July 31, 1962 E. R. BERGMANN 3,047,279

SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

Filed Feb. 2, 1959 5 Sheets-Sheet 1

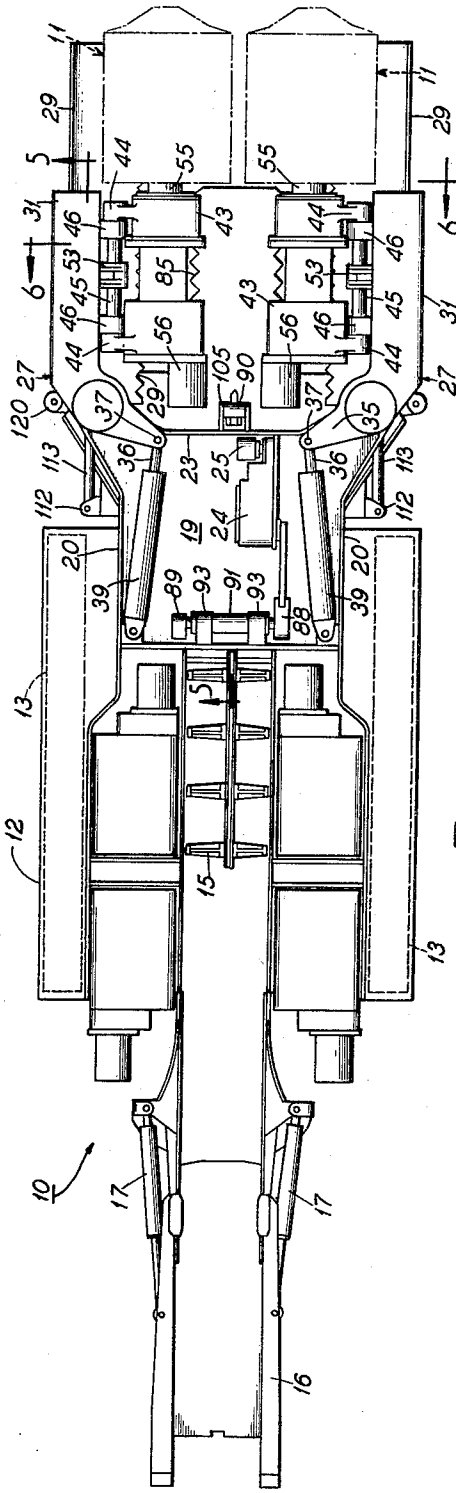


Fig. 1

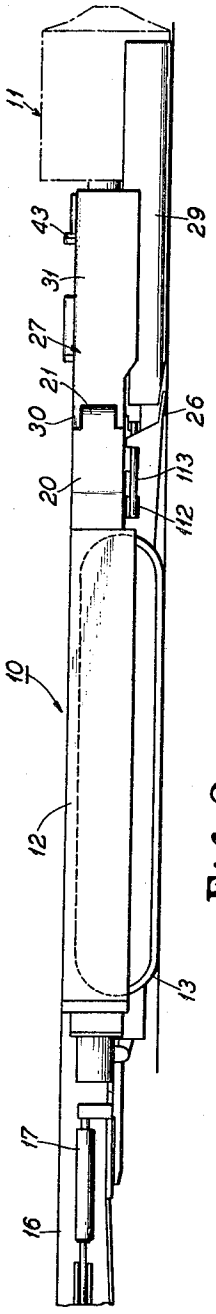


Fig. 2

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SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

Filed Feb. 2, 1959 5 Sheets-Sheet 2

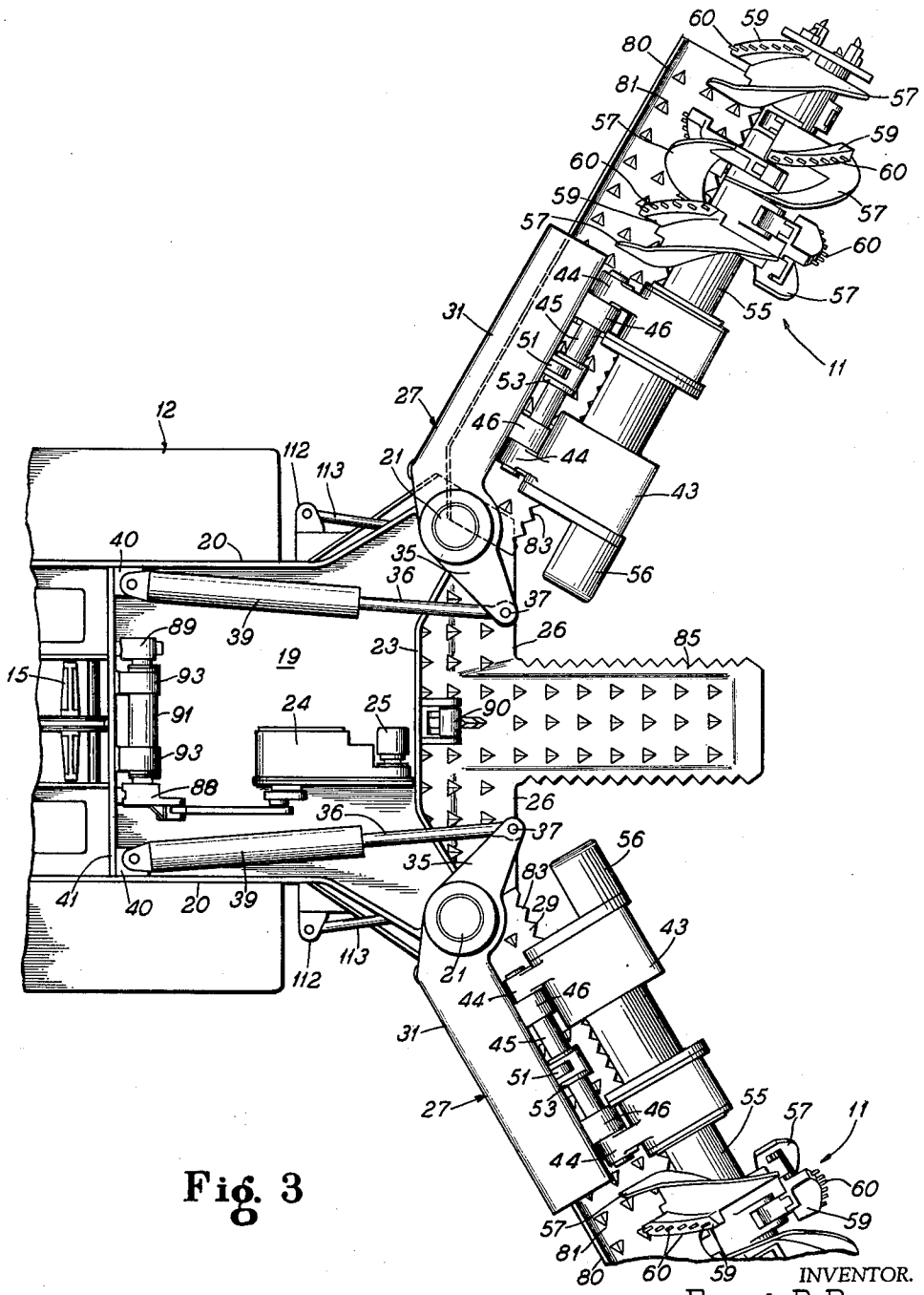


Fig. 3

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SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

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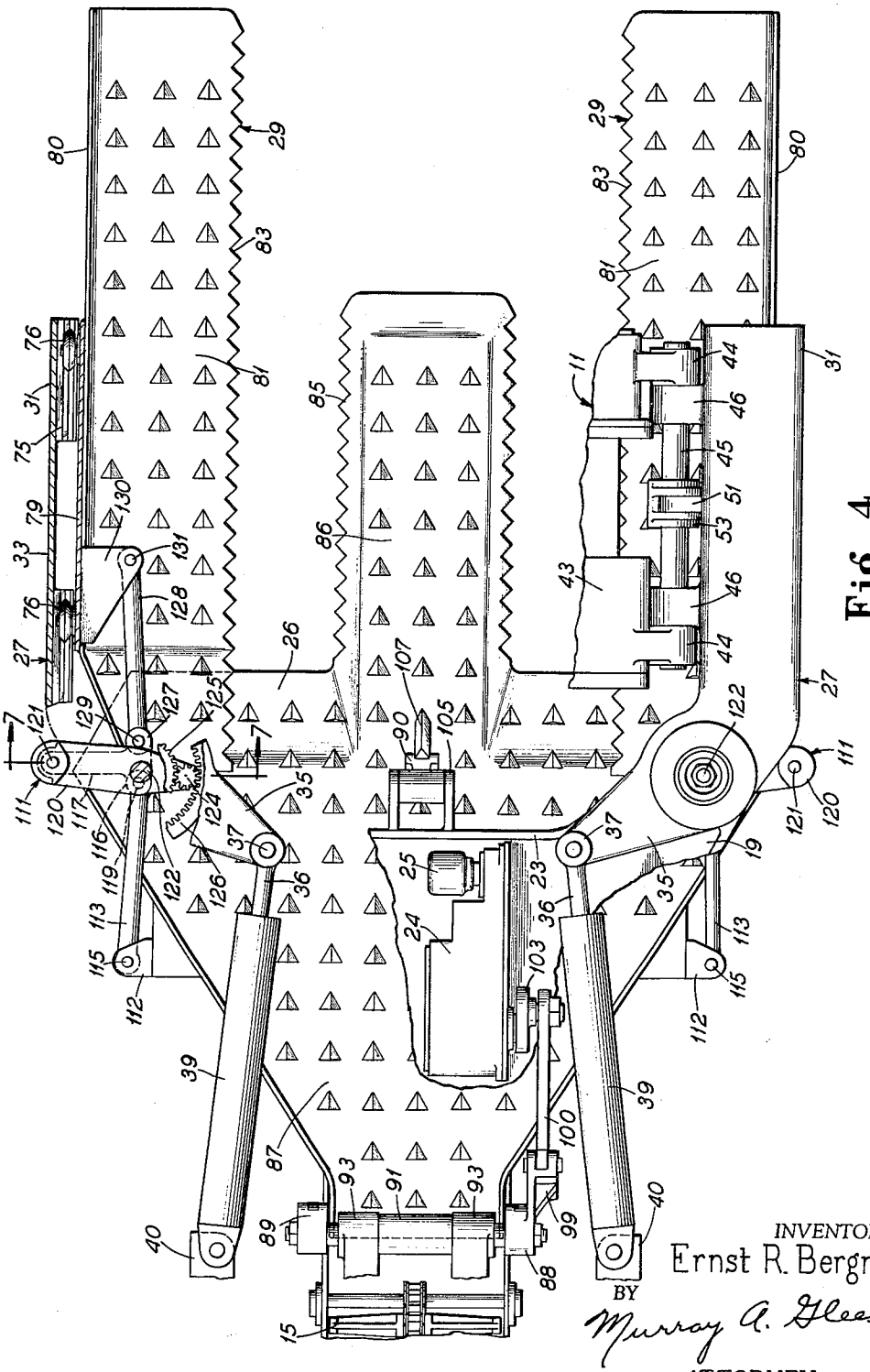


Fig. 4

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SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

Filed Feb. 2, 1959 5 Sheets-Sheet 4

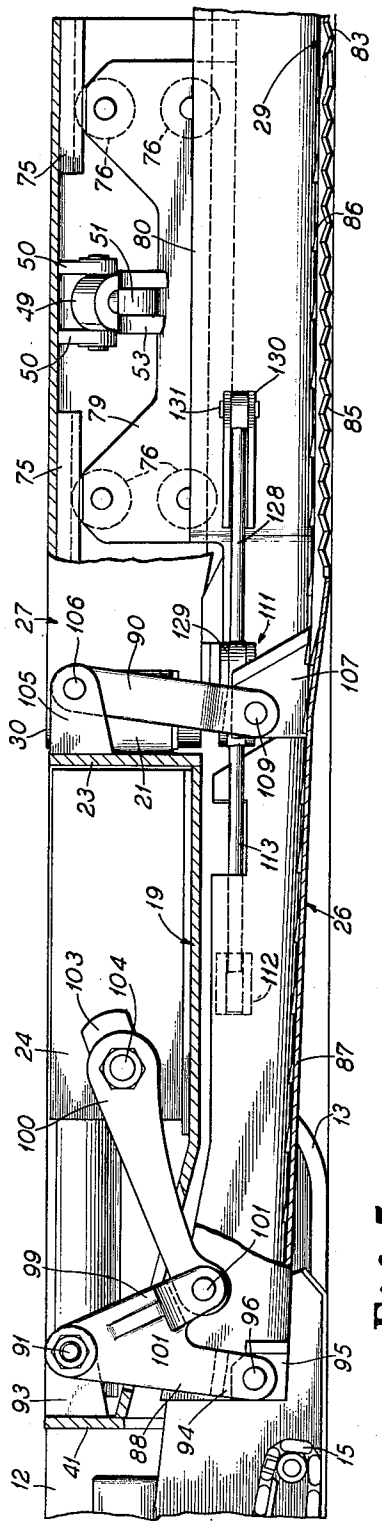


Fig. 5

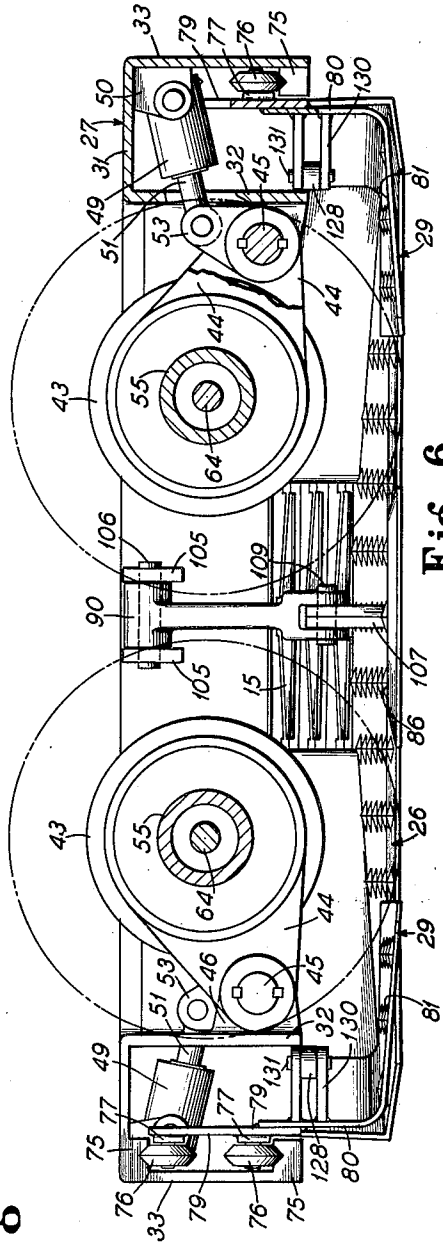


Fig. 6

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SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

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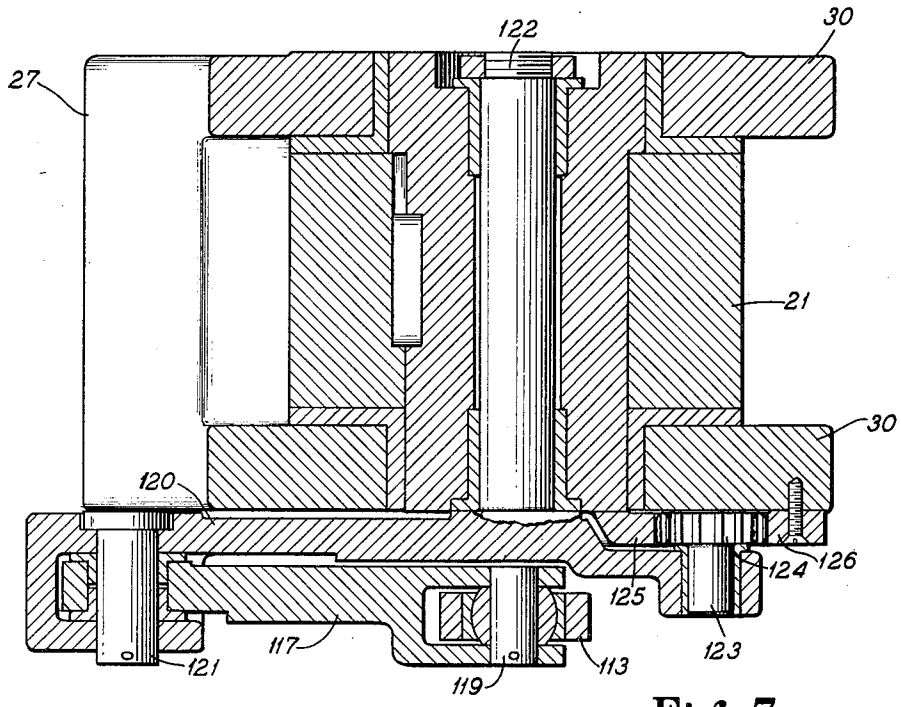


Fig. 7

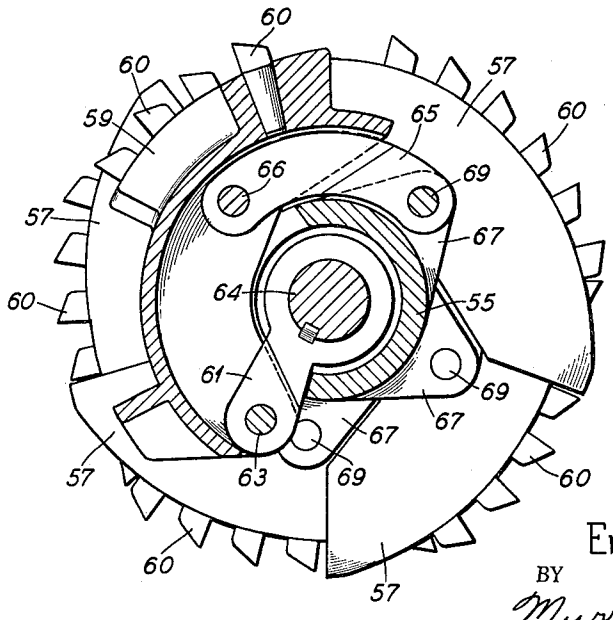


Fig. 8

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United States Patent Office 3,047,279 Patented July 31, 1962

3,047,279

SCISSORS TYPE CONTINUOUS MINING AND LOADING MACHINE

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Filed Feb. 2, 1959, Ser. No. 790,666
9 Claims. (Cl. 262—19)

This invention relates to improvements in mining machines of the continuous mining and loading type and more particularly relates to such machines as are adapted for operation in thin seams of coal and the like.

A principal object of the invention is to provide an improved continuous mining and loading machine for mining and loading in a continuous operation and arranged with a view toward simplicity and compactness in construction and efficiency in operation.

A further object of the invention is to provide an improved form of continuous mining machine particularly adapted for operation in coal and the like of low vertical height in which mining of the seam is carried out by side cutting mining heads advancing from the ribs of the working place toward the center of the machine during the mining operation, and having a more efficient form of cuttings collecting means for advancing the cuttings for loading during the mining operation.

A still further object of the invention is to provide an improved form of continuous mining machine operating on the side cutting principle by advancing individual mining heads from the ribs of the working place toward the center thereof, in which the mining heads are 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 low seams of coal in which the seam is mined by two side cutting augers movable laterally across a working face from the ribs to the center thereof, and utilizing a simplified and improved form of loading means operating on the shaker principle, following the mining heads and picking up and transporting the material for discharge beyond the rear of the machine.

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:

FIG. 1 is a plan view of a side cutting continuous mining machine constructed in accordance with the principles of the present invention;

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

FIG. 3 is an enlarged plan view of the forward end portion of the machine showing the side cutting mining heads in laterally extended positions with respect to the machine;

FIG. 4 is a fragmentary plan view of the forward part of the machine with the mining heads removed and showing the supports therefor in inwardly extended positions with respect to the center of the machine, with certain parts broken away and certain other parts shown in horizontal section;

FIG. 5 is an enlarged fragmentary sectional view taken substantially along line 5—5 of FIG. 1, in order to illustrate certain details of the pick-up and loading mechanism for the mined material;

FIG. 6 is a fragmentary sectional view taken substantially along line 6—6 of FIG. 1 and illustrating the supports for the side cutting augers and means for adjusting the augers with respect to the mine floor;

FIG. 7 is a fragmentary sectional view taken through the pivot for one of the side cutting augers substantially along line 7—7 of FIG. 4; and

FIG. 8 is a transverse sectional view taken through one of the side cutting augers and showing the auger in a retracted travelling position.

In the embodiment of the invention illustrated in the drawings, I have shown in FIGURES 1 and 2, a mining machine 10 of the side cutting continuous mining type, adapted to cut and load an entire seam of coal and the like by advancing two mining heads 11, 11 into the working face when positioned laterally, as shown in FIGURE 3 and by feeding said mining heads across the working face toward the center thereof.

The mining machine 10 includes generally a main frame 12 mounted on a pair of laterally spaced continuous traction tread devices 13, for propelling the machine from working place to working place and for advancing the machine into a working face to feed the side cutting mining heads 11 thereinto. The continuous traction tread devices 13 may be independently driven in a manner well known to those skilled in the art and are no part of the present invention, so need not herein be shown or described further.

A conveyor 15 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 15 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 16 of the conveyor by the operation of hydraulic swing jacks 17, as is well known to those skilled in the art so not herein shown or described further.

The main frame 12 has a shelf-like support structure 19 spaced above and extending in advance of the receiving end of the conveyor 15, and extending between the continuous traction tread devices 13 in advance of the forward ends thereof. The shelf-like support structure 19 has an outwardly flared forward end portion and has stiffening side walls 20 extending along opposite sides thereof and along the outwardly flared forward end portion thereof, and terminating in bearing bosses 21, at opposite corners of the outwardly flared forward end portion of the shelf-like support structure 19 (FIGS. 2, 3 and 5). A vertical wall 23 extends along the forward end of the shelf-like support structure 19 and upwardly therefrom and also terminates into the bearing bosses 21 at its opposite ends.

The shelf-like support structure 19 forms a support for a reciprocating drive mechanism 24 and drive motor 25 therefor, for reciprocably driving a flared feeder trough section 26 suspended from said shelf-like support structure and extending across the forward end of the machine.

The shelf-like support structure 19 also forms a support for two laterally spaced transverse feeder frames 27, pivotally mounted on the bosses 21 and forming supports for the side cutter mining heads 11 and reciprocating loading pans 29, slidably supported thereon and extending along the trailing sides of the side cutting mining heads 11, for picking up and advancing the mined material to the reciprocating loading trough section 26.

Each feeder frame 27 is of a generally box-like construction in cross section and has a bifurcated rear end portion 30 extending along opposite sides of the boss 21 and pivotally mounted thereon, for movement about the vertical axis of said boss. The feeder frame 27 has a

generally longitudinally extending support arm 31, extending laterally and longitudinally forwardly of the boss 21, when the mining heads are in the position shown in FIG. 1, and having an inner side wall 32 forming a support for the side cutter mining head 11, and an outer side wall 33 forming a support for a reciprocating loading pan 29. The feeder and support frame 27 also has an inwardly extending arm 35 extending inwardly of the pivot of said feeder frame and having a piston rod 36 pivotally connected thereto on a pivot pin 37. The piston rod 36 is extensible from a hydraulic cylinder 39, pivotally mounted at its head end on a bracket 40 extending inwardly of the side wall 20 of the shelf-like support structure 19, and of a rear wall 41 of said shelf-like support structure. The cylinder 39 and piston rod 36 thus form a hydraulic jack unit for swinging the feeder frame 27 laterally and for retaining said feeder frame in the laterally extended position shown in FIG. 3 to accommodate sumping of the side cutter mining heads 11 into the working face prior to swinging said side cutter mining heads inwardly toward the longitudinal center of the machine.

The side cutter mining heads 11 carried by the arms 31 are like those shown and described in a companion application Serial No. 790,253, filed January 30, 1959, now Patent No. 2,954,220, and include generally a gear and support housing 43 spaced inwardly of the arms 31 and mounted thereon for vertical swinging movement with respect thereto to adjust the positions of cutting of the side cutter mining heads. The gear and support housing 43 has spaced ears or arms 44 extending inwardly therefrom and keyed or otherwise secured at their inner ends to a longitudinally extending shaft 45 pivotally mounted on the wall 32 of the arm 31 on spaced bearing supports 46 extending inwardly of the wall 32 toward the center of the machine as shown in FIGS. 1 and 6.

The shaft 45 is pivoted and held in position to vertically move the associated side cutting mining head 11 by means of a hydraulic cylinder and piston unit including a cylinder 49 pivotally mounted at its head end between the side plates 32 and 33 on spaced support ears 50 extending inwardly of the side wall 33 and downwardly of the top wall of the arm 31 and having a piston rod 51 extensible therefrom and pivotally connected at its free end to a rocking arm 53 keyed or otherwise secured to the shaft 45. The admission of fluid under pressure to the head or piston rod ends of the cylinder 49 may thus elevate or lower the housing and support 43 about the axis of the shaft 45 to vary the cutting plane of the side cutter mining head 11, and to hold said side cutter mining head in the desired cutting position.

The housing and support 43 has a shaft 55 journaled therein and extending forwardly therefrom and driven by a motor 56 mounted on the rear end of said housing and support and shown as projecting rearwardly therefrom. The drive from the motor 56 to the shaft 55 may be like that shown in my Patent No. 2,954,200 so need not herein be shown or described further.

The shaft 55 is shown as having a plurality of parallel spaced helical segmental vanes 57 and 59 mounted thereon and extending therealong for substantially the length thereof. The vanes 57 form spiral conveying vanes for conveying the mined material rearwardly along the mining head while the vanes 59 have a plurality of cutter bits 60 mounted therein and extending therealong for a portion of the length thereof and form the side cutting augers, for cutting the material from the solid working face from the mine floor to the mine roof, to completely mine out the working face in a sumping and laterally inward cutting operation.

Each set of segmental helical vanes 57 and 59 may be integrally formed and is mounted on the shaft 55 for expansible movement with respect thereto to vary the cutting diameter of the mining head, as in my Patent No. 2,954,220. As shown in FIGURES 3 and 8, the segmental helical vanes 57 and 59 are pivotally mounted at their advance ends on lever arms 61 on pivot pins 63. The lever arms 61 in turn are keyed or otherwise secured to a shaft 64, coaxial with the hollow drive shaft 55, and relatively movable with respect to said hollow drive shaft to vary the cutting diameters of the boring head. The trailing ends of the segmental helical vanes 57 and 59 are pivotally connected to arcuate links 65 on pivot pins 66. The opposite ends of the arcuate links 65 are pivotally connected to lever arms 67, extending outwardly from the drive shaft 55, on pivot pins 69. It will be noted that the axis of each pivot pin 66 is in advance of the trailing end of its associated helical segmental vane and is so located with respect to the pivot pins 69 and the pivot pins 63 that the vanes 57 and 59 will expand and contract on substantially uniform arcs as the arm 61 is pivoted by pivotal movement of the shaft 64, as in my Patent No. 2,954,220.

The arms 31 of the feeder frames 27 also form slidable supports for the loading pans 29 on pairs of spaced facing generally V-shaped guides 75 extending inwardly from the walls 33 thereof and having supporting and guiding engagement with pairs of vertically and longitudinal spaced rollers 76, mounted on bosses 77 extending outwardly from plates 79, and having V-shaped faces conforming to the guiding faces of the guides 75.

Each plate 79 extends upwardly from and is welded or otherwise secured to a vertically extending side wall 80 of the loading pan 29. The side wall 80 terminates at its lower end portion into a lagged conveying face 81 of the loading pan 29, and extends along the loading pan for substantially the length thereof, as shown in FIGS. 1, 2 and 4.

Each loading pan 29 also has an advance serrated edge 83 having sliding engagement with the ground for digging under the mined coal falling on the ground, to retain the loading pan to the ground and agitating the loose coal sufficiently to cause the coal to be advanced onto the loading face 81 of the loading pan, to be progressed rearwardly along the loading pan onto the flared reciprocating trough section 26.

The loading surfaces or faces 81 of the loading pans 29 are inclined downwardly from the retaining walls 80 thereof at relatively flat angles, to cause the material progressed onto the loading pans, to force the serrated edges 83 to dig into the mined material, and are inclined upwardly at their rear ends to overlap the forward end of the flared reciprocating trough section 26, to progress the mined material onto said reciprocating trough section as the loading pans 29 are reciprocably driven, in a manner which will hereinafter be more clearly described as this specification proceeds.

The flared trough section 26 slidably engages the ground at its forward end and is inclined upwardly with respect to the ground in material discharge relation with respect to the conveyor 15, at its rear end. As herein shown, the trough section 26 has a bill or tongue 85 projecting forwardly from its central forward end portion and forming a forward continuation thereof between the loading pans 29. The tongue 85 has opposite serrated edges for agitating the loose material on the ground, to be picked up by a lagged conveying surface 86 of said tongue, extending therealong and merging into a lagged conveying surface 87 of the flared trough section 26.

The flared trough section 26 is reciprocably suspended adjacent its rear end on rocking arms 88 and 89, depending from the platform or shelf-like support 19, and is suspended adjacent its forward end on a rocking arm 90 depending from the forward end portion of the platform or shelf-life support 19. The rocking arms 88 and 89 are shown as being mounted on opposite ends of a transverse shaft 91, journaled in bearing bosses 93, projecting forwardly of the rear wall 41 of the support or platform 19.

The arm 88 is in the form of a bellcrank and has the arm 94 pivotally connected to an upstanding ear 95, on a pivot pin 96. The rocking arm 89 is similarly connected to the trough section 26 in laterally spaced relation with respect to the rocking arm 88. The rocking arm 88 also has an arm 99 extending at an angle with respect to the arm 95 and pivotally connected to a drive link 100 by a pivot pin 101. The drive link 100 is connected to a crank 103 of the shaker drive mechanism 24 as by a pivot pin 104.

The arms 88 and 89 may both be keyed or otherwise secured to the shaft 91 so that upon rotation of the crank 103 the two arms will reciprocably drive the trough section 26 with a shaker conveyor motion, progressing the mined material upwardly along the trough section 26 for discharge onto the conveyor 15. The shaker conveyor drive mechanism 24 may be of any well known form, commonly used to drive trough sections to progress material therealong from one end of the trough sections to the other, and is no part of the present invention, so need not herein be shown or described further.

The rocking arm 90 is connected between spaced ears 105 on a pivot pin 106. The ears 105 extend forwardly of the wall 23 adjacent the upper end thereof. The lower end of the rocking arm 90 is shown in FIGURE 6 as being bifurcated and as being pivotally connected to a connector ear 107, extending upwardly from the loading pan 26, adjacent the center thereof, on a pivot pin 109.

The shaker drive from the drive mechanism 24 to the loading pans 29 is through angle drives 111 driven from the flared trough section 26 and providing a substantially uniform shaker conveying action for the loading pans 29 in all positions of lateral adjustment of said loading pans with respect to the flared trough section 26. The drive from the trough section 26 to each loading pan is the same, so the drive to one loading pan only need herein be shown and described in detail.

As shown in FIGURE 4, a connector ear 112 extends laterally from the trough section 26 along the flared portion thereof and provides a pivotal support for a drive link 113, on a pivotal pin 115. The opposite end of the drive link 113 is connected with an arm 116 of a rocking arm 117 on a pivot pin 119. The rocking arm 117 is pivotally mounted at its outer end on a compensating arm 120 on a pivot pin 121. The compensating arm 120 in turn is pivotally mounted on the boss 21 on a vertical shaft 122, journaled in said boss. The compensating arm 120 has a shaft 123 journaled thereon, at the end thereof opposite the pivot pin 121, and depending therefrom. A pinion 124 on said shaft meshes with a stationary rack 125, shown as being formed integrally with the boss 21. The pinion 124 also meshes with a movable rack 126 spaced beneath and mounted on the underside of the lever arm 35 of the feeder frame 27. The lever arm 117 also has an arm 127 extending in an opposite direction from the arm 116 thereof, and having a drive link 128 pivotally mounted thereon on a pivot pin 129. The drive link 128 in turn is pivotally connected with a connector 130 extending inwardly of the vertical side plate 79 of the loading pan 29, on a pivot pin 131. Reciprocating movement of the flared trough section 26 is thus transferred to the loading pan 29, and as the angle of the loading pan 29 with respect to the flared trough section 26 changes, due to laterally swinging movement of the feeder frame 27, the pivot of the lever 117 will change, to compensate for the variations in angular relation between the loading pan 29 and the flared trough section 26, to provide a substantially uniform shaker conveyor drive to the loading pan 29 in all positions of adjustment thereof with respect to the flared trough section 26.

In operation of the machine, the feeder frames 27 are first moved to the laterally extended position shown in FIGURE 3. The side cutter mining heads 11 are then held in stationary relation with respect to the working face, by the holding of fluid under pressure in the head ends of the cylinders 39. The side cutter mining heads 11 may then be rotatably driven by the drive motors 56 and the entire machine may be advanced into the working face by operation of the laterally spaced continuous tread devices 13, feeding the mining heads 11 into the working face for the full depths thereof. During advance of the side cutter mining heads into the working face to the required depth, the motor 25 is started to reciprocably drive the flared trough section 26 and the loading pans 29, to pick up the mined material and progress it rearwardly along the loading pans 29 onto the flared trough section 26 for discharge onto the receiving end of the conveyor 15. Reciprocatory movement of the flared trough section 26 and loading pans 29 is continued for the entire mining operation.

When the side cutter mining heads 11 have been sumped into the working face for their full depth, fluid under pressure is admitted to the piston rod ends of the cylinders 39 at a controlled rate, to swing the side cutter mining heads 11 inwardly and cut out the entire seam from the mine floor to the mine roof, and to progress the mined material inwardly toward the loading tongue or pan 85 and onto the receiving end of the flared trough section 26, for loading onto the conveyor 15. This inward feeding movement is continued until the entire working face has been mined from the roof to the floor and the mined material has been cleaned from the floor.

It should here be understood that the feeder frames 27 may be moved inwardly and outwardly during lateral feeding movement and may be moved independently of each other to accommodate the entire face to be mined without interference between the mining heads and to accommodate the loading pans 29 to clean up the mined coal on the mine floor, to provide a clean floor prior to the starting of a next succeeding mining operation.

It should also be understood that when it is desired to set the side cutting mining heads 11 to operate in seams of coal of varying thicknesses that it is only necessary to admit fluid under pressure to the piston rod ends of the cylinders 49 to raise the mining heads 11 above the floor and to then adjust the mining heads 11 to the desired cutting radius by operation of the shafts 64 and crank arms 61, and to then lower the mining heads by releasing fluid under pressure from the piston rod ends of the cylinders 49 to the desired elevation with respect to the mine floor.

It should also be understood that the pivotal axes of lateral adjustable movement of the side cutting mining heads 11, are outwardly offset from the axes of rotation of said mining heads, so as to eliminate reciprocably driving the mining heads along their axes to remove the material between the bits of the mining heads, as disclosed in application Serial No. 753,763, filed August 7, 1958, by Edward L. Anderson and entitled "Mechanical Miner Having Offset Rotary Heads," and assigned to the assignee of the present invention, now Patent No. 2,979,-319, so not herein described further.

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

I claim as my invention:

1. In a continuous mining machine, a mobile main frame having a conveyor extending therealong, a reciprocating trough section reciprocably mounted at the forward end of said main frame and having an advance end portion engageable with the ground, and a rear end portion in material discharge relationship with respect to said conveyor, drive mechanism on said main frame for driving said trough section to progress material from the advance to the rear end thereof, two laterally spaced feeder frames extending forwardly of said main frame along opposite sides thereof, means pivotally mounting said feeder frames on said main frame for movement

about vertical axes, individual hydraulic cylinder and piston means connected between said main frame and said feeder frames for laterally swinging said feeder frames and for holding said feeder frames in position, a side cutting mining head extending along each of said feeder frames in advance thereof and mounted thereon for movement therewith, a loading pan reciprocably mounted on each of said feeder frames in trailing relation with respect to said mining heads and having material agitating advance edges engageable with the ground beneath said mining heads, and link and lever drive connections from said reciprocating trough section to said loading pans for reciprocably driving said loading pans in all positions of said feeder frames and loading pans with respect to said reciprocating trough section.

2. A mining machine in accordance with claim 1 wherein the link and lever drive connections comprise lever arms mounted for rocking movement about vertical axes, links connecting said reciprocating trough section to said lever arms for reciprocably driving said lever arms from said reciprocating trough section, second links connecting said lever arms with said loading pans for reciprocably driving said loading pans from said lever arms, and a compensating connection from said feeder frames to said lever arms for shifting the pivots of said lever arms in accordance with lateral swinging movement of said feeder frames, to impart a substantially uniform conveying action to said loading pans in all positions of lateral adjustment thereof with respect to said trough section.

3. A mining machine in accordance with claim 1 wherein the link and lever drive connections from said trough section to said loading pans comprises compensating arms mounted for pivotal movement about the pivotal axes of said feeder frames, a lever arm pivotally mounted in each of said compensating arms for movement about an axis spaced from the pivotal axis of the associated compensating arm, a link connecting said trough section to said lever arm in spaced relation with respect to the pivotal axis thereof, a second link connecting said lever arm to said loading pan, and means connected between said feeder frames and said compensating arms for holding said compensating arms stationary and for pivoting said compensating arms about the axes of said feeder frames upon lateral swinging movement of said feeder frames, to vary the pivots of said lever arms and thereby compensate for differences in angular relation between said loading pans and said trough section.

4. A continuous mining machine in accordance with claim 3, wherein the drive connections from the feeder frames to the compensating arms comprise a gear sector mounted on each of said feeder frames for movement therewith, a pinion mounted on each of said compensating arms for pivotal movement with respect thereto and a stationary rack meshing with said pinion.

5. In a continuous mining machine, a mobile main frame having a conveyor extending therealong, longitudinally extending side cutter mining heads spaced in advance of said main frame at opposite sides thereof, individual feeder frames for supporting said mining heads and feeding said mining heads laterally with respect to said main frame, means pivotally mounting said feeder frames on said main frame for pivotal movement about vertical axes at opposite sides of said main frame, individual hydraulic cylinder and piston means connected between said main frame and said feeder frames for laterally swinging said feeder frames and for holding said feeder frames in position, loading pans reciprocably guided in said feeder frames at the trailing sides of said mining heads and extending therealong and having trailing retaining walls and advance agitating edges engageable with the ground beneath said mining heads, means for reciprocably driving said loading pans to progress the mined material toward said conveyor, means mounting said mining heads on said feeder frames for vertical movement with respect to said loading pans about axes extending longitudinally of said feeder frames, hydraulic cylinder and piston means connected between said feeder frames and mining heads for vertically adjusting said mining heads with respect to said loading pans and for holding said mining heads in adjusted relation with respect to said loading pans, and means for varying the cutting diameters of said mining heads for accommodating said mining heads to mine seams of coal of varying thicknesses.

6. In a continuous mining machine, a mobile main frame having a conveyor extending therealong, a trough section having a flared forward end engageable with the ground and a rear portion in material discharge relation with respect to said conveyor, mounted on said frame for reciprocable movement with respect thereto, drive mechanism on said main frame for reciprocably driving said trough section to progress material toward the rear end of said trough section, laterally spaced side cutter mining heads spaced in advance of said main frame and trough section and extending longitudinally of said main frame at opposite sides thereof, feeder frames for supporting said mining heads and moving said mining heads laterally with respect to said main frame and reciprocating trough section, means pivotally mounting said feeder frames on said main frame for pivotal movement about vertical axes at opposite sides of said main frame, means for mounting said mining heads on said feeder frames for vertical movement with respect thereto about axes extending longitudinally of said feeder frames, hydraulic cylinder and piston means for vertically moving said mining heads with respect to said feeder frames and for holding said mining heads in vertically adjusted relation with respect to the ground, other hydraulic cylinder and piston means for moving said feeder frames and mining heads laterally and holding said feeder frames and mining heads in laterally extended positions with respect to said main frame, to accommodate sumping of said side cutter mining heads into a mine face, individual loading pans reciprocably mounted on each of said feeder frames in trailing relation with respect to said mining heads and having agitating forward end portions engageable with the ground, means for reciprocably driving said loading pans from said trough section, said trough section having a tongue projecting forwardly therefrom between said loading pans and having opposite agitating edges for agitating the mined material, and said loading pans progressing the mining material toward said tongue to be picked up thereby upon lateral movement of said mining heads.

7. In a mining apparatus, a main frame, a pair of side cutting mining heads extending in advance of said main frame and supported thereon for pivotal movement about laterally spaced vertical axes and including laterally movable feeder frames extending forwardly of said main frame and side cutting augers mounted thereon on the inner sides thereof and extending in advance thereof, means for retaining said feeder frames and mining heads in laterally extended positions with respect to said main frame, to accommodate advancing movement of said main frame to feed said mining heads into a working face, and for feeding said feeder frames and mining heads laterally of the working face toward each other, reciprocable conveyor means extending across the forward end of said main frame for picking up the material mined by said mining heads, individual loading pans mounted on said feeder frames for reciprocable movement with respect thereto and extending along said feeder frames into engagement with the ground, means for driving said reciprocable conveyor means, and drive connections from said reciprocable conveyor means to said loading pans for reciprocably driving said loading pans upon reciprocable movement of said conveyor means, for collecting and ad-

vancing the mined material onto and rearwardly along said main frame,

8. In a continuous mining and loading machine of the class described, a mobile main frame, a conveyor extending along said main frame from a position adjacent the ground at the forward end thereof beyond the rear end thereof, two independently movable laterally swingable side cutting mining heads spaced in advance of said main frame, two angularly movable feeder frames pivotally mounted on said main frame for movement about vertical axes at opposite sides of said conveyor adjacent the receiving end portion thereof, power means for angularly moving said feeder frames about the forward end of said main frame and for holding said feeder frames in position, conveyor means extending along said feeder frames for advancing the mined material to said conveyor, each mining head including a support housing having a side cutting auger journalled thereon and projecting from the forward end thereof, a shaft mounted on each feeder frame on the inner side thereof and extending longitudinally therealong, each support housing having an arm projecting radially therefrom and mounted on an associated shaft, and hydraulic cylinder and piston means connected between each feeder frame and an associated support housing for pivotally moving the associated side cutting mining heads relative to said feeder frames, about the axes of said shafts, and for retaining said mining heads in fixed relation with respect to said shafts.

9. In a continuous mining machine, a mobile main frame having a conveyor extending therealong from a position adjacent the ground at the forward end of said main frame and beyond the rear end thereof, two independently movable longitudinally extending side cutting mining heads spaced in advance of said main frame, individual feeder frames for supporting each side cutting mining head and feeding said mining heads from positions disposed laterally of said main frame across the forward end thereof, means pivotally mounting said feeder frames on said main frame for pivotal movement about

vertical axes at opposite sides of said conveyor adjacent the forward end thereof, individual hydraulic cylinder and piston means connected between said main frame and said feeder frames for laterally swinging said feeder frame and for holding said feeder frames in position, conveyor means connected with said feeder frames for movement therewith and extending along said feeder frame toward the rear end thereof for advancing the mined material toward said conveyor, said mining heads each including a support housing having a side cutting auger journalled therein and projecting forwardly thereof, means mounting said support frames and mining heads on said feeder frames for vertical adjustable movement with respect to said conveyor means about axes extending longitudinally of said feeder frames comprising shafts mounted on said feeder frames on the inner sides thereof and extending longitudinally thereof, arms projecting radially of said support housings and mounted on said shafts, and hydraulic cylinder and piston means pivotally mounted on each feeder frame for movement about an axis parallel to the axis of the associated shaft and having pivotal connection with said support housing for vertically adjusting the associated mining head with respect to the ground and for holding the mining head in adjusted relation with respect to said conveyor means.

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