No. 684,375. Patented Oct. 8, 1901.

B. A. LEGG.

MINING MACHINE.

(Application filed Dec. 6, 1895.)

(No Model.) 3 Sheets—Sheet 1.

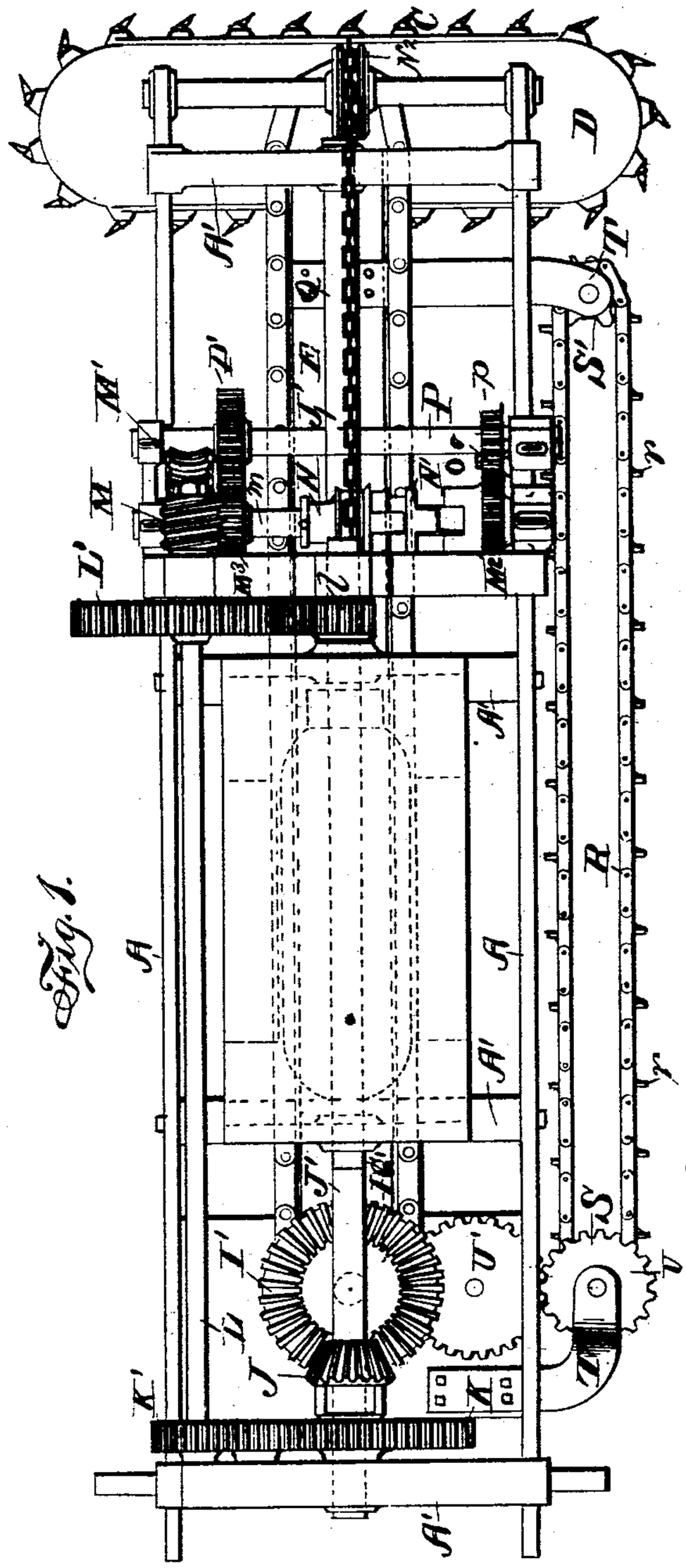

Fig. 1.

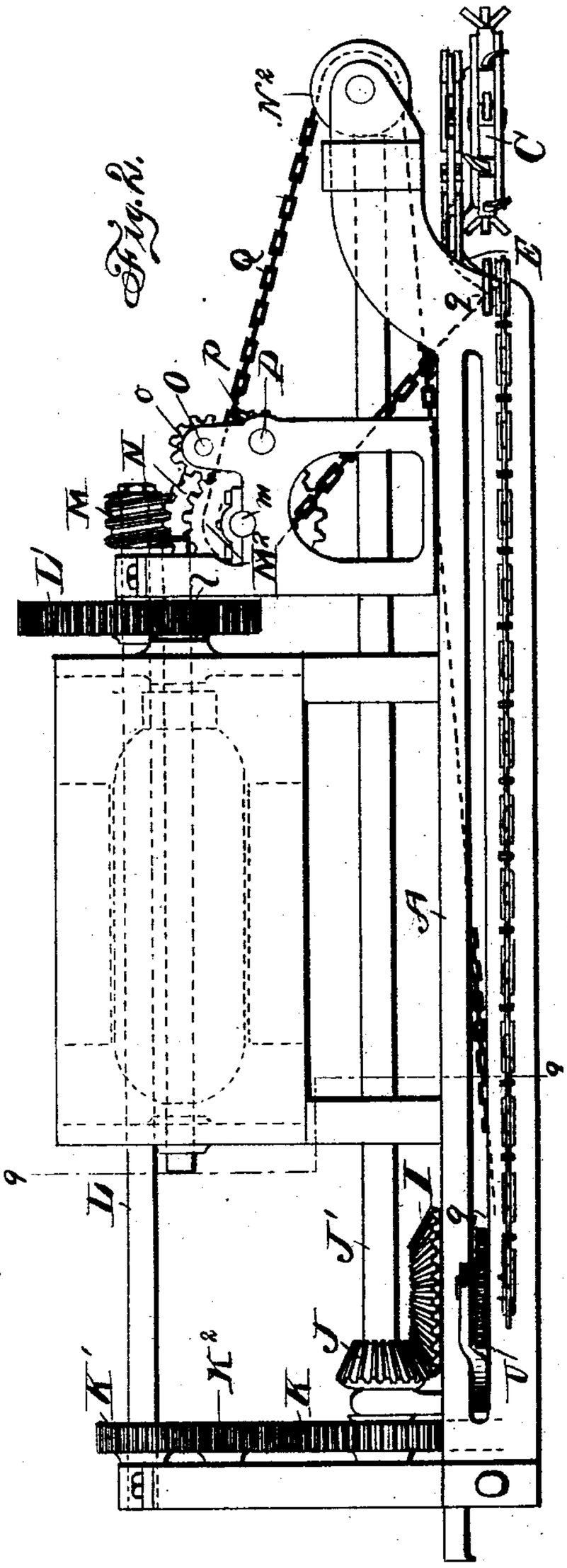

Fig. 2.

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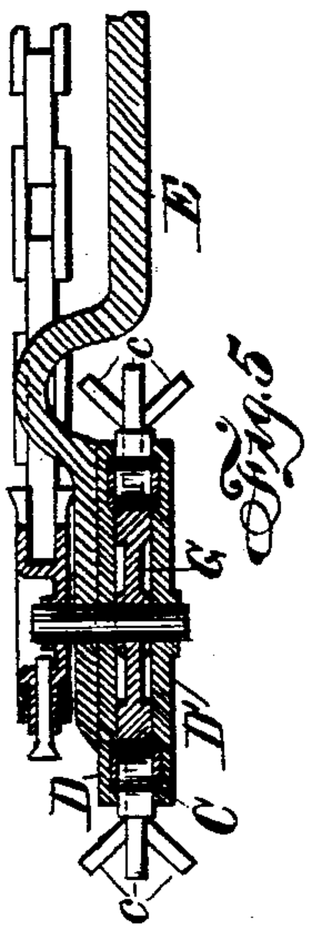

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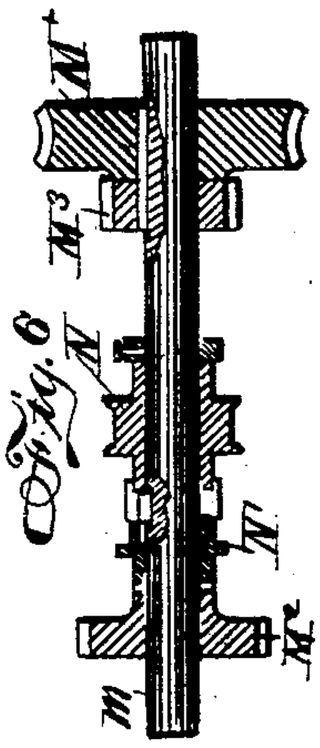

Fig. 6.

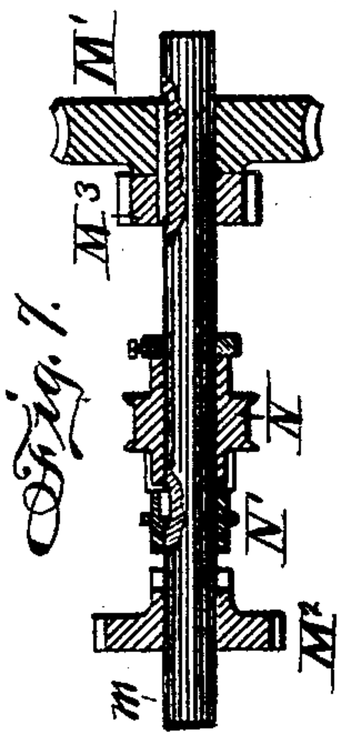

Fig. 7.

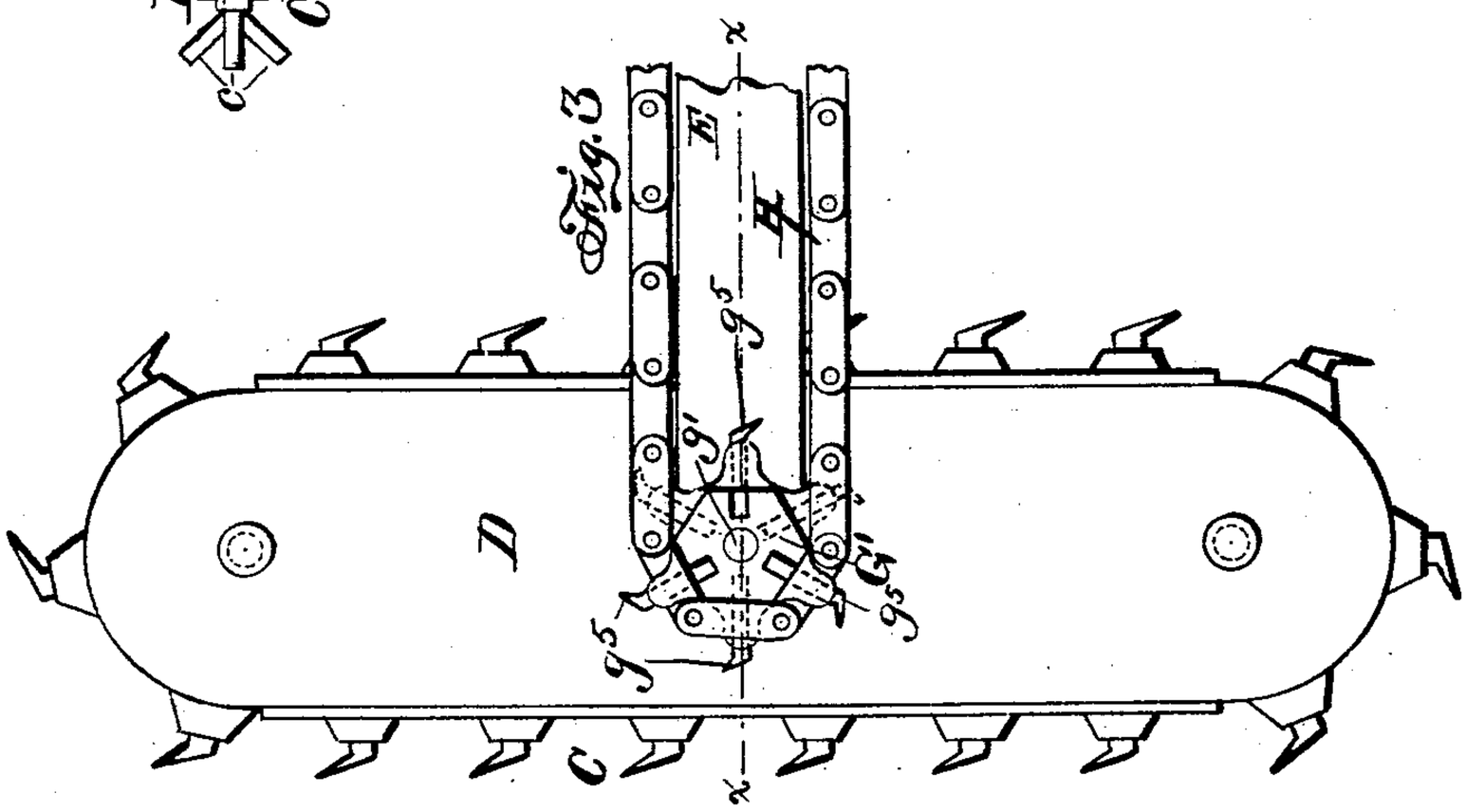

Fig. 3.

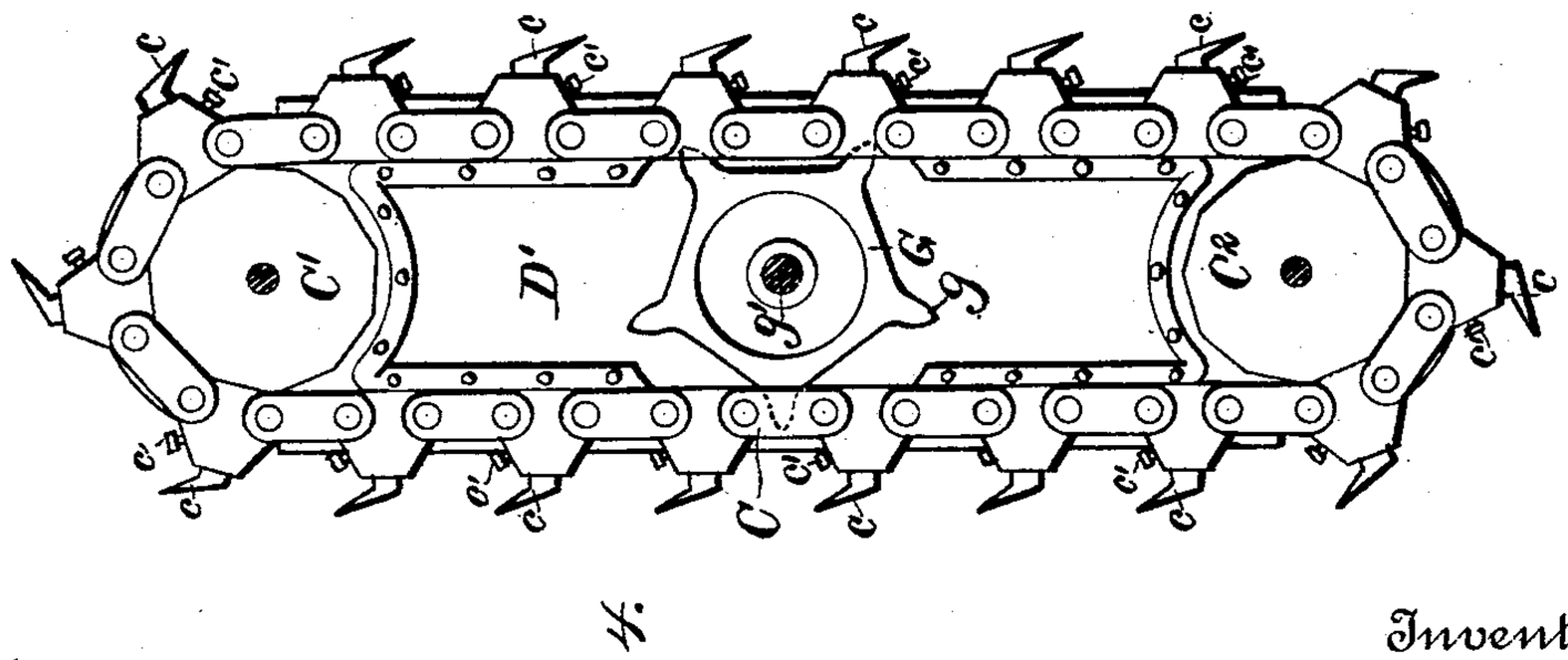

Fig. 4.

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MINING MACHINE.

(Application filed Dec. 6, 1895.)

(No Model.) 3 Sheets—Sheet 3.

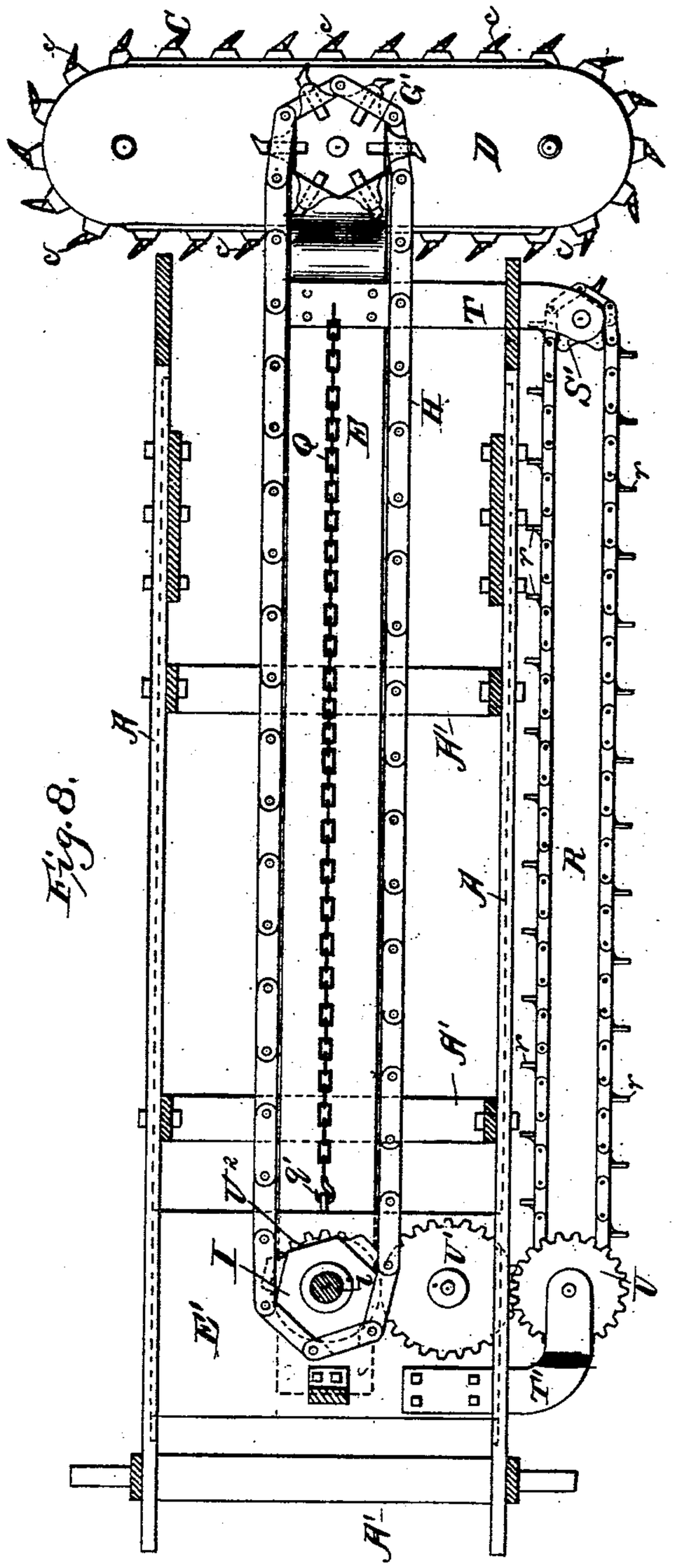

Fig. 8.

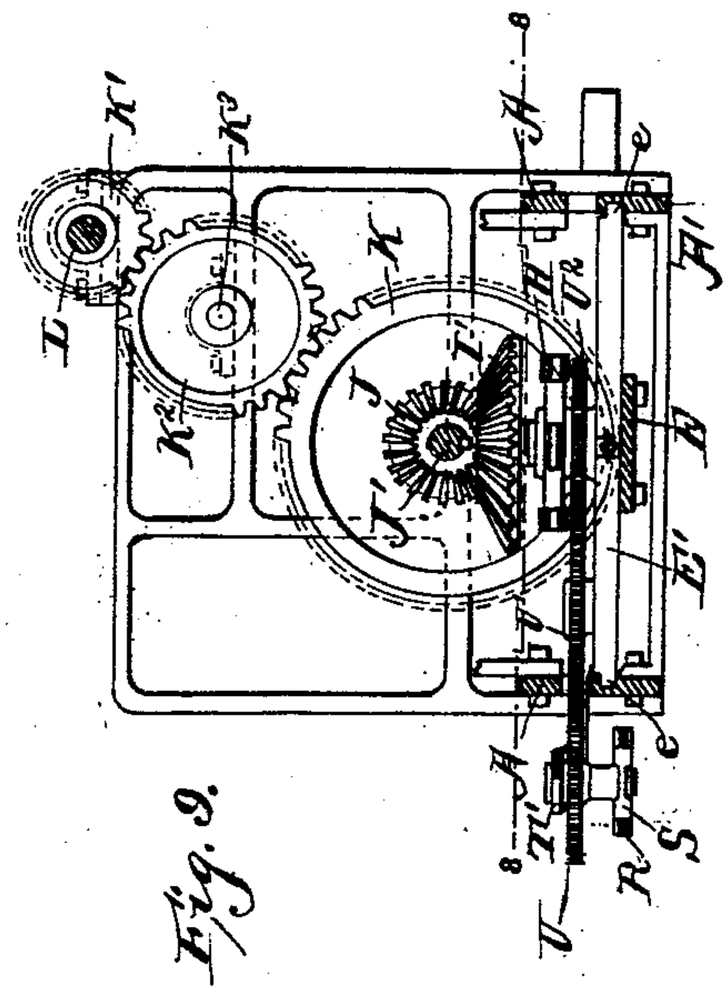

Fig. 9.

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UNITED STATES PATENT OFFICE.

BENJAMIN A. LEGG, OF CANONSBURG, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,375, dated October 8, 1901.

Application filed December 6, 1895. Serial No. 571,303. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN A. LEGG, a citizen of the United States, residing at Canonsburg, in the county of Washington and State of Pennsylvania, have invented certain new and useful Improvements in Mining-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as 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 plan view of a mining-machine embodying my improvements. Fig. 2 is a side elevation. Fig. 3 is a top plan view of the front cross-head. Fig. 4 is a similar view, the top plate being removed. Fig. 5 is a section on line *x x*, Fig. 3. Figs. 6 and 7 are detail views of parts of the carriage-moving mechanism. Fig. 8 is a horizontal sectional view on the line 8 8 of Fig. 9. Fig. 9 is a vertical transverse sectional view on the line 9 9 of Fig. 2.

In the drawings a bed-frame is shown having the side bars A A and cross-bars A′ A′, connecting the side bars at intervals. Upon this bed is mounted a carriage capable of supporting the cutting apparatus, also some of the devices which transmit power to the cutters and some of those which effect the advancing and receding of the carriage. Upon the bed are mounted the engine or motor and part of the gearing and shafting by which power is transmitted to the cutting apparatus and by which the cutter-carriage is advanced and withdrawn.

The cutting apparatus consists, primarily, of a short endless chain C, made of strong links pivotally connected together. With respect to its details it may be of any preferred or of any of the now well-known forms. It is mounted upon two supporting and guiding wheels C′ C², which are situated, respectively, at the ends and between a top and a bottom supporting-plate, (indicated by D D′.) This chain is provided with cutters *c*, seated in sockets in the cutter-links and fastened by screws *c*′.

One of the objects of the present invention is to dispense with the long chains which have been generally used in machines of this class and which extend from the two forward wheels backward on a triangular or polygonal path to a driving mechanism at the rear of the carriage and to substitute therefor an equally-efficient short chain requiring but a small number of cutters and to combine therewith means for supporting it of such nature that it can be advanced a relatively-long distance into the coal or material being cut without having the devices which support and actuate the chain strike against or engage with the walls of the kerf.

I am aware of the fact that it has been proposed to construct machines with short cutter-chains at the front ends, each mounted on two power-wheels revolving in vertical planes, the chains in such case to cut two horizontal kerfs, one above the other. I am also aware that in one instance it was proposed to employ a short cutter-chain at the front of the machine which could be advanced laterally into the material, the chain at all places to move in horizontal planes; but I am not aware of the fact that a cutter-chain of the last-described sort has been so arranged, supported, and driven that it could be advanced into the material in the manner which I have provided or so as to accomplish work to the same extent.

The chain-supporting plates D D′ are attached to the rear part of the carriage by one or more bars or plates E. The said connecting bar or plate E is extended back to a distance corresponding to the length of the desired cut, and the said centrally-arranged push-bar E is curved or bowed upwardly adjacent to the rear end of the cross bars or plates for supporting the cutter-chain to provide a passage for said chain. The cutter-chain is actuated by a driving-wheel G, which is also mounted between the plates D D′ and situated, preferably, at their centers. It has sprocket-teeth *g*, adapted to engage with the links of the chain C both at the front and the rear. The shaft *g*′ of this wheel extends upward through the plate D and is provided with a sprocket-wheel G′.

H is a chain engaging with the sprocket-wheel G′ and extending back to a point near the rear of the machine, where it engages with a driving-wheel I. The latter is secured to a

vertical shaft *i*, which also carries the bevel-wheel I'. With this wheel there engages the bevel-pinion J on the shaft J'.

K is a wheel secured to the shaft J', and with it meshes the pinion K', mounted on the shaft L. The latter is arranged longitudinally of the machine and extends forward to a point in front of the motor, where it carries a spur-wheel L', with which engages the pinion *l* on the armature-shaft. The sprocket-wheel G' is provided with a series of cutters g^5, which cut a path for said wheel and the driving-chain H. It will be seen that when the armature is in motion the cutting apparatus will be actuated through the devices described—that is to say, by the shaft L, the wheels K' K, the wheels J and I', and the chain H. While the cutters are being thus actuated the carriage can be simultaneously advanced by means or mechanism independent of the cutter-actuating devices, as follows:

M is a worm on the end of shaft L, it meshing with a worm-wheel M' on a shaft *m*. N is a sheave or pulley mounted loosely on this shaft *m*, but adapted to be connected thereto by means of a clutch N'.

O and P are shafts mounted in front of the shaft *m* and parallel thereto, O being a short or stud shaft carrying a wheel *o*, which meshes with a loose wheel M^2 on the shaft *m* and also engages with the wheel *p* on shaft P. The shaft P near the other end has secured to it a wheel P', which engages with a wheel M^3 on the shaft *m*. The clutch N' is adapted to engage also with the wheel M^2.

Q is a chain having the end *q* secured to the carriage at or near the front end and having the end *q'* secured to the carriage at the rear, the intermediate portion being looped, as shown, over the drum or sheave N and over a stationary sheave N^2, which is mounted on the front end of the bed. It passes from the end *q* backward to and around the drum N, thence forward to the sheave N^2, thence backward under the motor to the rear end of the carriage, where its end *q'* is fastened, as aforesaid.

It will now be seen that when the motor or engine is in motion the shaft L will through the worm M rotate the shaft *m* and the clutch N', and if the latter be engaged with the drum or sheave N tension will be exerted upon the chain Q in such a way as to draw the carriage forward, and that if the clutch N' be released from the drum N and engaged with the wheel M^2 (the motor acting continuously in one direction) the shaft P will be rotated and tension will be exerted in the opposite direction upon the chain Q, so as to cause the carriage to be drawn backward. The two sets of gearing have their parts so related that the advance or forward movement of the carriage is accomplished at a relatively low speed, while the withdrawing of it is effected much more rapidly.

The cuttings produced by the chain C are carried toward one side of the machine. To draw them out from the kerf, I use a chain R, provided with scrapers or flights *r*. It is mounted upon and actuated by the wheel S at the rear and is supported by the wheel S' at the front end. T T' are brackets or hangers for carrying these wheels. Wheel S is rotated by a wheel U, which receives power from the chain-wheel I through an idler U'.

The mode of operation and the numerous advantages incident to the machine above described will be readily understood. The bed-frame can be made narrow and the whole machine brought within a small compass in comparison to those heretofore used, which had the cutter-chains extended backward to the rear part of the carriage. There is no danger to the operatives from the cutters when in motion, as they are not exposed along the sides of the machine. As the motor is arranged at the front end the carriage and the parts connected thereto can be light and when in operation are not subjected to the strains experienced in those machines in which all of the movable parts are mounted on the sliding support.

What I claim is—

1. In a mining-machine, an endless chain provided with cutters arranged to rotate throughout in horizontal planes, wheels for said chain at the ends of its cut, a driving sprocket-wheel situated between the said end wheels engaging directly with the endless chain, one or more cross bars or plates supporting the said wheels, a sliding non-rotary carriage rigidly secured to and supporting the said cross-bars, a bed or holder for said carriage, means for moving the carriage forward and back, and means independent of the carriage-moving devices for actuating the cutter-chain, substantially as set forth.

2. The combination of the bed, the carriage, the horizontal wheels at the front of the carriage, the horizontally-moving chain mounted on said wheels, the chain-driving wheel between those aforesaid, the sprocket-wheel on the shaft of the intermediate wheel, cutters in the said sprocket-wheel, and a supplemental chain moving in horizontal planes for driving said toothed sprocket-wheel, substantially as set forth.

3. In a mining-machine, the combination of the bed, the horizontal chain-wheels at the ends of the cut, the chain provided with cutters mounted on said wheels and extending directly from one to the other both in the rear and the front thereof, and arranged to have the oppositely-moving parts of the chain travel in the same horizontal planes, the support for the said chain and wheels, the carriage interposed between the chain-support and the bed and having a sliding non-rotating bar connected to the chain-support and a cutter supplemental to the said chain in front of the said sliding bar, substantially as set forth.

4. In a mining-machine, the combination of the bed, the carriage, the cross support-

ing bars or plates at the front of the carriage, the endless cutter-chain on said support, and arranged to have its two oppositely-moving parts travel in the same horizontal planes, the end wheels for said chain, the intermediate driving-wheel, the sprocket-wheel connected to the driving-wheel, a non-rotating bar connected rigidly to the cross supporting-bars for the cutter-chain, and the chain for driving said sprocket-wheel, substantially as set forth.

5. In a front-thrust chain-cutter mining-machine, the combination of the bed-frame, the cutter-chain, the cross bars or plates for supporting the cutter-chain, the driving-wheel for the said chain mounted on the front cross bars or plates, the sliding carriage having a centrally-arranged, rearwardly-extending non-rotary bar secured rigidly to the said cross-bars and formed with a passage immediately behind the cross-bars for the travel of the chain cutters, and the main part of said bar behind said passage lying in the horizontal planes of the cutter-chain, substantially as set forth.

6. The combination of the bed, the horizontal traveling cutter-chain, the wheels for the chain, the cross bars or plates having their top and bottom surfaces at a distance apart less than the depth of the kerf, the sliding carriage having a non-rotary bar connected rigidly to and extending backwardly from the cross bars or plates, a cutter supplemental to the chain cutter in front of the said bar, and a power-transmitting mechanism independent of the said rigidly-connected and backward-extending bar for actuating both the said supplemental cutter and the chain cutter, substantially as set forth.

7. In a chain-cutter mining-machine, the combination of the cutter-chain, the wheels at the end of the cut, the chain being arranged thereon to travel directly from one to the other and both in front and rear thereof, the cross bars or plates supporting the said wheels, the intermediate driving-wheel lying in the planes of the end wheels and engaging directly with opposite sides of the cutter-chain, and bearing against the central part of the cutting side of the chain, the bed, the carriage, and means for rotating the intermediate driving-wheel, substantially as set forth.

8. The combination of the horizontally-arranged transversely-traveling cutter-chain, carrying the cuttings transversely of the machine, the cross-support therefor, the carriage having one or more bars rigidly secured to said cross-support, the stationary motor, the longitudinally-arranged cleaner-chain behind that end of the cutter-chain which finally delivers the cuttings, means connected to the carriage for supporting the cleaner-chain, the bed-frame rigidly secured to said motor and having a passage-way through which the cleaner-chain supports can freely move, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

BENJAMIN A. LEGG.

Witnesses:
ALEX. SPEER,
MINNIE O. SPEER.