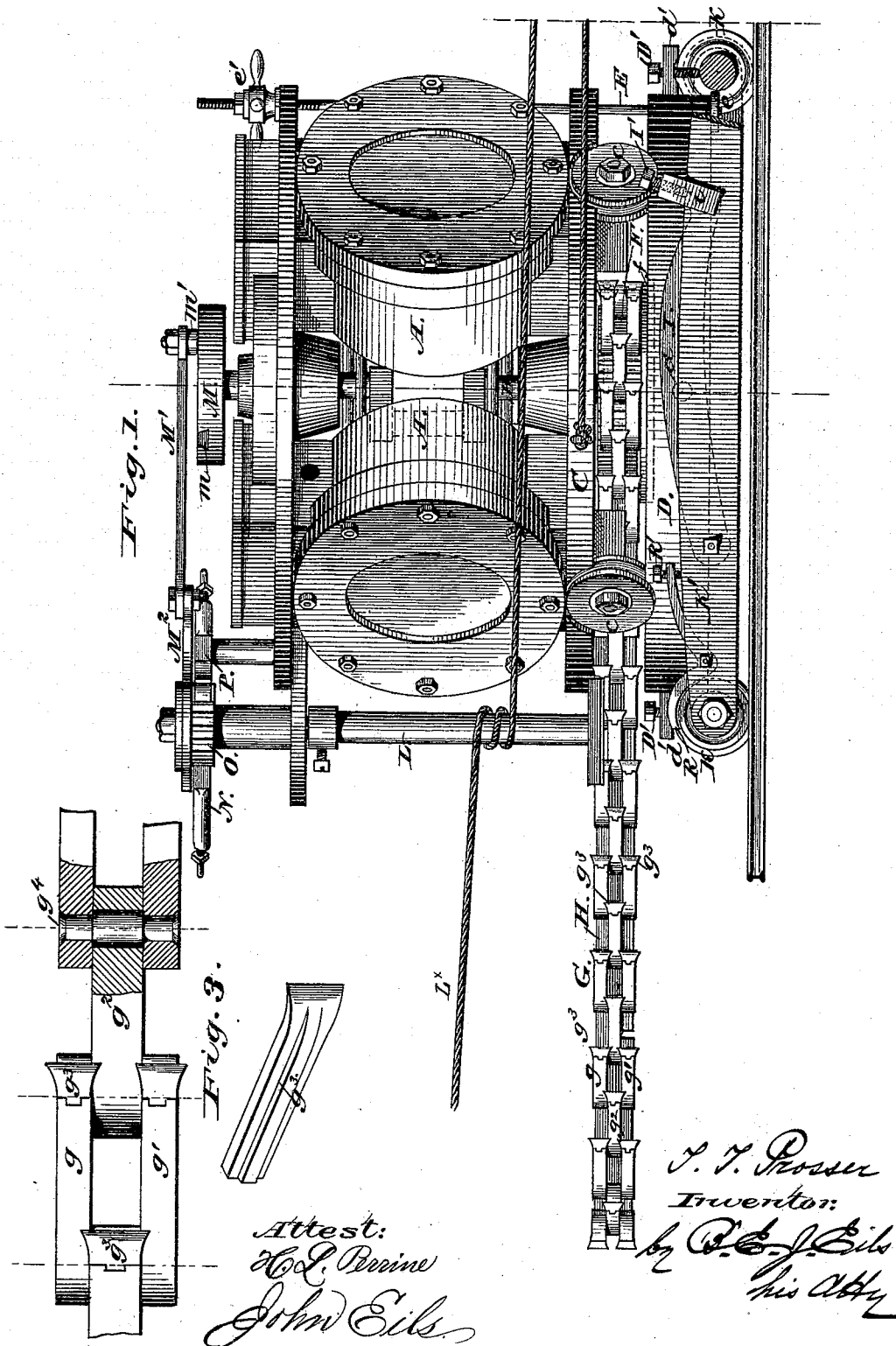


T. T. PROSSER.
COAL-MINING MACHINE.

No. 179,464.

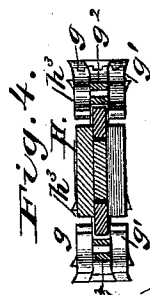
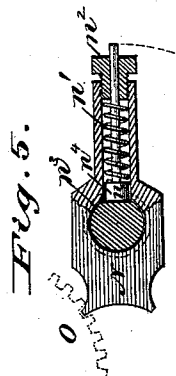
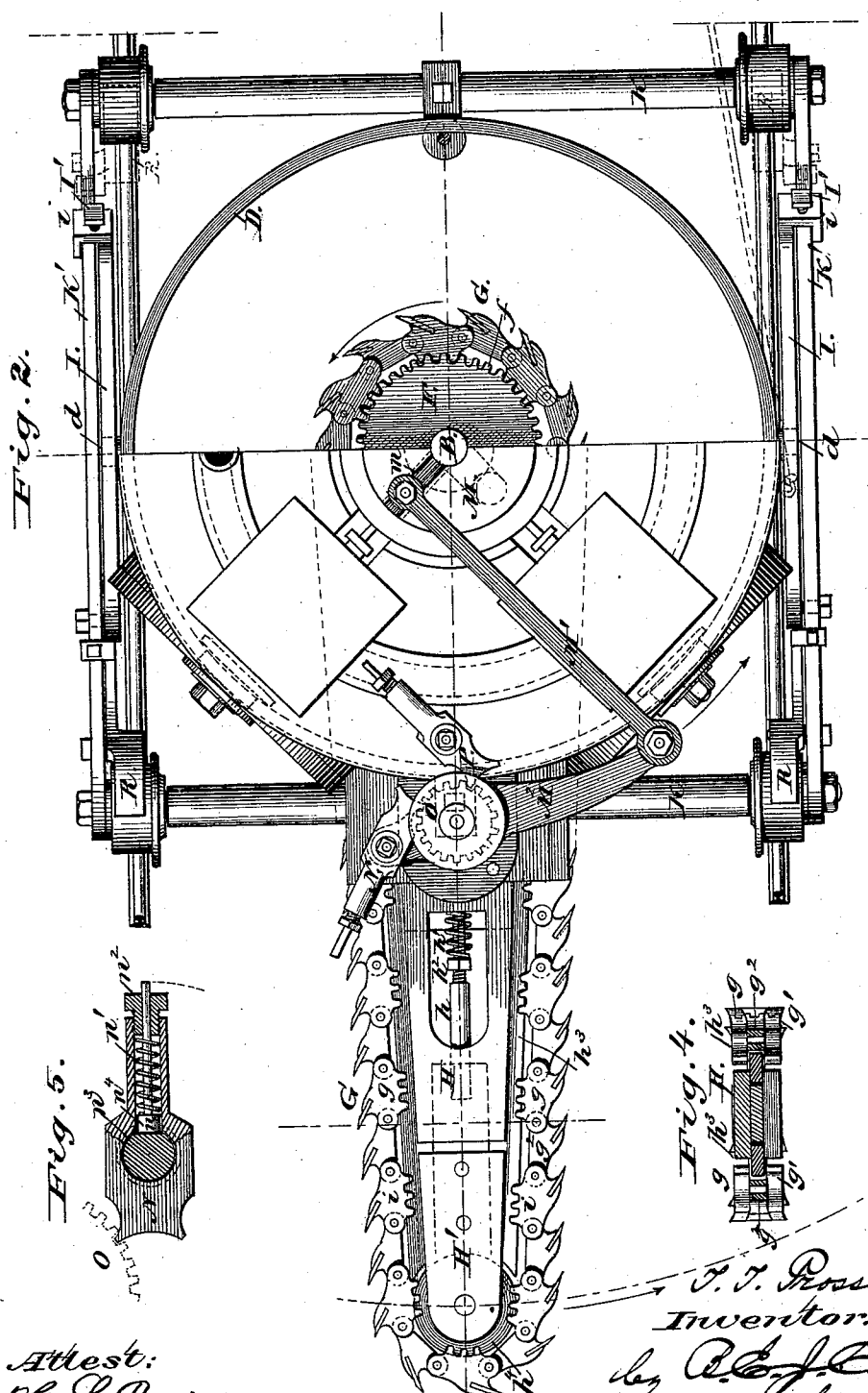
Patented July 4, 1876.



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Attest:
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his atty

UNITED STATES PATENT OFFICE.

TREAT T. PROSSER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN COAL-MINING MACHINES.

Specification forming part of Letters Patent No. **179,464**, dated July 4, 1876; application filed April 5, 1876.

To all whom it may concern:

Be it known that I, TREAT T. PROSSER, of Chicago, in the county of Cook and State of Illinois, have invented a certain Improvement in Machines for Mining Coal, of which the following is a specification:

This invention relates to machines for undercutting veins of coal preparatory to removing such coal from its bed, and more especially to that kind of such machines which have a laterally-projecting cutting apparatus driven by an engine, suitably mounted on trucks to run on a track by the side of the vein of coal.

My improvement consists in so mounting the machine that it can be readily adjusted to give to the cutting apparatus any required pitch or inclination in a longitudinal direction as well as transversely for governing the rake of the cutters. It further consists in mounting the machine on a circular track, so that it can be turned to let the cutting apparatus project in any direction, means being provided for locking it to said circular track after the desired adjustment. It further consists of an endless cutter-chain, of peculiar construction, which will be fully explained hereinafter. It further consists in providing the driving-wheel of the cutter-chain and the laterally-projecting arm, around which it moves, with means for giving horizontal support to said chain. It further consists in introducing a spring in the supporting-arm of the cutter-chain, so that it may yield longitudinally in case pieces of coal work their way between the arm and the chain. It further consists of a peculiar construction of the pawls of the feed mechanism. It further consists in the combination of a separate brake for each truck-wheel, any one or more of which brakes can be brought into action to compensate for side draft. It further consists in the adaptation, to a machine of the character stated, of an engine composed of four radially-arranged single-acting cylinders, located around the crank-shaft, which carries the driving-wheel of the cutter-chain.

In the annexed drawings, Figure 1 is a side elevation of my improved machine for mining coal. Fig. 2 is a part plan and part sectional view of the same. Figs. 3 to 5 are detail views.

The same letters of reference are used in

all the figures in the designation of identical parts.

The engine A, used for driving the cutting apparatus, is composed essentially of four cylinders, radially arranged in coincident pairs around the vertical crank-shaft B, with the crank of which the pistons are connected by pitmen. The details of this engine are fully described in another application for Letters Patent filed of even date with this. The base-plate C of the engine is mounted on wheels *c*, which run on a circular track, D, so that the entire engine and its adjuncts can be rotated; but it may be locked to said track in any position by means of a clamping-rod, E, a collar, *e*, on the lower end of which hooks under the circular tracks, while a nut, *e'*, on its upper end is provided to draw the rod up when the engine is to be locked to the said track.

Other well-known contrivances may be used as means for locking the engine.

The lower end of the crank-shaft B, protruding below the base-plate C, carries a spur-wheel, F, the teeth of which engage corresponding teeth on some of the links of the endless cutter-chain G, which travels in a horizontal direction around this wheel, and an arm, H, which is rigidly secured to the base-plate C, and projects radially therefrom. The arm H is made in two parts, the outer part, H', being connected to the other part in such a manner that it may yield longitudinally. It is placed in guides, and carries a stem, *h*, which acts on a spring, *h'*, the tension of which can be regulated by a nut, *h''*, all as best seen in Fig. 2. The cutter-chain G is composed of three lines of links, *g*, *g'*, and *g''*, each link carrying a bit, *g''*. The links *g* and *g'* of the upper and lower line are arranged in pairs connected by the intermediate line of single links *g''*. The links *g''* turn loosely on the enlarged central portion of the pintles *g''*, while the smaller ends of said pintles are riveted down on the links *g* and *g'* for rigidly uniting them, as seen best in Fig. 3. The inner edge of the links *g''* is blank, while the inner edges of the links *g* and *g'* are formed with projecting teeth *i* to be engaged by the teeth of the driving-wheel F. Suitable notches or seats are formed in the outer edges of the several links for the reception and retention

of the bits g^3 , which are provided with a longitudinal rib both for preventing lateral movement in their seats and for strengthening them.

It will be seen that the bits of the central line of links will cut out the ridge left standing between the upper and lower line of cutters, thus dividing the work of the cutter-chain very advantageously. The width of the central bits is such as to slightly overlap the ridge left standing by the other bits, and the cutting-edges of all the bits will be made slightly oblique, so as to cause them to cut with an upward tendency to compensate in a measure the natural declining tendency of the overhanging cutting apparatus. The cutter-chain is supported upon a flange, f , on the driving-wheel F, and ribs h^3 on either side of arm or cutter-bar H, which ribs enter between the pairs of links g and g^1 , so that the teeth of the links g travel along the upper surface of said ribs h^3 . In the extreme end of the cutter-bar a rotating disk, h^4 , is mounted to facilitate the turning of the chain, the disk protruding beyond the end of the cutter-bar, so as to form a continuation of the ribs h^3 , as it were.

The circular track D is hung on pivots d between arms or levers I I, which are, in turn, pivoted at one end to the respective side bars K' of the trucks K. The free ends of the levers I terminate in hooks i which embrace the side bars, and carry each a set-screw, I', to bear on the top edges of the side-bars.

By adjusting the set-screws I' the engine and cutting apparatus can be tilted more or less, so as to give any required inclination or dip to the cutting apparatus.

At right angles to the pivots d the circular track D has also projections d' , which overhang the axles of the trucks K and are tapped for the reception of set-screws D' to bear on the said axles. By adjusting these set-screws D' the machine may be tilted somewhat for inclining the cutter-bar transversely to give the required rake to the cutter-chain.

A shaft or drum, L, mounted in a vertical position on one side of the engine over the cutter-bar, is used as a windlass for moving the machine slowly along on the track alongside of the vein of coal as the under cutting proceeds. One end of a rope or chain, L^x , is permanently secured to drum L, and having been passed forward is reeved through a staked pulley-block and returned to the machine, to which it is secured at such a point that the machine will operate with little or no side draft under favorable circumstances. The drum L receives an intermittent rotation from the crank-shaft B through the following intermediate mechanism: The upper end of the crank-shaft carries a disk, M, provided with a transverse groove, m , in its upper face, in which a wrist-pin, m' , may be secured at any point according to the stroke required. The wrist-pin m' is connected by pitman M¹ to the long arm of a lever, M², which is pivoted to the upper end of the drum L, and the short arm of which carries a pawl, N, adapted to

engage the teeth of a wheel, O, fixed on drum L. The pitman M¹ imparts an oscillating motion to the lever M², so that the pawl N will rotate the drum step by step, moving it more or less each time, according as the throw of the crank-disk M is greater or less. A second pawl, P, is used in the ordinary manner to prevent reverse movement of the drum L. The pawls N and P have the peculiar construction shown best in Fig. 5, which enables them to be thrown out of action and so maintained, although they are under the influence of a constantly-acting spring. The shank of the pawls is hollow, and contains a piston, n , the stem of which is encircled by a spring, n^1 , held in place by an adjustable screw-box, n^2 . The flat face of the piston presses against the pintle or pin n^3 , on which the pawl turns. This pin n^3 has a flat surface, n^4 , which is directly opposite to the piston n when the pawl is in working position, and the spring will always return the pawl after its slight oscillation consequent upon the working of the wheel O, so that the piston will bear against the flat surface of the pin. But the pawls may be readily thrown out of gear by turning them so far that the piston shall come opposite to the round surfaces of the pins, when the force of the springs will hold them stationary at any point.

I provide a brake, R, for each truck-wheel, one or more of which brakes may be applied at any time to compensate for side draft. The brakes shown are simple levers pivoted to the side bars K' of the track-frame, and adapted to be brought into action by set-screws R', bearing on the upper edges of said side bars. Any other known form of brake may be used for the purpose indicated.

In operating the machine, the engine of which will be driven by compressed air, it is first adjusted to give the proper inclinations to the cutter-bar, which at this time will stand parallel to the railroad-track on which the machine runs. The rope of the windlass having been secured as above stated, the cutter-bar is swung around against the vein of coal and the machine started, the cutter-bar being gradually turned until it has entered to the desired width of the cut into the vein of coal. The engine, with its cutting apparatus, is then locked to the circular track, when the cutting will proceed. Of course the machine can cut on either side of the track.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as specified, of the carriage, the engine, the cutting apparatus, and the means for adjusting the engine and cutting apparatus.
2. The combination, substantially as specified, of the carriage provided with the circular track, and the engine and cutting apparatus, adapted to be turned on said track.
3. The combination, substantially as specified, of the circular track of the carriage, with the engine and cutting apparatus, and means

for locking the engine and cutting apparatus to the said circular track.

4. The endless cutter-chain, composed of pairs of cogged links, and intermediate blank links, all the links being provided with bits, substantially as specified.

5. The flanged driving-wheel, in combination with the ribbed cutter-bar, provided with a protruding rotating disk at its extreme outer end, substantially as specified.

6. The cutter bar or arm H, having a yielding end, H', substantially as and for the purpose specified.

7. The combination, with each truck-wheel of the carriage, of a separate brake, substantially as and for the purposes specified.

8. The combination, substantially as specified, of the pawl, the pintle flattened on one side, the piston, and the spring.

9. The combination, substantially as specified, of the carriage, the four-cylinder engine, mounted thereon for circular adjustment, the central crank-shaft, the driving-wheel, and the endless chain of the cutting apparatus.

In testimony whereof I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

TREAT T. PROSSER.

Witnesses:

B. C. J. EILS,
JOHN EILS.