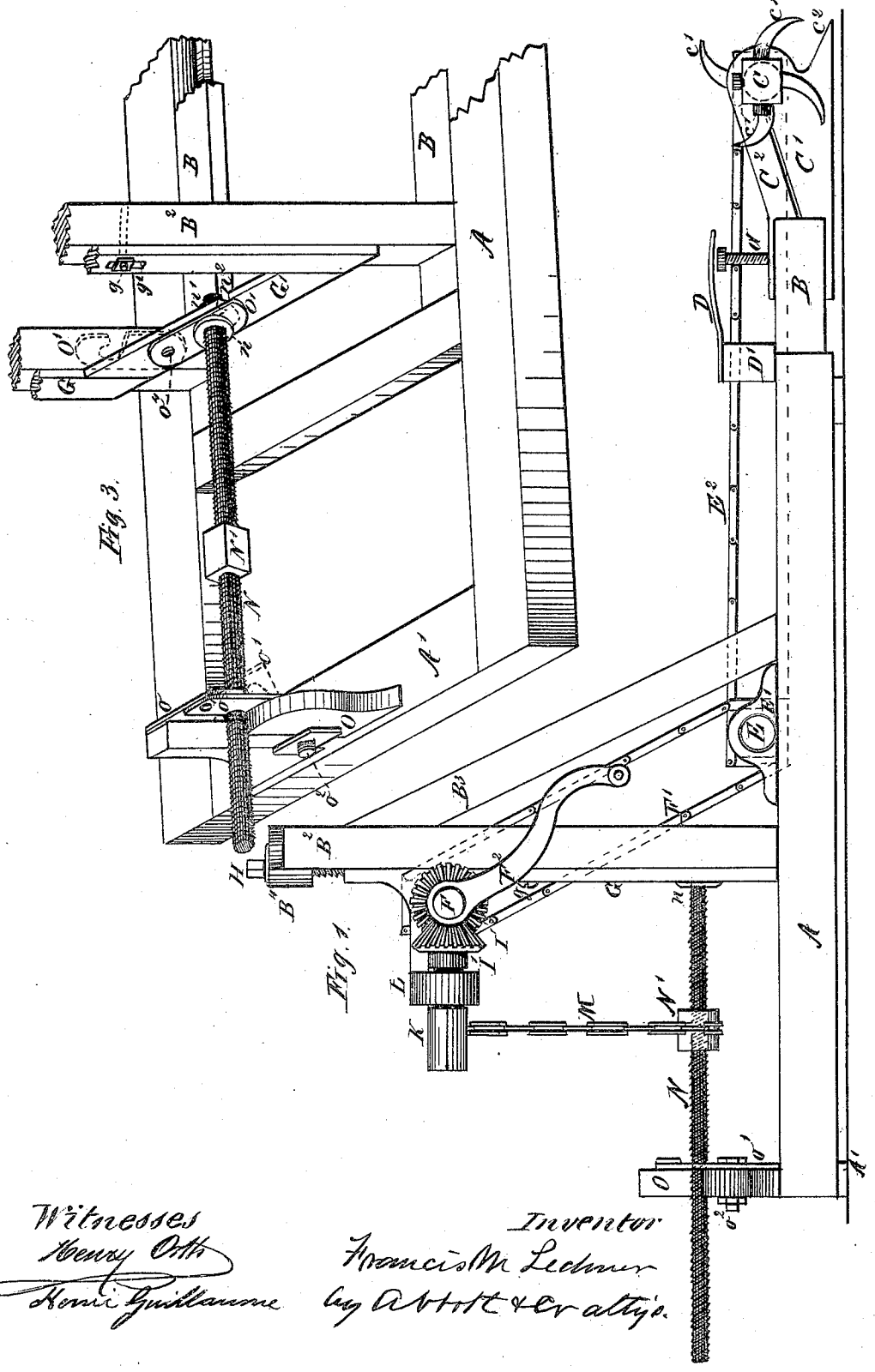
2 Sheets—Sheet 1.

F. M. LECHNER.

MINING-MACHINE.

No. 172,637. Patented Jan. 25, 1876.



Witnesses
Henry Otto
Henri Guillaume

Inventor
Francis M. Lechner
by Abbott & Co. attys.

2 Sheets—Sheet 2.

F. M. LECHNER.

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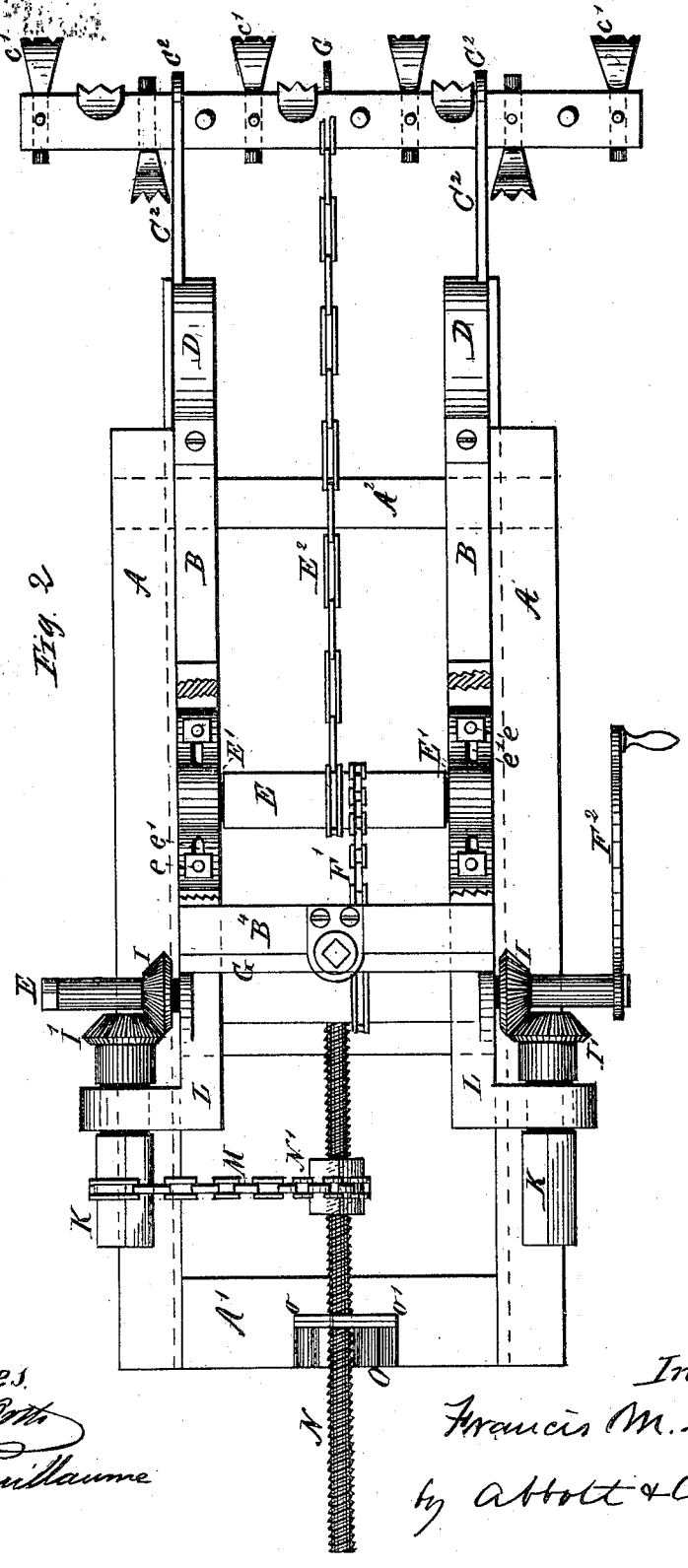

Fig. 2.

Witnesses.
Henry Orth
Louis Guillaume

Inventor
Francis M. Lechner
by Abbott & Co

UNITED STATES PATENT OFFICE.

FRANCIS M. LECHNER, OF WAYNESBURG, OHIO.

IMPROVEMENT IN MINING-MACHINES.

Specification forming part of Letters Patent No. **172,637**, dated January 25, 1876; application filed December 18, 1875.

To all whom it may concern:

Be it known that I, FRANCIS M. LECHNER, of Waynesburg, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Mining-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, 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 the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of the machine. Fig. 2 is a top-plan view. Figs. 3 and 4 are detached views of the feeding-screw and its supports and connections.

The frame consists of two sills, A A, rear cross-girt A^1, front cross-girt A^2 below the sills, sliding carriers B B, girt B^1, with posts B^2 B^2, braces B^3 B^3, and cap B^4, mounted upon carriers B B, these parts being framed and bolted as may be found best. Carriers B B move in grooves or dovetails formed for their reception in sills A A, which are made fast to the floor of the mine by means of jack-screws resting upon them, or upon a standard, O, and set firmly against the roof. C is the cutter-shaft, mounted at the front end of carriers B B in shoes C^1 C^2. Of the shoes, C^1 is the lower part, and C the upper part. Shaft C is preferably square, except where it is rounded to form bearings to turn in the metallic shoes. *c* c^1 represent a number of cutting-teeth, the shanks of which are adjustably secured in shaft C by means of set-screws. The teeth c^1 are of such width upon their cutting-edges (see Fig. 2) that as the shaft revolves there are but very narrow or thin walls of coal left between them, and to break down or cut out these walls in front of the bearings of shaft C, each shoe is armed at the lower side with a sharp projecting cutting-spur, c^2. Each carrier has a guiding-plate, D, secured by one end to a block, D′, the free end of each plate being adjusted vertically by means of a set-screw, *d*. These plates press against the upper side of the kerf or drift which is cut by the cutting-teeth *c* c^1, and the shoes C^1 rest on the bottom of this drift. Thus they (the teeth) are always maintained in proper working relation to the coal. E is a shaft revolving in suitable bearings E^1 on carriers B B. These bearings E^1 are adjustably secured to carriers B B by bolts *e*, which pass through slots e^1 in said bearings. The central part of shaft E is squared, and is connected with the cutter-shaft C by means of a driving-chain, E^2, the links of which correspond in length to the sides of shafts C and E. *c* is a cutting-tooth, inserted in cutter-shaft C in such position that said tooth, which is narrow or thin, will pass between the two strips or plates of which the alternate links of this chain are made. Thus this tooth *c* cuts a path for the chain. F is a driving-shaft, mounted in suitable bearings near the upper end of a frame, G, which slides up and down upon the rear of posts B^2. The central portion of shaft F is also squared and connected with shaft E by a chain, F^1.

In the drawings I have represented this frame as being secured to the posts B^2 by bolts *g*, which pass through slots *g′* in the posts or side pieces; but any usual or approved method of clamping the frame to the posts which will permit it (the frame) to slide freely may be adopted. F^2 is a crank on the end of shaft F. Through this crank, or through a pulley or gear-wheel, motion may be imparted to the driving-shaft F, and from thence to the other parts of the machine. H is a tightening-screw, mounted in a seat in cap B^4, and engaging with a thread in the upper girt of frame G, to raise or lower said frame, and thus tighten chain F^1. Upon each end of shaft F, outside of its bearings, is a bevel-gear, I, engaging with a corresponding bevel-gear, I′, on one end of each of two shafts, K K, mounted in brackets L L, projecting from frame G. M is a chain connecting shaft K with a feeding screw-shaft, N, having a square driving-block, N′, rigidly attached thereto, at such distance from its inner end that the chain shall always track freely. The rear end of shaft N is screw-threaded.

When preferred, the shafts C, E, F, and N, instead of being squared, may be provided with suitable sprocket-wheels, with which the chains may be made to engage.

O is a standard, rising from the rear cross-girt A^1. This standard is slotted vertically, and has a hinged plate, *o* o^1, bolted to it, the

bolt o^2 passing through the slot. (See Figs. 1 and 3.) Plate $o\ o^1$ has a screw-threaded bearing, o^3, with which the screw-threaded end of the shaft N engages. The front end of shaft N has two collars or flanges, $n\ n^1$, secured thereto, and is seated in a bearing in the lower girt G′ of frame G. n^2 is a throat leading to this bearing. O′ is a clamping and bearing plate, pivoted at o^4 to the girt G′, and serving the double purpose of confining shaft N in its seat in the girt G′, and protecting said girt from being rapidly worn away by collar n.

When it is desired to put the machine into operation it is firmly secured to the floor of the mine, usually by means of jack-screws, with the cutter-teeth close to the coal or other material which it is desired to cut. After driving-chain E^2 is placed upon shafts C and E it (the chain) is tightened by properly adjusting the bearings E^1. The chain F^1 is then tightened by means of screw H, which adjusts frame G, as has been explained. As the hinged plate $o\ o^1$ can be raised or lowered upon the slotted standard O, this plate can be readily adjusted to correspond with any change in the position of frame G, so that the screw-shaft N shall not be cramped.

When the driving-shaft F is made to revolve in the direction indicated by the arrow x, a rotary motion is imparted to the cutting-teeth $c\ c$, and by the revolution of the screw-shaft N in the threaded hinged plate $o\ o^1$, the carriers B B and the cutting-teeth are forced forward into the coal or other material, as will be readily understood without further explanation. By driving the shaft F in the opposite direction the carriers and cutters may be withdrawn from the work.

I do not wish to be confined to the specific mechanism shown for imparting to the cutter-shaft a rotary motion, as other gearing might be mounted upon the carrier for that purpose. Nor do I wish to be limited to operating the feeding screw-shaft N from shafts K K, as under some circumstances I may prefer to feed the cutter forward by means of a hand-wrench applied to the squared portion N.

What I claim is—

1. In a mining-machine, the cutter-shaft C, in combination with the adjustable teeth c^1, substantially as set forth.

2. The combination, with the shaft C and teeth c^1, of the supporting-shoes C^1, provided with the projecting cutting-spurs c^2 and shoes C^2, substantially as and for the purpose set forth.

3. The combination, with the carriers B and cutter-shaft C, of the supporting-shoes $C^1\ C^2$ and guiding-plates D, substantially as set forth.

4. The combination, with the posts $B^2\ B^2$, of the adjustable sliding frame G, shafts E and F, and chain F^1, substantially as set forth.

5. The combination of the cutter-shaft C, chain F^2, shafts E and F, and chain F^1, substantially as set forth.

6. The combination, with the stationary frame and sliding frame carrying the cutter-shaft and its driving mechanism, of the feeding screw-shaft N, substantially as set forth.

7. The combination, with the feeding screw-shaft N, having one end mounted in the adjustable frame G, of the slotted standard O and the adjustable screw-threaded plate $o\ o^1$, substantially as set forth.

8. The combination, with the feeding screw-shaft N, of the bearing having a throat, n^2, and the pivoted clamping-plate O′, substantially as set forth.

9. In combination with the cutter-shaft C and driving-chain E, the narrow cutting-tooth c^1, substantially as set forth.

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

FRANCIS M. LECHNER.

Witnesses:
HENRY L. LECHNER,
PERCY S. SOWERS.