2 Sheets—Sheet 1.

F. M. LECHNER.

MINING-MACHINE.

No. 186,854. Patented Jan. 30, 1877.

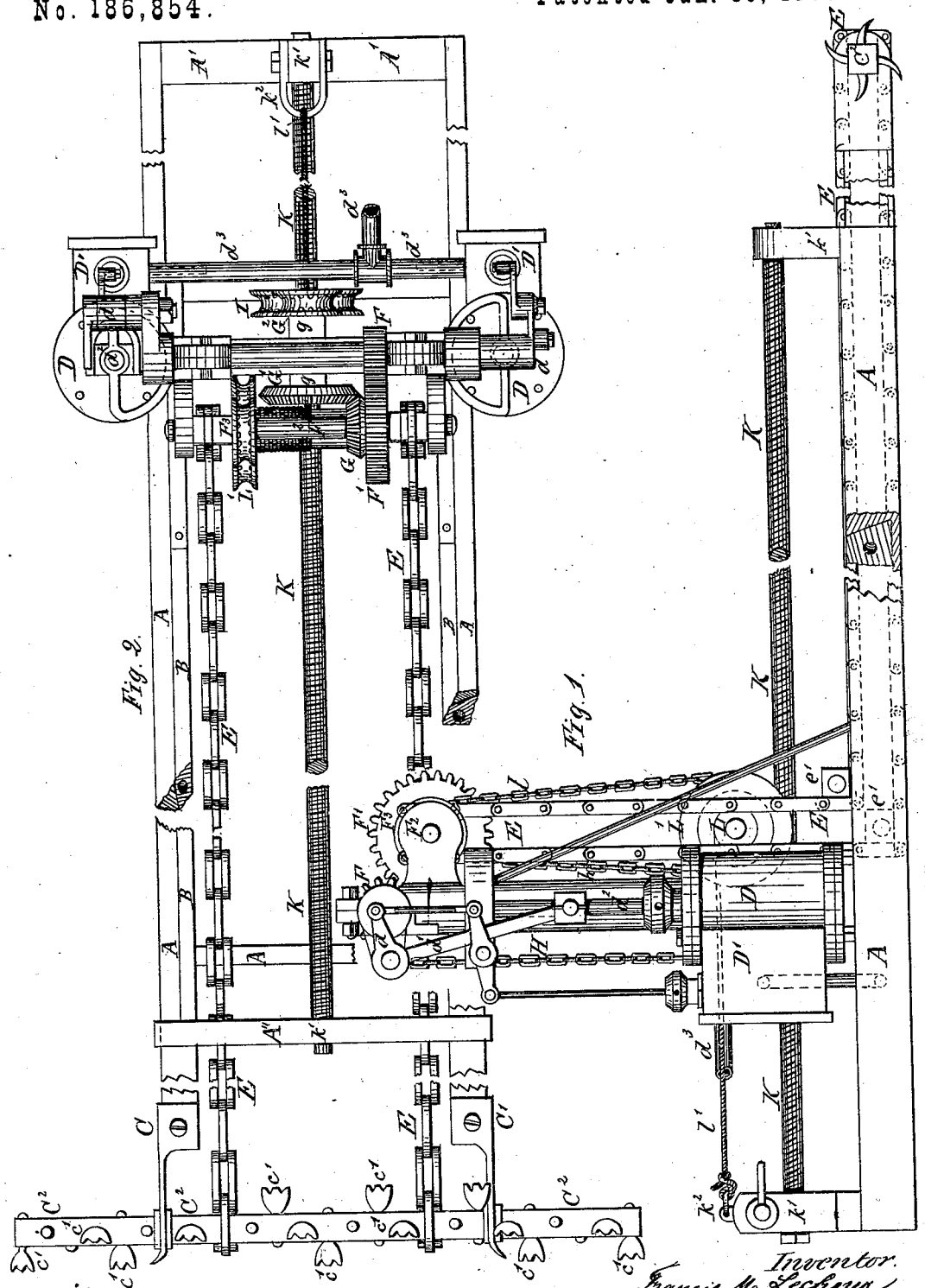


Fig. 2.

Fig. 1.

Witnesses.
Henry Orth
H. A. Blias

Inventor.
Francis M. Lechner
per H. A. Doubleday
atty.

2 Sheets—Sheet 2.

F. M. LECHNER.

MINING-MACHINE.

No. 186,854. Patented Jan. 30, 1877.

Fig. 5.

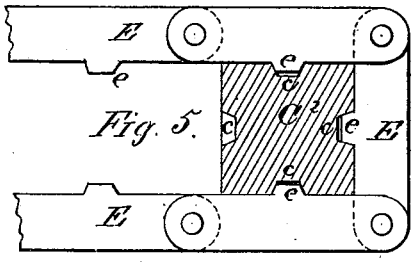


Fig. 4.

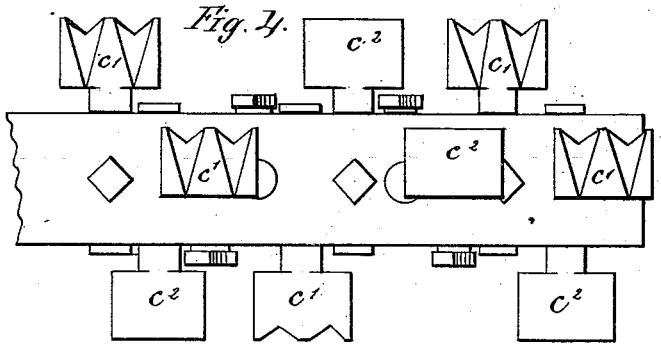
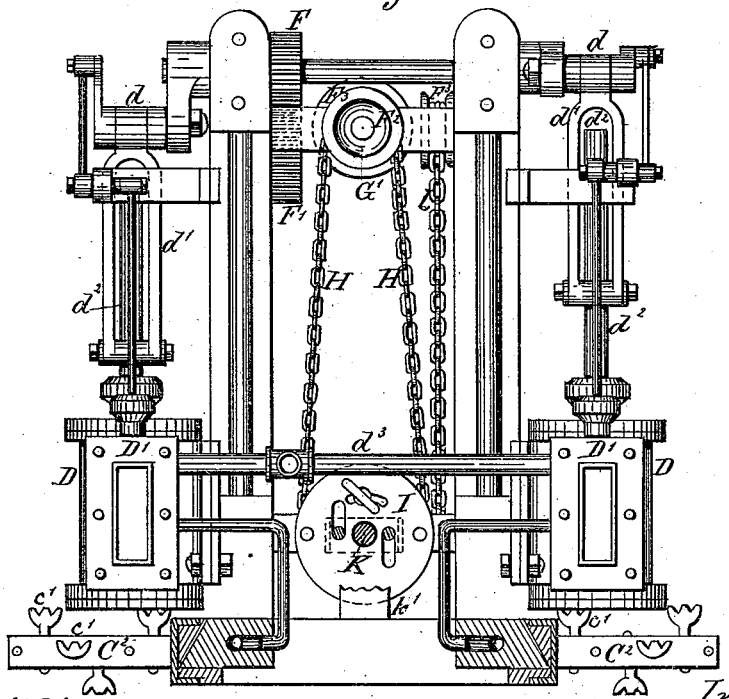


Fig. 3.



Witnesses

Henry Orth

F. H. Bliss

Inventor

Francis M. Lechner

Jr. H. A. Donaldson

atty.

UNITED STATES PATENT OFFICE.

FRANCIS M. LECHNER, OF WAYNESBURG, OHIO.

IMPROVEMENT IN MINING-MACHINES.

Specification forming part of Letters Patent No. **186,854**, dated January 30, 1877; application filed January 6, 1877.

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 letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation, partly broken away. Fig. 2 is a plan or top view. Fig. 3 is an end elevation. Fig. 4 is a detached view of the cutter upon an enlarged scale; and Fig. 5 is a detached view of the driving-chain enlarged.

In the drawings, A A are the sills, and A′ A″ the cross-girts of the main supporting-frame. B B are the sliding carriers of the cutter-frame, supported in sills A A by any tongue and groove, or equivalent construction.

Carriers B B are hollow, and conduct the exhaust air from the working engine and discharge it in the drift which is being cut in the coal or other material mined, the parts in Fig. 1 being broken away to show this air-passage in the carrier, and the exhaust-pipe leading from the valve-chest of the engine into the passage.

C C^1 are shoes, attached to and projecting forward from the front end of the carrier. C^2 is the cutter-head, square in cross-section, except where it is rounded to fit its bearings in the shoes, and recessed, as at *c*, Fig. 5, to receive spurs or dogs *e*, formed on or attached to the driving-chain E. c^1 c^2 are cutting teeth or blades, their shanks being adjustably secured by set-screws or otherwise in slots or seats formed for their reception in cutter-head C^2.

Teeth c^1 are similar to those shown in my Patent No. 172,637—that is, having their cutting-faces notched or somewhat saw-toothed in form, and, consequently, cut grooves or corrugations in the coal, while teeth c^2 are straight or chisel-shaped upon their cutting-edges, and are arranged to follow the teeth c^1, and cut out the ribs which have been left by teeth c^1.

D represents the cylinder, D′ the valve-chest, *d* the crank, d^1 the pitman, and d^2 the piston-rod, of an engine to be driven by compressed air, which may be supplied by any desired compressor through pipes d^3 in any usual manner.

It will not be necessary to describe the engine in detail, nor the frame which supports the engine upon the carriers B B.

F is a spur-gear upon the crank-shaft of the engine, and meshes with spur-gear F^1 upon the shaft F^2.

The driving-chains, preferably one upon each side of the machine, pass around the squared portions of shaft F^2, which have recesses like those at *c*, Fig. 5; thence around the revolving guides *e′ e′*, near the carriers B, to the cutter-bar C^2, the revolving guides being made adjustable, so that any slack produced in the chain can be taken up. Thus the motion from the engines (one upon each side of the machine) is transferred to the cutters. The cutter-frame is moved up to the coal as follows: G is a bevel-gear on shaft F^2. G^1 is another bevel-gear on shaft *g*. G^2 is a sprocket-wheel on the opposite end of shaft G^1. H is a chain, connecting sprocket-wheel G^2 with the sprocket nut carrier or driver I, which is mounted on the frame-work of the engine. This nut engages with a screw, K, which is rigidly supported upon posts *k k′* rising from the cross-girts of the main frame, so that as the nut is rotated upon the screw by means of chain H and sprocket nut-carrier I, the cutters and engines are moved toward the coal at the desired speed.

It is intended that as the cutters are advanced to their work the exhaust air from the engine or engines shall drive the cuttings out of the drift which is being cut.

L, Fig. 1, is a shaft, driven by a chain, *l*, running around a sprocket-wheel, L′, on shaft L, and another sprocket-wheel, F^3, on shaft F^2. One end of a rope or chain, *l′*, may be attached to post k^1, or to a clevis or staple, k^2, Fig. 2, the other end of the rope being attached to shaft L, in order that by the revolution of this shaft the rope may be wound up

and the engines and cutters withdrawn from the coal, the nut in the nut-driver I being first released from screw K′; or, when preferred, a second screw may be arranged to withdraw the carrier, cutter, and engine, and operated by hand.

Should it be found desirable, scrapers may be employed to remove, or to assist in removing, the cuttings from the path of the cutters.

I do not claim, broadly, the employment of a screw operated by the driving-power of the machine to advance the cutters to their work, such construction being shown in my Patent No. 172,637; but I believe that this patent is the first in which a screw-thread rotating continuously in one direction is alternately engaged with and disengaged from its corresponding thread to force the cutters forward, and permit them to be withdrawn from the breast of coal by a separate device.

What I claim to be new, and desire to secure by Letters Patent, is—

1. In a mining-machine, the combination of the straight or chisel-edged cutters c^2 with the notched cutters c^1, substantially as and for the purpose set forth.

2. In a mining-machine, the combination of a stationary screw and a detachable nut mounted in the sliding cutter-carrier, substantially as set forth.

3. In a mining-machine, the combination, with the sliding cutter-frame and a stationary screw, of the sprocket-wheel G^2 and the divided nut, adapted to engage with the screw, substantially as set forth.

4. In a mining-machine, the combination, with the sliding frame which carries the cutter, of a screw and nut for advancing the cutter, and a shaft and rope for withdrawing the same, with the mechanism which drives the cutter, substantially as set forth.

5. In a mining-machine, the shaft L and rope l', in combination with the main frame, for withdrawing the cutters, substantially as set forth.

6. In a mining-machine, a cutter-frame, made hollow to conduct air from the driving-engine and deliver it near the cutter, 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:

GRANVILLE W. SHAW,

JAS. G. BULL.