaled in block 13, sliding in slots in the walls of the side pieces. A spiral or other suitable spring is placed beneath each of the blocks 13, which keeps the wheel elevated to its greatest extent, but at the same time yields readily to the irregularities of the surface as the wheel passes over such. The threaded shank of this device passes through a sleeve, 14, in the cross-piece *g*, to which sleeve it is splined, and the sleeve and shank have therefore rotary movement together. By this means the operator can by the handles 15 turn the device K in any direction, and in order that it may be securely locked in position, I have provided the sleeve 14 with a circular head, 16, notched as shown, with which notches a locking-key, 17, engages and holds it in the required position. A hand-nut, 18, is also provided upon the threaded shank, to adjust it vertically.

The cutter-bar is represented at L in Fig. 1. I prefer to have it extend five feet beyond the machine, and provide it upon its periphery with thirty (more or less) of the cutters shown in the detail, Fig. 4. Upon the end of the bar, however, I prefer to use a cutter of the

form shown, which is better adapted for the purpose required of it—that is, the boring into the bed of coal. The side cutters are each made with three or more inclined faces, as shown in Fig. 4, the first incline upon the left being the greatest, and the next a little less, &c., so that a single cutter presents three cutting-edges, one continuing the cut where the other leaves it, this action cutting the material regularly and preventing clogging, as the material is thrown from the tool as fast as it is cut.

The machine may be made very cheaply of suitable material, and when constructed in the manner indicated all the parts will work with such regularity as to allow the machine to be turned upon its side and work in that position as well as when in an upright position, with the exception that it could not be moved automatically. When the machine is first set in motion, both of the pinions 9 9 are thrown out of connection with the wheel 8, and the machine forced up against the bed of coal, into which the cutter soon makes its way. One or the other of the gears 9 is then put in connection with the gear-wheel 8 and the machine moved in the direction desired, the side cutters operating upon the material in an obvious manner.

It is not essential that the details be followed closely, as they may be varied materially without departing from the spirit of my invention.

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

1. In a coal-mining machine, a revolving cutter-bar carrying a cutter or cutters adapted to cut laterally and longitudinally, mounted in fixed bearings in a frame which carries the driving mechanism, and which is adapted to be adjusted vertically, a main frame which carries the vertically-adjustable frame, and mechanism connected with the driving mechanism on the main frame, whereby the whole is moved laterally, as set forth.

2. The combination of the outer and inner frames, the rods *k k*, meshing into gears on the axles *a a* by means of worm-gears on their lower ends, and the pinions 9 9, splined to said rods and adapted to be thrown into or out of connection with the gear-wheel 8 on the driving-shaft E, whereby when one of said gears is in connection with said wheel 8 the rod to which the said pinion is connected is revolved, and through the means described gives corresponding movement to the axles to move the machine laterally.

In testimony that I do claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

his
WILLIAM × HILTON.
mark.

Witnesses:
WALTER A. BLOOMFIELD,
E. F. HAY.