(No Model.) 2 Sheets—Sheet 1.

W. D. FORSYTH.

COAL MINING MACHINE.

No. 594,240. Patented Nov. 23, 1897.

Fig. 5.

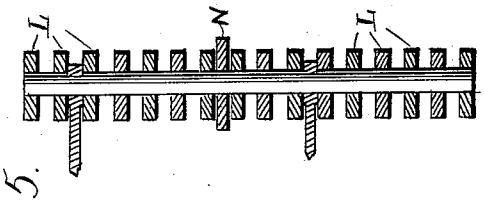


Fig. 1.

Fig. 6.



Fig. 4.

Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

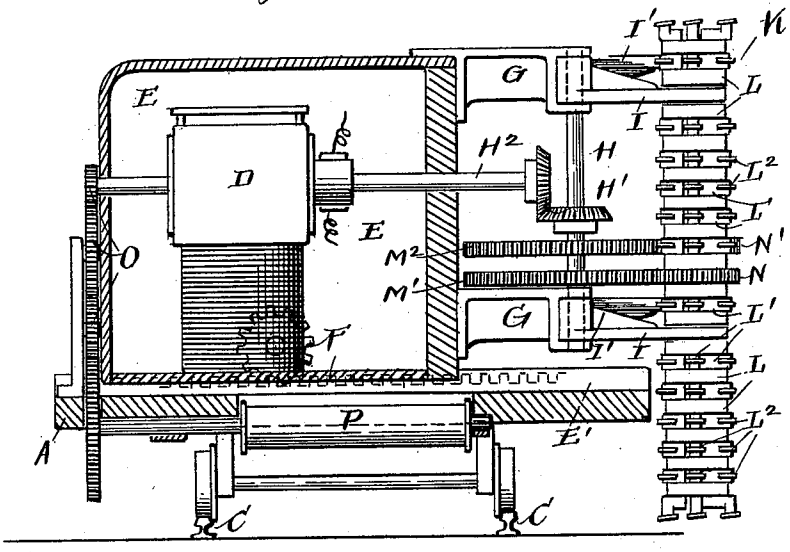
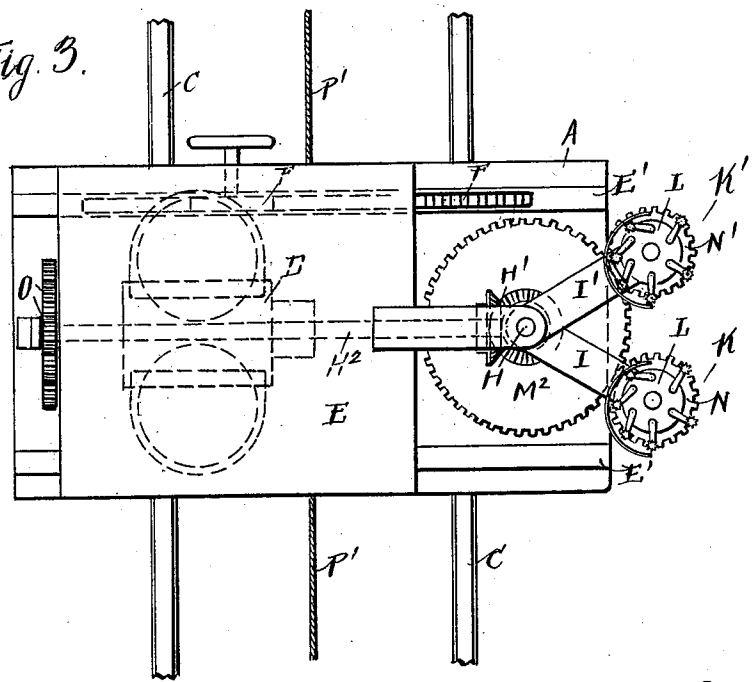


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILBER DAVID FORSYTH, OF PITTSBURG, PENNSYLVANIA.

COAL-MINING MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,240, dated November 23, 1897.

Application filed February 5, 1897. Serial No. 622,156. (No model.)

To all whom it may concern:

Be it known that I, WILBER DAVID FORSYTH, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Coal-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 letters of reference marked thereon, which form a part of this specification.

Figure 1 is a rear elevation of the machine embodying the invention. Fig. 2 is a partial section on line *x x*, Fig. 1, with the shields E not shown. Fig. 3 is a plan view of the machine. Fig. 4 is a view illustrating the operation of the cutters. Fig. 5 is a vertical section of one of the cutting-cylinders with the cutters removed. Fig. 6 shows detail views of the form of cutters used at top and bottom of the cylinders.

This invention has relation to a coal-mining machine which is designed to mine coal and reduce the same to a fine state. The machine is especially adapted for use where it is designed to pulverize the coal as it is mined in order that it may be mixed with water and pumped through pipe-lines to the desired point or points, but is not limited to such use; and it consists in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims.

Referring to the accompanying drawings, the letter A designates a frame of suitable character which is preferably mounted upon trucks, whereby it may, in operation, be moved back and forth upon movable tracks, such as indicated at C.

D designates a suitable motor, such as an air or steam engine or an electric motor, which is mounted on the frame A.

E is a carriage which is mounted to move longitudinally on the frame A in suitable guides E′, and which is arranged to be moved toward and away from the frame proper by means of suitable gear, such as indicated at F. Said carriage has upper and lower horizontal arms G, in the outer end portions of which is journaled a vertical shaft H, which is connected by bevel-gear H′ with the shaft H^2 of the motor, whereby it is rotated.

I I′ are the two forked frames or arms, each of which is pivoted to swing in a horizontal plane on a boss *g* of one of the arms G, said bosses being concentric with the shaft H.

K K′ designate two vertical cutter-cylinders, which are journaled side by side in bearings of the said arms or frames I I′, as indicated. Each of said cylinders consists of a central shaft upon which is rigidly secured, at short intervals from each other, a series of disks L. Each of said disks has pivoted thereto a series of short arms L′, to the outer end portion of which is journaled a cutter L^2, which consists of a peripherally toothed or serrated disk. The cutters carried by the end disks of each cylinder are inclined, as shown, so as to cause the cylinders to cut slightly above and below their ends and thus clear themselves.

Placed behind each cylinder and adjacent to approximately one-half of its circumference is an eccentric shield M, the purpose of which is to force back toward the cylinder the expanded arms L′ and gradually bring them to their nearest points to the center of the cylinder, said arms being suddenly released as they approach their working position, whereby, under centrifugal action, they suddenly fly out and strike the face of the coal. Said cylinders are rotated at a comparatively high rate of speed, for which purpose each carries a pinion N or N′, which meshes with a spur-gear M′ or M^2 on the motor-driven shaft H, above described. The two pinions N and N′ are located at non-adjacent points on the respective cylinders, and the bearings for one cylinder are slightly below those for the other cylinder. This arrangement is for the following purpose: It will be obvious that at the points occupied by the pinions and the bearings the cylinders are without cutters and that each cylinder in its operation must leave at such points uncut strips across the face of the coal. By the provision of the two cylinders, arranged as described, the second cyl-

inder removes the uncut portions left by the first and upon the return traverse the first removes the uncut portions left by the second upon the preceding traverse. Hence the face of the coal is kept even.

The machine is moved back and forth upon the track C through a train of gear O from the motor-shaft, which drives a drum P, journaled on the frame A, said drum having a cable P′ passed around it. The ends of said cable are made fast at opposite ends of the track. By reversing the motor or by reversing said gear the machine can be controlled as desired.

R designates a lever by means of which the frames I I′ may be swung at any desired angle to the center line of the machine. R′ is a segment which said lever engages to lock it in proper adjustment.

It will be obvious that the aggregation of small rolling cutters under rapid rotation effects a rapid mining and reduction of the coal. After each traverse of the machine the carriage E is moved forward the proper distance, this being repeated until the limit of its movement is reached, when the track C is moved nearer to the face of the coal or a new track is laid.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mining-machine, the combination with a suitable frame or truck, of a reciprocating carriage mounted thereon, gear for reciprocating said carriage, arms pivoted to said carriage, and a cutting device journaled in said arms and comprising a carrier, a plurality of swinging arms pivoted to the carrier, and a rolling cutter journaled to the free end portion of each of said arms, substantially as specified.

2. In a mining-machine, the combination with a reciprocating carriage having horizontally-extending arms pivoted thereto, of a cutting device journaled in said arms and comprising a carrier, a plurality of swinging arms pivoted to said carrier, and rolling cutters journaled to said arms, together with a device behind said carrier with which the free end portions of the cutter-carrying arms are adapted to impinge during a portion of their revolution, substantially as specified.

3. In a coal-mining machine, the combination with a frame, of a pair of vertical cylinders journaled therein side by side, and consisting each of a plurality of disks, each of which has pivoted thereto a series of arms, and rolling cutters journaled to said arms, the two cylinders having their bearings in said frame at different vertical points, substantially as specified.

4. In a coal-mining machine the combination with a frame, of a pair of vertical cylinders journaled thereon side by side, and carrying each a series of pivoted arms to which rolling cutters are journaled, and eccentric shields behind and adjacent to said cylinders, substantially as specified.

5. In a coal-mining machine, the combination with a frame, of a pair of vertical cylinders journaled therein, and composed each of a plurality of disks, a series of arms pivoted to said disk, a toothed cutter journaled to the free end portion of each of said arms, and eccentrically-placed shields behind and adjacent to each of said cylinders, substantially as specified.

6. In a coal-mining machine, the combination of a frame mounted upon suitable trucks, a carriage mounted to reciprocate upon said frame, and a pair of cutting-cylinders journaled side by side in said carriage and having each a plurality of pivoted arms, each of which has a cutter-disk journaled thereto, together with means for rotating said cylinders and for actuating said carriage, substantially as specified.

7. In a coal-mining machine, the combination of a frame mounted upon suitable trucks, a carriage mounted upon suitable guides thereof, means for operating said carriage, arms pivoted to said carriage to swing in a horizontal plane, a pair of cutter-cylinders journaled in said arms, and having each a plurality of pivoted arms, a rolling cutter-disk journaled to each of said arms, and a motor and gear for rotating said cylinders, substantially as specified.

8. The herein-described coal-mining machine, comprising a frame mounted upon trucks, a carriage mounted to move back and forth in said frame, a motor supported on said frame, gear operated by said motor whereby said frame may be moved on its trucks, gear for actuating said carriage, arms pivoted to said carriage, a pair of cutter-cylinders journaled side by side in said arms and carrying each a series of pivoted arms free to rotate therewith, rolling cutter-disks journaled to said arms, gear for rotating said cylinders, and means for drawing said arms in toward the axis of the cylinders during a portion of their movement, substantially as specified.

9. In a coal-mining machine, the combination with a rotary cylinder having a plurality of arms pivoted thereto, and rolling cutters journaled to said arms, of a stationary device located behind the said cylinder and with which the free end portions of the said arms impinge during a portion of their revolution, substantially as specified.

10. In a mining-machine, a cutting-cylinder having a plurality of arms pivoted thereto, said arms being arranged in sets, and cutting wheels or disks journaled to the free portions of said arms, the said wheels or disks which are journaled upon the arms at the end portions of the cylinder being inclined with respect to the axis of said cylinder, substantially as and for the purpose described.

11. In a mining-machine, the combination with a supporting-frame, of a pair of cylin-

ders journaled vertically in the said frame, side by side, and having their bearings in different horizontal planes, a plurality of horizontally-swinging arms pivoted to each of said cylinders, and cutter wheels or disks journaled to the free end portions of said arms, substantially as specified.

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

WILBER DAVID FORSYTH.

Witnesses:
H. H. ROWAND,
A. H. ROWAND.