Sept. 21, 1943. F. CARTLIDGE 2,329,875

MINING MACHINE

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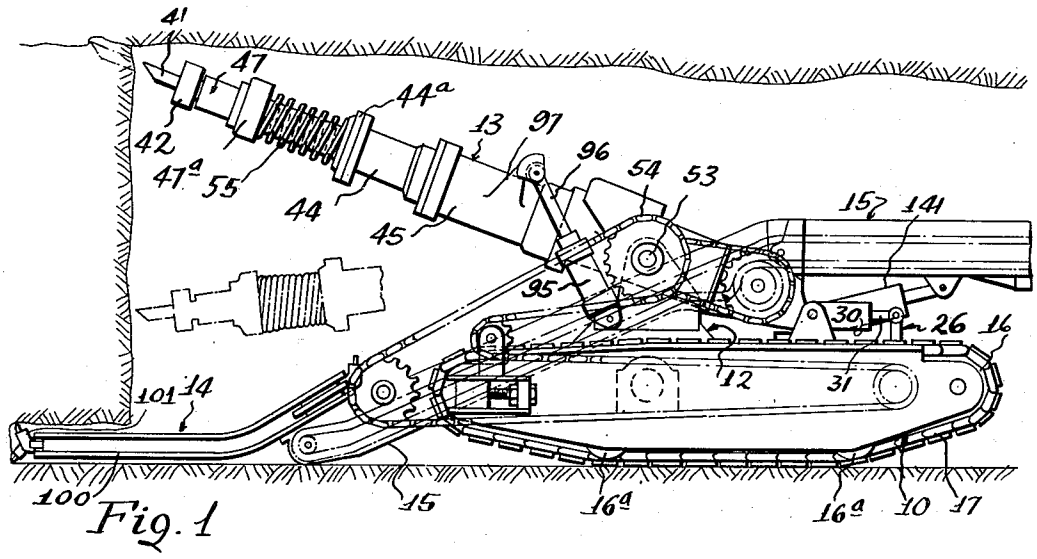


Fig. 1

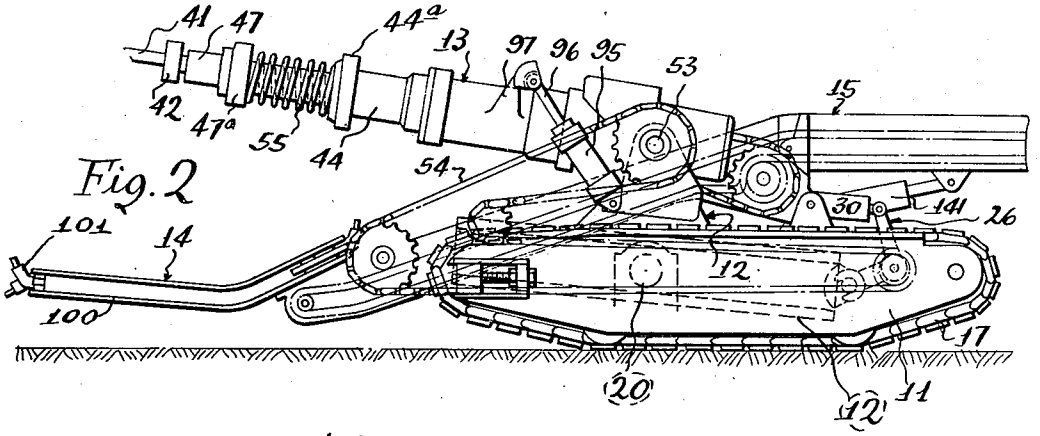


Fig. 2

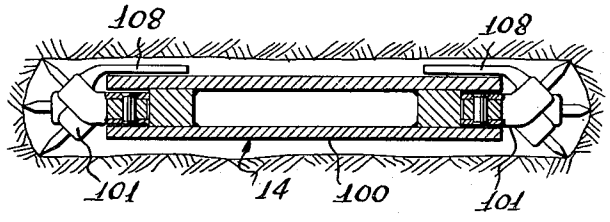


Fig. 16

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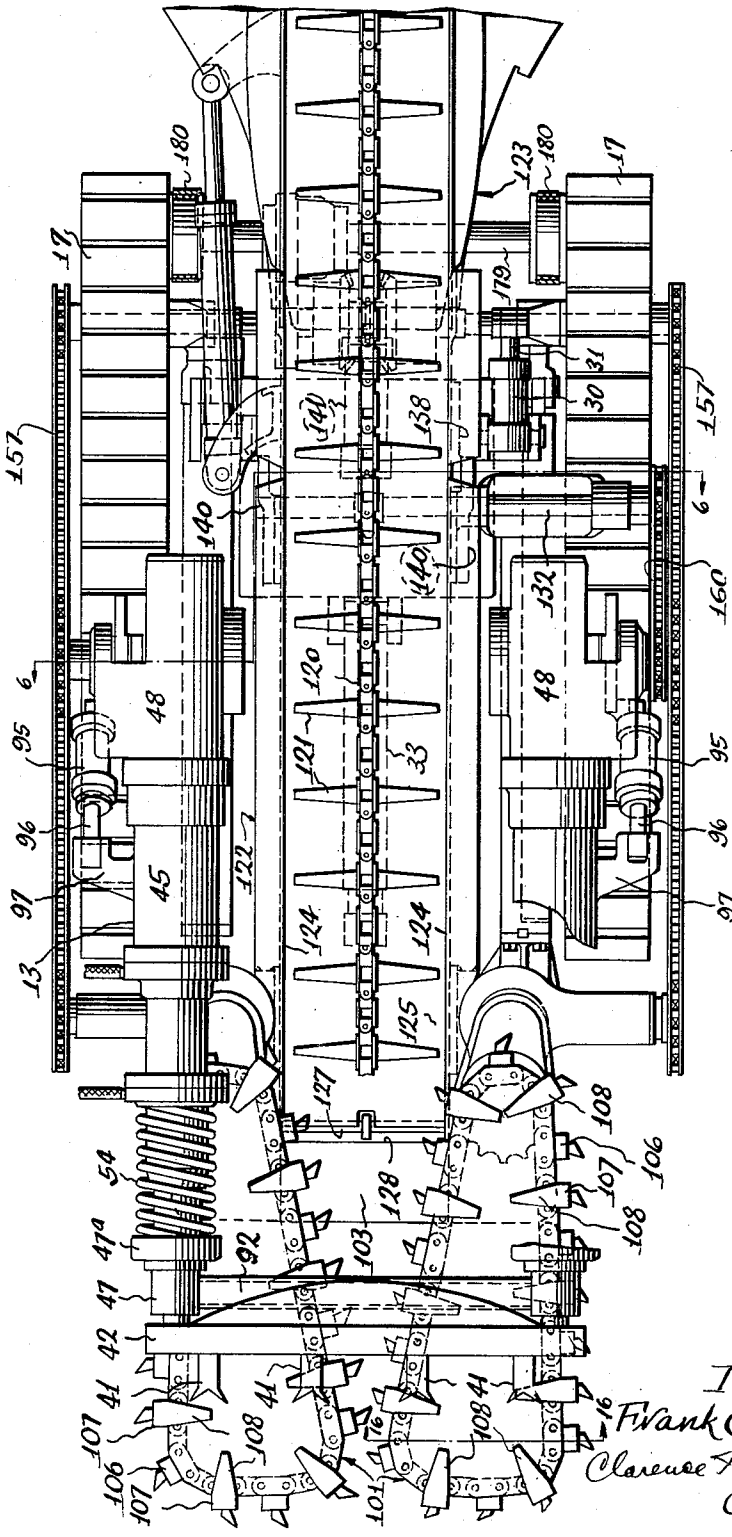


Fig. 3

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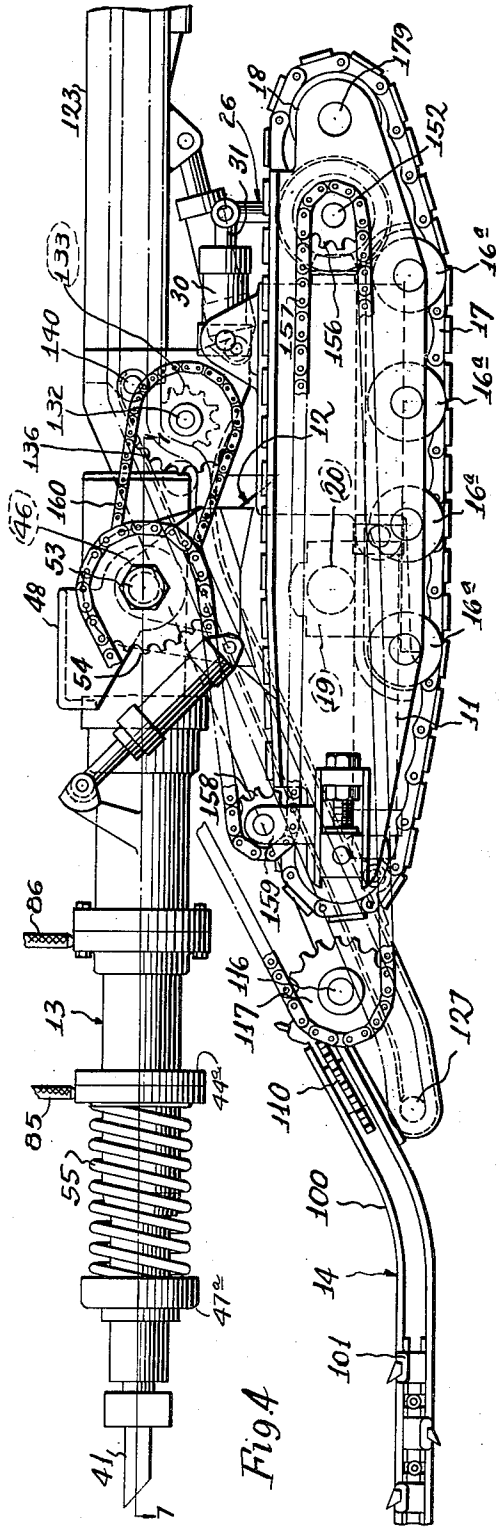


Fig. 4

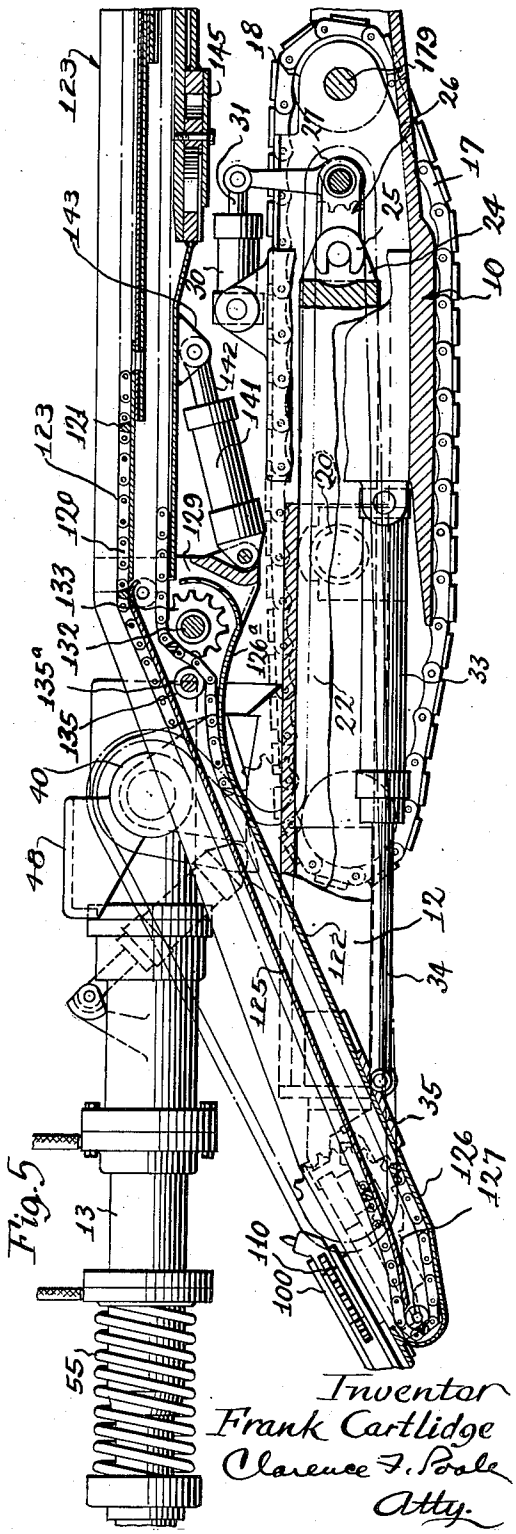


Fig. 5

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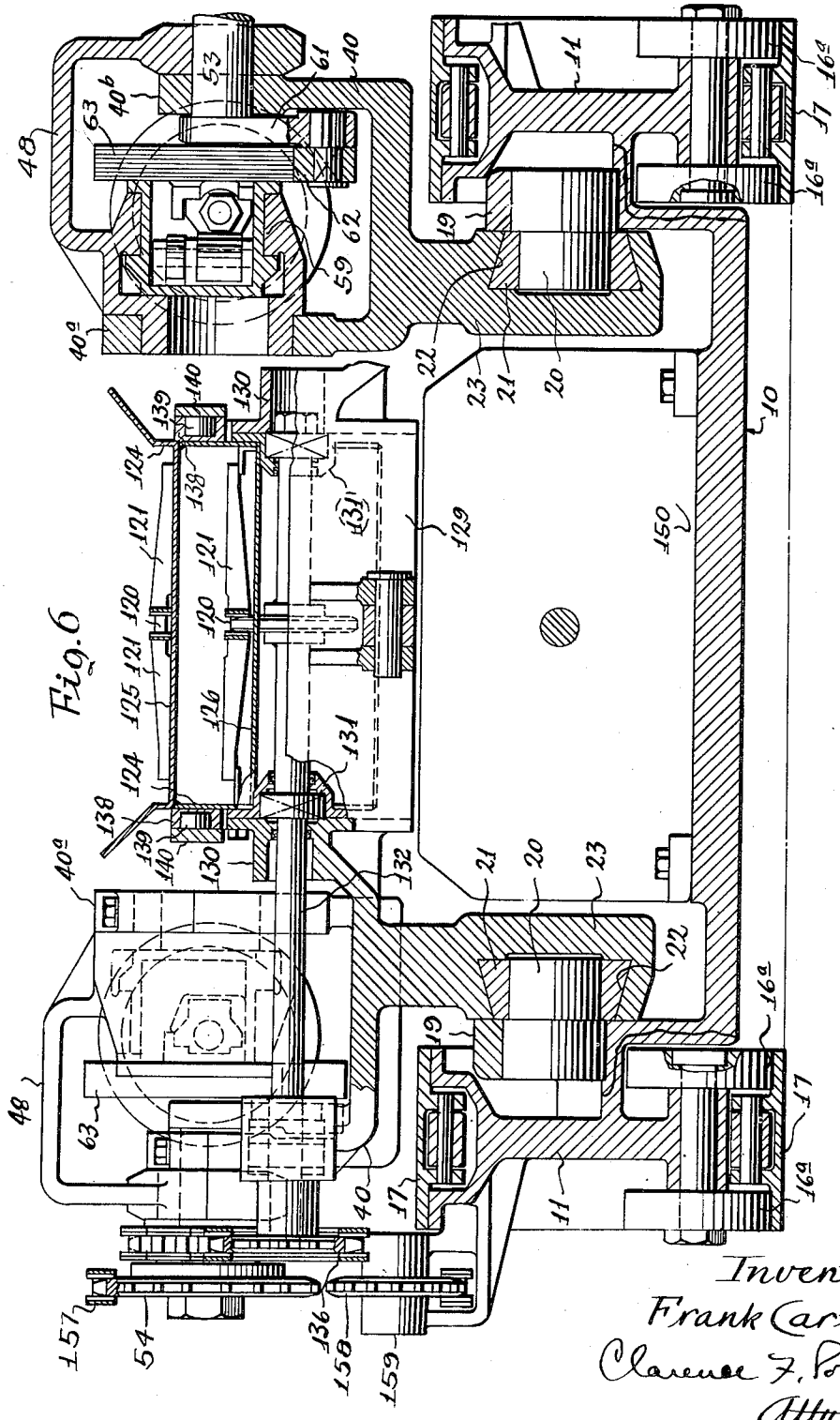


Fig. 6

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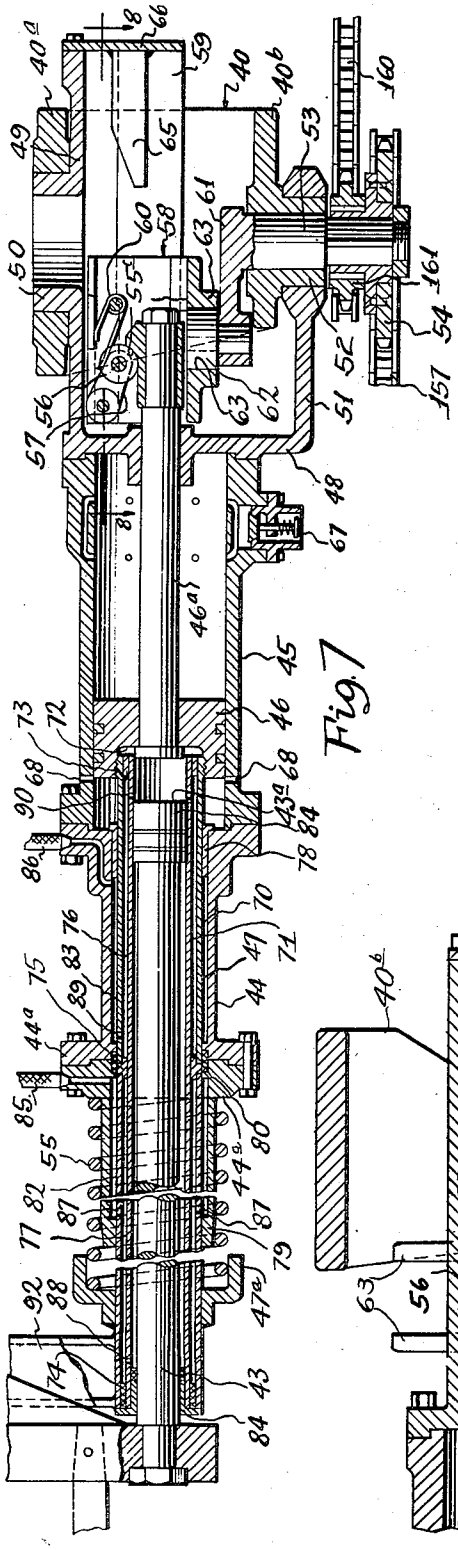


Fig. 7

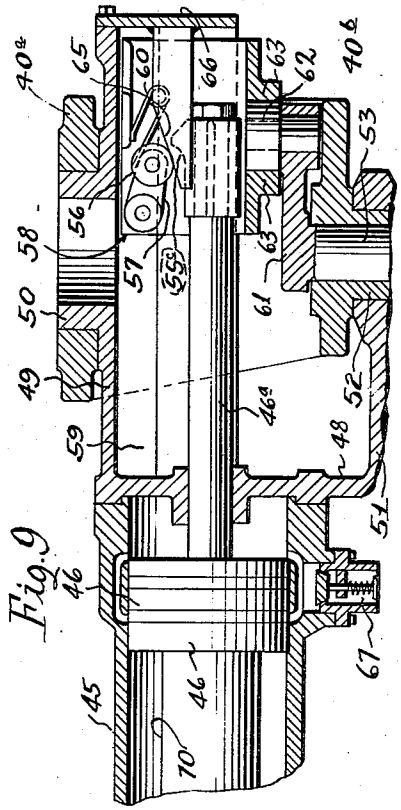


Fig. 9

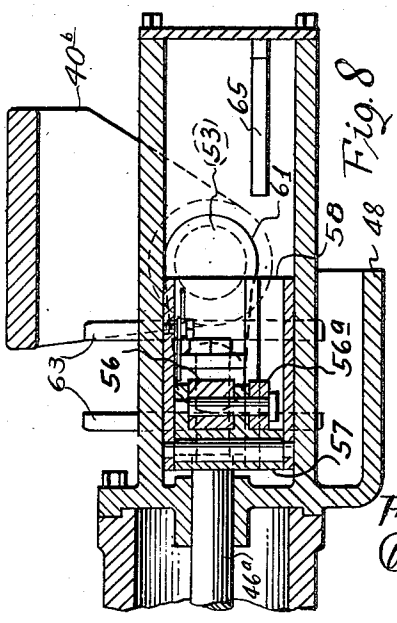


Fig. 8

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Fig. 13

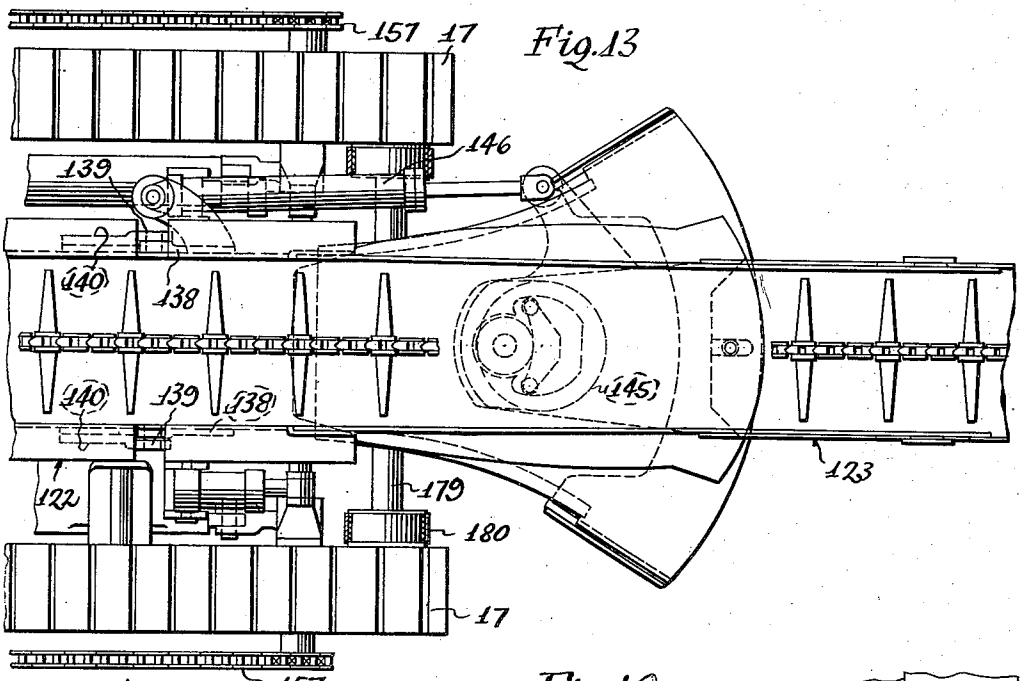
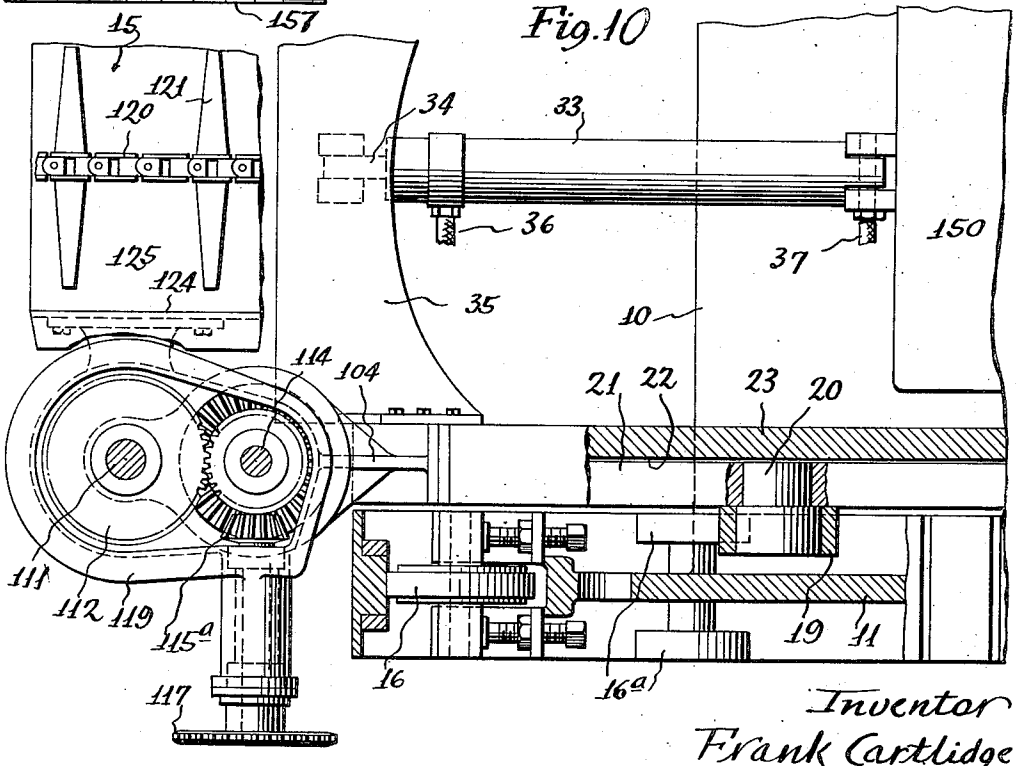


Fig. 10



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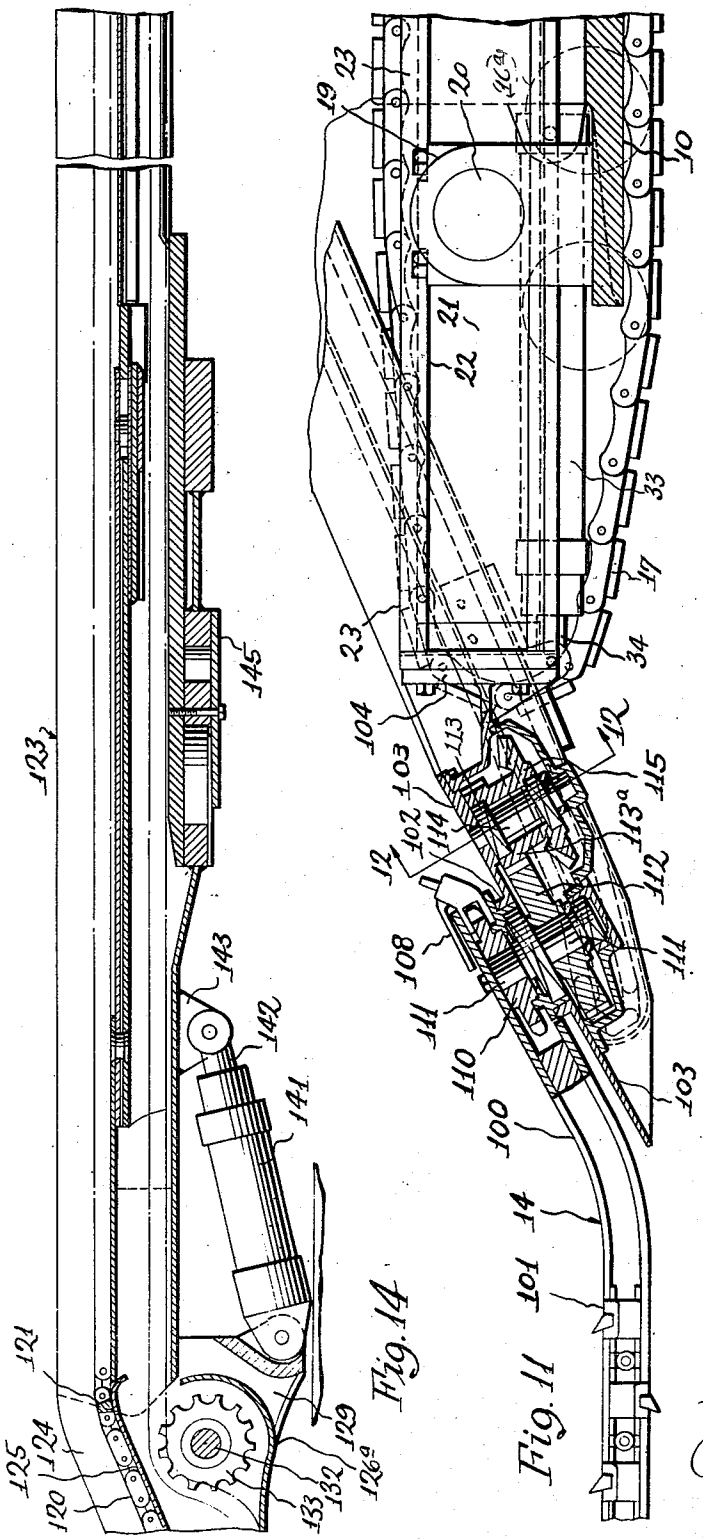


Fig. 14

Fig. 11

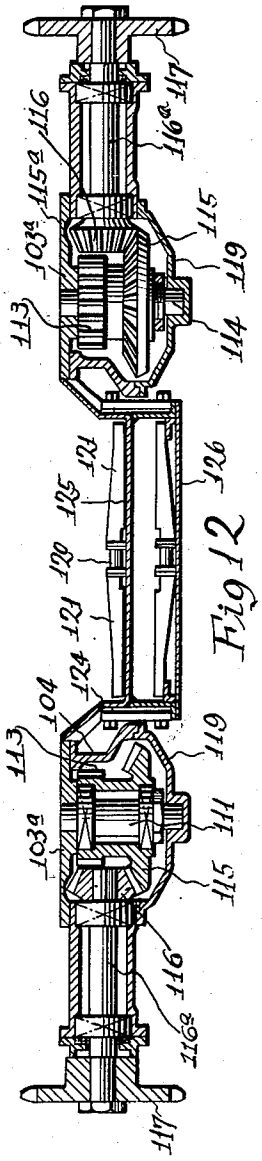


Fig 12

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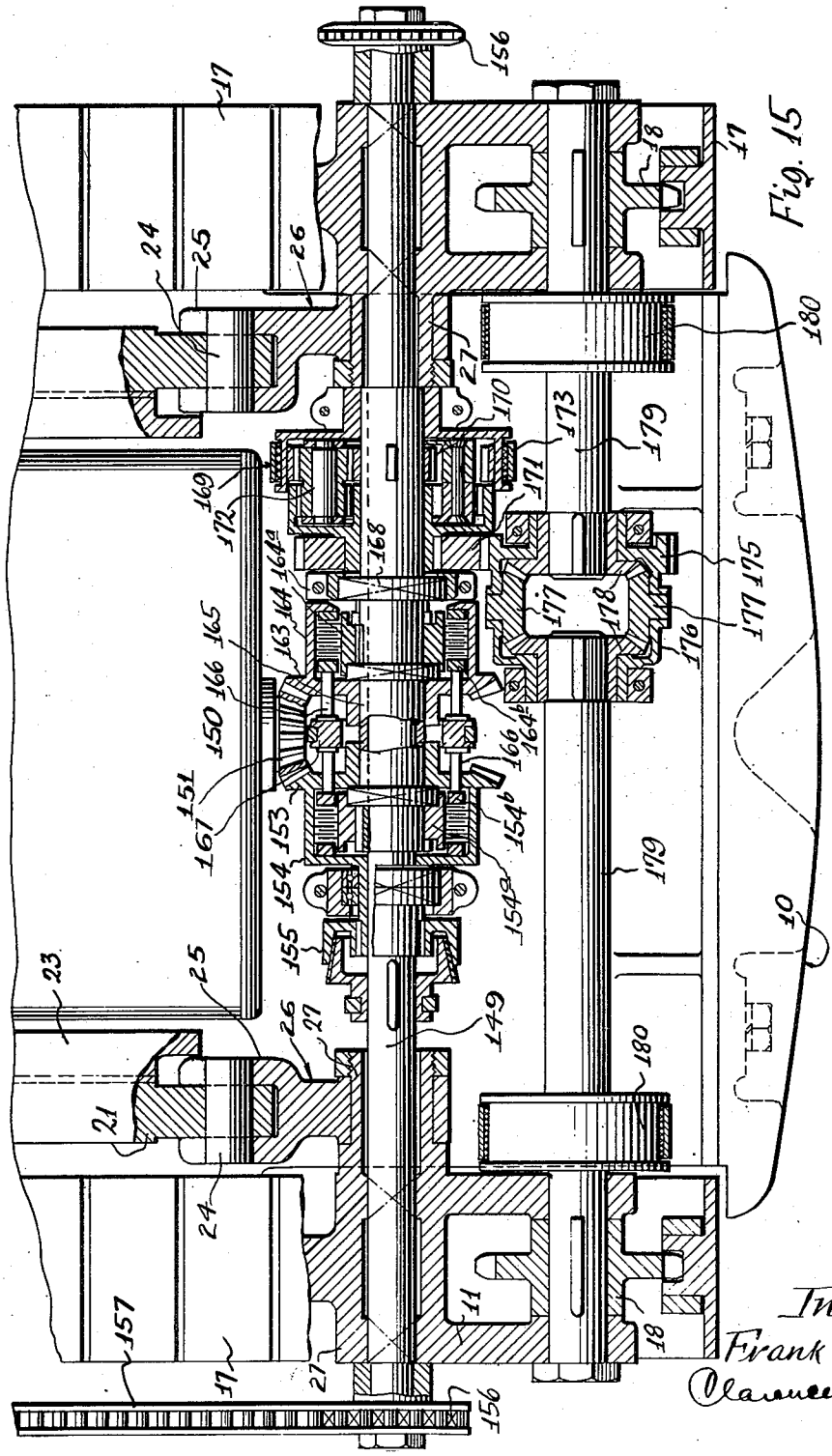


Fig. 15

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UNITED STATES PATENT OFFICE

2,329,875

MINING MACHINE

Frank Cartlidge, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application August 27, 1941, Serial No. 408,537

12 Claims. (Cl. 262—9)

This invention relates to improvements in mining machines especially adapted for use in mining coal, and more particularly to combined mining and loading machines wherein the coal can be dislodged from the working face and gathered and loaded out by the same mechanism.

Among the objects of my invention is to provide an improved and efficient form of picking mechanism for breaking down the coal face at various levels above the floor, with a novel form of undercutting and gathering mechanism cooperating with said picking mechanism in an especially efficient manner. A further object is to provide an improved form of extension frame for projecting the picking and gathering devices forwardly and rearwardly of the main frame under certain conditions. Other objects will appear from time to time as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings, in which:

Figure 1 is a view showing in side elevation a machine constructed in accordance with my invention, but with a rear portion of the discharge conveyer omitted, and illustrating the manner of use of the machine in a mine, as it is attacking the working face;

Figure 2 is a side view of the machine showing the parts in position for transporting from one working place to another;

Figure 3 is an enlarged plan view of the machine of Figures 1 and 2, with a part of the picking mechanism broken away at one side to show portions of the gathering mechanism;

Figure 4 is a side view of the machine, drawn to the same scale as Figure 3, showing the extensible frame in retracted position relative to the main frame;

Figure 5 is a view somewhat similar to Figure 4, but with certain parts shown in longitudinal section, and with the extensible frame in forwardly extended position;

Figure 6 is a transverse section taken generally on line 6—6 of Figure 3;

Figure 7 is a detail longitudinal section of one of the operating cylinders forming part of the picking mechanism, and showing the air piston in forwardly extended position;

Figure 8 is a detail section drawn to a larger scale and taken on line 8—8 of Figure 7;

Figure 9 is a fragmentary detail, taken on the same section line as Figure 7, but drawn to a larger scale and showing the air piston in rearwardly retracted position;

Figure 10 is a fragmentary detail plan view at the front end of one of the tractor treads and showing portions of said tractor tread and the extensible frame member mounting in section;

Figure 11 is a fragmentary detail, in part elevation and in part section, showing details of the gathering chain drive and the extensible frame member mounting, at the front end of the machine;

Figure 12 is a transverse section taken on line 12—12 of Figure 11;

Figure 13 is a fragmentary plan view drawn to a somewhat smaller scale than the preceding figures, showing the swinging discharge conveyer at the rear end of the machine;

Figure 14 is an enlarged transverse section of the swinging discharge conveyer shown in Figure 13;

Figure 15 is an enlarged fragmentary plan view in part section, showing details of the drive connections to the motor, and the control mechanism therefor;

Figure 16 is a detail transverse section of one of the gathering arms in kerf-cutting position.

Referring now to details of the machine of my invention illustrated in the drawings, a base frame 10 is formed integral with a pair of longitudinal endless-tread supporting side frames 11, 11, and has an extensible frame 12 mounted thereon between said tread supporting frames. The extensible frame has mounted thereon a pair of picking devices 13, 13, a pair of gathering devices 14, 14, and a conveyer 15 leading upwardly from said gathering devices and overhanging the rear end of the machine. The endless-tread supporting frames 11, 11 are provided as usual with a front end roller 16, a rear drive sprocket 18, and a plurality of intermediate guide rollers 16a, 16a for endless treads 17, 17 of well known construction.

It will be seen in Figures 5 and 6 that the base frame 10 extends transversely between the tread supporting frames 11, 11, and has a pair of upstanding trunnions 19, 19 disposed at opposite sides thereof which carry inwardly projecting trunnion studs 20, 20 pivotally engaged in elongated side bars 21, 21. Said side bars are telescopically mounted in slots 22, 22, undercut as shown in Figure 5 and extending horizontally along opposite sides of side frame members 23, 23 of the extension frame 12. With this arrangement the extension frame is telescopically slidable relative to the side bars 21, 21, and said extension frame, together with the side bars 21, is also tiltable endwise about the trunnion studs 20, 20.

The side bars 21 have transversely disposed pins 24 at their rear ends, each engaged by a bifurcated arm 25 of a bell crank lever 26 (see Figures 5 and 15). Said bell crank levers are pivotally mounted relative to the base frame 10, in the form shown said pivotal mountings consisting of bosses 27, 27 formed integral with the tread supporting frames 11. The bell crank levers 26, 26 are rocked by power to tilt the entire extension frame 12 on the trunnion studs 20, 20. In the form shown, said bell crank levers are rocked by a pair of hydraulic cylinder devices 30, 30 pivotally mounted on the base 10, and having their pistons 31, 31 pivotally connected to the upright arms of said bell crank levers. Hydraulic pressure to the cylinders 30, 30 may be supplied as usual from a pump, under manual control of suitable valves (not shown).

The tilting adjustment of the extension frame 12 relative to the base 10 may be noted in Figure 2, wherein the front end of said extension frame is tilted upwardly to elevate the gathering devices from the ground, and thus facilitate transportation of the machine from place to place.

The extension frame 12 is moved forwardly and rearwardly relative to the base 10 and its endless treads by means of a horizontally disposed hydraulic device 33 pivotally connected to said base and having its piston 34 connected to a cross member 35 at the front end of the extension frame 12 (see Figures 5 and 10). Hydraulic pressure may be supplied as usual to the front and rear ends of the cylinder 33 through pipes 36 and 37, under control of suitable valves, not shown.

The two pick devices 13, 13 are pivotally mounted at their rear ends on upright pedestals 40, 40 formed integral with the side frame members 23, 23 at opposite sides of the extension frame 12, so that said pick devices may swing in a vertical plane. In the preferred form shown, said pick devices are designed for simultaneous actuation of a plurality of picks 41, 41, herein four in number, mounted on a cross head 42 connecting ram members 43, 43 reciprocatingly operated by said pick devices (see Figure 3).

The pick devices 13 are similar in construction and are shown in detail in Figures 6, 7, 8 and 9. Each includes an air cylinder 45 having a piston 46 therein, operatively connected to the ram member 43 by a hydraulically controlled telescopic extension cylinder 47, as will presently be described in detail. Said extension cylinder is slidably mounted in a barrel portion 44 rigidly connected to the front end of the air cylinder 45.

Each air cylinder 45 is mounted forwardly of a housing 48 which forms the pivotal support for the pick. In the form shown, said housing has an inner side wall 49 with a boss 50 journalled in an upright wing 40a of the pedestal 40, and an outer side wall 51 which is journalled on an outwardly projecting boss 52 of a second upright wing 40b of said pedestal. The boss 52 of said pedestal also provides bearing for a crank shaft 53 having a chain sprocket 54 at its outer end, which forms part of a mechanical drive for actuating the pick, as will presently appear.

A coil compression spring 55 is mounted on the front end of the barrel 44 between a flanged portion 44a on said barrel and a collar 47a fixed on the projecting front end of the telescopic extension cylinder 47.

The piston 46 is actuated mechanically for producing quick forward strokes under combined air and spring pressure in the following manner: A piston rod 46a extends rearwardly from the piston 46 into the housing 48 and has a forwardly-facing detent 55c on its rear end. Said detent is adapted to be engaged by a roller 56 carried on a lever arm 57 pivotally mounted in a hollow block 58 which has reciprocable movement along longitudinal guide members 59, 59. A second roller 56a is also carried by the lever arm 57, offset laterally from roller 56. The lever arm 57 is normally maintained in detent-engaging position by a spring 60. The crank shaft 53 at the outer side of the housing 48 has a crank arm 61 thereon, carrying a roller 62 which moves between a pair of opposed vertical guides 63, 63 carried on the adjacent side of the block 58 (see Figure 7). With this arrangement, rotation of the crank shaft 53 produces reciprocating movement of the block 58. The driving means for the crank shaft will presently be described.

With the roller 56 engaged with detent 55c and the piston 46 in its forwardmost position as shown in Figure 7, a half revolution of the crank shaft will retract the piston by power so as to compress the air in the rear end of cylinder 45. Simultaneously, the coil spring 55 surrounding the front end of the telescopic extension device 47, will be compressed. As the piston 46 and the block 58 reaches the rear limit of their stroke, as shown in Figure 9, the roller 56a is engaged by a cam member 65 projecting from the rear wall 66 of housing 48, so as to lift the roller 56 from said detent member, thereby releasing the piston for a rapid forward stroke, under pressure of the air in cylinder 45 and the compression spring 55. Upon continued rotation of the crank shaft, the block 58 will again be moved to the initial position shown in Figure 9, so that the roller 56 will again engage the detent member 55c, and repeat the compressing movement and quick release of the piston 46 previously described. The spring 55 insures full return of the piston and ram to their forward position for the beginning of each compression stroke.

A check valve 67 is provided near the rear end of the air cylinder 45, communicating with the outer air, which valve operates automatically to replenish air which may be lost by leakage while the piston is under pressure. Suitable relief vents 68, 68 may also be provided at the low pressure end of the cylinder, as shown in Figure 7, of such size and arrangement to afford a desired amount of air cushioning action at the front end of the air cylinder as the piston approaches the forward limit of its stroke.

Details of the hydraulic extension cylinder 47 are shown in Figure 7. Said cylinder consists of an outer shell 70 and a concentric inner shell 71, both rigidly connected at their rear ends to the front face of the piston 46, as by threading in a centrally disposed recess 72. The two shells are spaced from each other and sealed by annular rings 73 and 74 at opposite ends, and by an intermediate ring 75, so as to form two chambers 76 and 77.

The outer shell 70 is slidably mounted in spaced relation within the barrel 44 by liquid-tight packing sleeves or glands 78 and 79 at the rear and front ends of said barrel, and by an intermediate packing sleeve or gland 80, herein mounted within the flanged portion 44a of said barrel. The packing sleeves thus described form partitions for two chambers 82 and 83 at front and rear of the barrel 44.

The inner shell 71 has a piston 43a therein, rigidly connected to the rear end of the ram 43. The front end of said ram extends through a liquid-tight packing sleeve or gland 84 at the front end of the inner shell.

Hydraulic pressure for extending or retracting the ram 43 is introduced through two flexible pipes 85 and 86, communicating respectively with the chambers 82 and 83 surrounding the outer shell 70. Pressure to the front end of piston 43a is supplied through port 87, formed in the outer shell 70 adjacent the front end of the chamber 82, so as to communicate with the chamber 77 between the inner and outer shells. From the latter chamber, a port 88 at the front end communicates with the interior of the inner shell 71 in front of the piston 43a.

Similarly, pressure is supplied from the outer chamber 83 to the rear end of piston 43a through port 89 formed in the outer shell 70 adjacent the front end of chamber 83, so as to communicate with the chamber 76, and from thence through a port 90 near the rear end of the inner shell 71, so as to apply pressure at the rear of the piston 43a.

The arrangement of the extension cylinder 47 and its associated chambers and ports just described, is such that the supply pipes 85 and 86 will be maintained in communication with the front and rear faces respectively of the piston 43a in all positions of reciprocating movement of the piston 46 in air cylinder 45, and in all permissible positions of extension of the ram 43 relative to said piston.

The front ends of the two extension cylinders 47 are rigidly connected by a cross-brace 92, to insure simultaneous adjusting movement of said extension cylinders. The cross head 42, carrying the pick members 13, 13 and connecting the outer ends of the rams 43, is movable toward and away from said cross brace.

The operation of the picking mechanism is as follows: When the hydraulic extension means is adjusted to its rearwardmost retracted position, pistons 43a are near the rear ends of the telescopic extension cylinders 47, as shown in Figures 3 and 7. The picking mechanism is preferably presented to a working face initially with the extension means in this retracted position, but with the coil springs 55 urging the extension cylinders 47 forwardly, and with the air pistons 46 at the front ends of their cylinders 45, as shown. Operation of the rotary retracting mechanism including crank arms 61 and the tripping mechanism associated with the guide blocks 58, as previously described, produces the desired retraction and quick release of the cross head 42 for its forward picking stroke. The springs 55 are compressed simultaneously with the air in cylinders 45 during the retracting stroke, and cooperate with the compressed air in said cylinders to produce the quick forward stroke.

The extension means is controlled by hydraulic pressure introduced through supply pipes 85 and 86 to opposite sides of pistons 43a. By maintaining balanced hydraulic pressures on opposite sides of said pistons, the extension means can be locked against longitudinal extending movement in any position of adjustment while said extension means reciprocates bodily with the pistons 46. When it is desired to advance the cross head toward the working face, the pressure on the rear piston 43a is increased temporarily to adjust the cross head to an extended position relative to the piston 46. Similarly, the cross head can be retracted toward the piston 46 by temporarily increasing the pressure on the front of pistons 43a. Since the hydraulic control of the extension means is independent of the means controlling reciprocation of the piston 46, it will be noted that endwise adjustment of the hydraulic extension means can be effected at any time during the operation of the picking mechanism.

It will be observed further, that while the picking mechanism usually will operate most efficiently with a full working stroke, yet my improved picking mechanism will perform very satisfactorily with only a partial stroke, in instances where the cross head may be advanced so close to the working that a full stroke is impossible. In such cases the air in cylinders 45 will be as fully compressed at the beginning of the forward stroke as when operating with a full stroke, excepting after long-continued operation under partial length strokes, when air leakage from the cylinders may tend to reduce the operating pressure. However, as soon as full stroke operation is resumed, the springs 55 cooperate with pistons 46 to replenish the cylinders 45 with a full charge of air through check valve 67.

Means for swinging the picks 13, 13 in a vertical plane consists of a pair of hydraulic cylinders 95, 95, each pivotally connected at its lower end to the adjacent pedestal 40 and extending upwardly and forwardly with its piston rod 96 pivotally connected to a bracket 97 on one side of the air cylinder 45. Hydraulic pressure may be supplied to the cylinders 95 through the usual flexible pipes, with valve control means thereof suitably mounted on the base frame.

The gathering devices 14 consist of a pair of cutter bars 100, 100 carried in forwardly projecting relation from the front end of the extension frame 12, in position to undercut the mine face, and to load out the material broken down by the pick devices 13, 13. Cutter chains 101, 101 are suitably guided about said cutter bars. In the form shown, said cutter bars are widened at their front ends so that the inner reaches of the chains 101, 101 approach each other fairly closely, but recede laterally from each other toward the rear ends of said arms. The outer reaches of the cutter chains are approximately parallel with each other, and are spaced apart substantially the full width of the cross head 42 of the pick devices 13, 13, as shown in Figure 3. The cutter bars are normally disposed in a horizontal plane close to the ground at their front ends, and are curved upwardly into an inclined plane at their rear ends. They are rigidly supported on annular bosses 102, 102 at opposite sides of a similarly inclined apron or plate 103 extending across the front end of the extension frame 12 and rigidly connected thereto as by brackets 104, 104 at the front ends of the side frame members 23, 23 of said extension frame, as shown in Figures 10 and 11.

The cutter chains 101 each have a plurality of bit-carrying cutter blocks 106, 106 of the type commonly employed in cutter chains of kerf-cutting machines. Said chains also carry a plurality of cutter blocks 107, 107, with integrally formed sweeper arms 108 projecting upwardly and inwardly therefrom in close proximity to the upper face of the cutter bar, as shown in Figure 16, so as to assist in sweeping the dislodged material rearwardly for loading on the conveyer 15.

The cutter chains 101 are each engaged with a sprocket 110 on shaft 111, extending through

and suitably journaled in the plate 103. The gearing for driving the sprockets 110 is shown in Figures 11 and 12. A gear 112 is keyed on each sprocket shaft 111 beneath the plate 103 and is meshed with a pinion 113 rotatable on bearings 113a on a stub shaft 114. The pinion 113 is integral with a bevel gear 115, driven by a bevel pinion 116 on a shaft 116a extending outwardly to the adjacent side of the machine where it has a sprocket 117 keyed thereon in position to be driven by a chain 118, which will presently be described in greater detail. In the form shown, the gearing for each chain sprocket 110, just described, is enclosed and has suitable bearing in a housing 119 detachably secured to the bottom of the plate 103 for ready removal.

The conveyer 15 has a single endless chain 120 with transverse flights thereon mounted for movement along a forward inclined section 122 and a generally horizontal rear section 123. The forward section 122 is rigidly mounted on the extension frame 12, while the rear section 123 is pivotally movable on a transverse axis, to permit vertical adjustment at the rear or discharge end thereof.

The inclined front section 122 of the conveyer 15 includes two flared side walls 124, 124 having upper and lower bottom plates 125 and 126 connected therebetween, forming in effect a double decked trough for the upper and lower strands of the conveyer chain 120. As shown in Figure 5, the lower bottom plate 126 is supported by the cross-member 35 of the extension frame 12. The side walls 124 of said front conveyer section extend forwardly between and are connected to the side wing portions 103a, 103a of the apron 103 (see Figure 12). The conveyer chain 120 passes over an idler shaft 127 suitably journaled in the front ends of said side plates, immediately adjacent the discharge edge 128 of the apron 103. The arrangement just described is such that the loose material, including lump coal and cuttings, dislodged either by the picks or the cutter bits, will be carried rearwardly by the cutter chains and be discharged upon the front end of the conveyer 15, between the side wings 103a, 103a.

The side walls 124 of the front conveyer section 122 are rigidly mounted at their rear ends on a cross frame member 129 carried on inwardly projecting brackets 130, 130 formed integral with the pedestals 40, 40, as shown in Figure 6. The cross frame member 129 includes a pair of spaced bearing supports 131, 131 having a conveyer drive shaft 132 rotatably mounted therein. Said drive shaft has a sprocket 133 engaging the lower strand of the conveyer chain 120. An idler roller 135 is mounted on shaft 135a between the side walls 124 forwardly of the drive shaft 132, as shown in Figure 5, so as to increase the wrap of the chain 120 about the sprocket 133. The bottom plate 126 of the conveyer is flared downwardly at 126a to accommodate the drive sprocket 133 and idler roller 135.

The drive shaft 132 extends laterally to one side of the machine, where it has a drive sprocket 136 forming part of a chain driving system which will presently be described in detail.

The rear section 123 of the conveyer is pivotally connected to the front section 122, so as to permit vertical swinging adjustment of said rear section. In the form shown, said connection consists of a pair of side plates 138 at opposite sides of the rear section, pivotally connected by pins 139 to side plates 140 on the front section, as shown in Figures 6 and 13. The rear section is elevated and lowered by a hydraulic cylinder 141, pivotally connected to the cross-frame member 129 and having its piston rod 142 pivotally connected to a bracket 143 on the under side of the rear conveyer section 123, as shown in Figure 14. Hydraulic pressure may be supplied to the cylinder 141 through the usual valve control means.

The rear conveyer section 123 also has an articulated joint indicated generally at 145, to permit lateral swing of the rear end portion of said section, by means of a hydraulic cylinder 146. The articulated joint shown herein is of the type disclosed in Patent No. 2,197,169, issued April 16, 1940, to C. E. Andershock, and details thereof need not be described herein as it forms no part of the present invention.

Referring now to the means for driving the several mechanisms previously described, including the picking devices 13, 13, the gathering devices 14, 14 and the conveyer 15, the machine shown herein has a single motor 150, with chain drive connections to said mechanisms operative in all positions of extension or retraction of the extension frame 12 relative to the base 10. Said motor is mounted on the base 10 between the tread supporting plates 11, as shown in Figures 6 and 15, and has an armature pinion 151 selectively engageable with a cross shaft 149 through a bevel gear 153, disc clutch housing 154, and a cone clutch indicated at 155. The opposite ends of cross shaft 149 extend through the tread supporting plates 11, 11 and bosses 27, 27 connected therewith, and have sprockets 156, 156 thereon disposed outside of the endless treads 17, 17, as shown in Figure 15. A drive chain 157 is trained over each of said sprockets, with its lower reach extending forwardly over the sprocket 117 on shaft 116, for driving the cutter chain 100 of the gathering device 14 at one side of the machine. From thence the chain passes rearwardly and upwardly over sprocket 54 on crank shaft 53 which drives the picking device 13 on the same side of the machine. The drive chain 157 then passes forwardly over an idler sprocket 158 mounted on bracket 159 at the front end of the extension frame 12, and thence returns rearwardly to the drive sprocket 156. With the arrangement of idler sprocket just described, the drive chain will be maintained at substantially uniform tension in all telescoping and tilting positions of the extension frame 12 relative to the base frame 10.

The conveyer drive shaft 132 is driven by a chain 160 connecting sprocket 136 on the outer end thereof with a sprocket 161 keyed on the crank shaft 53 at one side of the machine (see Figure 7).

The motor 150 also drives the endless treads 17 through the gearing shown in detail in Figure 15. The motor pinion 152 is constantly meshed with the gear 153 on clutch housing 154 previously mentioned, and with gear 163 on a companion clutch housing 164, so that the two clutch housings are rotated in opposite directions. Said clutch housings 154 and 164 are loosely mounted on a sleeve 165, which in turn is loosely mounted on cross shaft 149. Said clutch housings have friction clutch discs of conventional form therein, for selectively driving clutch members 154a and 164a respectively, keyed on sleeve 165. Said clutch discs are engaged by pressure plates 154b and 164b respectively, which are operated by a push rod 166 on a common shifter ring 167, so

that only one of said clutches can be engaged at the one time, and both clutches will be disengaged when the shifter ring 167 is in the central, or neutral, position shown.

The sleeve 165, rotatable reversely through the clutch mechanism just described, extends along the shaft 149 and through suitable intermediate bearings 168, to a planetary gear device indicated generally at 169. Said planetary is of the friction controlled type commonly employed in mining machinery, and includes a sun gear member 170 keyed on the sleeve 165, and a driven gear 171 operable, as usual, at reduced speeds through planetary gears 172, under frictional control of a brake band 173.

The drive gear 171 is meshed with a gear 175 on a differential drive member 176. Said drive member carries a plurality of bevel gears 177 meshed as usual with bevel gears 178, 178 on the adjacent ends of drive shafts 179, 179. The tread drive sprockets 18, 18 are keyed on the outer ends of said drive shafts. Brake drums 180, 180 may also be carried on said drive shafts.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a cutting and loading machine, a base having ground-supported propelling devices, a supporting frame telescopically and rockably mounted relative to said base, gathering devices including a pair of chain-carrying cutter bars projecting at the front end of said supporting frame and a picking device pivotally mounted for vertical swinging adjustment on said supporting frame above said gathering devices, whereby said gathering and picking devices may be bodily projected forwardly and rearwardly rectilinearly with said supporting frame in a plurality of planes relative to said base and its propelling devices.

2. In a cutting and loading machine, a base having ground-supported propelling devices, a supporting frame telescopically and rockably mounted relative to said base, gathering devices including a pair of chain-carrying cutter bars projecting at the front end of said supporting frame and a picking device pivotally mounted for vertical swinging adjustment on said supporting frame above said gathering devices, whereby said gathering and picking devices may be bodily projected forwardly and rearwardly rectilinearly with said supporting frame in a plurality of planes relative to said base and its propelling devices, a motor on said base for driving said gathering and picking devices, and means affording operative connection between said motor and said gathering and picking devices in all extended and tilting positions of said supporting frame.

3. In a cutting and loading machine, a base, a pair of laterally-spaced, forwardly projecting gathering arms projecting forwardly from said base in a horizontal plane and having orbitally movable cutter chains thereon, an elevating conveyer on said base arranged to receive material from between said gathering arms and carry it along said base for discharge rearwardly thereof, and a reciprocating picking device pivotally mounted on said base for vertical swinging adjustment at various angles above said gathering arms, said picking device including a transverse picking bar and a pair of laterally spaced, reciprocably operable ram members connected to said bar and having means for extending or retracting said bar relative to the front ends of said gathering arms and conveyer.

4. In a cutting and loading machine, a base, a pair of laterally-spaced, forwardly projecting gathering arms projecting forwardly from said base in a horizontal plane and having orbitally movable cutter chains thereon, an elevating conveyer on said base arranged to receive material from between said gathering arms and carry it along said base for discharge rearwardly thereof, and a reciprocating picking device pivotally mounted on said base for vertical swinging adjustment at various angles above said gathering arms, said picking device including a transverse picking bar, and a pair of laterally spaced reciprocably operable ram members connected to said bar and having hydraulically actuated, telescopic means for extending or retracting said bar relative to the front ends of said gathering arms and conveyer.

5. In a mining machine, a base, a supporting frame having gathering devices at its forward end, and means for extensibly and tiltably mounting said supporting frame relative to said base including a pair of trunnions at opposite sides of said base, and a pair of elongated bars pivotally connected with each of said trunnions and having sliding engagement along opposite sides of said supporting frame.

6. In a mining machine, a base, a supporting frame having gathering devices at its forward end, and means for extensibly and tiltably mounting said supporting frame relative to said base including a pair of trunnions at opposite sides of said base, and a pair of elongated bars pivotally connected with each of said trunnions and having sliding engagement along opposite sides of said supporting frame, and means affording tilting adjustment of said supporting frame relative to said base including a control member mounted on said base and operatively connected to one of said elongated bars.

7. In a mining machine, a base, a supporting frame having gathering devices at its forward end, and means for extensibly and tiltably mounting said supporting frame relative to said base including a pair of trunnions at opposite sides of said base, and a pair of elongated bars pivotally connected with each of said trunnions and having sliding engagement along opposite sides of said supporting frame, and means affording tilting adjustment of said supporting frame including a rocking lever pivotally mounted on said base and engaging one of said elongated bars.

8. A reciprocating picking device for loading machines including a ram, a piston connected to said ram, an air cylinder for said piston, rotary retracting mechanism acting on said piston, to compress air in said cylinder, a compression spring for supplementing the compressive action of said piston and normally urging the latter to the forward end of its stroke, and tripping means for automatically releasing said piston at the end of its compression stroke in said cylinder.

9. A reciprocating picking device for loading machines including a ram, a piston connected to said ram, an air cylinder for said piston,

rotary retracting mechanism acting on said piston to compress air in said cylinder, a compression spring normally urging said piston to the forward end of its stroke and tripping means for automatically releasing said piston at the end of its compression stroke in said cylinder, said cylinder having a check valve at its compression end affording replenishment of outside air to said cylinder during the return stroke of said piston.

10. A reciprocating picking device for loading machines including an air cylinder having a piston therein, means for intermittently actuating said piston to compress air in said cylinder and releasing said piston while under such compression to produce a quick return stroke, a ram, and extension means connecting said ram to said piston for reciprocation therewith including a casing connected to said air cylinder, a hydraulic cylinder rigidly connected to said piston and slidably mounted in said casing, a piston in said hydraulic cylinder rigidly connected to said ram, and hydraulic pressure supply means in said casing affording communication with opposite ends of said hydraulic cylinder in all of the reciprocating positions of the latter in said casing.

11. A reciprocating picking device for loading machines including a ram, a piston connected to said ram, an air cylinder for said piston, rotary retracting mechanism acting on said piston to compress air in said cylinder, a compression spring for supplementing the compressive action of said piston and normally urging the latter to the forward end of its stroke, and tripping means for automatically releasing said piston at the end of its compression stroke in said cylinder, said cylinder having a check valve at its compression end affording replenishment of outside air to said cylinder during the return stroke of said piston.

12. A reciprocating picking device for loading machines including a pick member, a casing, a reciprocating actuating member for said pick member in said casing, and extension means interposed between said pick member and said actuating member and reciprocable with the latter, including a ram connected to said pick member, a cylinder connected to said actuating member and slidable therewith in said casing, and hydraulic pressure supply means connected to said casing and affording communication with opposite ends of said hydraulic cylinder in all of the reciprocating positions of the latter in said casing.

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