Sept. 16, 1924. 1,508,634

W. J. WILSON

MINING AND LOADING MACHINE

Original Filed Nov. 3, 1917 2 Sheets-Sheet 1

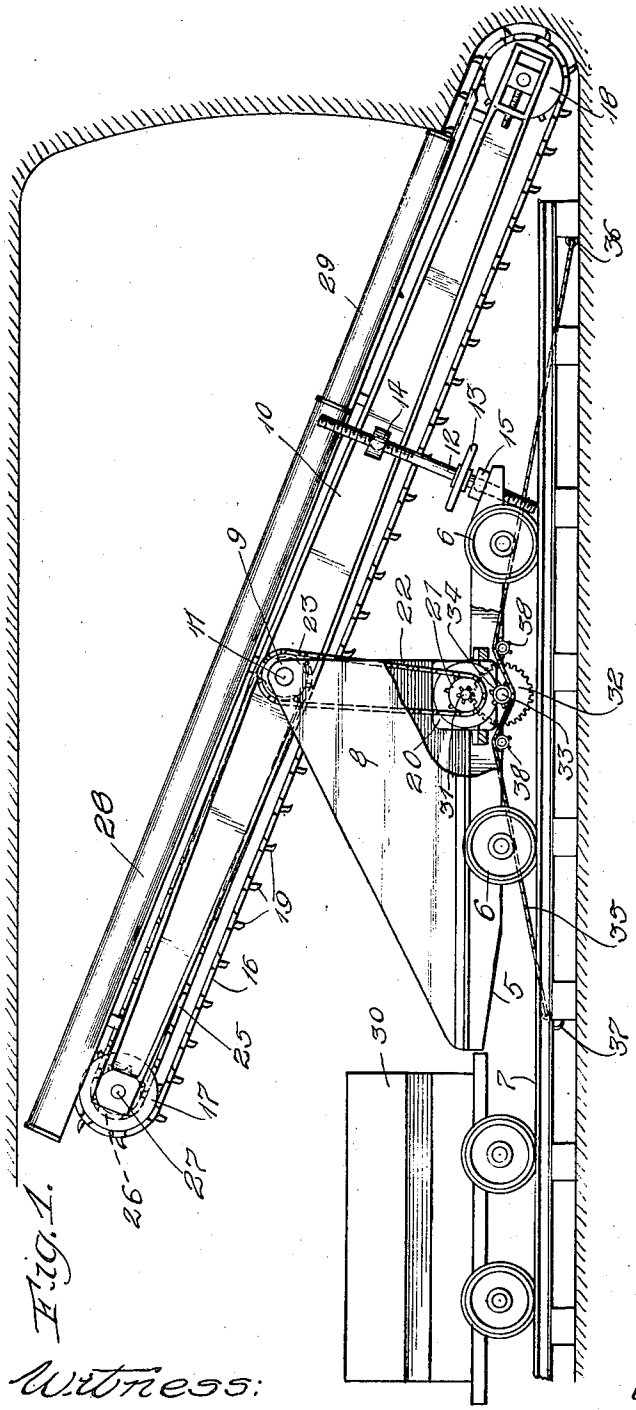

Fig. 1.

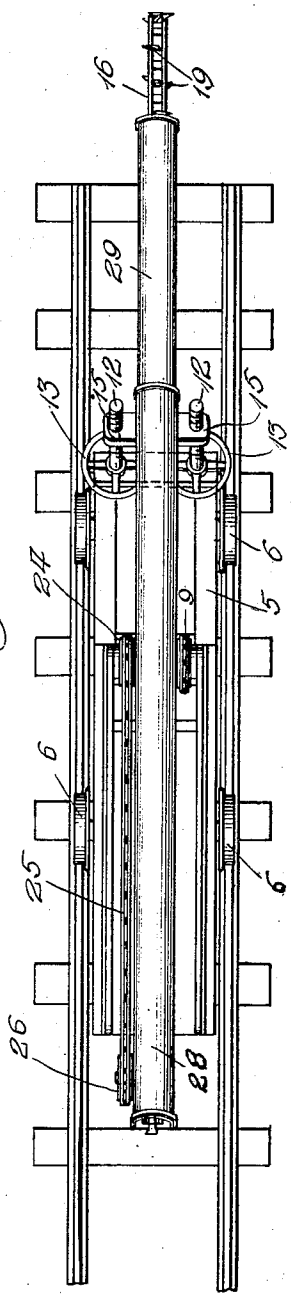

Fig. 2.

Witness:
T. L. Farrington

Inventor,
Walter J. Wilson,
By Glenn S. Noble, Atty.

Sept. 16, 1924. 1,508,634

W. J. WILSON

MINING AND LOADING MACHINE

Original Filed Nov. 3, 1917 2 Sheets-Sheet 2

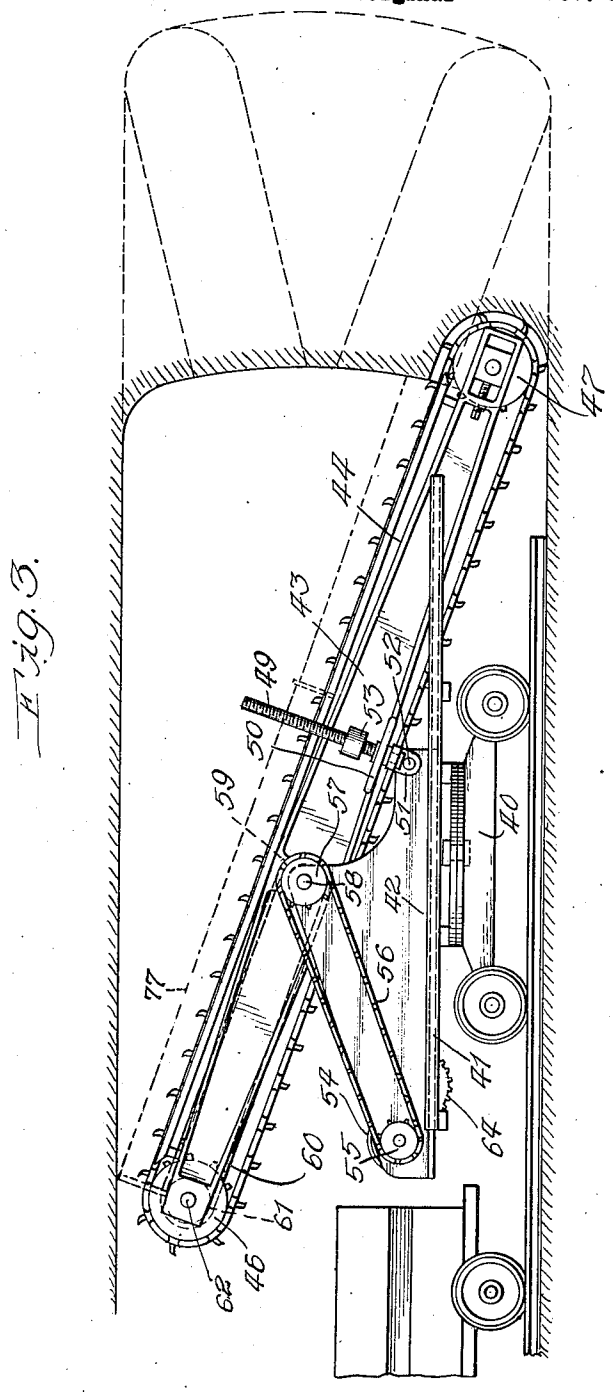

Fig. 3.

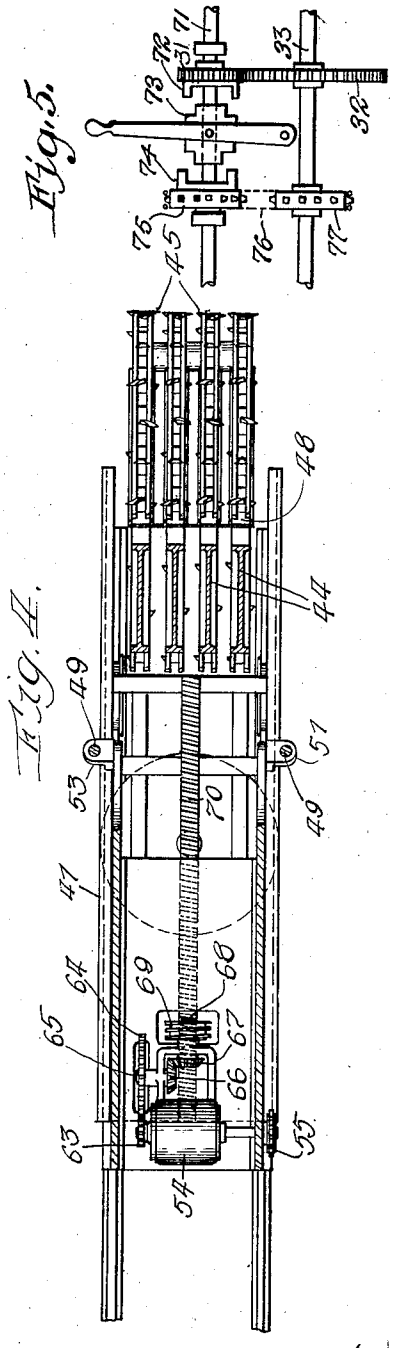

Fig. 4.

Fig. 5.

Witness:
R. L. Farrington

Inventor,
Walter J. Wilson.
By Glenn S. Noble Atty.

Patented Sept. 16, 1924. 1,508,634

UNITED STATES PATENT OFFICE.

WALTER J. WILSON, OF SEWICKLEY, PENNSYLVANIA.

MINING AND LOADING MACHINE.

Application filed November 3, 1917, Serial No. 200,174. Renewed April 18, 1924.

To all whom it may concern:

Be it known that I, WALTER J. WILSON, a citizen of the United States, residing at Sewickley, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Mining and Loading Machines, of which the following is a specification.

This invention relates to machines for excavating material such as coal or the like, and elevating, or carrying the excavated material back for loading.

The objects of this invention are to provide a new and improved form of mining machine; to provide a mining machine which will excavate the material and elevate it or carry it back to a suitable position for loading; to provide a coal mining machine which will excavate and load substantially all of the coal to be taken out of a room or entry; and in general to provide such an improved apparatus as will be described more fully hereinafter.

In the accompanying drawings illustrating this invention:

Fig. 1 is the side view of a machine embodying the principal features of this invention, parts being shown diagrammatically or omitted for convenience in illustration;

Fig. 2 is a plan view of the machine shown in Fig. 1;

Fig. 3 is a side view of a machine showing a modified form of construction, and,

Fig. 4 is a plan view of the machine shown in Fig. 3.

Fig. 5 is a detail showing a clutch and reversing device.

The present invention embodies a cutting apparatus, preferably of the chain and bit type, which is mounted and arranged to cut the coal or other material and carry it back to a suitable discharge point, means also being provided for actuating the cutting apparatus so as to swing it either vertically or horizontally or in both directions in order to cut substantially all of the material from an entry or from the side of a room.

As illustrated in Figs. 1 and 2, 5 is a support or carriage having wheels 6 which are preferably arranged to run on a track 7. The car or carriage 6 is provided with a frame or standards 8 having bearings 9 at the top thereof. A beam or arm 10, which may be constructed in any suitable manner, is pivotally mounted on a shaft 11 which engages with the bearings 9 of the supporting carriage. The beam or arm 10 is mounted so that its forward end may be raised and lowered to cut a vertical kerf, and suitable means are provided for swinging the same. In the present instance, I provide screws 12 having hand wheels 13 for turning them. The upper and lower ends of these screws are provided respectively with right and left hand threads which engage with nuts 14 and 15. The nuts 14 are suitably secured to the beam 10 and the nuts 15 are suitably secured to the base of the carriage 5 so that when the hand wheels are turned, the beam 10 will be raised or lowered.

The beam or arm 10 is provided with means for supporting and guiding the cutting devices. While in some instances I may utilize series of cutting devices, in the present instance I show a single cutter chain 16 which is mounted on wheels 17 and 18 at either end of the cutter arm. The chain 16 is provided with bits 19 which are mounted so that the chain cuts under and over as illustrated in Fig. 1.

A motor 20 is mounted on the carriage 5 and is provided with a sprocket wheel 21 which drives a chain 22 which in turn drives sprocket 23 on the shaft 11. This shaft has a second sprocket 24 which drives a chain 25 for turning a sprocket 26 on the shaft 27 which shaft drives a sprocket 17 for actuating the cutter chain 16. This provides a simple driving mechanism for the cutter chain, but it is obvious that such driving mechanism may be varied for different conditions.

In order to insure the delivery of substantially all of the excavated material, a chute or trough is arranged along the upper part of the cutter arm. This chute is shown as comprising a fixed section 28 and a movable section 29. The arrangement is such that, as the cutter arm passes into the material, the forward end of the section

29 will engage with the face of the wall, and this section will be gradually pushed backward into the fixed section. This provides a conveyor arrangement for conveying the excavated material backwardly so that it may be discharged into the mine car 30, or in a suitable position for loading.

The carriage may be moved along the track either manually, or by any suitable mechanical arrangement. As illustrating such arrangement, the driving shaft of the motor 20 has a gear 31 which meshes with a gear 32 on a shaft 33 mounted in suitable bearings transversely of the carriage. This shaft is provided with a sprocket wheel 34 which engages with a chain 35 extending lengthwise of the track 7. The front and rear ends of this chain are fixed at 36 and 37 respectively to the ties or to any other suitable anchors. Guide wheels or sprockets 38 may also be provided on the carriage to hold the chain in engagement with the driving sprocket 34. Any suitable clutch and reversing arrangement may be used for throwing this feeding mechanism into and out of operation, or the motor may be reversed to cause the carriage to move backward along the chain 35. Such an arrangement is shown in Fig. 5, which illustrates a well-known form of reversing mechanism. The gear 31 is loosely mounted on the driving shaft 71 of the motor 20 and is provided with a clutch jaw 72, which is adapted to be engaged by a clutch member 73 fitted on a spline in the shaft 71. The opposite end of this clutch member is adapted to engage with a clutch jaw 74, which is secured to a sprocket 75 loosely mounted on the shaft 71. The sprocket 75 is connected by means of a chain 76 to a sprocket 77 on the shaft 33. When the clutch is thrown into engagement with the jaw on the gear 31, the shaft 33 will be turned in one direction, and when the clutch is thrown into engagement with the jaw on the sprocket wheel 75, the shaft 33 will be turned in the opposite direction.

When the machine is to be operated, it is moved to cutting position on the track 7 and the ends of the chain 35 are fixed to suitable supports. Ordinarily the front end of the cutter arm will be lowered to the position shown in Fig. 1 for making the initial cut. With the arm in this position, the machine is fed forward and the cutter bits will excavate the material and elevate it so that it will be carried back through the chute at the top of the cutter arm and be delivered into the car 30. As the forward end of the cutter arm passes into the material, the movable chute 29 will be pressed backwardly as before described until the arm has passed in its full cutting distance. The screws 12 are then turned to elevate the forward end of the arm so as to cut a vertical kerf up to the top of the room. When the forward end of the cutter bar is elevated to its extreme position, it will be noted that there will be a substantially triangular section between the face of the coal and the kerf, which still remains. This triangular area is then excavated by backing the machine away from the face of the coal with the forward end of the cutter bar held in its elevated position so that a complete cut is made from the floor to the roof of the mine. During the last described movement, it is apparent that the cutter bar will be moving backwardly from the face of the coal, and in order to catch the cuttings, the movable shoot section 29 should be moved toward the face of the coal or held so that its inner end will remain in contact with, or adjacent to the face. This section may be moved or held in such position in any suitable manner, as by hand.

In the machine shown in Figs. 3 and 4, a car or support 40 is provided with a rotatable bed or turn-table 41. A frame or carriage 42 is slidably mounted in the bed 41 and supports the cutting mechanism. The cutter bar or arm 43 is made up of a plurality of beams 44 in order to support a number of cutter chains 45. These chains are supported and operated by sprocket wheels 46 at the outer end of the bar, and supported by guide wheels 47 at the inner end of the bar. A chain guide 48 extends across the upper edges of the beams 44 and provides a continuous bed or trough along which the coal is conveyed. Adjusting screws 49, having hand wheels 50, provide means for raising and lowering the forward end of the cutting mechanism. The lower ends of these screws engage with bearings 51 which are pivoted at 52 to the carriage 42, and their upper ends engage with nuts 53 secured to the sides of the cutter arm 43.

A motor 54 is mounted on the carriage 42 and drives a sprocket wheel 55 which drives a chain 56 engaging with a sprocket wheel 57 on a shaft 58, upon which the cutter arm is pivoted, or which is concentric with the pivotal mounting of said arm. The shaft 58 drives a sprocket wheel 59 which drives a chain 60, which drives a sprocket wheel 61 on a shaft 62 at the upper end of the cutter arm, which shaft drives the sprocket wheels 46 for the cutter chains.

Any suitable means may be utilized for feeding the carriage 42 along the bed or turn table 41. As shown, a motor 54 is provided with a gear 63 which meshes with a gear 64 on a stub shaft 65. This shaft drives a bevel gear 66 which meshes with a gear 67 on a stub shaft 68. The shaft 68 carries a worm 69 which engages with a rack 70 on the bed 41. By means of this

arrangement, it will be seen that as the worm 69 is turned, it will cause the carriage 42 to move forward or back along the bed 41.

This machine may be operated in various ways, one of which is as follows. The machine is moved up on the track to its initial cutting position substantially as shown in Fig. 3 and the truck or support 40 is then blocked or held against movement along the track in any suitable manner. The cutting apparatus is then started in operation and the carriage 42 is fed forward until the cutter arm reaches the position indicated by the lower dotted lines in Fig. 3. The forward feeding is then stopped by means of any suitable clutch and reversing mechanism (not shown). The forward end of the cutter bar is then gradually swung upwardly by means of the adjusting screws 49 until it reaches the position indicated by the upper dotted lines. The cutter bar is then held in this position and the carriage is then fed backwardly so as to cut out the triangular section indicated at the top of Fig. 3. In the particular design shown, it will be noted that the back end of the cutter arm and conveyor may be lowered to a position below the top of the mine car, but the parts may be proportioned so that this outer end will always be in a sufficiently elevated position to discharge the coal into the car, or an auxiliary conveyor may be utilized if desired for carrying the coal back and into the coal car. It will also be readily seen that in both forms of this invention, the cutting device may be moved forwardly and swung upwardly simultaneously, thereby making a somewhat sweeping cut. The cutter bar or arm 43 in this particular machine may also be provided with a chute, such as shown in Figs. 1 and 2 and as indicated at 77 by the dotted lines in Fig. 3, the construction and arrangement being substantially the same as heretofore described.

While I have shown practical embodiments of my invention, yet it will be readily seen that same will be subject to various modifications when constructed for commercial purposes, and therefore I do not wish to limit myself to the exact arrangements herein shown and described, except as specified in the following claims, in which I claim:

1. A mining machine of the cutter chain type, having a bar mounted on a horizontal axis with a chain having cutter bits coacting therewith and adapted to cut a kerf sufficiently wide to admit the bar, means for swinging said bar in a vertical plane to cut a vertical kerf, and means along said cutter bar adapted to keep the cuttings within the range of the cutter chain to provide a conveyor for conveying the excavated material.

2. A mining machine of the cutter chain type including a chain with bits thereon, having a cutter bar mounted on a substantially horizontal axis, said bits being arranged to cut a kerf to admit the chain and bar, means for swinging said bar in a vertical plane, and a rotatable support for said cutter bar whereby the bar may be swung in a horizontal plane.

3. A mining and loading machine comprising a cutter arm, a cutter chain having cutting bits, mounted on said arm, said bits being arranged to cut a kerf to admit the arm and chain, a pivotal support for said arm, means for swinging said arm in a vertical plane, a rotatable mounting for said support whereby the arm may be swung in a horizontal plane, and guiding means along the upper portion of said arm adapted to keep the cuttings within the range of the chain and bits whereby the excavated material will be conveyed rearwardly along the upper part of the arm.

4. A mining and loading machine comprising a truck, a beam pivotally mounted on said truck, means for adjusting said beam vertically, a cutter chain mounted on said beam, means for driving said chain so that the upper reach thereof will move backwardly along the upper portion of the beam, and an adjustable chute along the upper portion of said beam.

5. In a mining and loading machine, the combination of a truck, a cutter arm pivotally mounted on said truck and extending forwardly and rearwardly thereof, a cutting and conveying chain mounted on said arm, means for driving said chain, means for swinging said arm in a vertical plane, and a guideway along said arm which keeps the cuttings within the range of the chain for conveying the cuttings backwardly along the arm.

6. In a mining and loading machine, the combination of a support, a bar pivotally mounted on said support and adapted to swing in a vertical plane, means for adjusting said bar, a plurality of cutting and conveying chains each provided with cutter bits carried by said bar, and a guideway along said bar adapted to keep the cuttings within the range of said chains for conveying the excavated material.

7. In a mining and loading machine, the combination of a support, a beam pivoted to said support and extending forwardly and rearwardly thereof, means for swinging said beam in a vertical plane, a plurality of cutting and conveying chains carried by said beam, means for driving said chains, and a guideway along the upper portion of the beam adapted to keep the cuttings in the path of said chains for carrying coal backwardly along said beam.

8. In a mining and loading machine, the combination of a truck, a bed rotatably mounted on said truck and adapted to swing

in a horizontal plane, a carriage slidably mounted on said bed, means for feeding said carriage along the bed, an arm pivotally mounted in said carriage and arranged to swing in a vertical plane, means for swinging said arm, wheels mounted at the ends of said arm, a plurality of cutting and conveying chains mounted on said wheels, means for driving said chains, and a guideway along said arm adapted to keep the cuttings within the range of the cutting and conveying chains to carry the material to the rear of the machine.

WALTER J. WILSON.