

Oct. 14, 1930.

N. D. LEVIN

1,778,298

COAL MINING MACHINE

Filed Nov. 16, 1926

3 Sheets-Sheet 1

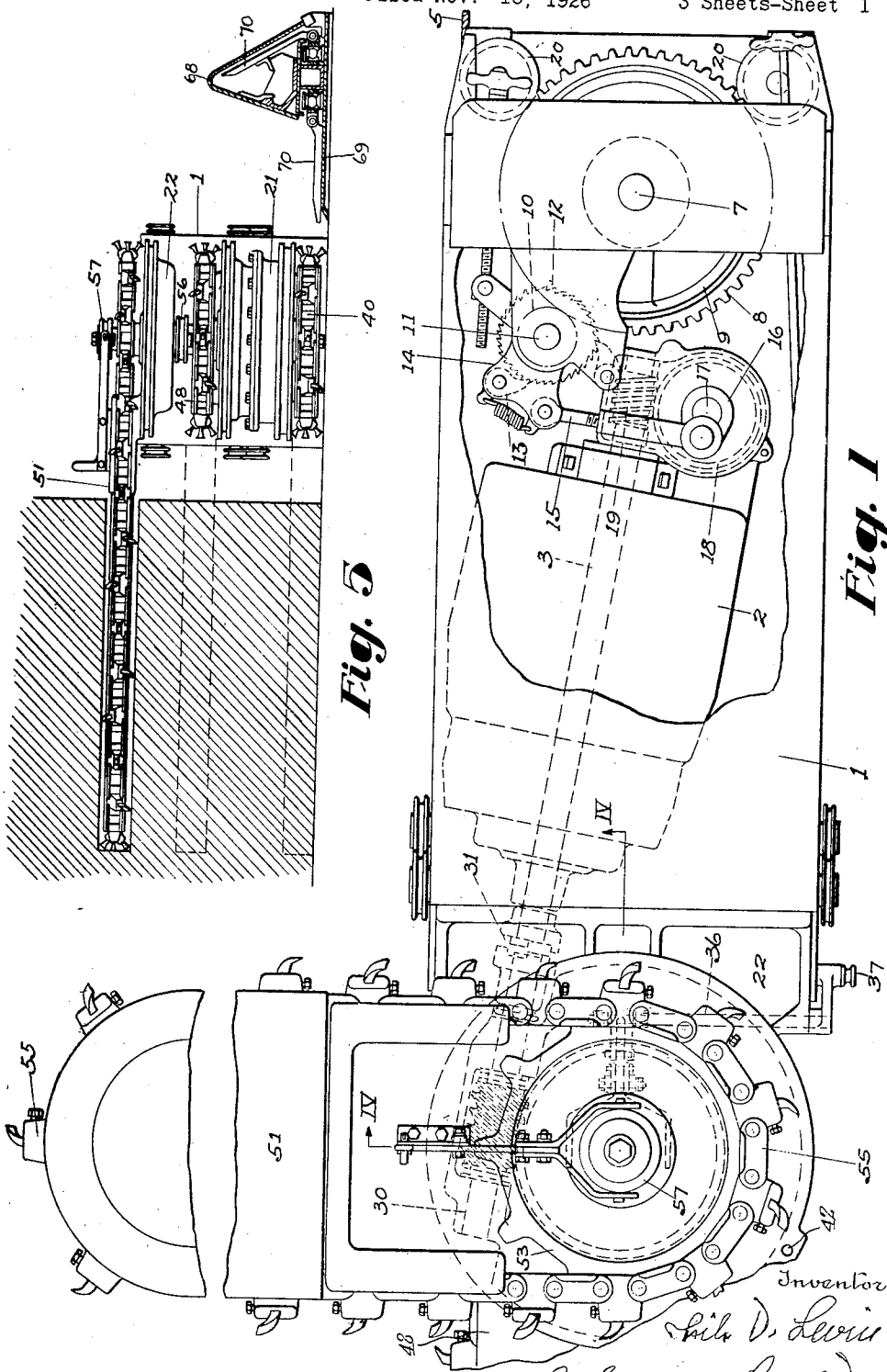


Fig. 3

Fig. 1

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3 Sheets-Sheet 2

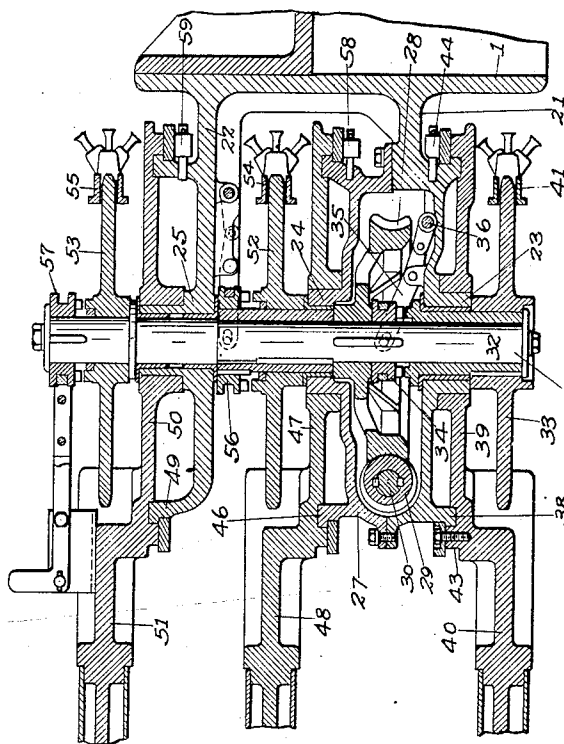


Fig. 4

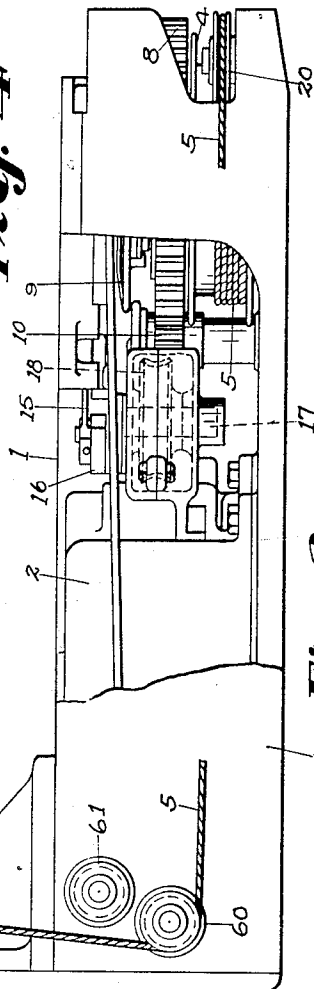


Fig. 2

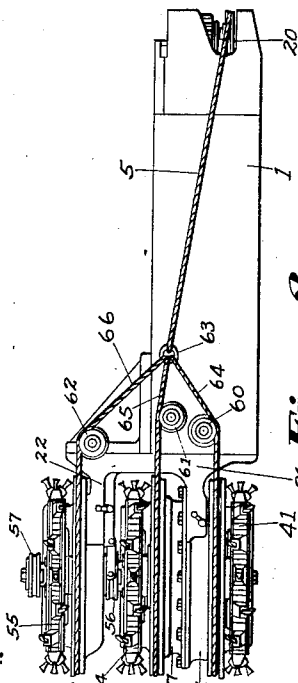
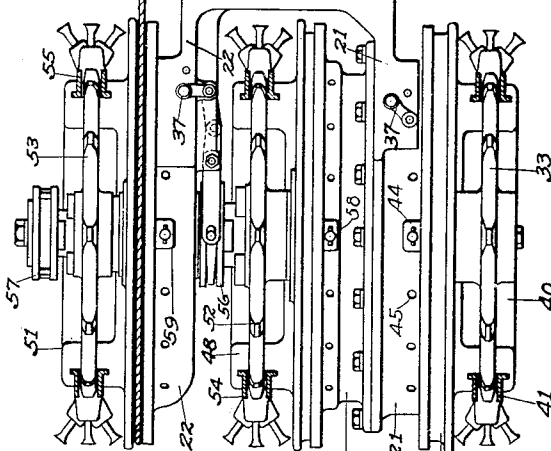


Fig. 3



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3 Sheets-Sheet 3

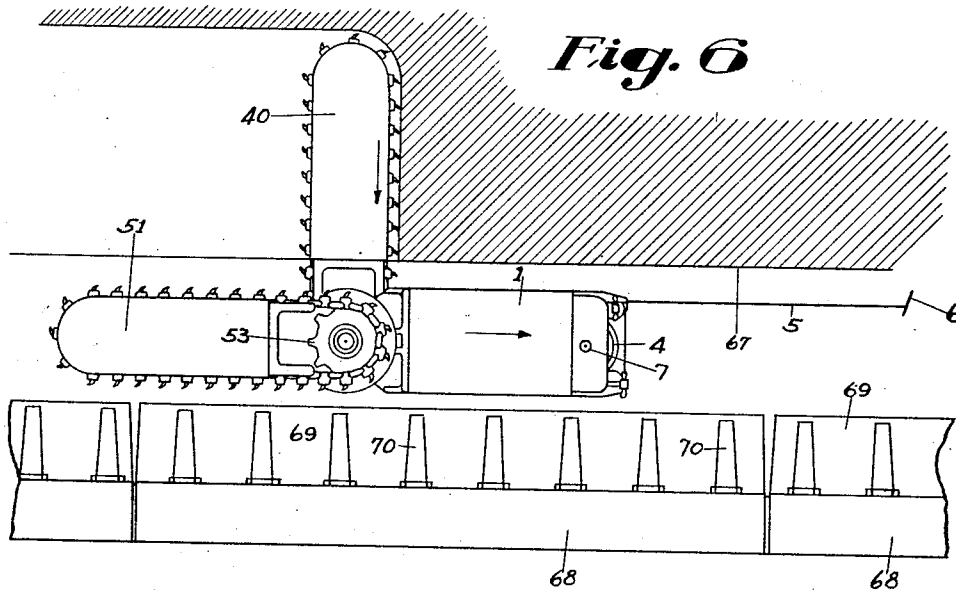
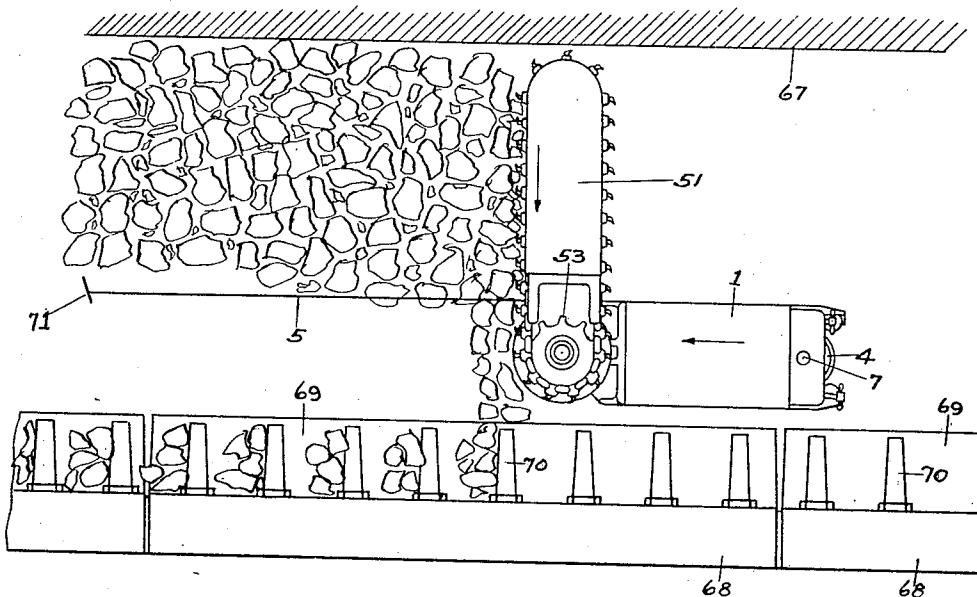


Fig. 7

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UNITED STATES PATENT OFFICE

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COAL-MINING MACHINE

Application filed November 16, 1926. Serial No. 148,699.

The present invention relates to certain new and useful improvements in coal cutting machines, and particularly to machines of the class having a supporting frame adapted to be moved relative to the coal body, and cutting devices projecting therefrom adapted to engage the coal to form a kerf therein preparatory to blasting down the coal above the kerf.

It is the especial object of this invention to provide, in a machine of the class described, means to form a single kerf in the coal body at the level of the mine floor, to form such a kerf in the coal body spaced above said floor, or to simultaneously form a plurality of spaced apart kerfs at the option of the operator.

The means whereby I attain this object are fully set forth in the following specification and illustrated in the accompanying drawing of which

Fig. 1 is a plan view of the preferred embodiment of my invention, the cover plates being broken away to reveal certain parts below.

Fig. 2 is a side elevation of the machine shown in Fig. 1, the side plates being broken away to reveal the interior mechanism.

Fig. 3 is a side elevation of the machine shown in Figs. 1 and 2, on a reduced scale, illustrating the manner of manipulating the cutting mechanism to simultaneously cut a plurality of spaced apart kerfs.

Fig. 4 is a vertical sectional view taken along the line IV—IV of Fig. 1.

Fig. 5 is a front elevation of the machine, illustrated in Figs. 1 and 2, showing its relation to the coal body during the cutting of a single kerf spaced above the floor of the mine.

Fig. 6 is a diagrammatic figure illustrating the manner of operating the machine to cut a kerf in the coal body preparatory to blasting down the coal above the kerf.

Fig. 7 is a diagrammatic view showing the method of using the machine to gather the dislodged coal onto a conveyor for transportation.

Like numerals refer to similar parts in the several figures.

In the drawings, I have shown the preferred embodiment of my invention wherein the main frame 1 comprises an elongated, rectangular structure adapted to rest upon and slide over the floor of the mine. Within the frame 1 is mounted a motor 2 by which the operative elements of the machine are actuated. The motor 2 may be of any preferred type suitable to the conditions under which the machine operates. For purposes of illustration, I have here shown an electric motor adapted to receive its actuating current through a suitable flexible conductor cable and to be controlled by the customary controlling mechanism, but as such devices are well understood in the mining machine art and as they form no part in the present invention, their illustration and description are not thought to be required at this time.

The motor 2 is provided with an armature shaft 3 which projects at both ends of its casing and is provided with power transmitting devices at both ends.

At its forward end; the main frame 1 contains the feeding mechanism by which the machine may be moved over the floor of the mine. This feeding mechanism comprises a winding drum 4 upon which is windable a flexible cable 5 the free end of which is adapted to be connected with any suitable abutments such as the anchor jack 6 towards which the machine may be drawn when the cable is wound upon the drum. The drum 4 is rotatably supported upon a vertical shaft 7, and is connectible with a spur gear 8, also mounted upon the shaft 7, by means of a friction clutch contained within the drum 4, and controllable by the manipulation of a hand wheel 9 positioned convenient to the hand of the operator. The spur gear 8 meshes with a pinion 10 attached to a vertical shaft 11 journaled in suitable bearings of the main frame. Attached to the shaft 11 is a ratchet wheel 12 adapted to be engaged by a pawl 13 carried by the rocker arm 14. The rocker arm 14 is connected through the connecting rod 15 with a crank 16 fixed to the shaft 17, and the shaft 17 carries a worm gear 18 which engages the worm 19 upon the forward end of the armature shaft 3.

When the armature shaft 3 revolves, the rotative motion is transmitted through the worm 19, worm wheel 18, crank 16, rod 15, rocker arm 14, pawl 13, ratchet wheel 12, pinion 10, to the gear 8 and through the friction devices within the drum 4 to cause the rotation of said drum to wind the cable 5 thereon. Suitable guide sheaves 20, mounted at the forward corners of the main frame 1, serve to guide the feed cable 5 in the desired direction from the winding drum 4.

From the rearward end of the main frame 1 there projects two brackets 21 and 22 having journal bearings 23, 24 and 25 in which the vertical shaft 26 is rotatably supported. The bracket 21 is shaped to form a gear case 27 within which is mounted a worm gear wheel 28 which is secured to the shaft 26 by a suitable key. The worm gear wheel 28 is engaged by a worm 29 mounted upon the armature shaft extension 30 which is supported in suitable journal bearings formed on the bracket 21. The armature shaft extension 30 extends in axial alinement with the armature shaft 3 and is adapted to be connected thereto by a suitable clutch 31. Mechanism is provided for the control of the clutch 31 but as such devices are well understood in the art, and as it forms no part of the present invention, its illustration and description is not thought to be required at this time. A sleeve 32, freely mounted upon the lower portion of the shaft 26, extends through the journal bearing 23 and to its lower end is fixed a sprocket wheel 33. At the upper end of the sleeve 32 are formed clutch teeth adapted to engage the corresponding teeth of a jaw clutch member 34 which is slidably attached to the shaft 26. A shifting lever 35 is arranged to move the clutch member 34 into or out of engagement with the sleeve 32 to operatively connect the sprocket wheel 33 with the shaft 26, or to disconnect it therefrom as condition may require. A rock shaft 36 mounted upon the bracket 21 engages the clutch shifting lever 35, and this rock shaft is provided with a handle 37 positioned convenient to the hand of the operator, by the manipulation of which the clutch 34 may be controlled.

Formed on the bracket 21 is a circular flange 38 which rotatably supports a turn table 39. Projecting horizontally from the turn table 39 is a cutter arm 40 upon the edges of which are formed guideways wherein travels the cutter chain 41 of the type commonly used in coal mining machines to cut the coal. Provision is made at 42 whereby the free end of the feed cable 5 may be attached to the cutter arm 40, and a groove 43 formed in the periphery of the turn table 30 serves to guide said cable towards the guide sheave 20 so that, by the winding of the cable 5 upon the winding drum 4 the cutter arm 40 may be caused to rotate about the

axis of the turn table to cause the cutter chain 41 to engage the coal to cut it. Attached to the turn table 39 is a latch 44, the bolt of which is adapted to engage either of a series of apertures 45 formed in the frame casting 21, to lock the cutter arm rigidly in the preferred position of angular adjustment.

Formed on the upper portion 27 of the bracket 21 is a circular flange 46 which rotatably supports a second turn table 47, and from this turn table 47 projects a second cutter bar 48 which is rotatable in a plane parallel to the plane of the cutter arm 40. A third circular flange 49 is formed upon the bracket 22 of the main frame and upon this flange is mounted a third turn table 50 from which projects a third cutter arm 51 also rotatable in a plane extending parallel to the planes of the cutter arms 40 and 48. In every respect the turn tables 47 and 50 and the cutter arms 48 and 51 are substantially similar to the corresponding part of the cutter arm 40. Rotatably mounted upon the shaft 26 are sprocket wheels 52 and 53 arranged in alinement with the guideways of the cutter arms 48 and 51 and these sprocket wheels engage the cutter chains 54 and 55 respectively. Upon the hub of each of the sprocket wheels 52 and 53 are formed clutch teeth adapted to engage with the clutch members 56 and 57 slidably attached to the shaft 26, and these clutches are provided with suitable mechanism for their control so that either or all of the sprocket wheels 33, 52, and 53 may be connected to or disconnected from the shaft 26 to drive their respective cutter chains. Bolts 58 and 59 similar to the bolt 44 are arranged to lock the cutter arms 48 and 51 in the desired position of angular adjustment.

Upon each side of the main frame 1 are mounted guide sheaves 60, 61 and 62 adapted to engage the feed cable 5 to lead it to turn tables 39 or 47 of the turn table 50 to cause their respective rotation about the common axis.

In Fig. 3 of the drawing I have shown an arrangement by which all three of the cutter arms 40, 48 and 51 may be simultaneously rotated to cut spaced apart kerfs in the coal face. As here illustrated the end of the feed cable 5 is attached to a ring 63 from which extends three branch cables 64, 65 and 66 which are led around the guide sheaves 60, 61 and 62 appropriate to the turn tables 39, 47 and 50 to simultaneously cause the cutter arms 40, 48 and 51 to form spaced apart parallel kerfs in the coal face. It is apparent that either of the branch cables 64, 65 or 66 may be omitted so as to cause the rotation of only two of the cutter arms.

By the devices above described, I have provided a machine adapted to form a kerf at the base of the mine vein, to form a kerf spaced above the mine floor, or to simultaneously form a plurality of kerfs extending in

parallelism across the face of the vein. It is apparent that the machine here shown may be subject to wide variation as to details, that either of the cutter arms may be omitted, or that any preferred number of additional cutter arms may be added without departure from the spirit of my invention.

In operation, my improved mining machine is brought to the working place with all three of the cutter arms projecting longitudinally of the machine and locked in that position. The machine is then positioned adjacent the coal face, extending longitudinally therealong. The feed rope 5 is drawn out from the winding drum and attached, in the manner above described, to the cutter arm or arms which are appropriate to form the kerf or kerfs desired. The cutter chains of the appropriate cutter arms are then actuated, the chains remaining idle upon any arm which is not in active use at the time, and the winding drum is actuated to cause rotation of the appropriate cutter arm or arms to form the kerf or kerfs desired. After the cutter arm or arms have swung through the preferred angle it or they are locked in that position, the feed cable disconnected therefrom, conducted around the guide sheave 20 and attached to an anchor jack 6 positioned adjacent the coal face in advance of the machine. By the winding of the cable 5, the machine will be moved bodily along the coal face to produce a kerf or kerfs extending longitudinally thereof.

The diameter of sprocket wheels 33, 52 and 53 is such that the distance between the ends of diametrically opposite bits on the chains will be substantially equal to the width of the main frame. In this manner, the cutter chains will discharge to points beyond the path of advance of the machine, so that the machine may be returned over the same path without obstruction.

In Figs. 6 and 7 of the drawing, I have illustrated one method of operating my improved coal cutting machine in combination with a longwall conveyor of well known design to effect the mining and reclaiming of the coal. As here illustrated, the coal cutting machine is positioned adjacent the coal face 67 with the lowermost cutter arm 40 turned at right angles to the longitudinal lines of the machine and inserted beneath the coal. The feed rope 5 extends along the coal face and is attached to a suitably positioned anchor jack 6 in advance of the machine. Positioned upon the mine floor, immediately adjacent the outer side of the coal cutting machine, and extending parallel with the coal face 67, is a longwall conveyor comprising an elongated frame 68 and a laterally projecting plate 69 which extends along the frame in contact with the mine floor. Within the frame 68, and consequently not visible in the drawing, is an endless chain to which is attached the conveyor

flights 70 which project across the plate 69 in contact therewith and are adapted, when said chain is actuated, to propel material along said plate. The construction of the frame 68 is such that it forms one side of a conveyor trough, the bottom of which is the plate 69. The opposite wall of the trough is formed by the loose coal lying upon the mine floor adjacent the plate 69. When the coal cutter is actuated to undercut the coal, the cuttings produced by the kerf cutter 40 are delivered thereby onto the plate 69 and are transported by the scrapers 70 longitudinally of the conveyor to the discharge point, where they are delivered to a suitable receptacle for further disposition. After the coal cutting machine has advanced to the full length of the coal face, the coal above the kerf is dislodged from the body of the vein, by blasting or other suitable methods. All of the cutter arms 40, 48 and 51 are then turned to the position at right angles to the longitudinal lines of the machine and locked in that position. The feed rope 5 is adjusted over the guide sheaves 20, 60 and 62 and is attached to an anchor jack 71 suitably positioned at the rearward side of the machine. The electric motor 2 is then actuated in such manner that the cutter chains 41, 54 and 55 will travel around the cutter frame 40, 48 and 51 in the direction opposite to that of the cutting operation. As the machine travels along the coal face, the cutter bits of the three cutter arms will engage the dislodged and broken coal and move it outwardly onto the plate 69 to be transported by the conveyor flights 70 to the delivery end of the conveyor. After all of the dislodged coal has been removed, the coal cutting machine will be repositioned adjacent the newly formed coal face, the longwall conveyor repositioned adjacent the coal cutting machine, and the operation repeated ad libitum.

What I claim is:

1. In a machine of the class described, the combination with a main frame, of a plurality of elongated kerf cutters projecting horizontally therefrom in different planes above and adjacent the mine floor and swingable about a common vertical axis, and means to bodily move the main frame or to swing either or all of said kerf cutters as and for the purpose set forth.

2. In a machine of the class described, the combination with a main frame, of a plurality of elongated kerf cutters projecting horizontally therefrom, said kerf cutters being spaced apart vertically and swingable about a common vertical axis in low-lying planes, and means carried by said main frame to bodily move the machine or to swing either or all of said kerf cutters as and for the purpose set forth.

3. In a machine of the class described, the combination with a main frame, of a plu-

ality of elongated kerf cutters projecting horizontally therefrom said kerf cutters being spaced apart vertically and swingable about a common vertical axis in low-lying planes; means to lock each kerf cutter in the preferred position of angular adjustment, and means to bodily move the main frame or to swing either or all of said kerf cutters about said axis as and for the purpose set forth.

4. In a machine of the class described, the combination with a main frame adapted to rest upon and slide over the floor of a mine, of a plurality of elongated kerf cutters projecting horizontally from said frame and swingable about a common vertical axis in low-lying planes, means to lock each kerf cutter in the preferred angular relation to the longitudinal lines of said frame, and means to bodily move the machine over the mine floor or to swing said kerf cutters either simultaneously or separately about said axis as and for the purpose set forth.

5. In a machine of the class described, the combination with a main frame adapted to rest upon and slide over the floor of a mine, of a plurality of elongated kerf cutters projecting horizontally from one end of said frame and swingable in low-lying planes about a common vertical axis positioned in the central longitudinal plane thereof, means to lock each kerf cutter in the preferred angular relation relative to said plane, and means to bodily move the machine over the mine floor or to swing said kerf cutters either simultaneously or separately about said axis as and for the purpose set forth.

6. In a machine of the class described, the combination with a main frame adapted to rest upon and slide over the floor of the mine, a plurality of vertically spaced apart cutter arms projecting horizontally from one end of said frame and adapted to be swung in low-lying planes from a position projecting laterally at one side of said frame to a corresponding position at the other side thereof, and means upon the frame to move the machine bodily over the mine floor or to rotate either or all of said cutter arms about their common axis as and for the purpose set forth.

7. In a machine of the class described, the combination with a main frame adapted to rest upon and slide over the floor of the mine, a cutter arm pivotally mounted at one end of said frame and adapted to be swung from a position extending laterally at one side of the frame to a corresponding position at the other side thereof, a second cutter bar projecting horizontally from said frame above the first mentioned cutter bar and adapted to be similarly swung in low-lying planes concentrically therewith, means upon the frame to bodily move the machine over the mine floor to engage the cutter bars singly or together in a working face or to move

either or both of said cutter arms about their common axis.

8. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along a coal face and to receive loose material from the floor of the mine along substantially its entire length, of a coal cutting machine comprising a main frame adapted to be supported upon the mine floor between said conveyor and said coal face, means upon the main frame to cause it to travel along the mine floor, and a plurality of superposed kerf cutters carried by said main frame adapted to engage the coal face to cut a kerf or a plurality of kerfs therein or to engage loose material at a plurality of levels adjacent the mine floor and move it onto said conveyor as and for the purpose set forth.

9. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along a coal face and to receive loose material from the floor of the mine along substantially its entire length, of a coal cutting machine comprising a main frame adapted to be supported upon the mine floor between said conveyor and said coal face, means upon the main frame to cause it to travel along the mine floor, and a plurality of superposed kerf cutters carried by said main frame adapted as the machine travels in one direction to engage the coal face to cut a kerf or a plurality of kerfs therein or when the machine travels in the opposite direction to engage loose material at a plurality of levels adjacent the mine floor and move it onto said conveyor as and for the purpose set forth.

10. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along a coal face and to receive material from the floor of the mine along substantially its entire length, of a coal cutting machine comprising a main frame adapted to be supported upon the mine floor between said conveyor and said coal face, means upon the main frame to cause it to travel along the mine floor relative to the conveyor, a kerf cutter carried by said main frame and adapted as the machine travels in one direction to engage the coal face to cut a kerf therein or as the machine travels in the opposite direction to engage loose material upon the mine floor and move it directly onto said conveyor as and for the purpose set forth.

11. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along the coal face and to receive material from the floor of the mine along substantially its entire length, of a coal cutting machine comprising a main frame adapted to be supported upon the mine floor between said conveyor and said coal face, means upon the main frame to cause it to

travel along the mine floor relative to the conveyor, an elongated cutter frame carried by said main frame, and a cutter chain supported in guide ways of said cutter frame adapted as the machine travels in one direction to engage the coal face to cut a kerf therein or as the machine travels in the opposite direction to engage loose material upon the mine floor and move it directly onto said conveyor as and for the purpose set forth.

12. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along a coal face and to receive material from the mine floor along substantially its entire length, of a coal cutting machine comprising a main frame adapted to travel longitudinally of said coal face, means upon the main frame to cause it to travel along said coal face relative to the conveyor, a kerf cutter carried by said main frame adapted as the machine travels in one direction to engage the coal face to cut a kerf therein and as the machine travels in the opposite direction to engage loose material upon the mine floor and move it directly onto said conveyor as and for the purpose set forth.

13. In an apparatus of the class described, the combination with an elongated conveyor adapted to extend along a coal face and to receive material from the mine floor along substantially its entire length, of a coal cutting machine comprising a main frame adapted to travel longitudinally of said coal face, means upon the main frame to cause it to travel along said coal face relative to the conveyor, an elongated cutter frame carried by said main frame, a cutter chain supported in guide ways of said cutter frame and adapted as the machine travels in one direction to engage the coal face to cut a kerf therein or as the machine travels in the opposite direction to engage loose material upon the mine floor and move it directly onto said conveyor as and for the purpose set forth.

14. In a machine of the class described, the combination with a main frame, of a plurality of horizontally projecting elongated kerf cutters swingably mounted thereon, each of said kerf cutters including a cutter chain, power means carried by said main frame, and power transmission means in connection with said power means and connectible selectively with said kerf cutters to swing any or all of the latter to form a kerf or a plurality of kerfs, and means for selectively driving said cutter chains from said power means.

15. In a machine of the class described, the combination with a main frame, of a plurality of vertically spaced horizontally projecting elongated kerf cutters swingably mounted thereon, each of said kerf cutters including a cutter chain, power means carried by said main frame, and power transmission means in connection with said power means

and connectible selectively with said kerf cutters to swing any or all of the latter to form a kerf or a plurality of superposed kerfs, and means for selectively driving said cutter chains from said power means.

16. In a machine of the class described, the combination with a main frame, of a plurality of horizontally projecting kerf cutters mounted thereon, each of said kerf cutters including a cutter chain, and swingable about a common vertical axis, power means mounted on said main frame, and power transmission means in connection with said power means and connectible selectively with any or all of said kerf cutters to swing the latter to form a kerf or a plurality of kerfs, and means for selectively driving said cutter chains from said power means.

17. In a machine of the class described, the combination with a main frame, of a plurality of horizontally projecting elongated kerf cutters swingably mounted thereon, power means carried by said main frame, power transmission means in connection with said power means and connectible selectively with said kerf cutters to swing any or all of the latter to form a kerf or a plurality of kerfs, and a power shaft connectible with the selected kerf cutter or cutters to actuate the cutting elements thereof.

18. In a machine of the class described, the combination with a main frame, of a plurality of vertically spaced horizontally projecting elongated kerf cutters swingably mounted thereon, power means carried by said main frame, power transmission means in connection with said power means and connectible selectively with said kerf cutters to swing any or all of the latter to form a kerf or a plurality of superposed kerfs, and a power shaft connectible with the selected kerf cutter or cutters to actuate the cutting elements thereof.

19. In a machine of the class described, the combination with a main frame, of a plurality of horizontally projecting kerf cutters mounted thereon, and swingable about a common vertical axis, power means mounted on said main frame, power transmission means in connection with said power means and connectible selectively with any or all of said kerf cutters to swing the latter to form a kerf or a plurality of kerfs, a power shaft coinciding with said vertical axis, and means to connect said power shaft with the selected kerf cutter or cutters to actuate the cutting elements thereof.

20. In a machine of the class described, the combination with a main frame, of a plurality of horizontally projecting elongated kerf cutters swingably mounted thereon, a power shaft mounted on said main frame, transmission means in connection with said shaft and selectively connectible with any or all of said kerf cutters to swing the latter

to form one or more kerfs, a second power shaft connectible with the selected kerf cutter or cutters to actuate the cutting elements thereof, and a common prime mover for said power shafts.

21. In a machine of the class described, the combination with a main frame, of a plurality of cutter arms, a vertical drive shaft rotatably supported in bearings of said frame, said arms being mounted for swinging movement about said shaft, cutting elements traversable along said arms, a second drive shaft, transmission means in connection with said second drive shaft and selectively connectible with any or all of said arms to swing the latter to form a kerf or kerfs, a common prime mover for said shafts, and means for actuating the cutting elements of the selected arm or arms from said vertical drive shaft.

22. In a machine of the class described, the combination with a main frame, of a plurality of cutter arms, a vertical drive shaft rotatably supported in bearings of said frame, said arms being mounted for swinging movement about said shaft, a cutter chain traversable on each of said arms, a sprocket on said shaft engaging each of said chains, a second drive shaft, transmission means in connection with said second drive shaft and selectively connectible with any or all of said arms to swing the latter to form a kerf or kerfs, a common prime mover for said shafts, and means for connecting with said vertical shaft the sprockets engaging the chains of selected arms for driving said chains.

23. In a machine of the class described, the combination with a main frame, of a plurality of turn tables mounted thereon, cutter arms projecting from said turn tables, a winding drum, a rope windable thereon, and means for connecting said rope to any one or all of said turn tables to swing the latter and the associated cutter arms upon winding movement of said drum.

24. In a long wall mining system, a stationary conveyor extending along the mine wall and spaced therefrom, a kerfing machine traversable intermediate the conveyor and wall, and a cutter arm supported on said machine in position to form a kerf in the mine wall during such traversing movement, said machine being returnable along the same path subsequent to breaking down the kerfed material to engage the cutter arm with the latter to drag it out longitudinally of the arm and deliver it directly to said conveyor.

25. In a machine of the class described, a plurality of cutter arms superposed in low lying planes and selectively movable to form a kerf in a corresponding plane, said cutter arms being movable in unison to disrupt and drag out the kerfed material subsequent to its breaking down.

26. In a machine of the class described, a

plurality of cutter arms movable in different low-lying vertical planes, selective means for moving any single arm to form a kerf and to move any or all of the arms to disrupt and drag out the kerfed material subsequent to its breaking down.

27. In a mining system, an elongated stationary conveyor spaced from a mine wall, a mining machine traversable between the conveyor and wall and having a cutter arm adapted to form a kerf in said wall, said machine being returnable along the same path and having other arms adapted to cooperate with said first arm to drag out the kerfed material, subsequent to its breaking down, and deliver it to said conveyor.

28. In a mining machine, a movable base frame, and a cutter bar adapted to extend substantially entirely across one end of said base frame to project therebeyond in operative position at either side thereof, whereby said cutter bar is adapted to engage disrupted material at either side of said base frame to drag it out and deposit it outside of the path of advance of said machine.

29. In a mining machine, a movable base frame, and a swingable cutter bar adapted to extend substantially entirely across one end of said base frame to project therebeyond in operative position at either side thereof, whereby said cutter bar is adapted to engage disrupted material at either side of said base frame to drag it out and deposit it outside of the path of advance of said machine.

30. In a mining machine, a movable base frame, and a plurality of cutter bars, each or all of said cutter bars being adapted to extend substantially entirely across one end of said base frame and to project therebeyond in operative position at either side thereof, whereby said cutter bar or bars is or are adapted to engage disrupted material at either side of said base frame to drag it out and deposit it outside of the path of advance of said machine.

31. In a mining machine, a movable base frame, and a plurality of swingable cutter bars mounted at one end of said base frame, each or all of said cutter bars being adapted to extend substantially entirely across one end of said base frame and to project therebeyond in operative position at either side thereof, whereby said cutter bar or bars is or are adapted to engage disrupted material at either side of said base frame to drag it out and deposit it outside of the path of advance of said machine.

32. In a mining machine, a movable base frame, an elongated arm projecting from one end of said base frame, an endless chain on said cutter bar, cutter bits on said chain, and a drive sprocket for said chain at the frame end of said cutter bar, said sprocket being rotatable about an axis lying substantially in the central vertical longitudinal plane of

said frame, the distance between the ends of said cutter bits diametrically of said sprocket being substantially equal to the width of said frame, whereby upon movement of the machine the cutter bar is adapted to engage and remove material in the path of the machine.

33. In a mining machine, a movable base frame, an elongated arm pivoted at one end to said frame at one end of the latter, said arm being swingable about its pivot point to project from said frame at either side thereof, an endless chain on said cutter bar, cutter bits on said chain, and a drive sprocket for said chain at the frame end of said cutter bar, said sprocket being rotatable about an axis lying substantially in the central vertical longitudinal plane of said frame, the distance between the ends of the cutter bits diametrically of said sprocket being substantially equal to the width of said frame, whereby upon movement of the machine the cutter bar is adapted to engage and remove material in the path of the machine.

34. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, and an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, said cutter being disposable to project from either side of the machine to perform the described operations.

35. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, and an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, said cutter being swingable to project from either side of the machine to perform the described operations.

36. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, said cutter being swingable to project from either side of the machine to perform the described operations, and power actuated means on the machine to swing the cutter.

37. In a mining system, a mining machine movable along a mine wall, an elongated horizontal kerf cutter supported on said machine in position to form a kerf in the mine wall at the mine floor delivering such movement, said machine being movable again along the same path to engage said kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, an elongated stationary conveyor disposed parallel to the mine face adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, and a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations.

38. In a mining system, a mining machine movable along a mine wall, an elongated horizontal kerf cutter supported on said machine in position to form a kerf in the mine wall at the mine floor delivering such movement, said machine being movable again along the same path to engage said kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, an elongated stationary conveyor disposed parallel to the mine face adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, and a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations, said cutters being swingable to project from either side of the machine to perform the described operations.

39. In a mining system, a mining machine movable along a mine wall, an elongated horizontal kerf cutter supported on said machine in position to form a kerf in the mine wall at the mine floor delivering such movement, said machine being movable again along the

same path to engage said kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, an elongated stationary conveyor disposed parallel to the mine face adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations, said cutters being swingable to project from either side of the machine to perform the described operation, and power actuated means on the machine to swing the cutters either singly or together.

40. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, and a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations.

41. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, and a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations, said cutters being swingable to project from either side of the machine to perform the described operations.

42. In a mining system, a mining machine movable along a mine face, an elongated horizontal kerf cutter supported by and projecting from said machine at a cutting angle

to the line of movement thereof to form a kerf in the mine wall at the mine floor during movement of the machine, said machine being movable again along the same path to engage the kerf cutter with the kerfed material subsequent to its breaking down to drag it out along the mine floor, said kerf cutter having a portion effective to move such material across the path of travel of the machine to the outer side thereof, an elongated stationary conveyor disposed parallel to the mine wall adjacent the path of movement of said machine and adapted to receive the dragged out material at the mine floor and convey it away, a second cutter in low-lying planes above the first adapted to participate in the kerfing and dragging out operations, said cutters being swingable to project from either side of the machine to perform the described operations, and power actuated means on the machine to swing the cutters either singly or together.

In testimony whereof I have hereunto set my hand.

NILS D. LEVIN.

CERTIFICATE OF CORRECTION.

Patent No. 1,778,298.

Granted October 14, 1930, to

NILS D. LEVIN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 71, for the word "bath" read both; page 2, line 108, for "of" read or; page 3, line 122, claim 2, after "therefrom" strike out the comma; page 5, line 96, claim 18, for "he" read the; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of December, A. D. 1930.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)