



No. 751,919.

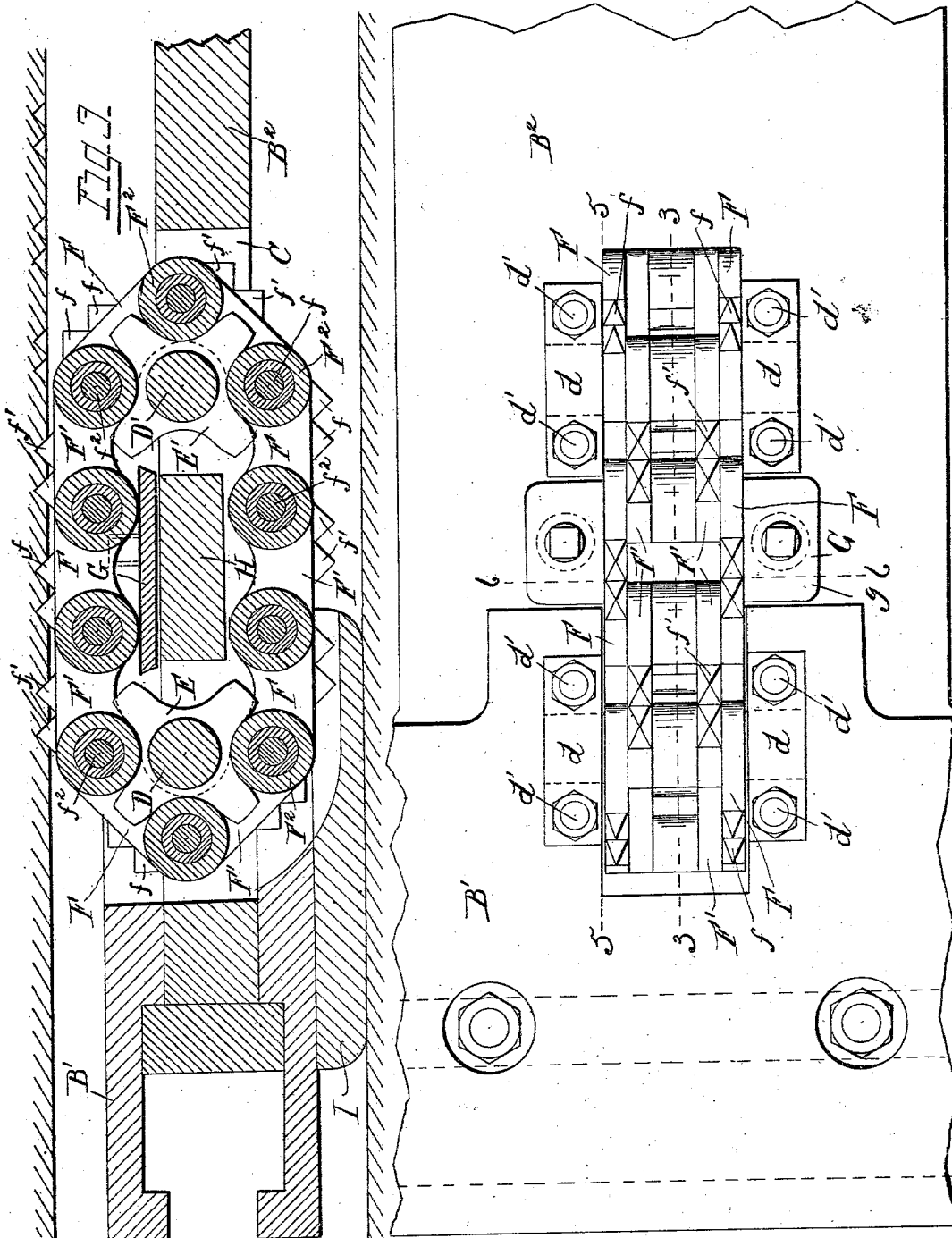
PATENTED FEB. 9, 1904.

J. A. JEFFREY.  
MINING MACHINE.

APPLICATION FILED NOV. 20, 1896.

NO MODEL.

3 SHEETS—SHEET 2.



WITNESSES

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FIG. 4

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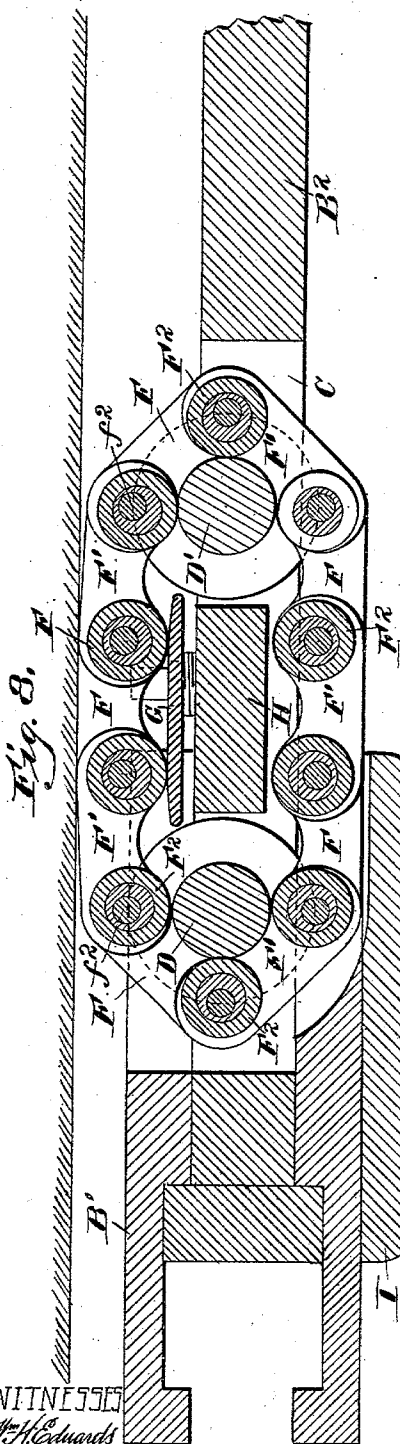
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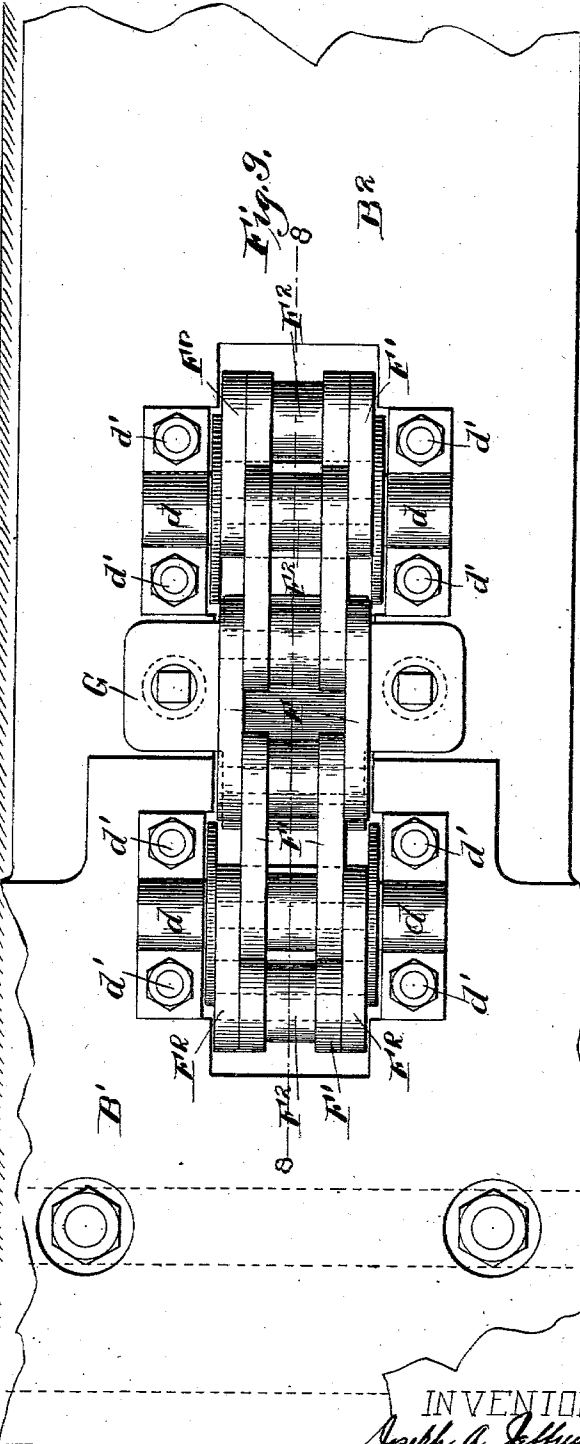
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3 SHEETS—SHEET 3.



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

## MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,919, dated February 9, 1904.

Application filed November 20, 1896. Serial No. 612,876. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH A. JEFFREY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Mining-Machines; and I do hereby 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.

Figure 1 is a plan view of a mining-machine having my improved holding or steadying device applied thereto. Fig. 2 is a longitudinal sectional view on the line 2 2 of Fig. 1. Fig. 3 is a central longitudinal sectional view on the line 3 3 of Fig. 4. Fig. 4 is a plan view, on an enlarged scale, of a portion of the movable carriage. Fig. 5 is a section on the line 5 5 of Fig. 4, on a reduced scale. Fig. 6 is a transverse vertical sectional view on the line 6 6 of Fig. 4, on the same scale as Fig. 5. Fig. 7 is a section of the chain-holder-adjusting plate. Figs. 8 and 9 are a section and a plan of a modified form of the holder.

My invention relates to improvements in holding or steadying devices for the movable carriages of chain-cutter mining-machines.

The object of the present invention is to provide a simple form of holding mechanism which will overcome the tendency of the forward end of the carriage to swing or swerve to one side of a straight central line under the reactionary thrust produced by the rapidly-moving cutters contacting with the solid wall of coal.

In the drawings I have shown my improvements as applied to one of the now well-known forms of front-thrust chain-cutter mining-machines, it comprising a bed-frame A, adapted to be held stationary by front and rear jacks or braces N N', a carriage B, fitted in guides on the bed, and a motor or engine, conventionally illustrated at M, for moving the carriage longitudinally of the bed and for driving the endless chain carrying the cutters, which chain is supported on the aforesaid carriage in the well-known manner.

The carriage B is shown as composed of a central longitudinal push-bar B<sup>2</sup> and a front

cross-head B', from the outer ends of which extend rearwardly-converging chain guide-bars B<sup>3</sup>. My improved holding or steadying device is arranged along the central longitudinal line of the carriage, preferably extending partly over or into the front cross-head B'. Said holding device consists of a short endless chain mounted on suitable supporting-sprockets and provided with a series of spurs or teeth adapted to penetrate one of the horizontal walls of the main kerf produced by the cutters on the carriage. In the embodiment of my invention herein illustrated the chain carrying the holding-spurs is composed of a series of inner links F' and a series of outer links F, the ends of said inner and outer links lapping one on the other and being connected by pintles f<sup>2</sup>, which extend through tubular projections on the inner links F' and are surrounded by rollers F<sup>2</sup>. Said chain is supported on sprockets E E', mounted on transverse shafts D D', extending across a slot or passage C, formed in the central push-bar B<sup>2</sup> of the carriage and in the front cross-head B'. The shafts D D' are shown as fitted in bearing recesses or sockets formed in the bar B<sup>2</sup> and detachably held therein by cap-pieces d, adjustably secured to said push-bar B<sup>2</sup> by bolts d'.

H designates a cross-bar extending across the slot or passage C between the sprockets E E', and on said bar or plate is supported the device for taking up any slack in the chain. This consists of a plate G, through which extend adjusting screws or bolts g, that enter the above-described cross-bar H.

The links F of the holding device are provided with a series of spurs or projecting teeth f, there being two of such spurs on each of said links in the present construction arranged adjacent to each other at about the middle of the link. Similar spurs f' are formed on the inner links F', the last-said spurs being arranged on transverse lines between those at f.

To the under side of the front cross-head B' is secured a shoe I, which rides along the bottom or lower horizontal wall of the kerf cut by the endless chain B<sup>4</sup> and acts to hold said cross-head and the forward portion of the car-

riage up and hold the holding auxiliary chain in such position that the spurs  $f, f'$  thereon will successively enter or penetrate the upper horizontal wall of the said kerf.

5 The operation of the above-described improvements will be readily understood. As the carriage B is advanced into the coal by the motor or engine the spurs  $f, f'$  are caused to successively penetrate slightly into the upper wall of the chain-kerf and effectually prevent the carriage from moving laterally in a direction opposite to that in which the chain B<sup>4</sup> is traveling.

15 The holding device herein described and illustrated presents marked advantages over any of those heretofore proposed for the same purpose with which I am acquainted.

By the construction herein I avoid the expenditure of power required to cut a separate path or kerf for the holding device, as has been necessary with some of the earlier forms of devices proposed for this purpose, and I provide that there shall at all times be a relatively large number of holding points or spurs engaging with the horizontal wall of the kerf. This is in contrast to those constructions heretofore proposed in which a rotary toothed wheel was depended on to effect the holding of the carriage to line. By my construction, in which the said holding-spurs are arranged in a series of longitudinally-separated groups, two or more of which are simultaneously active, I avoid the danger of the device being rendered more or less inoperative by reason of the scaling of the coal in the face of the kerf being engaged at the point of engagement of the holder therewith. When a single holding-spur only is engaged at any time, it frequently breaks out a flake or scale of coal of such size that when the next succeeding tooth or spur comes into position for action it cannot penetrate the body of coal, and therefore fails to accomplish the purpose for which it was intended. As shown, I prefer also to have the holding-spurs arranged on two longitudinal lines; but there can be modification in this, as well as in other respects, without departing from the spirit of my invention. Thus instead of employing a sprocket-chain of the character herein an endless belt having a series of holding-spurs might be supported upon two peripherally-grooved smooth-surfaced drums or guide-wheels, and, again, more or less of the advantages of the present construction can be attained by employing a different style of chain from that herein shown, having the holding-spurs arranged along a single common central longitudinal line.

60 In some coals the machine can be held sufficiently steady by devices which do not penetrate the kerf-wall at all. In Figs. 8 and 9 I have shown a chain-holder in which there are no penetrating-spurs, the chain being ar-

65 ranged in such way that it can be caused to press against the upper horizontal wall of the main kerf in opposition to the shoe pressing upon the lower wall. In either case—that is to say, whether the chain is provided with spurs or not—I attain two important advantages. I can provide a line or lines of holding contact which shall be as prolonged as desired and at the same time reduce to a minimum the resistance to the advance of the machine. It will be seen that as the carriage is moving forward in the direction of the arrows  $x, x$  the active part of the chain-holder is moving backward relative to the carriage, and there is no friction against the coal, the sliding of the relatively-moving parts being taken upon the smooth metal and at places where rollers, such as those at F<sup>3</sup>, can be inserted as antifriction devices.

Figures 8 and 9 illustrate another feature of importance incident to a holder of this character for the meeting of the following conditions, namely: Frequently a mining-machine as it is entering the coal impinges upon masses of refractory material—such as sulfur, slate, or the like—which it is impossible to penetrate or at least unwise to attack. In such cases the practice is to draw the carriage out from the coal, then raise the whole machine, including the bed-frame, to higher horizontal planes, and commence a new cut above, but communicating with the partial cut previously formed. It will be seen that during the second higher cut the carriage has no support below it because of the previous removal of the coal, the shoe I being elevated from the floor. If now there be a holding device above the cutter-head projecting to a height above the uppermost plane of the cutter-points, this holder, having no opposing abutment, tends to refuse to cut or penetrate the coal above the kerf and serves as a wedge or cam to force the cutter-head downward. With a chain-holder of the character of that herein this can be readily obviated, as will be seen by examining Fig. 8. The supporting-plate G can be at any time let down in such way as to release the chain-links from contact with the coal, bringing them below the line of the top points of the cutters. Whether the links are provided with spurs or are smooth on their upper surfaces is not material with respect to this, as in either case the parts can be so related and mounted as to permit the links to be thrown up or down, as required.

What I claim is—

1. In a mining-machine, the combination of the cutter-chain, the carriage supporting said chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, and a holding device for the carriage consisting of an endless chain supported on the carriage and adapted to engage with one of the horizontal

walls of the main kerf and to have its active portion moved backward on lines substantially parallel to the path of the carriage while moving bodily forward therewith, substantially as set forth.

2. In a mining-machine, the combination of the cutter-chain, the carriage supporting said chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, and a holding device consisting of an endless chain mounted on the carriage and adapted to engage with the coal in the wall of the main kerf and to remain intermittently stationary relatively to the coal while the carriage is advancing, and to advance bodily with the carriage, substantially as set forth.

3. In a mining-machine, the combination of the cutter-chain, the carriage supporting the chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, and a holding device consisting of an endless chain mounted on the carriage and having links provided with spurs adapted to engage with one of the walls of main kerf, which spurs intermittently are stationary relative to the coal, while the holder-chain is bodily advancing with the carriage, substantially as set forth.

4. In a mining-machine, the combination of the cutter-chain, the carriage supporting the chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, and a holding device consisting of an endless chain on the carriage adapted to have its links engage with the stationary coal-wall and while so engaging to remain intermittently stationary while the carriage is advancing, and means for adjusting toward and from the coal the active part of the chain, substantially as set forth.

5. In a mining-machine, the combination of the cutter-chain, the carriage supporting the chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, and the holding device consisting of an endless chain and two rollers or wheels for said chain, the said chain being adapted to have an active part between the said wheels engage with the coal and to move from the forward wheel to the rear wheel while the carriage is advancing whereby relatively prolonged lines of engagement can be provided, substantially as set forth.

6. In a mining-machine, the combination of the cutter-chain, the carriage supporting the chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, a holding device having an active part adapted to engage with a horizontal wall of the main chain-kerf and to be held in a relatively lower position out of such engagement, and in a rela-

tively higher position when in such engagement, and means for positively supporting it in such positions, substantially as set forth.

7. In a mining-machine, the combination of a cutter-chain, a carriage supporting the chain, the bed for supporting and guiding the carriage, the power devices for actuating the cutter-chain and moving the carriage, a holding and steadying device, consisting of an endless chain supported upon wheels or rollers on the carriage, and having an active part adapted to engage with a wall of the main chain-kerf, and an adjusting plate or bar, G, adapted to hold said active part of the chain in either of two positions; substantially as set forth.

8. In a mining-machine, the combination of the bed, a carriage mounted on the bed, a cutter-chain supported by the carriage, power devices for actuating the cutter-chain and moving the carriage on the bed, a holding device, consisting of an endless chain mounted on the carriage and having an active portion adapted to engage with the upper horizontal wall of the main chain-kerf, a plate, G, mounted below the active portion of said holding device, and means adjustably connecting said plate with the carriage, whereby said active portion of the holding device may be held in a relatively high position to engage with the top horizontal wall of the main kerf or in a relatively lower position and out of engagement with said wall of the kerf; substantially as set forth.

9. In a mining-machine, the combination of a bed, a carriage mounted thereon and adapted to move relatively thereto, a cutter-chain supported on the carriage, power devices for actuating the chain and for moving the carriage to force the chain into engagement with the material to be cut, a holding device mounted on the carriage and arranged to engage with one of the walls of the kerf formed by the cutter-chain to prevent lateral swaying of the carriage as it advances, means for supporting the holder in a position to engage with a wall of the kerf, and means for adjusting the position of the said support to permit the disengagement of the holder from the kerf-wall, substantially as set forth.

10. In a mining-machine, the combination of a fixed bed, a carriage movable thereon, laterally-acting cutters on the carriage, and a holding device mounted thereon and having a series of projections adapted to engage with one wall of the kerf, the projections being arranged to come successively into action as carriage advances relative to the said fixed bed, and each to remain stationary relative to the kerf-wall during its engagement therewith, the said projections being arranged in a line parallel with the direction of advance of the carriage and adapted to prevent lateral swaying of the same, substantially as set forth.

11. In a mining-machine, the combination

of the bed, the carriage, the laterally-acting cutters on the carriage, and the holding device mounted on the carriage and consisting of a chain adapted to travel with the carriage into  
5 the kerf and to have both its inner and outer links engage with the coal on one side of the carriage, substantially as set forth.

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

JOSEPH A. JEFFREY.

Witnesses:

A. D. SHAW,

R. GROS. HUTCHINS.