(No Model.) 2 Sheets—Sheet 1.

J. L. BEURY & J. T. CRESSEY.

MINING MACHINE.

No. 544,424. Patented Aug. 13, 1895.

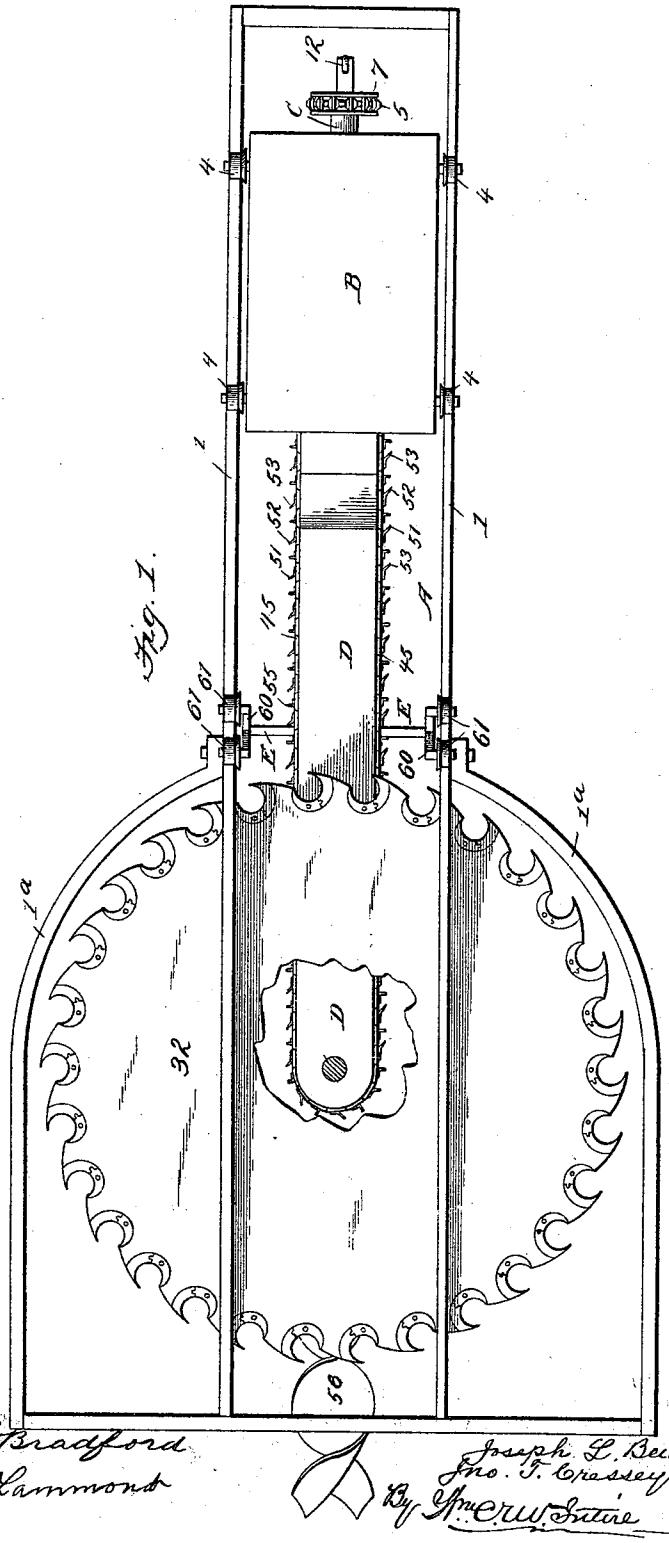

Fig. 1.

Witnesses
Edwin L. Bradford
N. Curtis Lammond

Inventors
Joseph L. Beury
Jno. T. Cressey
By Wm. C. R. W. Tuttle Attorney

(No Model.) 2 Sheets—Sheet 2.

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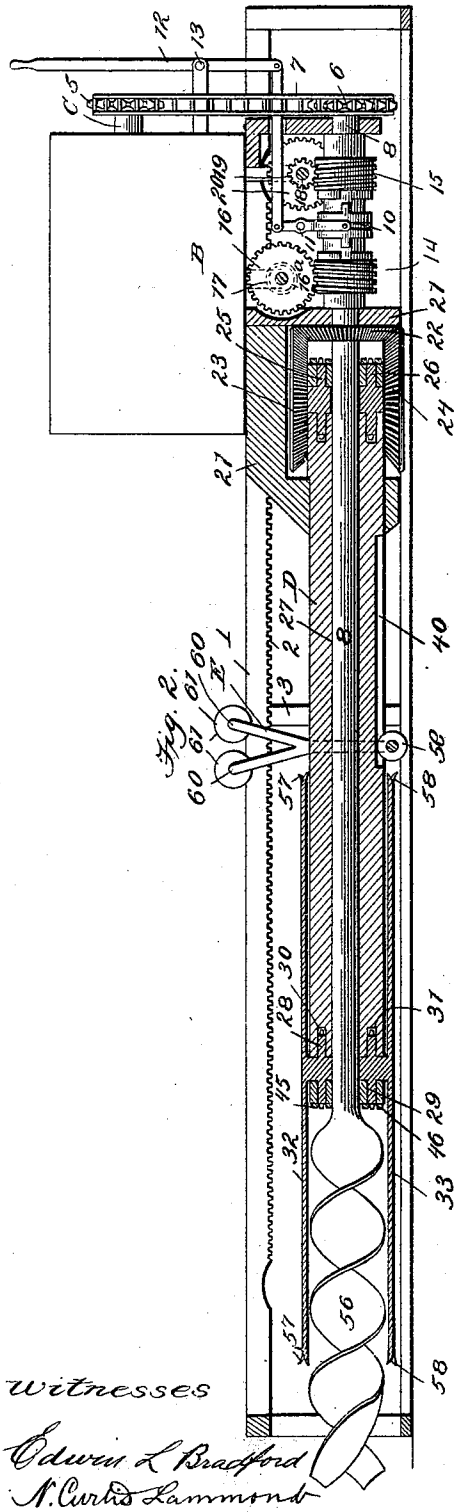

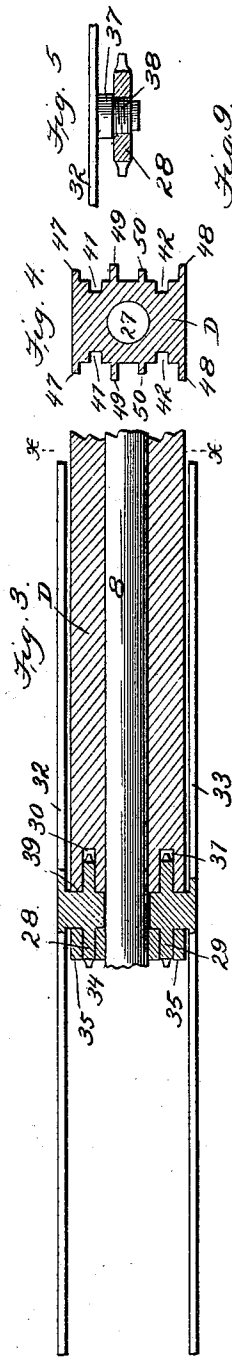

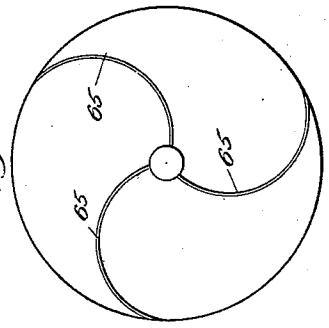

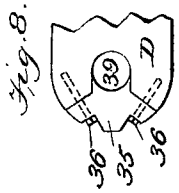

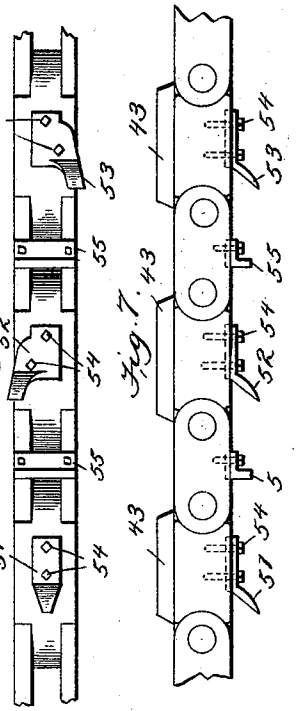

Witnesses

Edwin L. Bradford

N. Curtis Lammond

Inventors

Joseph L. Beury

Jno. T. Cressey

By Wm. C. R. W. Fairie Attorney

UNITED STATES PATENT OFFICE.

JOSEPH L. BEURY AND JOHN T. CRESSEY, OF BEURY, WEST VIRGINIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,424, dated August 13, 1895.

Application filed April 26, 1894. Serial No. 509,070. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH L. BEURY and JOHN T. CRESSEY, citizens of the United States, residing at Beury, in the county of Fayette and State of West Virginia, have invented certain new and useful Improvements in Mining-Machines; and we 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.

This invention relates to certain new and useful improvements in mining-machines; and it consists, substantially, in such features of construction, arrangement, and combinations of parts, as will hereinafter be more particularly described.

The particular class or character of mining-machines to which the invention has reference more especially is such as is shown and described in the Letters Patent No. 513,296, granted to Beury and Cressey on the 23d day of January, 1894; and the object of the present invention is to overcome several deficiencies of such machine and to render the machine capable of performing much more effectual work in a given space of time.

A further object of the invention is to materially lessen the surface of the material actually cut by the machine, and yet at the same time to so cut into the deposits that the work of loosening and breaking up the same is greatly expedited and facilitated.

A further object of the invention is to provide for increasing the distance between the faces of the cutting-disks each side of the centering-auger, whereby the coal removed from between the kerfs of the two disks may be of such thickness as to render it merchantable, and at the same time producing a deeper pit for the overhanging coal to fall in, and without increasing the actual cutting-surface operated upon by the disks.

A still further object of the invention is to dispense with all projecting portions beyond the actual working or cutting portions or edges of the machine, and to prevent any clogging of the driving or cutting mechanism, as well as to obviate any squeezing tendency upon the operative parts during the operation of mining.

These objects are attained by the means illustrated in the accompanying drawings, wherein—

Figure 1 represents a top or plan view of the machine as it appears all ready for the mining operation, the upper cutting-disk being partly cut out in the center to more clearly indicate certain parts. Fig. 2 is a longitudinal sectional elevation of the machine taken about centrally and clearly indicating the construction and relative arrangement of the parts contributing to make up the entire machine. Fig. 3 is an enlarged sectional detail of the cutting-disks, together with a portion of the auger-shaft and a portion of the movable stock or beam in which said shaft works, and which also supports and guides the movement of the cutter-chains, hereinafter more specifically referred to. Fig. 4 is a cross-section of Fig. 3 on the line $x\,x$, this view showing more clearly the construction of said movable stock or beam. Fig. 5 is a sectional view in detail to more clearly indicate the preferred means of uniting or fastening together the forward sprocket-wheels and the cutting-disks. Fig. 6 is a side view in detail, enlarged, of a portion of one of the sprocket cutter chains, showing the relative arrangement of the three separate forms of cutters, together with scrapers which are secured upon the chains at intermediate points between said cutters. Fig. 7 is a top or plan view of Fig. 6. Fig. 8 is an enlarged detail view in top plan and representing the manner of removably securing the sprocket-wheels in the forward end of the movable stock or beam. Fig. 9 is a plan view of the under or lower cutting-disk, showing the spiral ribs which serve to continuously carry off the loose material from between the disks.

Before proceeding with a more detailed description of the several parts it may be stated in a general way that the machine is one which is operated by an electric or other suitable motor which simultaneously drives a pair of cutting-disks which revolve in opposite directions, while at the same time an auger or drill is also being operated always in advance of said cutting-disks, so as to break up the coal deposit and open the way for the more effective work of the disks. Simultaneously also with the operation of the said auger and disks a pair of endless chains is operated in

opposite directions, said chains leading from the axis of the disks and extending behind the same for a suitable distance to effect the desired cutting and scraping out of loose material through the medium of the cutters and scrapers which are carried by the chains in their movement or travel. The whole of the working parts are operated from the one source by proper intermediate gearing and connections, and it will be understood that as the mining operation progresses the cutting devices and mechanism advance in a body, the motor itself also being carried along with the rest.

Referring to the drawings, A represents the main frame of the machine, which, as shown, is made up of the longitudinal beams 1 1 and the forward semicircular framework 1^a, the said framework being as light and made up by as few parts as possible. Formed on the under side of each of the longitudinal portions or rails 1 1 is a rack 2, which gears with the pinions hereinafter referred to in connection with the motor, and at central points vertical uprights 3 for the frame are located or arranged, that one herein shown also exercising the function of a stop for the rearward travel of a supporting-truck hereinafter described.

B represents an electric or other suitable motor that is mounted at the rear end of the machine upon the top rails 1, the said motor being provided with suitable wheels 4 4, which fit the rails and are free to move thereon. The motor-shaft is indicated at C, and on the end of this shaft is a sprocket-wheel 5, which is connected with another sprocket-wheel 6 by means of a sprocket-chain 7, the said wheel 6 being carried by the rear end of the main operating-shaft 8, hereinafter more specifically mentioned.

In order that the parts of the machine may be properly advanced or carried forward in operation and then reversed so as to have them brought back to their former positions from which the start was made, we employ suitable clutch-gear, which in the one instance drives the parts forward and in the other reverses them or carries them back. Thus on the main operating-shaft 8, at near its rear end, is a movable clutch 10 suitably supported at 11, and being operated or shifted by means of a lever 12, pivoted at 13, and extending upward alongside of the motor. Said clutch of course is free to move lengthwise of the shaft for a limited distance; but it rotates with the shaft, and whenever it is desired to drive the several sets of cutting mechanism forward, the clutch is moved to engage with a worm-gear 14 loose on the shaft and having its thread in a left-hand direction; and whenever it is desired to reverse the machine and bring the parts back, the said clutch is shifted the other way to engage with a worm-gear 15, also loose on the shaft, and having its thread right-hand or reverse to the thread of the gear 14. The threads of the gears are, of course, reversed if the main shaft is rotated in an opposite direction to that illustrated. The position of the shaft, it should be understood, is about central of the machine, and gearing with the worm 14 is a worm-wheel 16 that is supported from the bed of the motor B, and at the ends of the shaft 16^a of said worm-wheel small pinions 17 are carried, which engage or work in the racks 2 on the under side of the rails 1 1 of the main frame. Thus when the main shaft is revolved in the forward direction the motor and cutters will be carried along forwardly as the mining work advances. Similarly also the motor-bed supports another shaft 18, which carries centrally thereof a worm-pinion 19, meshing with the returning worm 15, while said shaft carries at its ends spur-wheels 20, which in like manner take into the racks 2. Thus when the clutch is shifted to engage the worm-wheel 15 the motor, as well as the cutting devices or mechanisms, will all be returned.

While a particular form of feed and reversing mechanism has been herein shown, it is obvious that other forms could be resorted to, and therefore no limitations are intended in this particular.

Secured in any suitable manner to the motor and sliding in the main frame is a frame 21, through which the main driving-shaft passes, and said sliding frame 21 serves as a sort of housing for the beveled gearing which drives the sprocket-wheels to actuate the chains carrying the cutters, as will be described. On the inside of the frame 21 the shaft is provided with a beveled gear-wheel 22, which meshes with two corresponding beveled gear-wheels 23 and 24, and these latter wheels carry on their axles the sprocket-wheels 25 and 26, respectively, which are loosely seated in recesses formed therefor in the rear end of a longitudinally-movable stock or beam D, which latter extends almost the entire length of the machine about centrally thereof. The said sprocket-wheels thus turn with the beveled gears 23 and 24, and as is apparent said gears are operated in opposite or reverse directions. The sprocket-wheels 25 and 26 may be either formed integral with the wheels 23 and 24 or they may be separate therefrom and the two suitably joined or secured together.

The longitudinally-movable stock or beam D is hollow or bored out for its entire length at 27, and the main operating-shaft 8 passes through the same, as shown, thus having a very extended bearing and support, which renders said shaft less liable to breakage or strain. The forward end of the beam is also provided with an upper and lower sprocket-wheel 28 and 29, corresponding to the wheels 25 and 26 at the rear end, and the forward end of said beam or stock is furthermore so constructed as to enable the wheels and their hubs to be easily seated in working position within the recesses 30 31 formed for that purpose. In some instances the wheels 28 and

29 are made as a part of the revolving cutting-disks 32 33, in which event both the said wheels are placed within the forward end of the stock or beam, as represented at 34, Fig. 3, they being maintained in position by means of a removable nose-block 35, which is secured to the end of the stock by means of the screws 36. Again, however, the wheels 28 29 are separate from the cutting-disks, as seen in Fig. 5, where the disk is formed with a hub 37, having a shoulder, as shown, which is screw-threaded at 38 to fit a corresponding threaded opening in the wheel. The manner of securing the disks and wheels together in this instance is by first placing the wheels in the recesses in the end of the stock or beam D until the openings of the wheels correspond or coincide with the vertical opening 39 in the stock, and then inserting the screw-threaded hubs of the disks into the opening 39 from its upper and lower ends, respectively, and then turning the disks.

From the described construction it will be readily seen that the hubs on the disks may be made of any desired length, and that according to the length of the hubs the distance between the faces of the disks may be increased, whereby the cuts made in the coal will be correspondingly separated and hence a slab of coal left between the disk-kerfs, which, when broken down and taken out, is of such proportions that it will make thoroughly merchantable coal (in contradistinction to the slack or fine dust produced by disks operating close together) and when removed leaves a pit of greater substantial height, so that the overhanging coal may have more room within which to fall. The auger being in advance of the disks and between the same it will be seen that the slabs produced by the kerfs of the disks are separated or divided transversely by the cut of the auger, and thus they are capable of being readily thrown down and removed. It is obvious that other means of uniting the two could be resorted to, but the construction shown has been found thoroughly practical and is preferred.

The stock or beam D is formed in its under side for about one-half its length with a groove 40, (see Fig. 4,) which receives a guide-wheel, as will hereinafter appear. The said stock or beam is also formed in each side with corresponding longitudinal grooves 41 and 42, which receive guide-blocks 43 attached or secured at intervals to the inner sides of the sprocket-chains 45 and 46, and in addition to said grooves the stock or beam is also formed or provided on each side with corresponding upper and lower longitudinal ledges or shelves 47 and 48 and inner longitudinal ledges or shelves 49 and 50, each pair of said shelves serving to receive between them the upper and lower faces of the links of the sprocket-chains, which, as will be understood, serve to preserve alignment of the chains as well as to guide them and prevent access of material between the working-surfaces of the chains. These chains, of course, pass around the stock or beam and engage with the sets of sprocket-wheels already described, and inasmuch as the gear-wheels described are caused to revolve in opposite directions it follows that the chains also pass in or follow different directions.

Secured to the outer faces of the links in alternate arrangement are three separate or independent forms of knives or cutters 51 52 53, arranged at different angles, as shown, so as to cut into the sides of the ore-bed at different points and thereby loosen up the ore, so as to enable it more readily of itself to thereafter break away. The said cutters may be of any suitable shape, but preferably of the forms shown in Figs. 6 and 7, wherein they are fastened to the chains by means of screws or rivets 54 passing through the chains and through the shanks of the cutters. At points on the chains intermediate of the cutters referred to suitable scrapers 55 are also securely fastened, and these serve to carry out the loose material during the movements or travel of the chains.

The main operating-shaft 8 carries at its forward end an auger or drill 56, which, as will be observed, projects forwardly of or beyond the operating edges of the cutting-disks, so that the way is better opened up for the disks by reason of the auger always entering the bank or deposit in advance of such disks. This is always the case by reason of the fact that the several moving parts all move together and therefore maintain the same relative positions to each other.

The cutting-disks 32 33 revolve in opposite directions, as already explained, and said disks are preferably each formed or provided with a double row of picks or teeth 57 58, projecting in opposite directions. These picks or teeth are also preferably removable from the disks, so as to be easily replaced when worn or broken. In order that no loose material be permitted to lodge itself between the disks, the lower disk is formed or provided with curved blades 65, which carry the material outwardly in an obvious manner.

The longitudinally-movable stock or beam D is supported upon a truck E, carrying at its lower part a centrally-arranged wheel or roller 59, fitting within the groove in the under side of the beam, and said truck is also provided with vertical arms 60, which carry wheels 61, running upon the upper sides of the rails of the main frame.

By reason of the connection between the sprocket-wheels and cutting-disks the latter may be adjusted to any width of cut within certain limits, as is evident.

As thus constructed, when the machine is started with the clutch engaging the forward worm-gear, the shaft 8 will be rotated as well as the auger, and the motor, truck, gearing, and all of the operating parts will be moved gradually forward until the truck E reaches the forward end of the main frame, where it

will be arrested by coming in contact with said frame. The parts will continue to move forward, however, until the end of the groove in the under side of the stock comes into contact with the roller 59 of the truck. At this point the clutch is shifted and the parts will then be returned in the manner already explained. It will thus be seen that the cutting-disks, the auger, and the cutters and scrapers on the chains are all operated at the same time, and it will further be seen that all of the objects of the invention are fully attained. On the return of the motor and the other devices the beam or stock will be supported in the same way by the truck until the latter is stopped by the upright 3 of the main frame, and then the said beam will continue to move over the bottom wheel or roller of the truck until the other extremity of the bottom groove of the stock is reached, whereupon the clutch may be either released entirely or again shifted to again send the parts forward as before.

We claim—

1. In a mining machine, a main frame, a motor, a longitudinally movable stock or beam, a main auger shaft, oppositely rotating cutting disks, and a pair of chains moving in opposite directions and provided with cutters and scrapers, substantially as described.

2. In a mining machine, a main frame, a motor traveling upon said frame, a movable stock or beam, a truck supporting the beam, a main auger shaft passing through the beam, a pair of oppositely moving cutting disks, a pair of oppositely moving chains provided with cutters, and connections for operating these parts from the motor, substantially as described.

3. In a mining machine, the motor, the stock or beam, the main operating and auger shaft passing through said beam, the clutch and its gear, the beveled gear wheels, and the sprocket wheels working therewith in one end of the beam, the cutting disks, and the sprocket wheels also connecting therewith and working in the opposite end of the beam, and the sprocket chains passing around the ends of the beam and formed or provided with knives or cutters arranged at different positions or angles, substantially as described.

4. In a mining machine, a main frame, a motor, a stock or beam moving with said motor, a main shaft extending through the stock or beam, operating and reversing connections between the motor and shaft, a pair of oppositely rotating cutting disks, an auger operating in advance of said disks, and chains also moving in opposite directions and provided with cutters arranged at different positions or angles, substantially as described.

5. In a mining machine, the combination of the movable stock or beam formed with grooves in its under surface, the main frame bars 1, 1, and the trucks mounted upon the bars 1, 1, and provided with guide wheels or rollers entering the grooves in the under side of the movable stock, substantially as and for the purposes set forth.

6. In a mining machine the cutting disks provided with hubs 37 threaded and shouldered as described, in combination with the sprocket wheels 28 and 29 adapted to receive the hubs of the disks, whereby the disks may be arranged at variable distances apart, substantially as and for the purposes described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH L. BEURY.
JOHN T. CRESSEY.

Witnesses:
WM. C. MCINTIRE,
N. CURTIS LAMMOND.