F. M. LECHNER.
Mining-Machine.

No. 211,100. Patented Jan. 7, 1879.

Fig. 4.

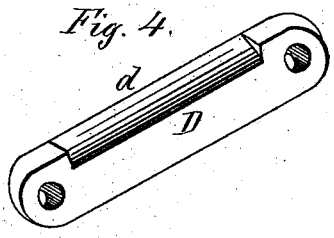


Fig. 2.

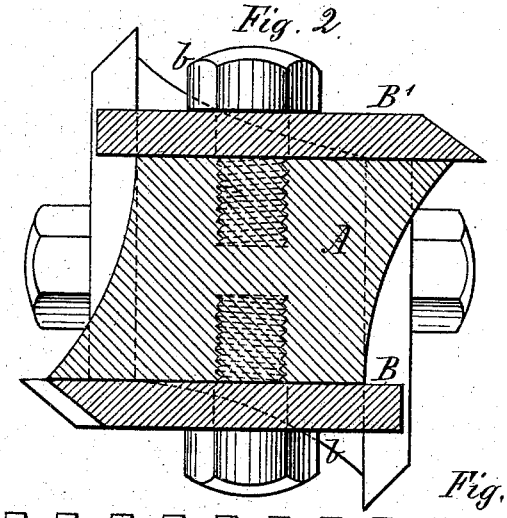


Fig. 3.

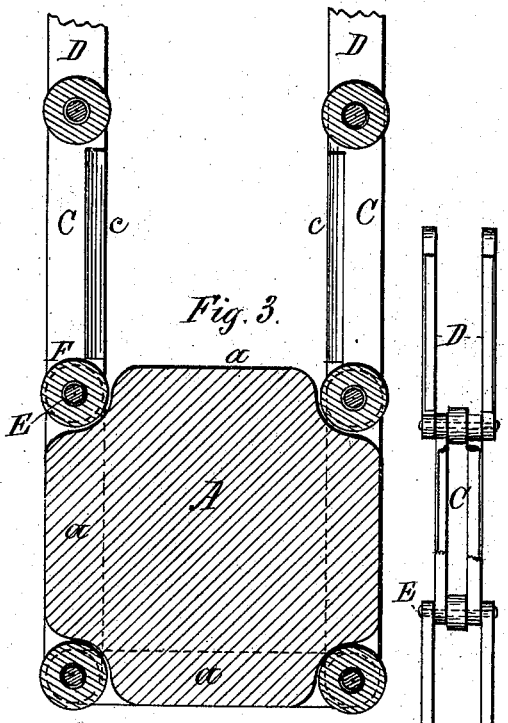
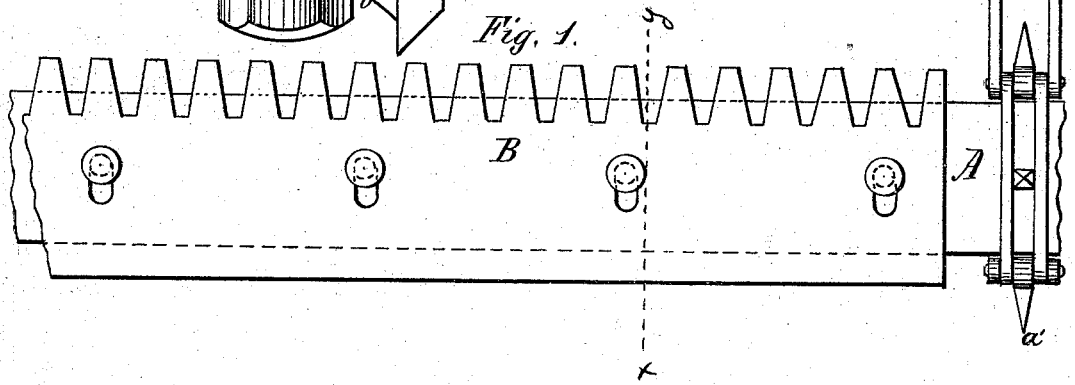


Fig. 1.



Witnesses.
Henry Orth
W. A. Bliss

Inventor
Francis M. Lechner
per W. A. Doubleday

UNITED STATES PATENT OFFICE.

FRANCIS M. LECHNER, OF WAYNESBURG, ASSIGNOR TO THE LECHNER MINING MACHINE CO., OF COLUMBUS, OHIO.

IMPROVEMENT IN MINING-MACHINES.

Specification forming part of Letters Patent No. **211,100**, dated January 7, 1879; application filed August 31, 1878.

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 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.

Figure 1 is a plan view of a portion of a cutter-bar having my improvements applied thereto. Fig. 2 is a transverse vertical section taken on line *x x*, Fig. 1. Fig. 3 is a vertical section on line *y y*, Fig. 1; and Fig. 4 is a detached view of one of the driving-chain links.

Like letters of reference indicate similar parts in all the figures.

This invention consists in improvements upon the cutters, the cutter-bar, and the chain which drives the cutter-bar in a machine for mining coal, and is an improvement upon the mining-machines heretofore patented to me.

A is the cutter-bar, substantially rhomboidal in cross-section except at such points as are traversed by the chains and other places where it is mounted upon the sliding carriers, at which points it is rounded to fit the box in which it turns. Upon opposite sides of this bar are secured the cutter-sections B B′, the cutting-teeth B′ being arranged to cut out the ridges left by the teeth B, as will be readily understood. These cutters are adjustably secured to the cutter-bar by means of set-screws or bolts *b*, which pass through slots in the cutter-plates; and it will be observed that the shape of the cutter-bar in cross-section is such as to give wide faces upon which to secure the cutters.

The cutter-bar is provided with lugs *a* at suitable distances from the ends of the bar to engage with the driving-chain; and it will be seen that my peculiar construction of bar possesses some advantages over those heretofore used—for instance, by making the portions traversed by the chain square in cross-section I am enabled to use a chain composed of links of equal length, and provide that each lug shall be acted upon at an equal distance from the center of the bar, thus applying the power with uniformity; while by making the portions of the bar which are occupied by the cutters rhomboidal in cross-section I am enabled to furnish wide bearing-surfaces to which to attach them (the cutters); and by constructing parts of the shaft with the long sides or the wide sides at right angles in cross-section to other wide sides or faces I am enabled to arrange the cutters upon all four sides of the shaft, thus insuring a nearly continuous cutting action and great steadiness in the movements of the cutting devices. Each side or face of each lug is formed upon the arc of a circle struck from about the center of the opposite side of the same lug, for a purpose which will soon be explained.

The links of the chain are formed of rectangular bars of metal C C D D, connected at their ends by means of pivots E, which pass through perforations in the ends of the links, upon each of which pivots is mounted a friction-roller, F, between the ends of the links D D, the diameter of these friction-rollers being such that they project a little beyond the ends of the adjacent links. These friction-rollers serve the purpose of properly spacing the links D D, and also perform another function, to be hereinafter set forth.

Each chain-link is chamfered or beveled upon one side to form a knife or cutting edge, which is indicated at *c* and *d*, these knife-edges being constructed upon the inner faces of the links. By "inner faces" I mean the faces which are next to the cutter-bar as the chain wraps the bar.

I have found in using chains the links of which are of the same thickness upon both edges that in operating my machine, especially when cutting the slate, the fine dust is sometimes packed upon the cutter-bar by the chain, thus forming a coating upon the bar and producing an enlargement at the points traversed by the chain to such an extent as to increase its tension and seriously interfere with driving the cutters; but by using links with knife-edges I find that the difficulty is entirely obviated, as the cutting action of said edges

wholly prevents any accumulation or packing of slate or other material at these points.

By an examination of Fig. 3 of the drawings the operation of the friction-rollers F will be readily understood, as it will be seen that, owing to the faces of the lugs *a* being formed in arcs of circles, the friction-rollers traverse the lugs easily, although in close contact therewith, as the cutter-bar is revolved; hence any unsteadiness or "backlashing" of the cutter-bar is prevented by the close contact of the friction-roller with the lugs during their engagement.

Each lug *a* is provided with a cutting spur or tooth, *a'*, (see Fig. 1,) to remove the coal as it advances, leaving but a thin wall of coal uncut in front of each link of the chain.

I have shown in my patent of January 30, 1877, No. 186,854, a construction of chain and cutter-shaft which is intended to secure some of the results aimed at in this invention—that is to say, steadiness of motion and certainty of operation of the cutters.

In my former patent I showed a cutter-bar having recesses formed in its sides and a chain the links of which were provided centrally with projecting lugs which took into the recesses; but my present construction possesses many advantages over the former one, in that, for one thing, I am enabled to mount friction-rollers on the pivots which unite the ends of the chain-links, the rollers engaging with the lugs on the bar; and, again, the use of lugs on the bar enables me to use knife-edged links C D, which I could not construct with lugs projecting from the knife-edge, because there is not thickness enough of metal upon the under edges to support lugs at those points.

What I claim is—

1. The herein-described chain consisting of links C C D D, pivots E, and friction-rollers F, substantially as set forth.

2. The cutter-shaft provided with lugs *a*, having their engaging faces formed in arcs of circles, in combination with the chain provided with friction-rollers F, substantially as set forth.

3. A mining-machine driving-chain the links of which are constructed with beveled edges or cutting-edges, substantially as described.

4. A cutter-bar for a mining-machine having sections which are square in cross-section to receive the driving-chain, and having other sections which are rhomboidal in cross-section to receive the cutters, substantially as set forth.

5. A cutter-bar for a mining-machine having sections which are rhomboidal in cross-section to receive the cutters, and having other sections also rhomboidal in cross-section, but having their under faces arranged in planes at right angles to the planes of the wider faces of the adjoining sections, 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:

H. H. DOUBLEDAY,
THOS. J. FORD.

1.500 words.