Jan. 12, 1960 H. W. DRIEHAUS 2,920,879

MINING APPARATUS UTILIZING TWO SIDE CUTTING AUGERS

Filed Oct. 18, 1956 5 Sheets-Sheet 1

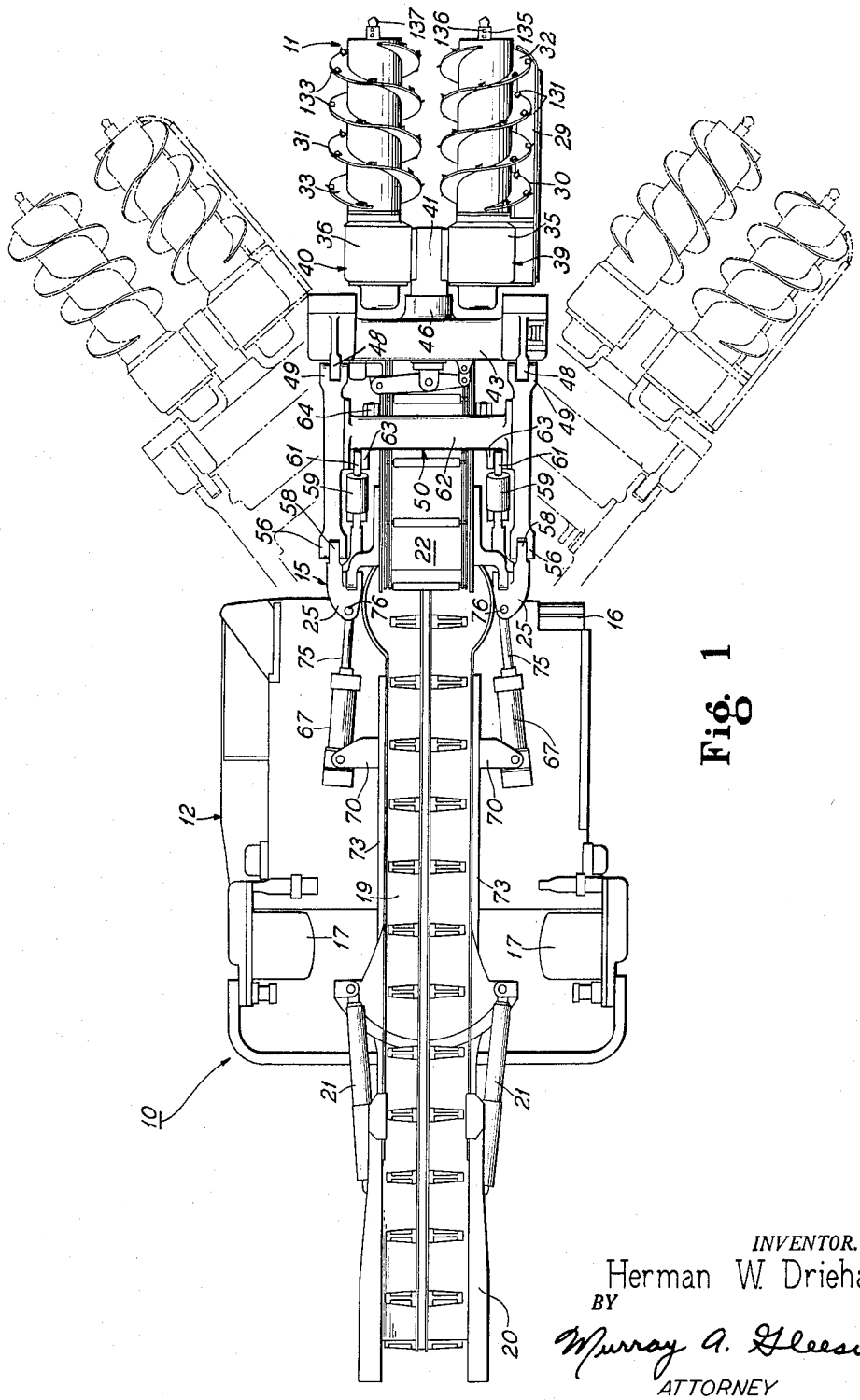


Fig. 1

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Filed Oct. 18, 1956 5 Sheets-Sheet 2

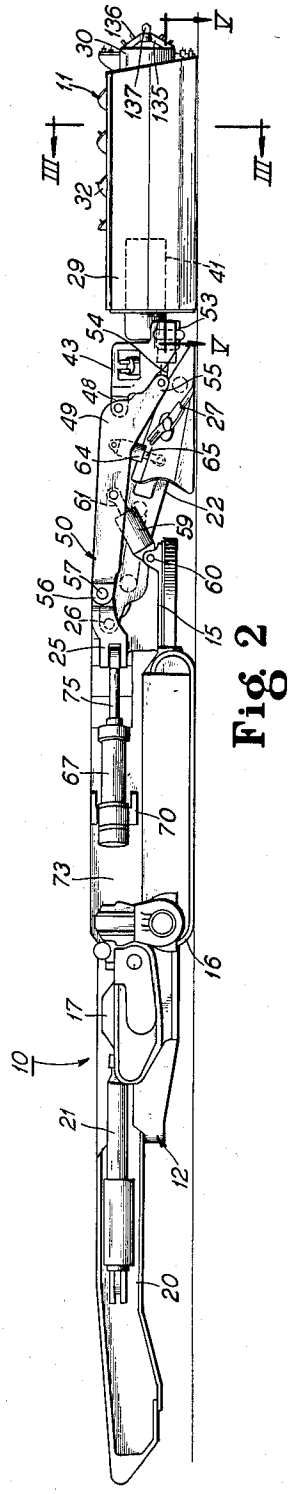


Fig. 2

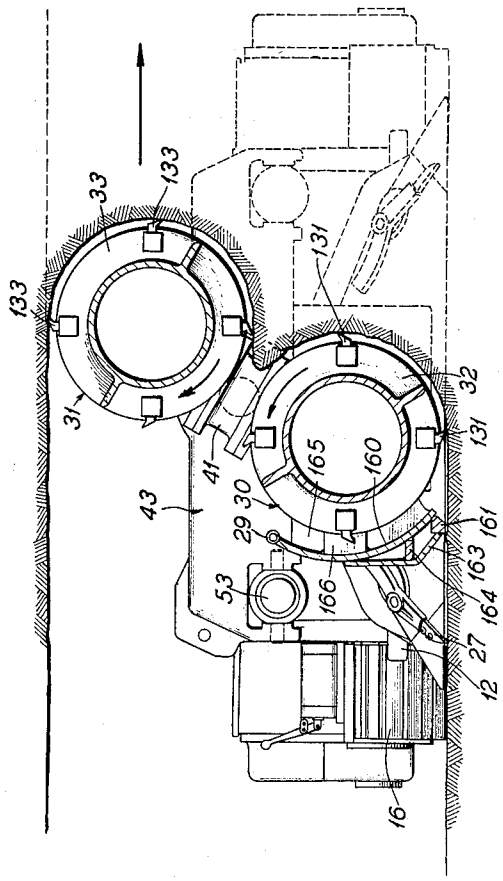


Fig. 3

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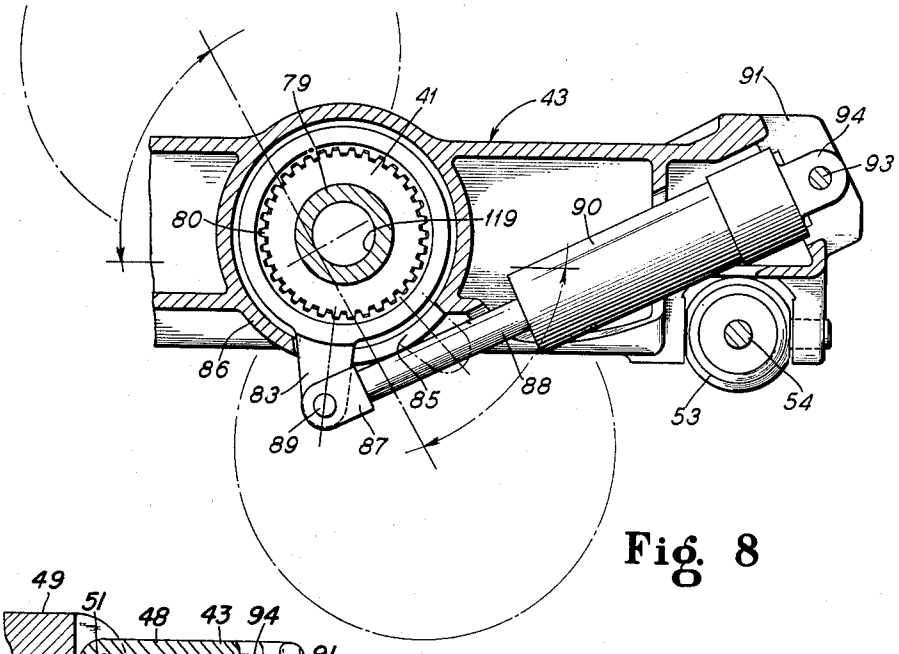


Fig. 8

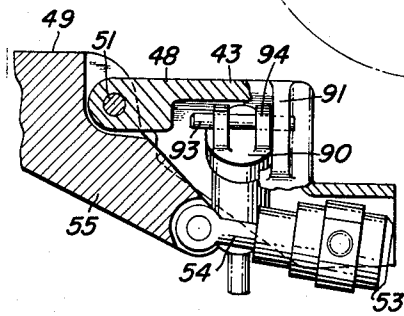


Fig. 9

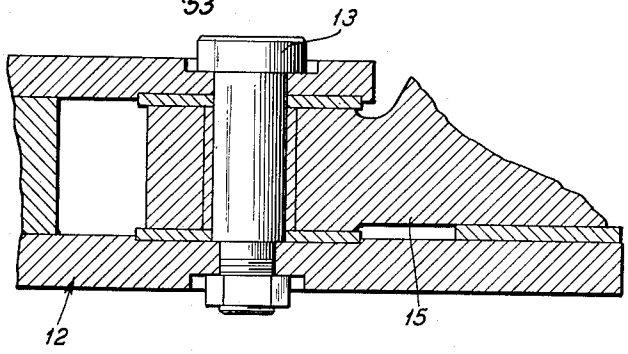


Fig. 4

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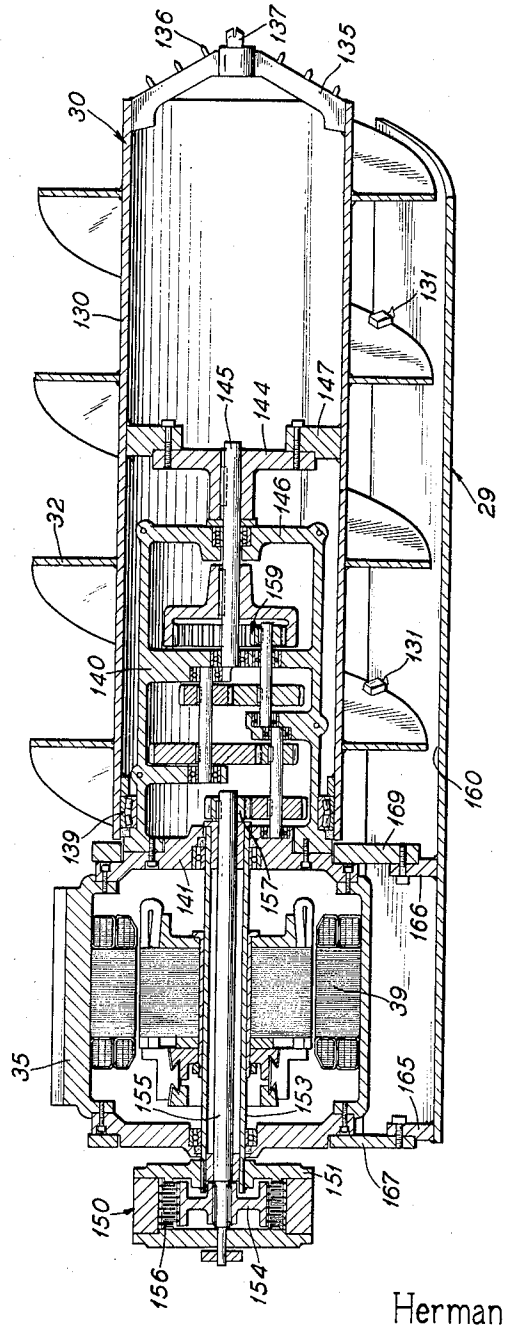


Fig. 5

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MINING APPARATUS UTILIZING TWO SIDE CUTTING AUGERS

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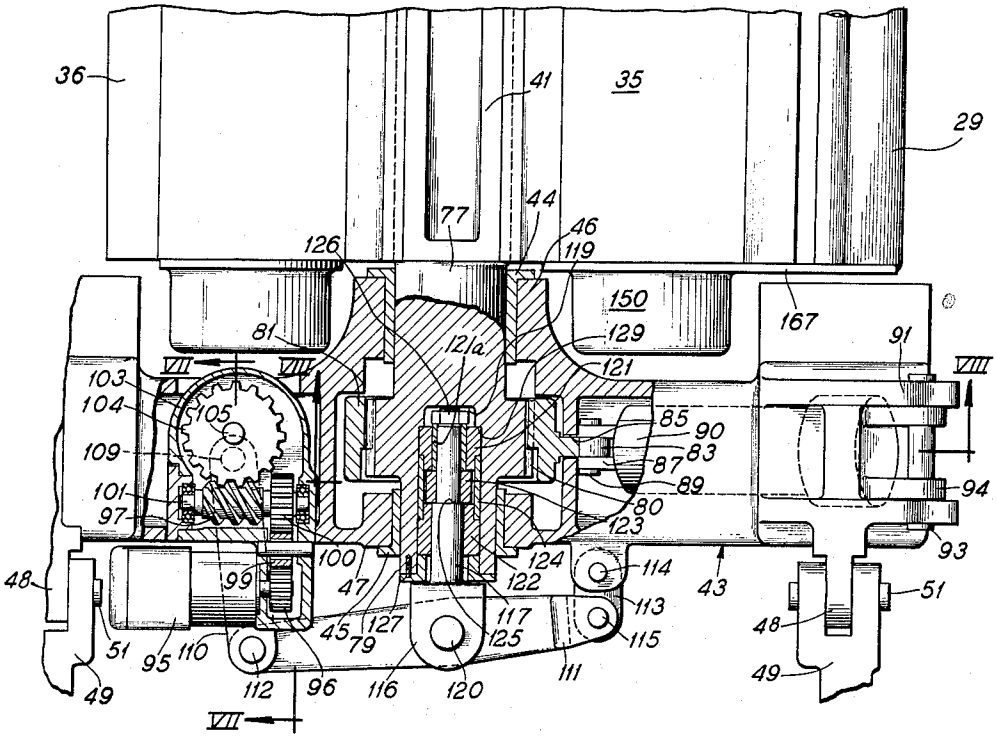


Fig. 6

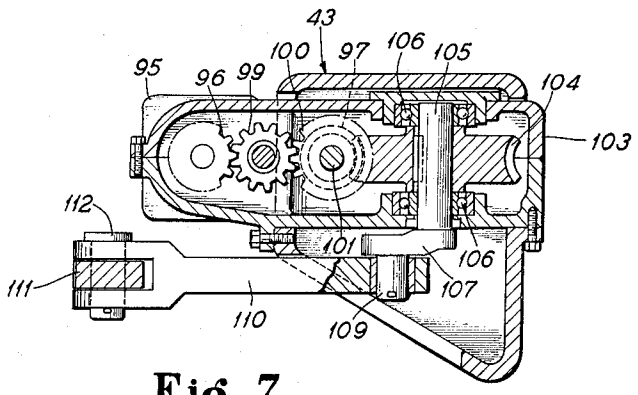


Fig. 7

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2,920,879

MINING APPARATUS UTILIZING TWO SIDE CUTTING AUGERS

Herman W. Driehaus, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application October 18, 1956, Serial No. 616,763

9 Claims. (Cl. 262—19)

This invention relates to mining apparatus and more particularly relates to improvements in mining machines of the continuous mining type.

A principal object of the invention is to provide a novel form of continuous mining and loading machine arranged to mine and load an entire coal seam while being advanced laterally across the seam.

A further object of the invention is to provide an improved form of continuous mining machine operating on the side cutting principle and so arranged as to be readily adapted to coal seams of varying heights.

A still further object of the invention is to provide an improved form of continuous mining machine particularly adapted for operation in coal seams of low vertical height and utilizing two side cutting augers advanced into a coal face by advancing movement of the entire machine toward the face and advanced laterally across the face by feeding movement about a vertical axis.

A still further object of the invention is to provide a novel form of mining head utilizing two side cutting augers adjustable about a longitudinal axis disposed between the augers for adjusting the augers to cut out coal seams of varying heights and having a simplified drive arrangement for reciprocably moving the augers during rotation and lateral feeding movement thereof.

A still further object of the invention is to provide an improved form of mining machine particularly adapted for operation in low seams of coal in which an entire seam is mined by two side cutting augers movable laterally across a coal face in an arcuate path and in which a simple and novel form of cutting and collecting means is provided to extend along the retreating auger and collect the cuttings for picking up by a gathering device regardless of the position of the retreating auger with respect to the ground.

These and other objects of the invention will appear from time to time as the following specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a plan view of a continuous mining machine constructed in accordance with the principles of the present invention;

Figure 2 is a view in side elevation of the machine shown in Figure 1;

Figure 3 is a sectional view taken substantially along the line III—III of Figure 2, drawn to an enlarged scale, with certain parts removed and showing the mining head in the operation of cutting across a coal face;

Figure 4 is a fragmentary vertical sectional view taken through the pivot for the swivel or turret frame supporting the mining head for lateral movement across the main frame of the machine;

Figure 5 is a horizontal sectional view taken through one of the side cutting augers substantially along line V—V of Figure 2;

Figure 6 is an enlarged fragmentary plan view of the rear portion of the mining head and pivotal support therefor on the leveling frame for the mining head, with

certain parts shown in horizontal section in order to illustrate the drive mechanism for reciprocably moving the mining head during a side cutting mining operation;

Figure 7 is a fragmentary vertical sectional view taken substantially along line VII—VII of Figure 6;

Figure 8 is a sectional view taken substantially along the line VIII—VIII of Figure 6 and showing the connection for pivoting the mining head to adjust the head to cut out seams of varying thicknesses; and

Figure 9 is an enlarged fragmentary detail view showing one of the leveling jacks and its connection between the elevating and leveling frame.

In the embodiment of the invention illustrated in the drawings, I have shown a mining machine **10** of a continuous mining type adapted to cut and load an entire coal seam by arcuate feeding movement of a mining head **11** across the front of a main frame **12** for the machine about the axis of a pivot pin **13**, pivotally connecting a turret **15** to said main frame adjacent the forward end thereof (see Figure 4).

The main frame **12** is shown as being mounted on a pair of laterally spaced continuous traction tread devices **16**, for propelling the machine from working place to working place and advancing the machine into a working face. The continuous traction tread devices **16** are driven from individual motors **17**, disposed adjacent the rear end of the main frame at opposite sides thereof, and each having driving connection with an associated continuous traction tread device through a suitable speed reducer, which may be of any well known form, so need not herein be shown or described further.

A conveyor **19** is shown as extending along the main frame **12** from a position adjacent the forward end of said main frame to a position beyond the rear end of said main frame for discharging the mined material into a room conveyor, shuttle car or the like, for carrying the mined material away from the machine. The conveyor **19** is shown as being a well known form of center strand endless chain and flight type of conveyor, which is laterally flexible to accommodate lateral swinging movement of an overhanging discharge end portion **20** of the conveyor by operation of hydraulic swing jacks **21**, as is well known to those skilled in the art so not herein shown or described further.

An inclined elevating conveyor **22** is mounted on the turret **15** for vertical adjustment about a transverse axis disposed above the receiving end of the conveyor **19**. As herein shown, the elevating conveyor is pivotally connected to spaced support members **25** of the turret **15** on pivot pins **26**. The support members **25** of the turret **15** and the pivot pins **26** connecting the conveyor **22** to said turret, space the discharge end of the conveyor **22** in cascade relation with respect to the receiving end of the conveyor **19**, for arcuate movement across the receiving end of said conveyor and for vertical movement about the axes of the pivot pins **26**. The conveyor **22** is provided with gathering devices **27** at its forward end for picking up the mined coal from the ground and progressing the mined coal onto said elevating conveyor **22** during the mining operation and in cooperation with a cutting confining shield **29** on the mining head **11** and extending along a retreating side cutting auger **30** of said mining head.

The mining head **11** also includes an advance side cutting auger **31** extending in parallel relation with respect to the side cutting auger **30** and exactly like the side cutting auger **30**, except the side cutting auger **31** rotates in an opposite direction from the direction of rotation of the side cutting auger **30**, so that each auger will progress the mined material in the space therebetween, to be progressed by scrolls or spirals **32** and **33** of the augers **30** and **31**, respectively, toward the gather-

ing mechanism 27 during the operation of cutting across a mine face

The side cutting augers 30 and 31 extend forwardly of shells 35 and 36 of motors 39 and 40, respectively, for driving the respective side cutting augers 30 and 31 in opposite directions in a manner which will hereinafter be more clearly described as this specification proceeds.

The motor shells 35 and 36 extend along opposite sides of a roll-over frame 41 and are suitably supported thereon. The roll-over frame 41 is journaled in a leveling frame 43 for rotation about an axis extending longitudinally of the motors 39 and 40, and spaced therebetween, on spaced bearings 44 and 45 mounted in a forward boss 46 and a rear wall 47, respectively, of said roll-over frame. Adjustable movement of said roll-over frame will thus adjust the mining head 11 about a longitudinal axis disposed intermediate the side cutting augers 30 and 31, to adjust the mining head for cutting in coal seams of various desired thicknesses.

The leveling frame 43 has spaced ears 48 extending rearwardly therefrom adjacent opposite sides thereof and pivotally connected between the furcations of bifurcated arms 49 of an elevating frame 50, on pivot pins 51. The leveling frame 43 is vertically adjusted about the axes of the pivot pins 51 by operation of laterally spaced leveling jacks 53 trunnioned on said leveling frame adjacent opposite ends thereof. Each leveling jack 53 has a piston rod 54 pivotally connected with a depending arm portion 55 of the elevating frame 50, extending in advance of the arm 49. The leveling jacks 53 thus serve to adjust the leveling frame 43 with respect to the elevating frame 50 and to adjust the side cutting augers 30 and 31 into parallel relation with respect to the ground, as said side cutting augers are elevated or lowered by the elevating frame 50.

The elevating frame 50 is pivotally connected adjacent its rearward end to supports 58 extending forwardly of the support portions 25 of the turret 15. As herein shown, the supports 58 extend between the bifurcations of bifurcated rear end portions 56 of the elevating frame 50 and are pivotally connected thereto as by pivot pins 57.

The elevating frame 50 is raised and lowered about the axes of the pivot pins 57 and is maintained in various desired positions of adjustment with respect to the ground by hydraulic lift jacks, herein shown as comprising cylinders 59 pivotally connected at their head ends to the turret 15 on support ears 60 extending upwardly therefrom, and having piston rods 61 extending therefrom. The piston rods 61 are pivotally connected at their free ends to a cross frame member 62 of the elevating frame 50 between connecting ears 63, projecting rearwardly therefrom.

The gathering mechanism 27 and elevating conveyor 22 are raised and lowered about the axis of the pivot pins 26 by operation of hydraulic lift jacks comprising cylinders 64 pivotally connected to opposite sides of the elevating frame 50 and piston rods 65 extensible therefrom and pivotally connected to opposite sides of said elevating conveyor (Figure 1).

The mining head 11 is pivotally moved across the forward end of the main frame 12 by hydraulic swing jacks comprising cylinders 67 trunnioned to the main frame 12 for movement about vertical axes on trunnion supports 70 projecting laterally from side plates 73 extending along opposite sides of the conveyor 19. Piston rods 75 extensible from the cylinders 67 are pivotally connected with the support members 25 on vertical pivot pins 76.

Referring now in particular to the roll-over frame 41 and leveling frame 43 and the means for adjustably moving said roll-over frame with respect to said leveling frame and for holding said roll-over frame in position, as well as the means for reciprocably moving the roll-over frame 41 and side cutting augers 30 and 31 with respect to the elevating frame 43 during the mining operation, the roll-over frame 41 has spaced shaft portions 77 and 79, respectively journaled in the bearings 44 and 45 and has an intermediate splined portion 80 between said shaft portions and of a larger diameter than said shaft portions. The intermediate splined portion 80 is slidably engaged by the splines of an internally splined collar 81 extending about said splined portion and having an ear 83 extending radially therefrom through a slot 85 in an arcuate bottom wall portion 86 of the leveling frame 43. The ear 83 extends between the furcations of a bifurcated connector 87 on the outer end of a piston rod 88, and is pivotally connected thereto as by a pivot pin 89. The piston rod 88 is extensible from a cylinder 90 pivotally connected at its outer end to spaced ears 91 on a pivot pin 93 extending through connecting ears 94 extending outwardly from the head of the cylinder 90.

A motor 95 is shown in Figures 6 and 7 as being mounted on the rear wall of the leveling frame 43 for reciprocably moving the roll-over frame 41 and mining head 11 with respect to the leveling frame 43. The motor 95 may be a fluid pressure operated motor and is provided with a motor pinion 96 driving a worm 97 through an intermediate spacer gear 99 meshing with a gear 100 on a shaft 101 for the worm. The shaft 101 is journaled at its ends in opposite side walls of a gear housing 103, and meshes with a worm gear 104. The worm gear 104 is shown in Figure 7 as being keyed or otherwise secured to a vertically extending crankshaft 105 journaled in the housing 103, as by ball bearings 106, and having a crank 107 on its lower end spaced beneath the housing 103. The crank 107 has a crank pin 109 journaled in one end of a connecting link 110. The connecting link 110 is shown as having a bifuracted rear end portion extending along opposite sides of and connected with one end of a lever 111 by a pivot pin 112. The lever 111 is connected at its opposite end to the rear wall of the leveling frame 43 on the opposite side of the pivotal axis of the roll-over frame 41 from the connecting link 110 by a link 113. The link 113 is pivotally connected to the leveling frame 43 at one end by a pivot pin 114, and pivotally connected to the level 111 at its opposite end by a pivot pin 115.

A connector 116 extends rearwardly of a shaft 117 which is mounted in the shaft portion 79 of the roll-over frame 41 in a cavity 119 extending axially along said shaft portion. A pivot pin 120 is provided to connect the lever 111 to the connector 116 and shaft 117 intermediate the ends of said lever.

The shaft 117 is mounted within the cavity 119 on spaced collars 121 and 122, spaced apart by an intermediate collar 123 and connected together by a sleeve 124. The intermediate collar 123 abuts a shoulder 125 on the shaft 117 and is maintained in engagement therewith as by a nut 126 threaded on the inner end of said shaft into engagement with the inner end of a bearing sleeve 121*a* within the collar 121. A flanged collar 127 is shown as being secured to the end of the shaft portion 79 on its flange and as extending inwardly along the cavity 119 into engagement with the outer end of the collar 122. The collar 121 abuts a shouldered portion 129 of the cavity 119. Thus, upon operation of the motor 95 and oscillating movement of the lever 111, the roll-overframe 41 and side cutting augers 30 and 31 will be reciprocably moved with respect to the leveling frame 43 along the bearings 44 and 45, to free the side cutting augers 30 and 31 during rotation thereof and during feeding movement thereof across a coal face.

Referring now to Figures 1, 3 and 5 and the side cutting augers 30 and 31 and the drive thereto, each side cutting auger is of a similar construction, as has previously been mentioned, so the side cutting auger 30 only need herein be shown and described in detail.

The side cutting auger 30 is shown as comprising a drum 130 having the conveying scroll or spiral 32 extending along the periphery thereof for advancing the cut

and broken down coal toward the gathering devices **27**. The conveying spiral **32** has spaced cutter bits **131** extending outwardly therefrom and carried thereby and pitched to cut upon rotation of the auger in a direction, which is shown in Figure 3 as being in a counterclockwise direction. In a similar manner the scroll or conveying spiral **33** of the side cutting auger **31** has bits **133** projecting therefrom and pitched to cut upon rotation of the side cutting auger **31** in a clockwise direction.

The auger **30** is also provided with an end face **135** having spaced cutter bits **136** projecting therefrom and having a central pilot bit **137** for cutting at the inner end of the auger and accommodating the auger to advance endwise into the coal face at the initiation of the mining operation.

The drum **130** is shown as being journaled adjacent its rear end on a bearing **139** mounted on a cylindrical housing **140** extending outwardly of an end plate **141** of the motor **39**, adjacent said end plate. The drum **130** is supported adjacent its forward end on a drive member **144** keyed or otherwise secured to a drive shaft **145** journaled intermediate its ends in an end wall **146** of the housing **140** and projecting forwardly therefrom. The drive member **144** has supporting and driving engagement with an annular ring **147** extending inwardly of the periphery of the drum **130** adjacent the forward end thereof.

The drive from the motor **39** to the shaft **145** includes a clutch **150**, herein shown as being a friction disk clutch having a driving member **151** keyed or otherwise secured to the rear end of a hollow motor shaft **153** and driving a driven member **154** keyed or otherwise secured to a longitudinal shaft **155** through friction disks **156** in a manner well known to those skilled in the art so not herein shown or described further.

The drive shaft **155** is coaxial with and extends through the center of the hollow motor shaft **153** beyond the forward end of said hollow motor shaft and has a pinion **157** on its forward end having driving connection with the drive shaft **145**, through a geared reduction train **159**.

The cuttings confining shield **29** is shown in Figures 3 and 5 as comprising an inner cuttings confining plate **160** generally conforming to the path of travel of the cutter bits **131**, and having a bar **161** extending along the lower end thereof and slidably engageable with the ground. The plate **160** is reinforced by an outer plate **163** extending downwardly from the plate **160** from a position adjacent the center thereof for a portion of the length thereof and then angularly inwardly to the bar **161** and spaced from the plate **160** by a reinforcing spacer **164**. The plate **160** is shown in Figure 5 as having spaced arms **165** and **166** extending inwardly therefrom. The arm **165** is bolted or otherwise secured to a ring **167** rotatably carried on the rear end portion of the motor shell **35**. In a like manner the arm **166** is bolted or otherwise secured to a ring **169** rotatably carried at the opposite end of the motor shell **35** at the rear end portion of the drum **130**. The cuttings confining shield **29** is thus pivotally mounted on the motor **35** to freely engage and slide along the ground as the mining head **11** is adjustably moved, by adjustable movement of the roll-over frame **41** to confine the cuttings to be conveyed by the conveying spiral or scroll **32** to the gathering devices **27**, to be picked up thereby.

In operation of the machine, the mining head may first be adjusted to the height of the coal seam to be mined by adjustable movement of the roll-over frame **41** operated by the admission of fluid under pressure to the proper end of the cylinder **90**, with the side cutting auger **31** positioned above the side cutting auger **30**, as previously described. During adjustable movement of the roll-over frame **41** and mining head **11** about the axis of said roll-over frame, the elevating frame **50** may be raised or lowered by operation of the hydraulic cylinders **59** and the mining head may be leveled with respect to the ground by operation of the cylinders **53**.

When the mining head is adjusted to the height of the coal seam and is in the proper relation with respect to the ground, the turret **15** may be swung to the extreme right hand position shown by broken lines in Figure 1, by the admission of fluid under pressure to the head end of the left hand cylinder **67** and the piston rod end of the right hand cylinder **67**. The motors **39** and **40** may then be started and the continuous traction tread devices **16** may also be put into operation to sump the augers **30** and **31** into the coal face to the required depth, it being understood that the side cutting auger **30** is sumped along the right hand rib of the working place.

Fluid under pressure may then be admitted to the head end of the right hand cylinder **67** and the piston rod end of the left hand cylinder **67** to laterally feed the mining head across the coal face to the left hand rib thereof, in substantially the broken line position shown in Figure 1, at which time the entire machine may be withdrawn by operation of the continuous traction tread devices **16**, to mine and clean up the left hand rib of the working place.

During the mining operation, the top side cutting auger **31** will make a generally arcuate cut in the coal face, advancing from the top to substantially the center of the face and will advance the cuttings and broken down coal to be picked up and carried away by the side cutting auger **32**, cutting from the mine floor up to substantially the center of the coal face, as shown in Figure 3. It should here be understood that the coal in the space between the bits of the side cutting augers **30** and **31** breaks away as the lateral cutting operation progresses across the coal face.

While I have herein shown and described one form in which my invention may be embodied, it should be understood that modifications and variations of the invention may be effected without departing from the spirit and scope of the novel concepts thereof.

I claim as my invention:

1. In a mining apparatus, a main frame, a mining head including a pair of laterally spaced side cutting augers, a turret pivotally mounted on said main frame and forming a support for said augers, means laterally swinging said turret for feeding said augers across a working place, a supporting connection between said turret and said side cutting augers comprising an elevating frame pivotally connected to said turret, a roll-over frame supporting said augers for adjustable movement about an axis extending longitudinally thereof, a leveling frame rotatably supporting said roll-over frame on said elevating frame and maintaining said augers in parallel relation with respect to the ground, fluid pressure operating devices interposed between said turret and elevating frame for lifting and lowering said frame, fluid pressure operating devices interposed between said elevating frame and leveling frame for leveling said augers with respect to the ground, a fluid pressure operating device interposed between said leveling frame and said roll-over frame for pivoting said roll-over frame and augers in accordance with the thickness of the seam to be mined and cuttings confining means adjustably mounted on the retreating of said side cutting augers for engagement with the ground by gravity upon adjustable movement of said side cutting augers with respect to the ground for confining the cuttings to be conveyed toward said frame by the retreating of said side cutting augers.

2. In a mining apparatus, a mobile main frame, a side cutting mining head having two laterally spaced side cutting mining augers, means for rotatably driving said augers, a support for said augers on said main frame including a turret, means for laterally moving said turret across the front of said main frame for feeding said augers across a working place, means for supporting said augers on said turret including a roll-over frame supporting said augers for adjustable movement about an axis extending longitudinally thereof and spaced therebetween, means selectively operable for rotatably moving

said roll-over frame and augers to adjust said augers to seams of varying thickness, and means for reciprocably moving said augers in the direction of the axis of rotation of said roll-over frame comprising a motor, a crank driven by said motor, a lever arm oscillatably driven by said crank, and a drive connection between said lever arm and said roll-over frame concentric with the axis of rotation thereof.

3. In a mining apparatus, a mobile main frame, a side cutting mining head having two laterally spaced side cutting mining augers, means for rotatably driving said augers, a support for said augers on said main frame including a turret mounted on said main frame for movement across the front thereof, means for pivotally moving said turret and feeding said augers across said main frame, an elevating frame mounted on said turret, means for raising and lowering said elevating frame, a leveling frame mounted on said elevating frame and extending in advance thereof, means for adjustably moving said leveling frame with respect to said elevating frame, a roll-over frame pivotally mounted on said leveling frame for movement with respect thereto about an axis extending longitudinally of said augers and spaced therebetween, and for movement along the axis of said roll-over frame, said roll-over frame having said augers mounted on opposite sides thereof, means for adjustably moving said roll-over frame with respect to said leveling frame for selectively adjusting said augers to the seam to be mined, and means for reciprocably moving said augers during operation thereof comprising a motor on said leveling frame, a crank driven by said motor, a lever pivoted to said leveling frame at one end and oscillatably driven by said crank at its opposite end, and a drive connection between said lever and said roll-over frame concentric with the axis of rotation thereof.

4. In a mining apparatus, a mobile main frame, a side cutting mining head having two laterally spaced side cutting mining augers, means for rotatably driving said augers, a support for said augers on said main frame including a turret mounted on said main frame for movement across the front thereof, means for pivotally moving said turret and feeding said augers across said main frame, an elevating frame mounted on said turret, means for raising and lowering said elevating frame, a leveling frame mounted on said elevating frame and extending in advance thereof, means for adjustably moving said leveling frame with respect to said elevating frame, a roll-over frame pivotally mounted on said leveling frame for movement with respect thereto about an axis extending longitudinally of said augers and spaced therebetween, and for movement along the axis of said roll-over frame, said roll-over frame having said augers mounted on opposite sides thereof, means for adjustably moving said roll-over frame with respect to said leveling frame for selectively adjusting said augers to the seam to be mined, means for reciprocably moving said augers during operation thereof comprising a motor on said leveling frame, a crank driven by said motor, a lever pivoted to said leveling frame at one end and oscillatibly driven by said crank at its opposite end, and a drive connection between said lever and said roll-over frame concentric with the axis of rotation thereof comprising a shaft mounted in said over-roll frame for rotation with respect thereto about the axis of rotation thereof, means restraining axial movement of said shaft with respect to said roll-over frame, and an operative connection between said shaft and lever, intermediate the ends thereof.

5. In a mining apparatus, a mobile main frame, a side cutting mining head including two connected and laterally spaced side cutting mining augers, means for rotatably driving said augers in opposite directions, a support for said augers on said main frame including a turret pivoted to said main frame for movement across the front thereof, an elevating frame mounted on said turret, a leveling frame mounted on said elevating frame and extending in advance thereto, a roll-over frame pivotally mounted on said elevating frame for movement with respect thereto about an axis extending longitudinally of said augers and spaced therebetween and for movement along the axis of rotation of said roll-over frame, said augers extending along opposite sides of said roll-over frame beyond the forward end thereof, means for reciprocably moving said augers during rotation thereof comprising a motor on said leveling frame, a crank rotatably driven thereby, a lever pivotally mounted on said leveling frame, a drive connection from said crank to said lever for oscillatably driving said lever, a drive connection from said lever to said roll-over frame concentric with the axis of rotation thereof, means for adjustably moving said roll-over frame and retaining said roll-over frame in various desired positions of adjustment comprising a collar having splined driving engagement with said roll-over frame and accommodating axial movement of said roll-over frame with respect to said collar, and a fluid operated jack pivotally mounted on said elevating frame and having operative connection with said collar for adjustably moving said collar and roll-over frame.

6. In a mining apparatus, a side cutting mining head having two laterally spaced side cutting mining augers, support means for said augers comprising a roll-over frame disposed between said augers and having supporting engagement therewith, means supporting said roll-over frame for movement about an axis extending longitudinally of said augers and spaced therebetween, fluid pressure operated means selectively operable to adjustably move said roll-over frame and augers about the longitudinal axis thereof, means for driving said augers comprising an individual motor for each auger forming a rearward continuation thereof, and a geared drive connection from each motor to an associated auger.

7. In a mining apparatus of the class described, a mobile main frame, a side cutting mining head supported on said main frame in advance thereof for lateral movement across the forward end thereof and for vertical adjustable movement about an axis extending longitudinally of said frame, a conveyor extending along said frame, gathering mechanism for picking up loose material from the ground and depositing it onto said conveyor, said side cutting mining head comprising laterally spaced advance and retreating side cutting augers and power means for driving said augers, and a cuttings confining shield movably mounted on said mining head for adjustable movement with respect thereto by gravity to maintain said shield in engagement with the ground upon vertical movement of said auger with respect to the ground and extending along the retreating of said augers and confining the material mined thereby to the path of the spiral of said auger, to be conveyed by said auger to said gathering mechanism.

8. In a mining apparatus of the class described, a mobile main frame, a side cutting mining head supported on said main frame in advance thereof, for lateral movement with respect thereto and for vertical adjustable movement about an axis extending longitudinally of said mining head, a conveyor extending along said main frame, gathering mechanism for picking up loose material from the ground and depositing it onto said conveyor, said side cutting mining head comprising laterally spaced parallel advance and retreating side cutting augers and power means for driving said augers, a cuttings confining shield extending along the retreating side of the retreating of said augers for confining the cuttings thereto to be conveyed thereby to said gathering mechanism, and means pivotally mounting said confining shield on said mining head to engage the ground by gravity upon vertical movement of said mining head with respect to the ground.

9. In a mining apparatus of the class described, a mobile main frame, a side cutting mining head supported on said main frame in advance thereof for lateral move-

ment across the forward end thereof and for vertical adjustable movement with respect thereto about an axis extending longitudinally of said frame, a conveyor extending along said frame, gathering mechanism for picking up loose material from the ground and depositing it onto said conveyor, said side cutting mining head comprising laterally spaced parallel advance and retreating side cutting augers having individual motors for driving the same and conveying spirals extending therealong for advancing the cuttings toward said gathering mechanism, a cuttings confining shield carried by said mining head and extending along the retreating of said augers, and means pivotally mounting said cuttings confining shield on said mining head for pivotal movement about an axis coaxial with the axis of rotation of the retreating of said augers and accommodating said cuttings confining shield to have free engagement with the ground upon vertical adjustment of said mining head with respect to the ground.

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