N. A. NEWDICK.

MINE WORKING MACHINE.

APPLICATION FILED JAN. 24, 1916.

1,308,639.

Patented July 1, 1919.

6 SHEETS—SHEET 1.

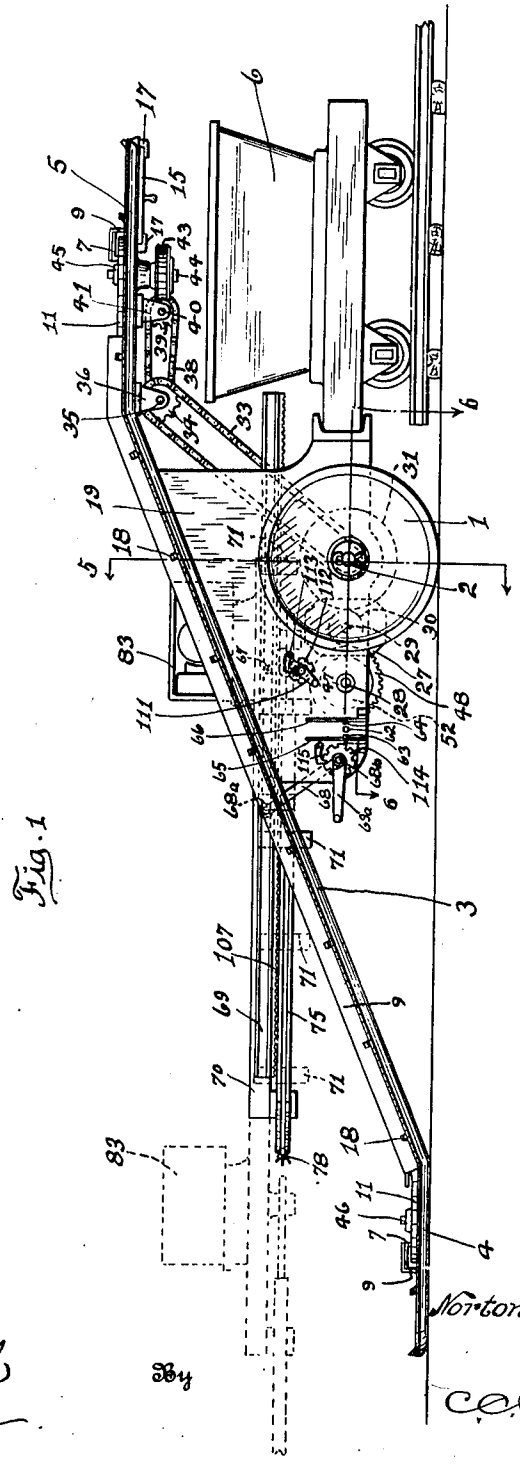


Fig. 1.

Witnesses

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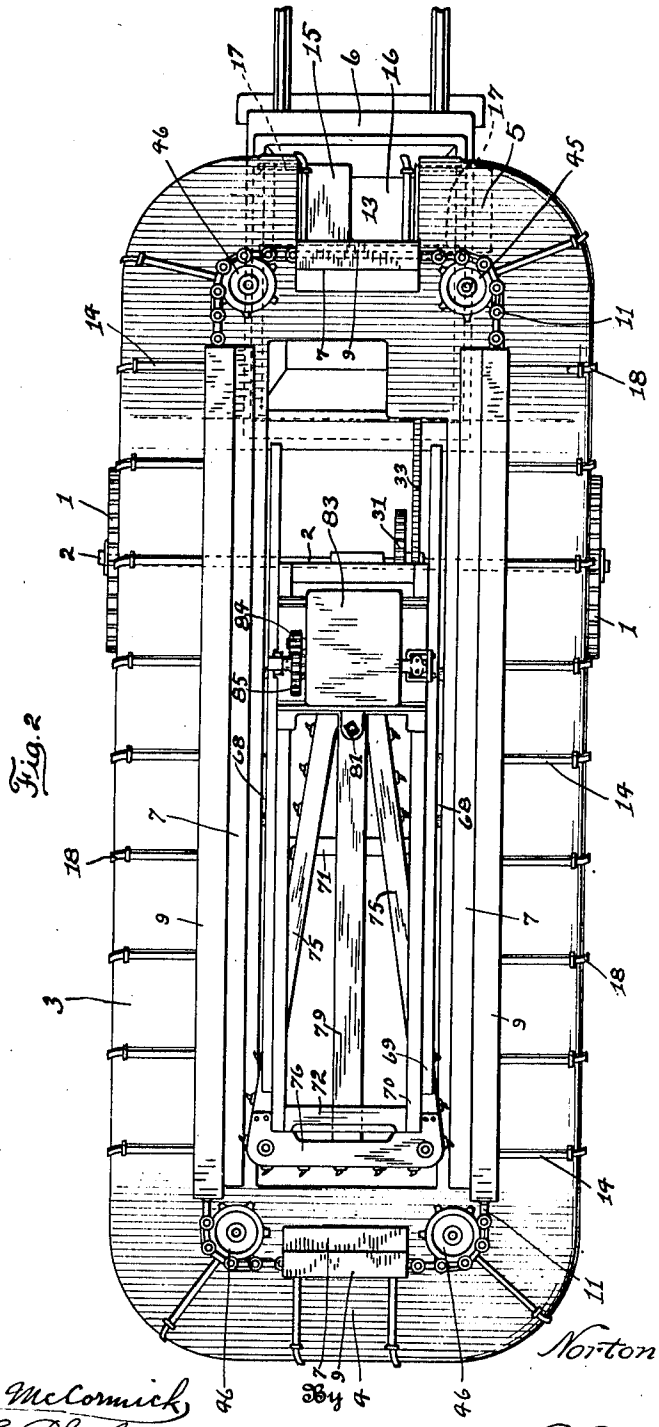


Fig. 2

Witnesses

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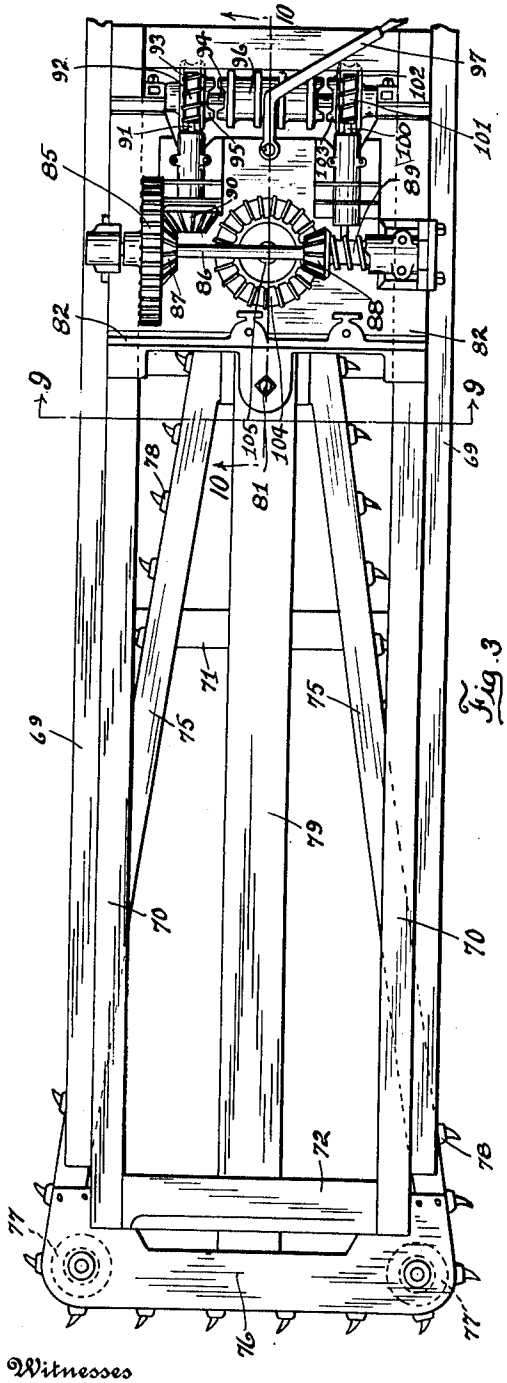


Fig. 3

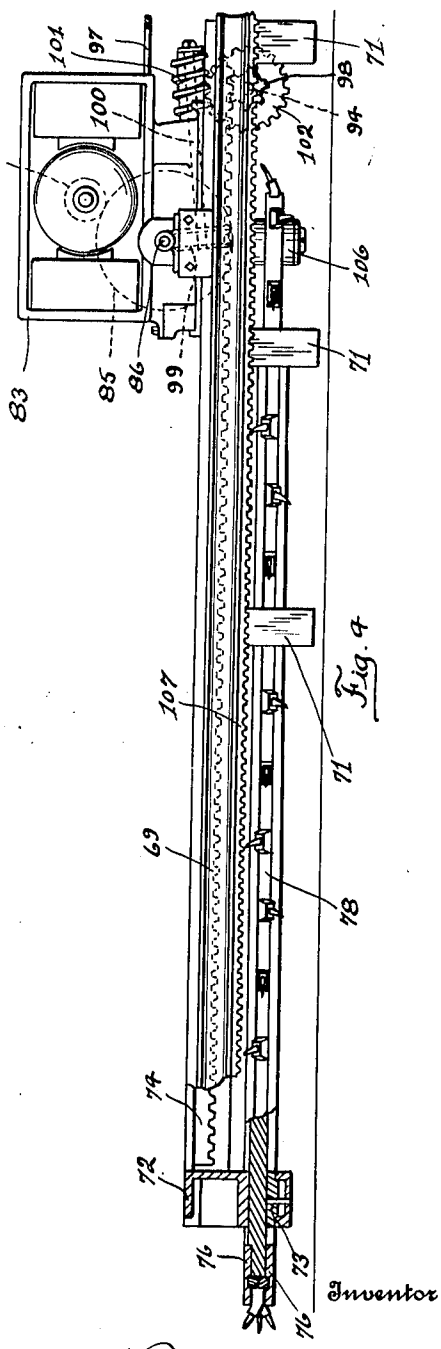


Fig. 4

Witnesses

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6 SHEETS—SHEET 4.

Fig. 6

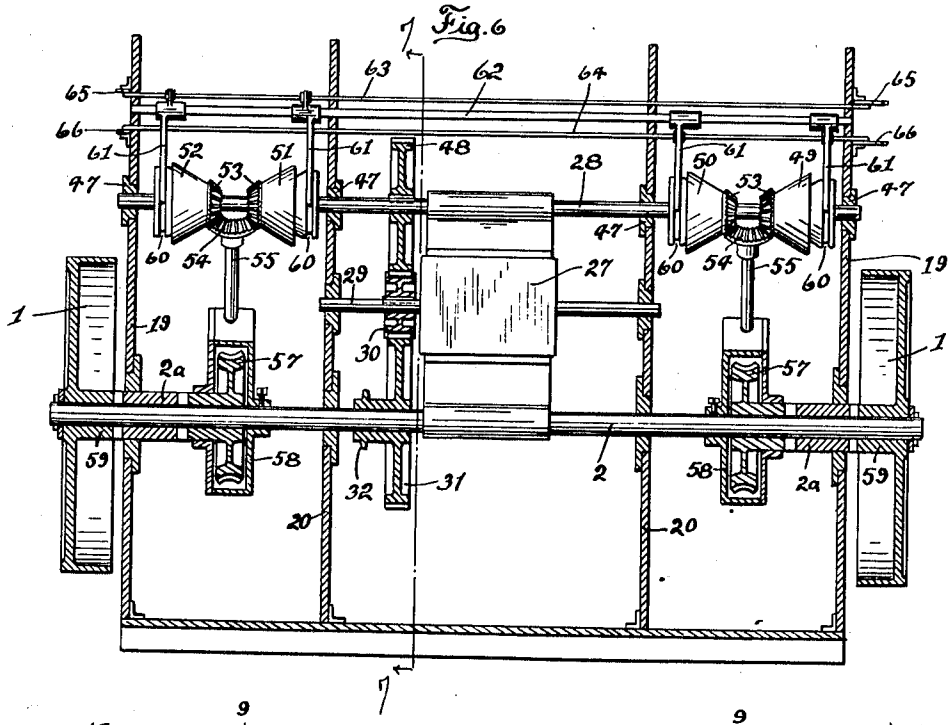
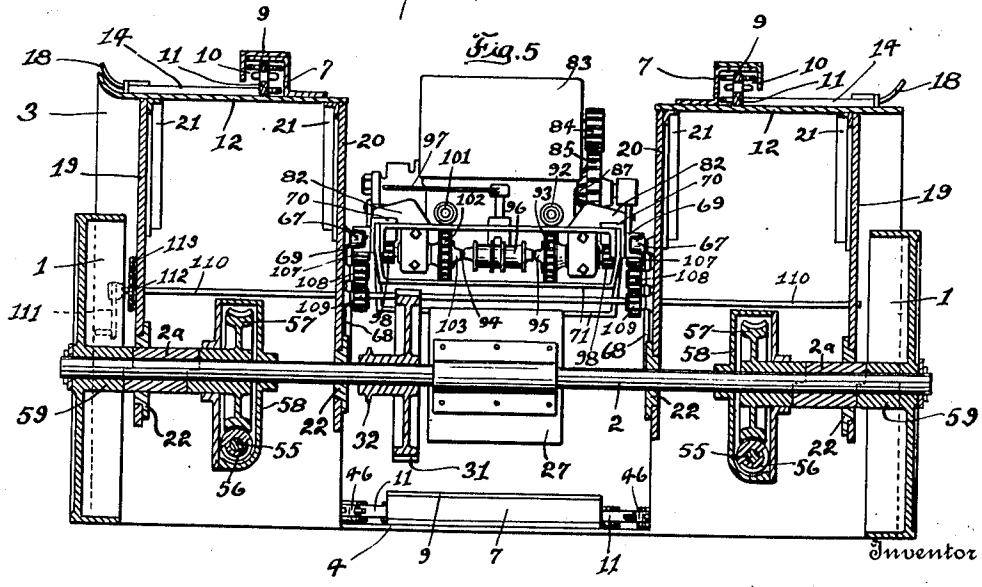


Fig. 5



Witness

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6 SHEETS—SHEET 5.

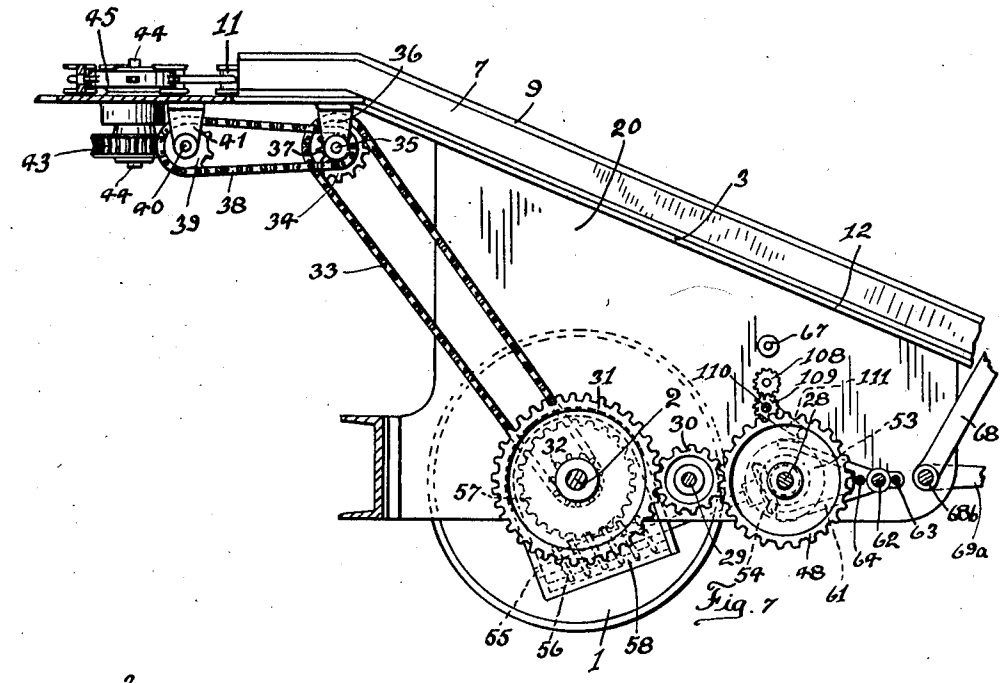


Fig. 7

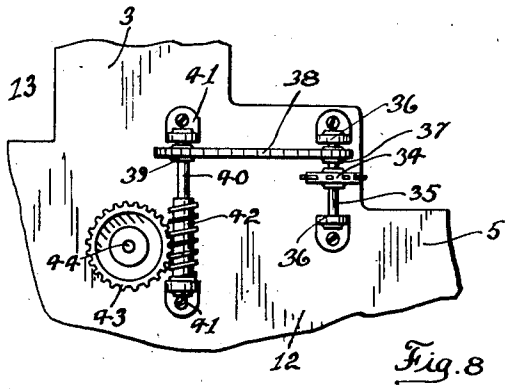


Fig. 8

Witness

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6 SHEETS—SHEET 6.

Fig. 9

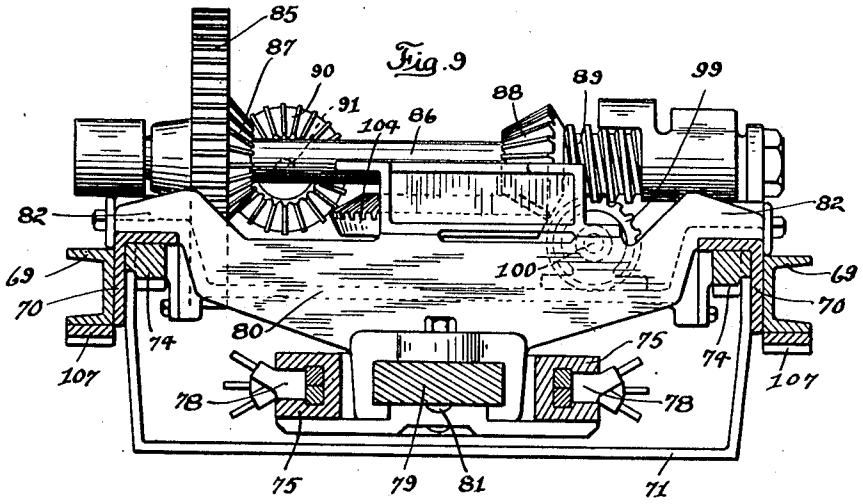
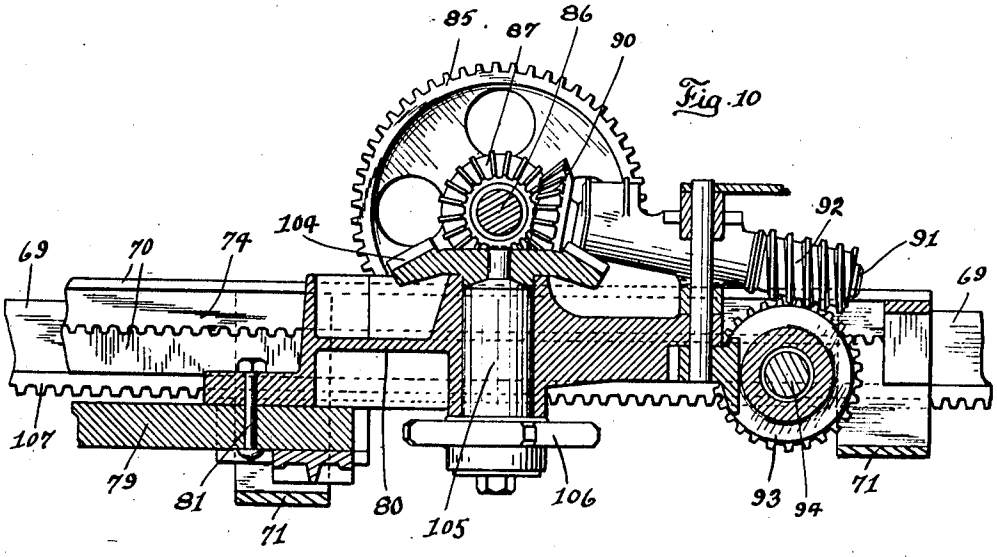


Fig. 10



Witnesses

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UNITED STATES PATENT OFFICE.

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MINE-WORKING MACHINE.

1,308,639. Specification of Letters Patent. Patented July 1, 1919.

Application filed January 24, 1916. Serial No. 73,814.

To all whom it may concern:

Be it known that I, NORTON A. NEWDICK, 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 Mine-Working Machines, of which the following is a specification.

This invention relates to mine working machines and is directed particularly to loading machines for transferring the broken-down coal in coal mines into the mine cars.

The main object of my invention resides in the provision of a structure whereby the coal layer is given a kerf cut by a swinging movement of the machine as a whole and subsequently loading the broken down coal by a similar movement of the machine. In other words, the novelty of this invention resides in the combination of a kerf cutting machine and a conveyer structure so mounted and related to each other that they may be swung sidewise to cut the kerf when this kerf cutting structure is in operative position, or to sweep the mine floor to gather the coal when the kerf cutting structure is in inoperative position. This is broadly claimed in my Patent Number 1,278,196 September 10, 1918.

A further object of my invention resides in the provision of a two-wheeled truck support, upon which the conveyer and peculiarly located kerf cutting structure are mounted, combined with mechanism for rotating one of the wheels in one direction and moving the other wheel in the other direction, whereby the desired swinging movement may be obtained.

Other objects of my invention become more apparent after a further detailed description of the accompanying sheets of drawings, wherein similar characters of reference designate corresponding parts, and wherein:

Figure 1 shows my improved type of machine in side elevation, the kerf cutting structure being shown in inoperative position in full lines and in operative position in broken lines,

Fig. 2 is a top plan view of the structure shown in Fig. 1,

Fig. 3 is a top plan view of the kerf cutting structure shown separately and also shown with the driving motor removed,

Fig. 4 is a side elevation partly in section of the structure shown in Fig. 3,

Fig. 5 is a cross section taken on line 5—5 of Fig. 1,

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 1,

Fig. 7 is a section taken on line 7—7 of Fig. 6,

Fig. 8 is a bottom plan view of the drive connection of the conveyer, as shown to the left of Fig. 7,

Fig. 9 is a section taken on line 9—9 of Fig. 3, and,

Fig. 10 is a section taken on line 10—10 of Fig. 3.

In these drawings, there is shown a base unit or truck, comprising essentially a pair of traction wheels 1 loosely mounted upon an axle 2. Mechanism is provided whereby these wheels may be rotated in either a forward or rearward direction, or one of the wheels may be made to rotate in one direction and the other wheel in the other direction, the latter means being those at present employed for causing a side sweep of the machine as a whole. This base unit carries in superposed relation a conveyer designated generally by the reference numeral 3 and it will be noted that this conveyer operates about driving and idler sprockets which are horizontally arranged. Further, this conveyer is provided with a forwardly extending depressed extension 4 and a rearwardly horizontally arranged extension 5 positioned directly over any type of conveyance, such as a mine car shown at 6. This entire conveyer structure, as well as the machine as a whole, is supported about a horizontal pivot, which in the present instance is the axle 2, the depressed extension 4 serving as the means for supporting the forward portion of the structure upon the mine floor.

Reference to Figs. 1, 5, 6 and 7 will show that the conveyer structure comprises a general framework formed of properly bent longitudinally extending Z-bars 7 onto which there are secured the angle irons 9 to form an inclosure space 10 in which the chain 11 is confined. These Z-bars are thus rigidly mounted upon a pan structure formed of plates 12 extending on both sides of the conveyer and around its lower depressed end, but cut out at the upper rear end as is shown at 13 to permit the dump-

ing of the coal into the car 6 when conveyed to this point by means of the flights 14 securely carried by the chain 11. In order to always locate the dump opening 13 over the mine car, no matter in what position of swing the conveyer structure may be, I have provided this portion of the conveyer with a slide member 15 having a supplemental opening 16 and the whole slide plate slidable back and forth beneath the opening 13 in the channel members 17. By means of this structure, the point at which the coal is discharged, may be located according to the position of the opening 16. For purposes of convenience, the flights 14 are provided with cutter teeth 18 at their ends to cut their way into the coal heap as the conveyer is operated. As will be noted from the drawing, the conveyer trough or pan 12 is flat practically throughout its entire working surface and it is upon this that the coal rides in its ascent from the heap to the mine car, the angle irons 9 and the Z-bars 7 forming the means of stiffening the trough. This trough is rigidly supported on two sets of plates designated 19 and 20, angle irons shown at 21 forming the means of attachment in each case, as well as also providing means for stiffening the trough as a whole. The lower portions of these plates are securely fastened to bearing members 22, which latter are pivotally or rotatably mounted about the axle 2, as is shown particularly in Fig. 5.

The manner of driving the conveyer is as follows: Referring particularly to Figs. 5 and 6, it will be noted that there is provided a motor 27 which is supported upon the axle 2 and upon a counter shaft 28. The armature shaft 29 of this motor rigidly carries a gear wheel 30 which in turn meshes with a gear wheel 31 loosely mounted upon the axle 2. This gear wheel 31 is provided with a hub extension which forms a sprocket as shown at 32 and a chain 33, Fig. 7, passing over a sprocket 34 also engages this sprocket 32. The sprocket 34 is rigidly carried by a shaft 35 supported in brackets 36 carried by the underside of the conveyer frame and this shaft is further provided with a second sprocket 37 over which a chain 38 passes. This chain 38 also engages a sprocket 39 carried on a shaft 40, which latter is also supported in brackets 41 carried on the underside of the frame. Referring to Fig. 9, it will be noted that this shaft 40 is also provided with a worm 42 and this worm meshes with a worm wheel 43 carried by one of the corner shafts of the conveyer. This shaft has been designated 44 and its upper end is provided with a drive sprocket 45, over which the conveyer chain 11 passes. The remaining sprocket wheels 46 of the conveyer are all idle sprockets and are, therefore, loosely mounted on their respective shafts. Therefore, whenever it is desired to set the conveyer in operation, the switch governing the current to the motor 27, is closed. Should it be desired to rotate the conveyer in the opposite direction, the current to the motor may be reversed so that this motor itself will run in a reverse direction.

The mechanism for controlling the bodily movement of the conveyer, will now be described. The axle 2, as has been related, is provided with a pair of traction wheels 1 loosely mounted thereon and mechanism is provided whereby these traction wheels may both be moved in either a forward or reverse direction or one may be moved in a forward and the other in a reverse direction, the latter arrangement being provided to cause the conveyer to sweep the mine floor to gather all of the dislodged coal. The counter shaft 28 is journaled in the side plates 19 by means of hub boxes 47 and this shaft is further provided with a gear wheel 48 which is keyed thereto arranged to mesh with the motor gear wheel 30. In this manner the shaft 28 is rotated whenever the motor 27 is set in operation and in order to drive the traction wheels, the shaft 28 has been provided with four friction clutches designated respectively 49, 50, 51 and 52. The cone portions, or the inside portions of each of these clutch members is rigidly connected with the shaft 28, while the shell or outside member is loosely mounted on this shaft, but each is provided with a bevel gear 53. Meshing with these gears 53 are bevel pinions 54 mounted upon angularly disposed shafts 55, which latter carry worms 56 on their lower ends. These worms then in turn mesh with worm wheels 57 loosely mounted on the axles 2 and housed within the housings 58. The outside face of the hub of each of the worm wheels 57 is formed with a clutch designed to mesh with a clutch collar 2^a loosely mounted on the axle 2 and the opposite end of each clutch collar is similarly formed with a clutch face to engage the hubs 59 of the traction wheels 1. Each of the cone portions or movable portions of the friction clutches is provided with a groove 60 in which yoke 61 operates. All of these yokes are slidably mounted upon a rod 62 securely fastened in the side frames 19 and the extreme upper ends of the yoke engaging clutches 51 and 52 are rigidly connected with a rod 63 slidably mounted in the side plates 19, while the remaining two yokes or those operating in conjunction with the clutches 49 and 50 are rigidly mounted in connection with slide rods 64. These two slide rods are controlled by means of handles 65 and 66 respectively, these handles being mounted on each side of the machine as a whole, so that control may be effected when the operator happens to be on either side of the machine. These handles 65 and 66 are pivoted at their lower ends to the frame plates and are pivotally connected inter-

mediate their ends to the slide rods 63 and 64.

Therefore, a movement of both the handles 65 and 66 toward the left of Fig. 6, will cause an engagement between the parts of the friction clutches 49 and 51 and then through the medium of the gear wheels 53 and 54 on the shafts 55 and the worm 56 and the worm wheel 57, the axle 2 will be rotated in a forward direction. Movement of both of the handles 65 and 66 in the opposite direction will bring the other two clutches into working operation to cause a reverse movement of the traction wheels. Movement of the handle 65 toward the left and the handle 66 toward the right will bring the working parts of the clutches 51 and 50 into engagement and because both the traction wheels 2 and the worm wheels 57 are loosely mounted on the axle 2, the traction wheels themselves will be rotated in opposite directions through the medium of the clutch collars 2^a. Therefore, this latter arrangement will cause the machine as a whole, to pivot about a center substantially in the center of the axle 2 and in consequence the forward end or the depressed extension 4 of the conveyer will be made to sweep the mine floor.

The kerf cutting structure used in connection with the present machine will now be described: This kerf cutting structure is more or less standard at the present time, but the machine as a whole is mounted in a supplementary frame comprising the side frame plates 20, which latter are provided with a pair of oppositely disposed rollers 67 and also at a point farther forward with a pair of arms 68. These arms 68 are rigidly mounted on a shaft 69 which extends through both the frame plates 20 and also the outside frame plates 19 and is provided with cranks 69^a on its outside ends. The opposite ends of the arms 68 are provided with rollers 68^a and these rollers 68^a, together with the rollers 67 slide in channel members 69 which in reality form a third frame for the mining machine itself. As is well known, a mining machine comprises what is known as a stationary member and a movable or cutter member and it is upon these channel members 69 that the so-called stationary member is rigidly mounted to enable the kerf cutting machine as a whole, to be moved forward by sliding the channel members 69 over the rollers 67 and 68^a. This stationary member comprises an angle iron structure 70 held properly spaced by means of tie plates 71 and a front piece formed of members 72 and 73. The angle iron framework is provided on its under surface with a pair of racks 74 by means of which the cutter member is moved forward. This cutter member comprises a pair of side channels 75 of a well known construction which are securely held spaced at their forward ends by means of a pair of opposed plates 76 between which sprocket wheels 77 are rotatably journaled. The channel members 75 form a guide for the cutter chain 78 and it is over the sprockets 77 that this cutter chain passes. This cutter member also includes a central bar 79 which, at its forward end slides between the front plates 72 and 73 of the stationary member and which carries the driving or operating mechanism at its rear end. This driving mechanism comprises a motor support plate 80 rigidly secured to the central bar 79 by means of a bolt shown at 81 and further provided with laterally extending ears 82 which slide upon the upper surface of the angle stationary member 70. Upon this motor support plate 80, the motor 83 is supported and the armature shaft of this motor carries a pinion 84. This latter pinion meshes with a spur gear 85 rigidly mounted on a shaft 86 which is suitably journaled in the motor support framework and which shaft is also provided with bevel pinions 87 and 88 and a worm 89. The pinion 87 meshes with a bevel gear 90 mounted upon a shaft 91 which carries a worm 92 at its lower end. This latter worm meshes with a worm wheel 93 loosely mounted on a shaft 94 and it is this shaft on which the control is mounted. The worm wheel 93 itself is provided with a clutch face 95 designed to coöperate with a clutch collar 96 itself slidably keyed on the shaft 94 and operated by means of a yoke lever 97. On each end of the shaft 94 there is mounted a spur pinion 98 which coöperates with one of the racks 74 and, therefore, when the clutch collar 96 is shifted to a position of engagement with the worm 95, this shaft 94 is caused to rotate, which in turn causes the pinions 98 to engage the rack bar 74 to cause a forward feed. To retract the slide or cutter member, the worm 89 is provided. This worm 89 meshes with a worm wheel 99. This worm wheel is mounted on a shaft 100 which carries a worm 101 at its other end, which worm is designed to mesh with a worm wheel 102 also slidably mounted on the shaft 94 and this worm wheel is further provided with a clutch face 103. Thus, when the clutch collar is moved to engage the clutch face 103, it is out of engagement with the clutch face 95 and, therefore, the worm wheel 93 is idle on this shaft, while the worm wheel 102 is rigidly connected with the same. Because of the driving connection between the shaft 86 and this worm wheel through the medium of the worm 89, worm wheel 99 and worm 101, the shaft 94 will be rotated in a direction reverse to that previously described, thus causing a rotation in the reverse direction of the spur pinions 98, which in turn causes a retraction of the machine. To drive the cutter chains the shaft 86 is provided

with the bevel pinion 88 which meshes with a bevel gear 104 which latter is in turn mounted on a shaft 105 which carries a driving sprocket 106 for these cutter chains.

In order to positively force the kerf cutting machine in either a forward or rearward direction, I have provided both channel members 69 with a rack 107, pinions designated 108 being designed to mesh with these racks. These pinions in turn mesh with driving gears 109 mounted on a cross shaft 110, which shaft is provided at its outer end with a crank 111. This shaft is further provided with a toothed wheel 112, with which the pivoted dog 113 coacts to hold the shaft in any desired position, the shaft itself being held against turning so long as the dog is in engagement with any one of the notches shown in the wheel 112. Thus, by turning the crank 111, the entire kerf cutting machine may be moved forwardly by means of the gear connection with the rack 107 on the underside of the channel members 69. After the kerf cutting structure has been extended to the desired distance, it may be locked in this position by dropping the dog 113 into the desired notch in the wheel 112. After this, the movable portion of the kerf cutting machine may be extended as is customary. By reversing the direction of movement of the crank 111, the entire kerf cutting machine may also be retracted to its retracted position, as is shown in Fig. 1.

In order to provide a structure whereby a kerf cut may be made at any desired angle to the horizontal, I have provided the arms 68 already referred to, these arms carrying rollers 61 at their outer ends. The rear ends of these arms are rigidly connected with the shaft 69 and upon this shaft there is rigidly mounted a notched wheel 114 with which the dog 115 coacts. By turning the crank 69^a, the arms 68 are moved and the entire kerf cutting machine then finds its pivot about the rollers 67. In this manner the entire kerf cutting machine may be elevated or lowered to any desired inclination and the structure held in this position by dropping the dog 115 into the corresponding notch on the notched wheel 114. Because of the location of the driving pinion 108 directly beneath the pivoted rollers 67, this tilting movement may be effected without wedging or breaking any of the parts, inasmuch as only a very small amount of play is necessary to accommodate the movement of the kerf cutting machine to all positions of inclination within practical limits.

From the foregoing description, taken in connection with the accompanying sheets of drawings, it will be apparent that I have provided a machine that will accomplish the several operations required in mining, by a common movement. Should it be desired to cut the kerf, the kerf cutting structure is moved forward by a turning of the crank 111. Any desired position of inclination of this kerf cutting structure may also be obtained by an operation of the crank 69^a. Because of its location, this kerf cutting structure will make what is commonly called a center cut and if it is properly positioned, the cutter chain may be started in operation and fed forwardly as is customary. After this cutter chain has been fed into the coal face the desired distance the entire machine as a whole, may be swung about a vertical pivot by rotating one of the traction wheels in one direction and the other traction wheel in the other direction. After this kerf cut has been completed, the kerf cutting machine is retracted to its inoperative position and, after the coal has been broken down in any desired manner, the same movement as outlined for the kerf cutting machine, will sweep the depressed extension of the conveyer structure across the mine floor to gather this broken down coal. It will thus be apparent that considerable time is saved, in that it is not necessary to move from place to place during the continuous operation of mining and further it is not necessary to employ two distinct machines for accomplishing this result as, as has been related, the same movement for giving the kerf cut will serve the purpose of gathering the coal from the mine floor.

What I claim, is:

1. A mine working machine comprising a base unit, a conveyer structure supported thereby, a kerf cutting structure located above the front end of said conveyer and relatively movable with respect to said conveyer structure to assume an operative or inoperative position, the means for driving said two structures independently of each other and means for swinging said conveyer and kerf cutting structures sidewise to cut the kerf when said kerf cutting structure is in operative position or to sweep the mine floor to gather the coal when said kerf cutting structure is in inoperative position.

2. A mine working machine comprising a base unit, a conveyer structure supported thereby, a kerf cutting structure located above the front end of said conveyer and mounted to assume an extended operative position forward of the nose of said conveyer structure and a retracted inoperative position to the rear of the nose of said conveyer structure, and means for swinging said conveyer and kerf cutting structure sidewise to cut the kerf when said kerf cutting structure is in operative position or to sweep the mine floor to gather the coal when said kerf cutting structure is in inoperative position.

3. A mine working machine comprising a base unit, a conveyer structure supported

thereby, a kerf cutting structure located above the front end of said conveyer and mounted on said unit and movable to assume an extended operative position forward of the nose of said conveyer structure and a retracted inoperative position to the rear of the nose of said conveyer structure, and means for moving said base unit in the arc of a circle to cut the kerf when said kerf cutting structure is in operative position or to sweep the mine floor to gather the coal when said kerf cutting structure is in inoperative position.

4. A mine working machine comprising a base unit, a conveyer structure supported thereby, a kerf cutting structure located above the front end of said conveyer and mounted on said unit and movable to assume an extended operative position forward of the nose of said conveyer structure and a retracted inoperative position to the rear of the nose of said conveyer structure, a pair of traction wheels upon which said base unit is mounted, and means for turning one of said wheels in one direction and the other wheel in the other direction to cut the kerf when said kerf cutting structure is in operative position or to sweep the mine floor to gather the coal when said kerf cutting structure is in inoperative position.

5. A coal working machine comprising a base unit, a conveyer structure supported thereby, a kerf cutting structure located above the front end of said conveyer, a support frame in connection with which said kerf cutting structure is movably mounted to assume an extended operative or retracted inoperative position and means for swinging said conveyer and kerf cutting structures sidewise to cut the kerf when said kerf cutting structure is in operative position or to sweep the mine floor to gather the coal when said kerf cutting structure is in inoperative position.

6. A mine working machine comprising a base support, a conveyer structure supported thereby, a kerf cutting structure located above the front end of said conveyer, a support frame in connection with which said kerf cutting structure is movably mounted, means for moving said kerf cutter forward in its frame beyond the end of said conveyer to assume an extended operative position, and means for swinging said conveyer and kerf cutter sidewise to cut the kerf when said kerf cutter is in operative position or to sweep the mine floor to gather the coal when said kerf cutter is in retracted inoperative position.

7. A mine working machine comprising a base support, a conveyer structure supported thereby, a kerf cutting structure, a support frame in connection with which said kerf cutting structure is movably mounted, means for tilting said frame to assume the desired inclined position, means for moving said kerf cutter forward beyond the end of said conveyer to operative position after said frame has assumed the desired inclined position, and means for swinging said conveyer and kerf cutter sidewise to cut a kerf when said kerf cutter is in operative position, or to sweep the mine floor to gather the coal when said kerf cutter is in retracted inoperative position.

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

NORTON A. NEWDICK.

Witnesses:
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C. C. SHEPHERD.