

(No Model.)

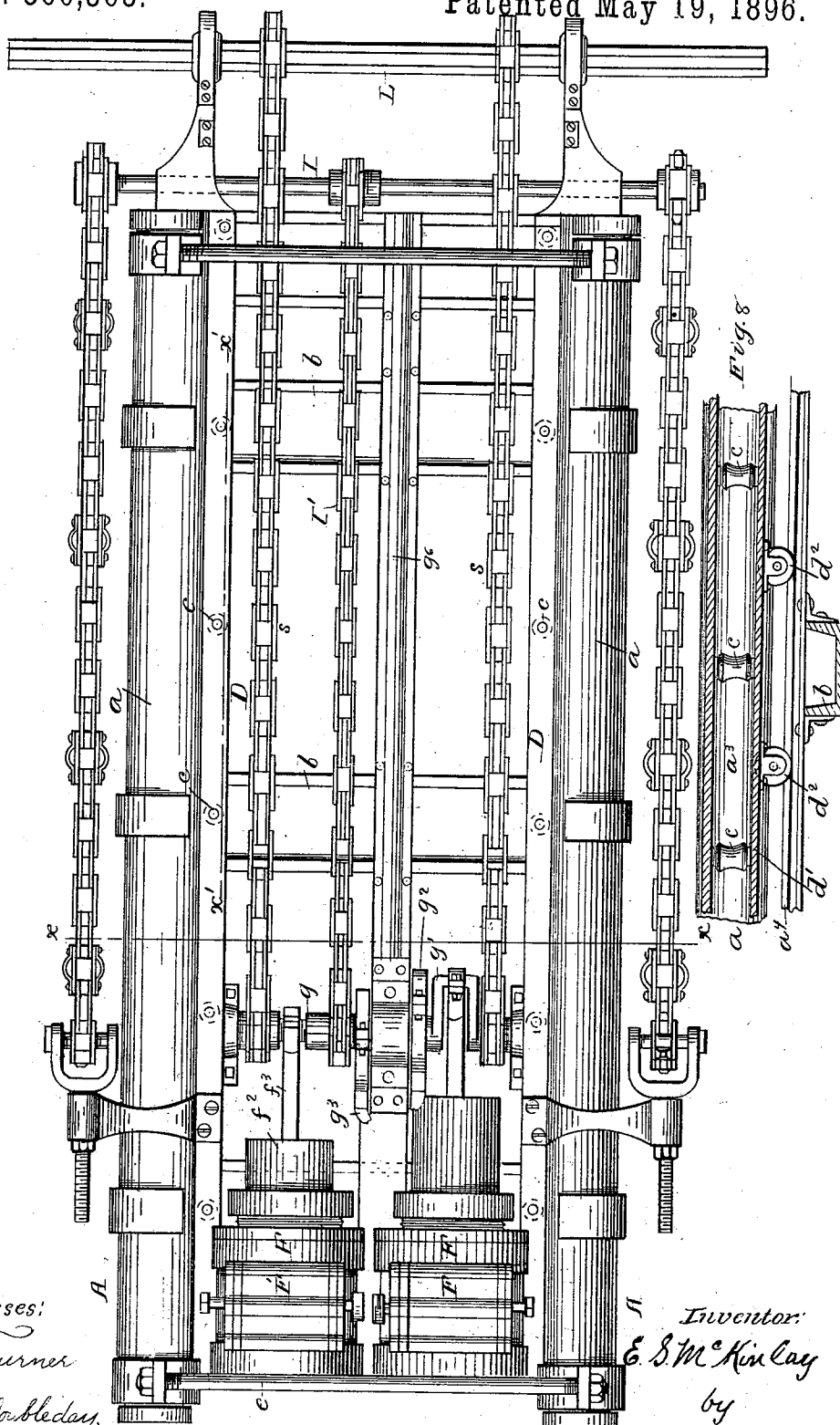
2 Sheets—Sheet 1.

E. S. McKINLAY.
MINING MACHINE.

No. 560,363.

Patented May 19, 1896.

Fig. 1



Witnesses:
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UNITED STATES PATENT OFFICE.

EDWARD S. MCKINLAY, OF DENVER, COLORADO.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,363, dated May 19, 1896.

Application filed October 19, 1886. Serial No. 216,670. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. MCKINLAY, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Mining-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a plan view of a machine embodying my improvements. Fig. 2 is a cross-section on the line xx , Fig. 1. Fig. 3 is a sectional view of one of the antifriction-rollers on a large scale. Fig. 4 is a side view of the central support of the crank-shaft. Fig. 5 is a plan view, and Fig. 6 an elevation, of one of the shoes for carrying the cutter-bar. Fig. 7 shows sections on the lines yy and zz of Fig. 6. Fig. 8 is a partial longitudinal section on the line $x'x'$, Fig. 1.

The invention herein relates to improvements in mining-machines of the class in which use is made of a stationary frame or bed and of a carriage mounted thereon for carrying the cutting apparatus.

This invention relates to improvements in mining-machines of the class in which use is made of a stationary frame or bed, a carriage mounted thereon to move forward and back, a cutting apparatus at the front end of the carriage, an engine or motor at the rear end of the carriage, and one or more chains for imparting motion to the cutters at the front, said parts being arranged to act as a "breast" or front-thrust undercutting-machine.

It consists in providing a bed with relatively elevated side bars or parts, downwardly-extending bars, cross-bars, and bottom longitudinally-arranged bars, together with a carriage having attached parts such as aforesaid and arranged to have a bearing or guidance upon and by means of the elevated side bars, but also to have a support upon the aforesaid bottom longitudinal bars.

It consists also in combining with the above-described parts antifriction-rollers so arranged as to avoid the cramping and binding which has been incident to machines of this class when pressure is applied to the carriage.

The stationary bed A is formed with two

side portions a , secured to cross-braces b , which are securely bolted thereto and so form a rigid and strong bed, the stationary frame resting on these cross-braces, several of which are employed at sufficient intervals to impart the necessary strength and rigidity to the frame. The side portions a may be of any preferred character. As shown, they consist of tubes a , which can be utilized as cylinders to feed forward the carriage, (they containing pistons, see Figs. 2 and 5,) united to the shoes or brackets l , which carry the cutter-bar L. These tubes are adapted to have air fed to them for driving forward the carriage; but instead of this construction—that is to say, instead of air-tubes with pistons and instead of cross-girths and connecting devices of the character shown and instead of the shoes and cutting apparatus illustrated and described—use may be made of any of those now well known. For instance, instead of tubes T-bars, channel-bars, or grooved bars, such as have been used heretofore, can be applied.

It will be seen that the side portions a have parts at a^3 extending horizontally inward, which parts a^3 are adapted to receive the upward pressure of the carriage, there being antifriction-rollers interposed between the carriage and said inward-projecting parts a^3 , as will be described. c c represent the idler-rollers or antifriction-rollers, which are thus interposed. The side portions of the bed are also provided with a track a^4 , having a V-shaped rail or rail of equivalent shape, on which travel corresponding-shaped antifriction-rollers on the carriage.

The traveling carriage D is provided with bars d , fitted or adapted to the side parts a of the bed, they having the side bars d' extending outward from the parts d and lying under or below the aforesaid parts a^3 . The side bars d are provided at suitable intervals with the antifriction-rollers d^2 , which are mounted on the bars d in slots or recesses and which run on the V-shaped tracks a^4 of the bed, the roller d^2 corresponding in shape to these tracks and supporting the traveling carriage on the stationary bed, friction between the bars of the carriage and stationary bed being overcome by the rollers c and the rollers d^2 ,

and the rollers d^2 supporting the carriage on the track a^4 , and any upward pressure of the carriage is received by the rollers c , interposed between the side bars of the carriage and the side portions of the frame.

In the construction shown the rollers c are carried by the side bars d ; but it will be understood that they may be attached to the bed-frame and adapted to receive the upward pressure of the carriage in a way substantially equivalent to that in which they operate in the machine illustrated. When the parts a are curved in section, as shown, the rollers c will preferably be concave longitudinally. If the side pieces a of the bed have a flat surface to receive the upward thrust, these rollers will be cylindrical.

On the carriage are mounted the engines and the power devices by which the cutting apparatus is operated. $F F$ represent the cylinders, having valve-boxes F' , piston-rods f^3 , and trunk-pistons f^2 , the piston being connected to the cranks g' of the engine-shaft g . This shaft carries also the eccentrics g^2 , the rods g^3 of which extend back to the valve-boxes F' . (Connection not shown.)

The crank-shaft g is mounted directly upon the side bars $d d$ of the carriage and is so situated as to be little if any above the upper surfaces of the side bars. If necessary a box or bearing for the central part of the shaft can be provided, as shown at g^4 , this box or bearing having antifriction-rollers g^5 fitted to a track g^6 . The crank-shaft is connected directly with the cutter-bar by the chains $s s$. It also drives the slack chain-shaft I by chain I' . For these chains s and I' sprocket-wheels are provided on the crank-shaft and on the cutter-bar and the slack chain-shaft.

Some of the advantages of this construction can be retained if use be made of a supplemental or secondary shaft, geared or connected to the crank-shaft, and provided with the sprocket-wheels or other devices for driving the cutter-bar. In such case the secondary shaft should be also in as low a plane as possible, in order to have it level with the cutter-bar. In either case—that is to say, whether the cutter-bar is driven directly from the crank-shaft or from a secondary shaft—the speed imparted to the cutter-bar can be very high, and when high speed is thus used the forward pressure upon the cutter-bar need not be so great, and cutters with smaller points can be employed for effecting the incisions in the coal or rock.

As shown, the valve-chests F' are above the cylinders, and the latter are provided with the aforesaid trunk-pistons f^2 , to which are pivoted the connecting-rods f^3 , united to the cranks of the shaft g ; but, instead of engines of this character, use may be made of any which will attain the same purposes. The engines are driven by compressed air, preferably, though steam or other motive agent can be used, if desired. As the devices by which the motive agency is taken into the mine and

let onto and exhausted from the engines are well known, they need not here be set forth in detail.

Rollers c , being concave and fitting the convex side portions of the bed, are equivalent to two separate rollers, the lower part c' of the one shown operating to prevent the carriage from rising up, while the upper part c^2 can be regarded as an antifriction-stop to hold the carriage properly laterally in relation to the side portions of the bed—that is to say, these devices more or less encircle the side bars—and in this respect there can be modification without departing from the invention, irrespective of the fact that friction is reduced by the particular form of devices shown. To be sure, as shown, the whole roller c acts as a stop for holding these parts in proper positions laterally; but nevertheless it will be seen that the lower part, in particular, acts as an antifriction-stop to prevent the carriage from rising upward.

The machine differs from those of this class as known to me and heretofore made in that much of the weight of the engine or motor is taken off from the side bars and is supported on the supplemental longitudinal bed-bars secured to the bottom cross-bars. While I have herein shown a cutter-bar as mounted across the front end of the machine, and a chain for imparting motion to the cutters, it will be understood that any of the forms of front-thrust cutting apparatus well known prior to my invention can be employed.

At the date of this patent it is known that in such machines between the carriage (with the cutting apparatus) and the bed can be interposed one set of vertical rollers like that at d^2 on horizontal axes, upon which the carriage rests downward directly, and another set of rollers on horizontal axes directly above some bar or part of the carriage, and against which this bar or part bears, the last said rollers being attached to the bed and operating to prevent the upward displacement of the carriage. I regard such rollers secured to the bed and bearing against the upper surface of the carriage as the equivalents of the rollers c in so far as the latter act as antifriction-stops to prevent the carriage from rising up. So, too, at this time it is well known that in mining-machines three sets of antifriction-rollers can be used, those of one set being on horizontal axes which receive the weight of the carriage, a second set on horizontal axes which receive the upward thrust of the carriage, and a third set on vertical axes which receive the lateral thrust of the carriage. Such an arrangement is also the equivalent of that which I have shown, inasmuch as the rollers c in my construction perform a twofold function, they receiving both the upward and the lateral thrusts of the carriage.

I am aware that channeling and other machines have been made or proposed which were so constructed as to run upon tracks and which had supplemental wheels engaging

with the tracks or flanges thereon to prevent any tilting action of the machine, and I do not claim this style of machine as of my invention. The differences between such constructions and mine are clearly manifest without explanation. My machine belongs to the class in which a traveling carriage is mounted and slides upon a main frame, the whole being portable and adapted for making an undercut in the face of the coal. The carriage is fed forward and then withdrawn on the main frame instead of continuously feeding it forward on track rails.

I do not herein claim any of the combinations set forth in the claims in my other application, Serial No. 214,257, or the application, Serial No. 124,318, filed by myself and W. A. McKinlay jointly, preferring to claim in this case the patentable matters relating to the antifriction-rollers.

What I claim is—

1. In a front-thrust, or breast, undercutting mining-machine, the combination of a bed having side bars situated above the ground, bars extending downward therefrom, cross-bars resting upon the ground and one or more longitudinal bars at or near its center and connected to the cross-bars, a carriage fitted to the said bed and having a cutting apparatus across the front end thereof, one or more chains for imparting motion to the cutters and extending from the rear part of the carriage to the front thereof, an engine or motor at the rear of the carriage having its central

part resting upon the aforesaid central longitudinal bottom bars of the bed, and rollers or wheels interposed between the carriage and the elevated side bars of the bed, all of said parts constituting a portable unitary structure, substantially as set forth.

2. In a front-thrust, or breast, undercutting mining-machine, the combination of a bed having side bars elevated from the ground, downwardly - extending supporting - bars, cross-bars adapted to rest upon the ground, one or more longitudinal bars secured to the top of the cross-bars, a carriage moving forward and back on the said bed, a cutting apparatus on said carriage and across its front end, one or more chains for imparting motion to the cutters and extending from the rear of the carriage to the front, a motor or engine mounted on the carriage at the rear end and arranged to drive the chain or chains and to bear downward on the longitudinal bottom bed-bars and engaging with or bearing against the elevated side bars by devices which encircle more or less of said side bars, whereby an upward or downward displacement of the motor or carriage is prevented, and they are supported longitudinally on lines between the side bars, substantially as set forth.

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

EDWARD S. MCKINLAY.

Witnesses:

LUCIUS P. MARSH,
E. A. CLARK.