April 23, 1935. W. N. A. VANDER HULST 1,998,529

MINING MACHINE

Original Filed Feb. 12, 1932 6 Sheets-Sheet 1

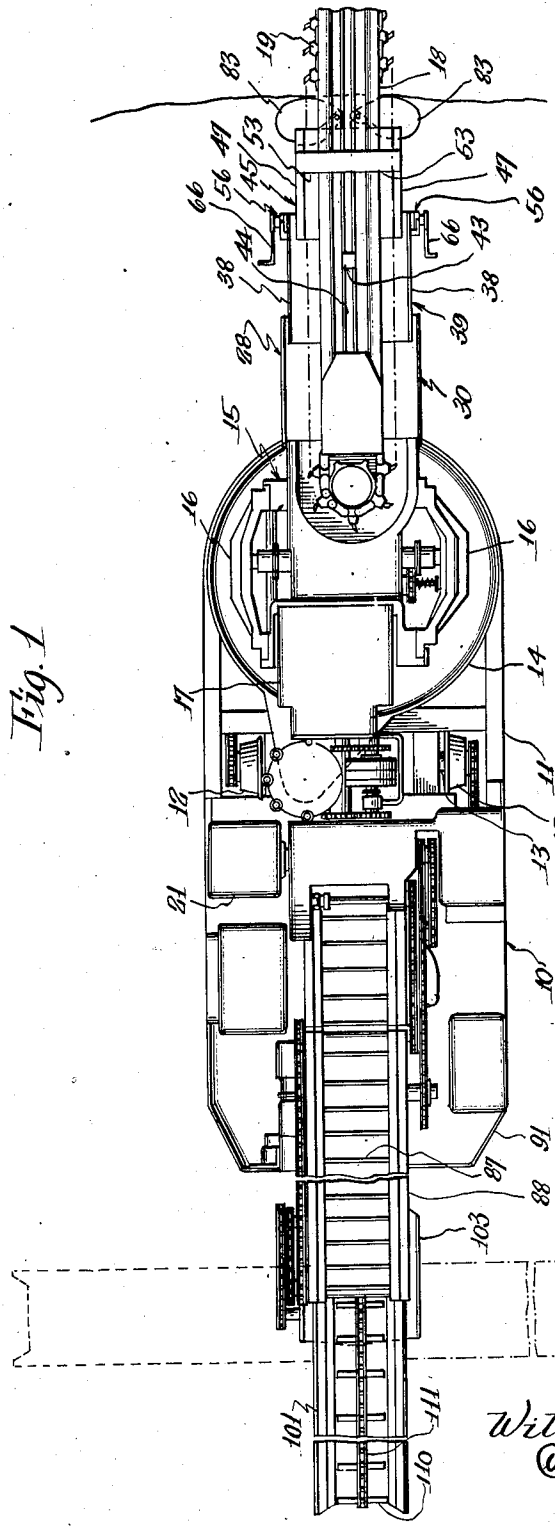


Fig. 1

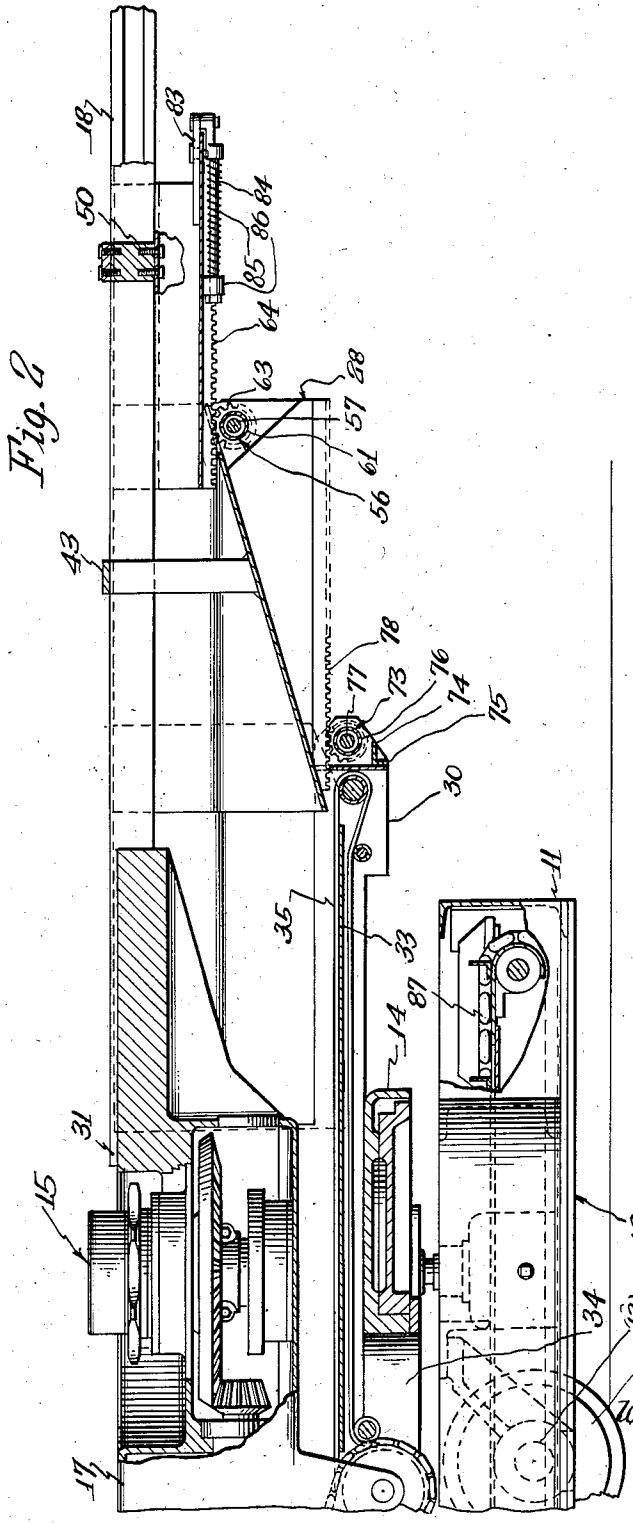
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MINING MACHINE

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Fig. 2



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Fig. 3

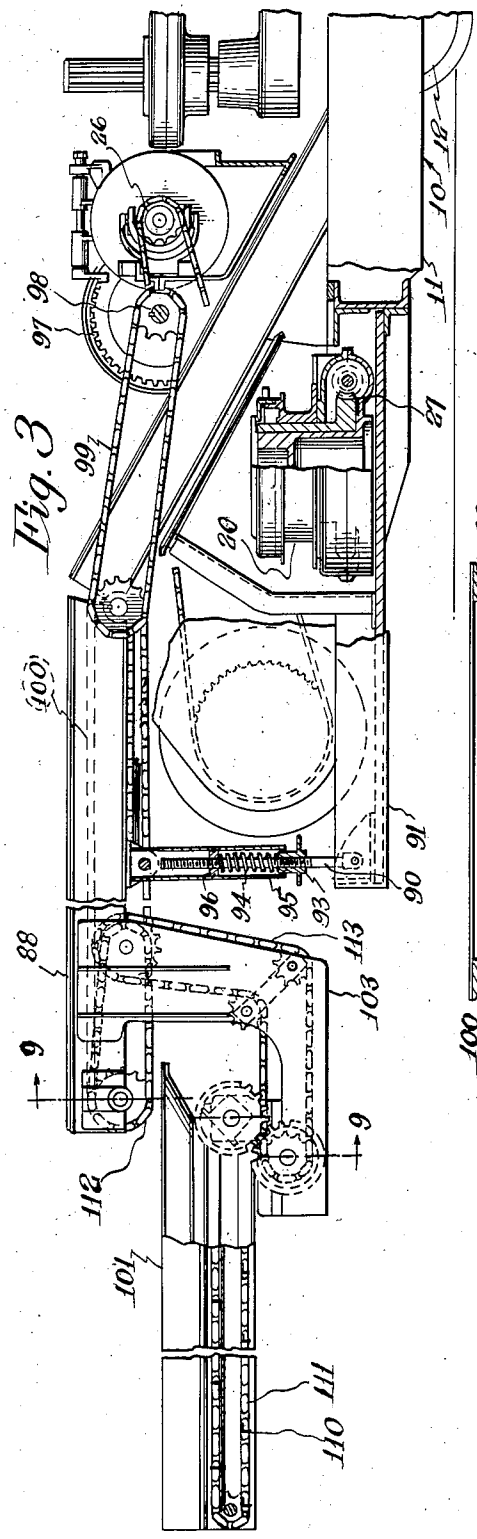
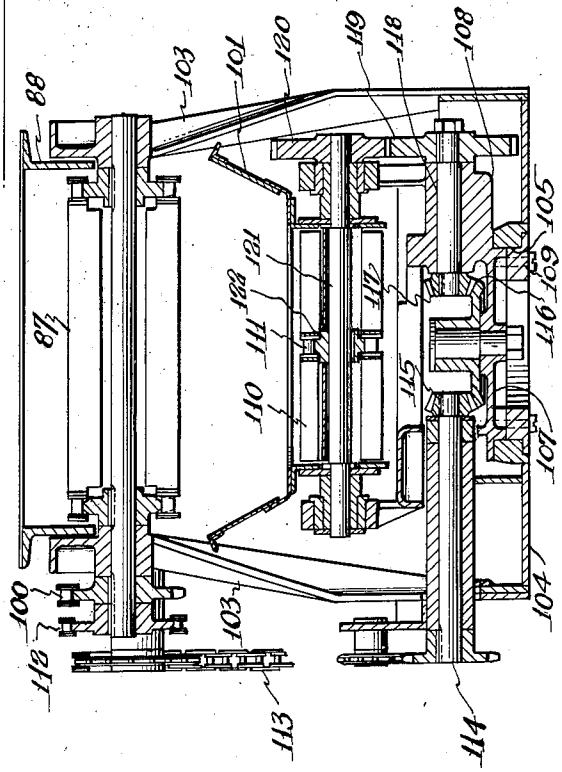


Fig. 9



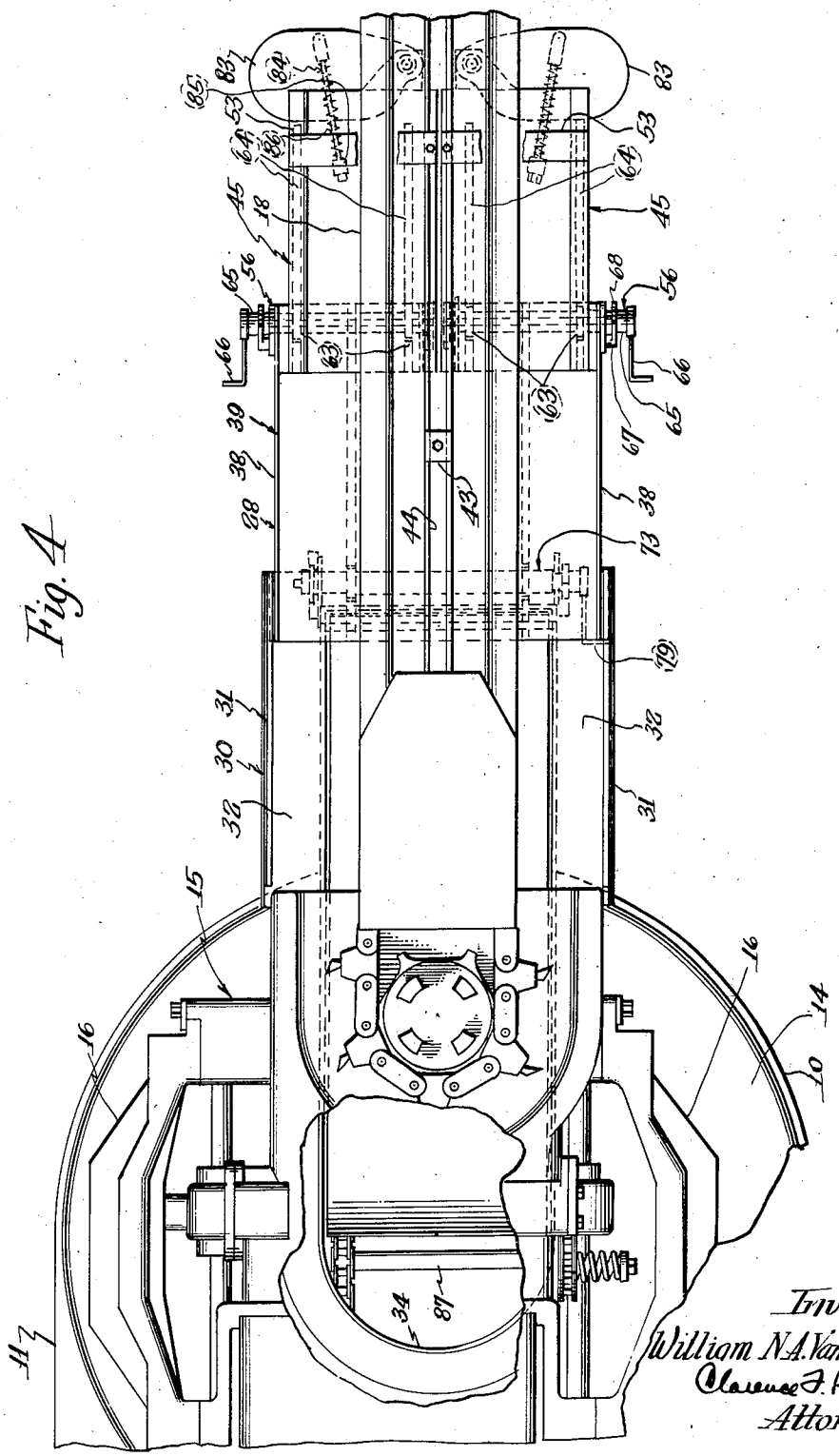
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MINING MACHINE

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Fig. 4



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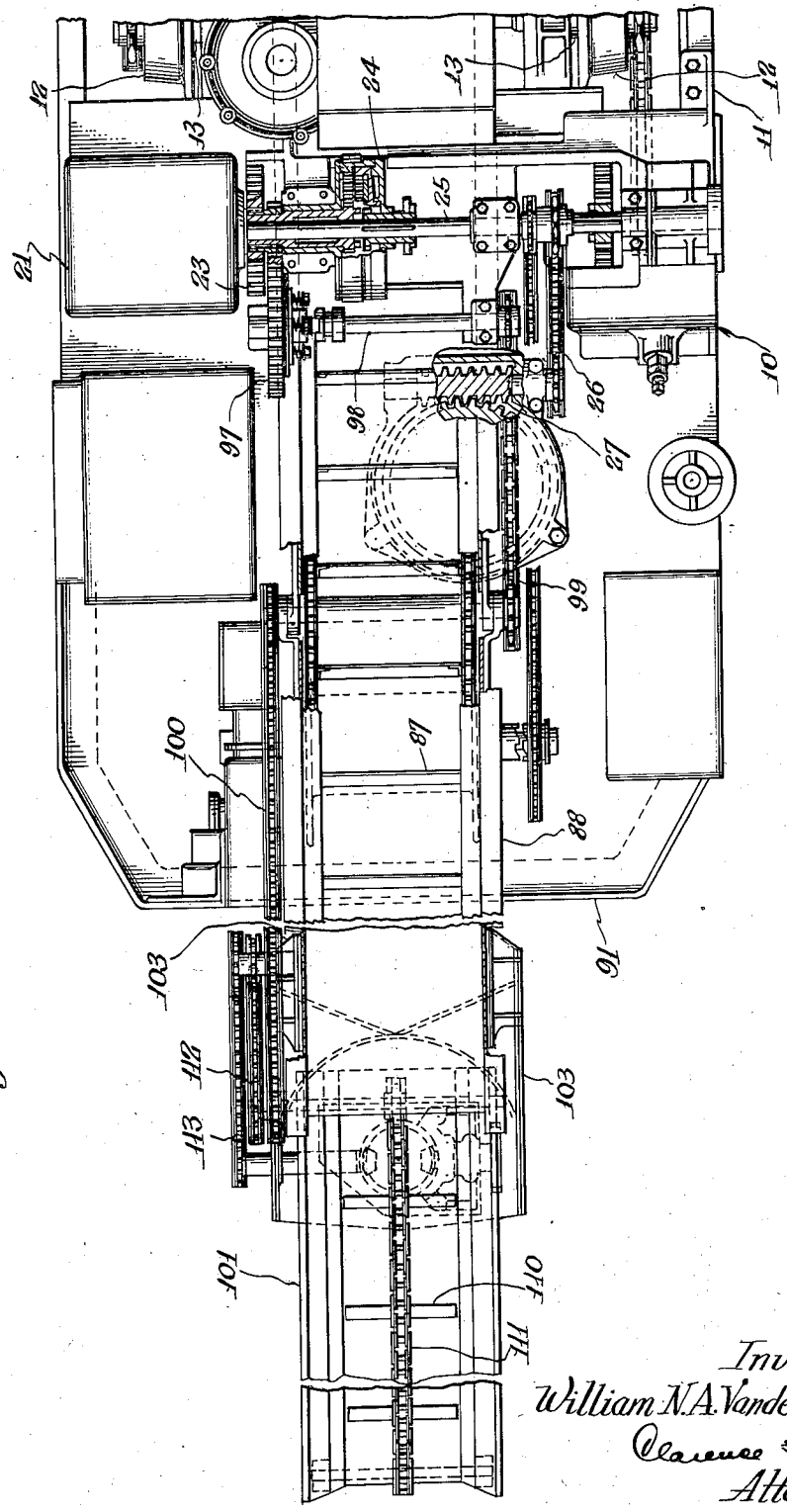


Fig. 5

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MINING MACHINE

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Fig. 6

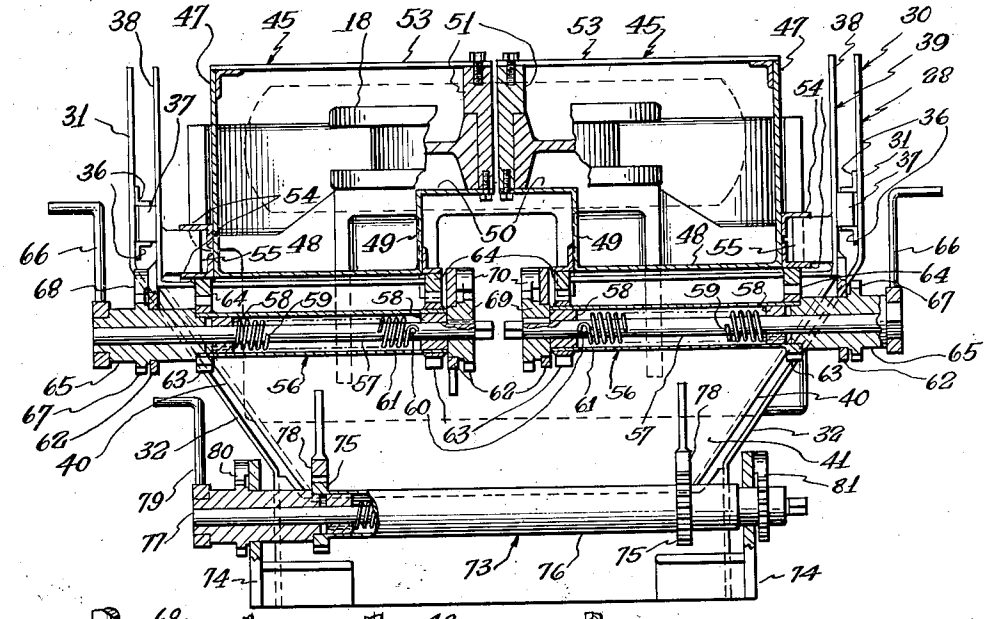


Fig. 7

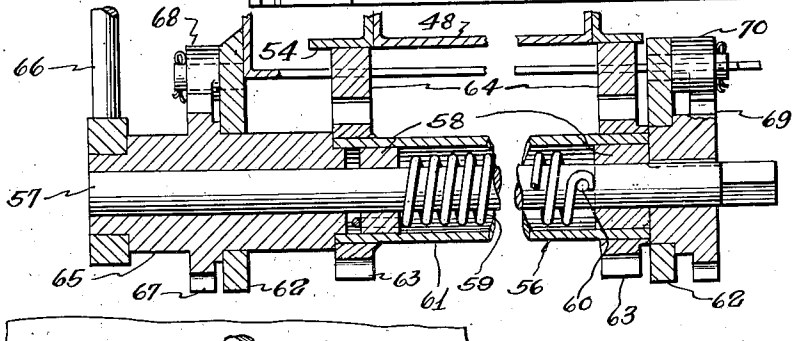
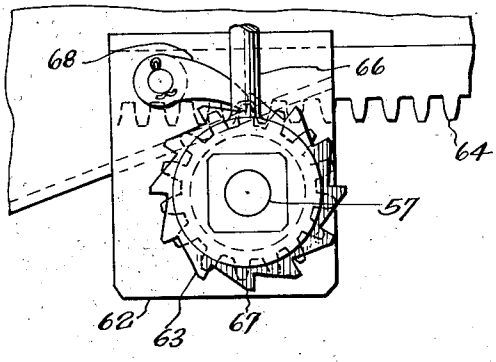


Fig. 8



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UNITED STATES PATENT OFFICE

1,998,529

MINING MACHINE

William N. A. Vander Hulst, Chicago, Ill., assignor to Goodman Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application February 12, 1932, Serial No. 592,476
Renewed September 14, 1934

21 Claims. (Cl. 262—28)

This invention relates to improvements in mining machines, and more particularly to mining machines of the track mounted type adapted to cut a horizontal kerf in the mine wall above the mine rails, equipped with means for collecting the cuttings and delivering them rearwardly beyond the machine into the gob or a suitable receptacle.

This invention has as one of its objects to provide a more efficient means for collecting the cuttings removed from the kerf cut in the mine wall by the cutter bar during the cutting operation which will more readily follow an uneven surface including a telescopic cuttings collector means having a plurality of independently operable forward sections arranged side by side, and means for maintaining said cuttings collector in engagement with the mine wall while cutting across the face. Another object of my invention is to provide a mining machine having a new and improved means for discharging the collected cuttings to either side of the machine rearwardly therefrom into a suitable material receiving device.

The general type of machine disclosed is fully described in a patent application filed May 24, 1930 by William T. McCullough, Serial No. 455,218 and entitled Improvements in mining machines, which matured into Patent No. 1,943,832 on January 16, 1934, so will only herein be described insofar as is necessary to clearly set forth the improved features of my present invention.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a device embodying my invention;

Figure 2 is an enlarged side elevation of the forward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details of my invention;

Figure 3 is an enlarged side elevation of the rearward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details of my invention;

Figure 4 is an enlarged plan view of the forward portion of the device shown in Figure 1 with parts broken away to more clearly show the details of my invention;

Figure 5 is an enlarged plan view of the rearward portion of the device shown in Figure 1 with parts broken away and in section to more clearly show the details of my invention;

Figure 6 is an enlarged partial fragmentary transverse sectional view of the forward portion of the device embodying my invention showing the details of the cuttings collecting device;

Figure 7 is an enlarged partial fragmentary sectional view showing certain details of the means for moving the various sections of the cuttings collecting device with respect to each other;

Figure 8 is an enlarged fragmentary side elevation of the pawl and ratchet mechanism embodied in the means for moving the various sections of the cuttings collecting device with respect to each other; and

Figure 9 is an enlarged sectional view taken substantially along line 9—9 of Figure 3.

Referring now in particular to the drawings, the embodiment of my invention illustrated comprises a mining machine, generally indicated at 10, of the well known track mounted type adapted to cut an arcuate kerf in the face of the coal in front of and to each side of the track above the mine bottom. Said mining machine includes a truck frame 11 mounted on track wheels 12 and axles 13.

The truck frame 11 is provided with a turntable 14, which turntable in turn supports a cutting element generally indicated at 15.

The cutting element 15 is supported on the turntable 14 for vertical movement with respect thereto in parallel spaced guides indicated at 16. Said guides are provided with suitable racks therein which are engaged by pinions supported on suitable drive shafts journaled in said cutting element for vertically moving said cutting element and adjusting the cutting mechanism so a kerf may be cut at various elevations in the face of the mine wall. These racks and pinions are not herein shown or described since they are not a portion of my invention and are clearly shown in the aforementioned McCullough application.

The cutting element 15 is provided with a motor 17 adjacent its rearward end and a cutter bar 18 projecting forwardly therefrom. Said cutter bar is provided with a cutter chain 19 of an ordinary construction which is movable therearound in suitable guides and driven from said motor in a usual manner (not shown).

The cutter bar 18 is sumped into the coal by suitable feeding means which may either be the track wheels 12 or a feeding drum 20 having a flexible feeding member attached thereto for moving said cutter bar into the coal upon rotation of said feeding drum when said flexible feeding member is attached to a suitable jack forwardly of the machine.

A suitable motor, indicated at 21, is provided

for driving the feeding drum 20 or track wheels 12 at either a high speed or low frictionally controlled feeding speed by means of a suitable gear train, indicated at 23, frictionally controlled planetary gear reduction device 24 and transverse shaft 25. Said feeding drum is driven from said transverse shaft by means of a suitable chain and sprocket drive indicated at 26, and a worm and worm gear indicated at 27. Said track wheels are driven from said transverse shaft by means of suitable reduction gears and chain and sprocket drives not herein shown in detail since they are no portion of my invention and are clearly disclosed in the aforementioned patent of William T. McCullough.

Referring now in particular to the cuttings collecting device associated with the cutter bar 18 for collecting the cuttings from the kerf cut by the cutter chain 19, said cuttings collecting device comprises a chute, indicated at 28, made in three sections, which sections are telescopic within each other.

The first of these three sections is a fixed or stationary section 30 disposed adjacent the rearward end of the cutter bar 18 and having vertically extending wall members 31 with converging sides 32 and a bottom 33.

Suitable conveying means are provided along the bottom 33 for conveying the cuttings rearwardly along the fixed section 30 into a discharge opening 34 disposed centrally of the turntable 14. The conveying means may be of any type but herein comprises a belt conveyor 35 threaded along the top side of the bottom 33 around a suitable drive roller at the rearward end thereof and forwardly underneath said bottom and around a suitable direction changing device adjacent the forward end thereof.

A pair of parallel spaced angles 36 are secured to the inner sides of the wall members 31 of the fixed section 30. Said angles form a guide means for blocks 37 secured to the outer side of vertically extending side walls 38 of a movable section 39 of the chute 28 for supporting said movable section adjacent opposite sides for telescopic movement with respect to said stationary section of said chute.

The movable section 39 of the chute 28 is provided with converging sides 40 converging inwardly from the lower end of the side walls 38 and inclined bottom plate 41 to permit the cuttings to be readily discharged into the fixed section 30 of said chute.

Means are provided for supporting the movable section 39 for slidable movement along the cutter bar 18 which comprises a bracket 43 slidably supported in a slot 44 provided in and extending longitudinally of the central portion of said cutter bar. Said bracket has bearing engagement with the top surface of said cutter bar on each side of the slot 44 and depends therefrom and has its lower end secured to the top portion of the inclined bottom plate 41 of said movable section.

The forward, or third section, of the chute 28 comprises a pair of sections 45 arranged side by side and independently movable with respect to the cutter bar 18, and adapted to be telescoped within the sections 30 and 39. The construction of each of the forward sections is similar so a description of one of said sections will suffice for both.

Each forward section 45 is provided with an outer vertically extending side wall 47 and a bottom 48. The bottom 48 extends transversely of the cutter bar 18 in a substantially horizontal plane and has a portion 49 extending upwardly therefrom and forming an inner side wall for the forward section 45 which is spaced outwardly from the center line of said cutter bar and a portion 50 which extends inwardly from the portion 49 in a horizontal plane and abuts a portion of the underside of said cutter bar. The portion 50 of the bottom 48 is secured to the lower side of a support member 51 which is slidably movable in the slot 44 of said cutter bar and is provided with a shoulder engaging the top surface of said cutter bar adjacent said slot. A tie member 53 connects the top side of the support member 51 with the side wall 47. Parallel spaced angles 54 extend outwardly from the side wall 47 so as to form a suitable horizontal guide therein and are engaged by a block 55 secured to and extending inwardly from the side wall 38 of the movable section 39. Thus the forward sections 45 may be independently moved longitudinally of the cutter bar 18 and may be telescoped within the movable section 39 and fixed section 30.

Referring now in particular to the means for extending or retracting the movable sections 39 and 45 of the chute 28, spring actuated devices are provided for extending said movable sections, which devices are similar in construction to the ordinary shade roller and are shown in a prior application Serial No. 537,247 filed by me May 14, 1931. One of these devices is provided for each separate section and the construction of all of these devices is the same with the exception that the length thereof differs in some cases so one of these spring roller devices will only be referred to in detail.

Spring roller devices 56 are supported in bearing supports 62, 62 integral with and extending forwardly from the movable section 39. Said spring roller devices are provided to independently move the movable sections 45 forwardly along the cutter bar 18 to engage the face of the coal, and each of said spring roller devices includes a shaft 57 journaled in spaced bearing members 58 having a helical spring 59 coiled thereon and disposed between said spaced bearing members. One end of said helical spring is anchored to a radial pin 60 extending from the shaft 57 and disposed adjacent the inner side of one of said spaced bearing members and the opposite end of said helical spring is secured to said other spaced bearing member.

A tubular housing 61 surrounds the shaft 57 for a portion of its length and is so arranged that an annular space is provided between said shaft and housing. Said tubular housing is supported adjacent its opposite ends and secured to the spaced bearing members 58 in a suitable manner (not shown) so it may be rotated about the shaft 57. Pinions 63 are provided on opposite ends of said tubular housing. Said pinions mesh with racks 64 disposed adjacent opposite sides of the forward section 45 and depending therefrom. A sleeve member 65 is freely mounted on the outer end of the shaft 57 and has a shouldered inner end which fits within the tubular housing 61 and which is secured to said tubular housing in a suitable manner. Said sleeve member is provided with a squared outer end which may be engaged by a crank 66 for rotating said sleeve member and said tubular housing. A ratchet 67 formed integral with said sleeve member is adapted to be engaged by a pawl 68 to hold said sleeve member from rotation in one direction. The opposite end of the shaft 57 has a ratchet 69 keyed

thereto, which ratchet is adapted to be engaged by a pawl 70. The pawl 70 and ratchet 69 are disposed oppositely from the pawl 68 and ratchet 67 to permit the shaft 57 to be rotated with respect to the sleeve member 65 or to permit said sleeve member to be rotated with respect to said shaft and to hold the helical spring 59 in tension when desired. The inner end of the shaft 57 is squared so it may be engaged by a suitable crank for rotating said shaft and winding said helical spring to the required tension.

When winding the helical spring 59 to the required tension, the tubular housing 61 is held from rotation by means of the pawl 68 and ratchet 67. When said helical spring has been wound to the required tension and the sections 45 are telescoped within the sections 39 and 30, and it is desired to permit said movable sections to move forwardly along the cutter bar 18, the pawls 70 are engaged with the ratchets 69. This holds the shafts 57 from rotation and effects rotation of the tubular housings 61 which drives the pinions 63 and moves said pinions along the racks 64. When it is desired to telescope the sections 45 within the sections 39 manually, the pawls 68 and 70 are disengaged from their respective ratchets and the tubular housing 61 is rotated by means of the crank 66 and sleeve member 65. It should be noted, however, that during the cutting operation said sections are maintained in engagement with the coal face by means of the spring roller devices 56 and that said sections are telescoped within the sections 39 by the reaction of the coal face against said movable sections as the cutter bar 18 is moved therein or therealong, the pawls 68 being disengaged from the ratchets 67.

In a similar manner a spring roller device 73 is provided for moving the movable section 39 with respect to the fixed section 30. Said spring roller device is journaled in suitable bearing supports 74 extending forwardly from the fixed section 30 and is provided with pinions 75 integral with a roller 76 adapted to rotate about a shaft 77. The pinions 75 mesh with racks 78 depending from the movable section 39. A crank 79 is operatively connectible with the roller 76 adjacent one of its ends and is provided to manually rotate said roller when desired. The end of the shaft 77 opposite the crank 79 is squared and oppositely disposed pawl and ratchet devices 80 and 81 are provided to hold the spring in the spring roller device 73 in tension and to hold said shaft stationary when the roller 76 is being driven, or for holding said roller stationary while winding the spring to the required tension by rotation of said shaft.

Suitable means are provided on the forward ends of the movable sections 45 for engaging the face of the coal and guiding said forward sections as they are moved therealong. The means herein shown comprise material engaging members 83 of a curved contour pivotally connected at their inner ends to the inner sides of said forward sections. Yieldable means are provided to engage said members with the face of the coal, which means herein comprise rods 84 having compression springs 85 coiled therearound. Said rods are pivotally connected to the underside of said material engaging members adjacent the forward end thereof and extend rearwardly therefrom. The rearward ends of said rods are slidably supported in members 86 pivotally connected to the bottoms 48 of said forward sections, and compression springs 85 are interposed between said members and the forward ends of said rods to maintain said material engaging members in engagement with the face of the coal.

It may thus be seen that the movable sections 39 and 45, 45 of the chute 28 are moved forwardly along the cutter bar 18 by means of their respective spring roller devices for maintaining the material engaging members 83 in engagement with the face of the coal during a major portion of the cutting operation, and that said movable sections are independently movable with respect to each other along said cutter bar to permit the material engaging members 83 to more closely follow an uneven coal face. As said cutter bar is moved along the face of the coal while cutting a kerf therein, the material engaging members 83 are yieldably moved to compensate for irregularities in the coal face and either one or the other forward section 45 of the chute 28 may also be yieldably moved with respect to said cutter bar when necessary, said material engaging members being maintained in engagement with the face of the coal by means of the compression springs 85 and spring roller devices 56 and 73.

It should be noted that during the cutting operation a major portion of the cuttings are discharged by the cutter chain 19 on the advance side of the cutter bar 18 and that one of the purposes in providing two movable sections 45 side by side is to catch any cuttings which might fall from the retreating side of said cutter bar and to permit the cuttings collecting device to operate as efficiently while cutting from right to left as from left to right.

Referring now in particular to the means for disposing of the cuttings collected by the chute 28 and discharged through the discharge opening 34 in the turntable 14, a conveyor 87 extends longitudinally of the truck frame 11 beneath said discharge opening. Said conveyor may be of any suitable construction but is herein preferably shown as a flight conveyor and is inclined upwardly from the truck frame 11 rearwardly of the discharge opening 34 and extends substantially horizontally beyond the rearward extremities of said truck frame. A rearward frame portion 88 of said conveyor is adjustably supported on an inclined section of said conveyor so the rearward end of said conveyor may be vertically adjusted to permit the discharge of material into cars of varying heights and so the top of said conveyor may be lowered to compensate for uneven mine roofs.

Suitable yieldable support means are provided for supporting and adjusting the rearward frame portion 88 of the conveyor 87, which means herein comprise threaded shafts 90, 90 pivotally supported at their lower ends on opposite sides of a frame member 91 extending rearwardly from the truck frame 11. A nut 93 is threaded on each threaded shaft 90 and its top side abuts the bottom side of a compression spring 94 coiled around each of said threaded shafts. Said compression springs are partially enclosed in tubular housings 95 pivotally connected to the underside of the rearward frame portion 88 of the conveyor 87. Each of said blocks is secured within a tubular housing 95 and abuts the upper end of a compression spring 94. Said blocks are provided with a suitable aperture in their central portion to permit the threaded shafts 90 to pass therethrough. Suitable gripping means are provided on the nuts 93 so said nuts may be readily rotated by hand. It may thus be seen that as the nuts 93 are rotated and moved upwardly along

the threaded shafts 90 that the rearward frame portion 88 of the conveyor 87 is pivotally moved about its axis of pivotal connection to the inclined portion of said conveyor which raises the rearward end of said rearward frame portion, and that said rearward frame portion is yieldably supported on the frame member 91 to permit limited vertical movement with respect thereto. Thus a means has been provided for adjusting the height of the rearward end of the conveyor 87 and for permitting the rearward end of said conveyor to be moved downwardly against suitable spring members when a projection from the roof engages said conveyor during the traveling operation of the machine.

The conveyor 87 is driven from the motor 21 by means of reduction gears generally indicated at 97, shaft 98, and chain and sprocket drives 99 and 100.

Another conveyor 101 is supported by the rearward frame portion 88 of the conveyor 87 and is provided with sides forming a hopper beneath the discharge end of said conveyor. The conveyor 101 is supported on a turntable for pivotal movement with respect to the conveyor 87 about a vertical axis for depositing the loose material discharged from the conveyor 87 to either side of the track into the gob or a suitable receptacle or material conveying means. Said conveyor is supported on the rearward frame portion 88 of the conveyor 87 by means of supporting brackets 103 depending from and extending outwardly from said rearward frame portion. Said brackets are connected together adjacent their rearward ends by means of a suitable frame member 104 which provides a turntable support for the conveyor 101. The turntable support comprises an annular ring 105 formed adjacent the central portion of the frame member 104 which is adapted to receive a circular bearing portion 107 of a supporting frame member 108 for the conveyor 101. A flanged retaining ring 109 is adapted to fit in the annular ring 105 and its flange abuts a shouldered under portion of said annular ring. The retaining ring 109 is secured to the lower side of the circular bearing portion 107 of the supporting frame member 108 for holding said circular bearing portion within the annular ring 105. It may thus be seen that the conveyor 101 may be rotated about a vertical axis for discharging material at various desired positions with respect to the mine track.

The conveyor 101 is of an ordinary construction and is herein shown as being a flight conveyor having flights 110 secured at their central portion to a drive chain 111 disposed centrally of said conveyor, which drive chain is driven from the conveyor 87 in all positions of rotation of said conveyor with respect to the conveyor 87. The means for driving the drive chain 111 from the conveyor 87 comprises a chain and sprocket drive 112 driven from the rearward end of said conveyor in an obvious manner, and a chain and sprocket drive 113 driven from the chain and sprocket drive 112 and trained downwardly and rearwardly along the brackets 103. The chain and sprocket drive 113 drives a transversely extending shaft 114 journaled within a suitable bearing support secured to one of the brackets 103 and so arranged that its axis intersects the axis of pivotal movement of the conveyor 101. A bevel pinion 115 is keyed on the inner end of the transversely extending shaft 114 and meshes with and drives a bevel gear 116 coaxial with the axis of pivotal movement of the conveyor 101. The bevel gear 116 drives a bevel pinion 117 keyed on the inner end of a horizontal shaft 118 journaled in the frame member 108. A spur gear 119 is keyed on the outer end of the horizontal shaft 118 and meshes with and drives a spur gear 120 keyed on a horizontal shaft 121. A sprocket 122 is keyed on the horizontal shaft 121 adjacent the central portion of the conveyor 101 and meshes with the drive chain 111 for driving said chain and conveyor.

It may now be seen that a new and improved mining machine has been provided wherein the material cut from the face of the coal by the cutter chain may be collected and discharged beyond the rearward end of the machine, and that this machine is so arranged that the cuttings collecting means is maintained in engagement with the face of the coal during a major portion of the cutting operation, which cuttings collecting means is so arranged that it may readily follow an uneven coal face when the cutter bar is cutting in either normal or reverse directions and that said machine is of a unitary compact structure and includes a new and improved means of a simplified construction for disposing of the cuttings collected by said cuttings collecting means.

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

I claim as my invention:

1. In a mining machine, the combination of cutting mechanism including a cutter bar and a cuttings collecting device associated with said cutter bar and comprising a plurality of longitudinally extensible sections arranged side by side on opposite sides of said cutter bar.

2. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are independently movable with respect to each other.

3. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are adapted to have yieldable engagement with the mine wall.

4. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are adapted to have independent adjustable contact with the face of the mine wall.

5. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are arranged beneath said cutter bar and extend beyond the sides thereof.

6. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are moved by spring actuated devices.

7. A mining machine as set forth in claim 1 in which the longitudinally extensible sections are moved by spring roller devices.

8. In a mining machine, the combination of cutting mechanism including a cutter bar, and a cuttings collecting device associated with said cutter bar and comprising a plurality of telescopic sections extensible longitudinally of said cutter bar including a plurality of forward sections arranged side by side on opposite sides of said cutter bar and telescopic into said next adjacent rearward section.

9. A mining machine as set forth in claim 8

in which said forward longitudinally extensible sections are independently movable with respect to each other.

10. A mining machine as set forth in claim 8 in which the forward longitudinally extensible sections are adapted to have independent adjustable contact with the face of the mine wall.

11. A mining machine as set forth in claim 8 in which the telescopic sections are arranged beneath the cutter bar and extend beyond the sides thereof.

12. A mining machine as set forth in claim 8 in which the telescopic sections are moved with respect to each other by spring actuated devices.

13. A mining machine as set forth in claim 8 in which the telescopic sections are moved with respect to each other by spring roller devices.

14. In a mining machine, the combination of cutting mechanism including a cutter bar and a cuttings collecting device associated with said cutter bar and comprising a plurality of longitudinally extensible sections arranged side by side on opposite sides of said cutter bar, said sections being independently movable with respect to each other and adapted to have yieldable engagement with the mine wall.

15. In a mining machine, the combination of cutting mechanism including a cutter bar and a cuttings collecting device associated with said cutter bar and comprising a plurality of longitudinally extensible sections arranged side by side on opposite sides of said cutter bar, said sections being arranged beneath said cutter bar and extending beyond the sides thereof for independent adjustable contact with the face of the mine wall.

16. In a mining machine, the combination of cutting mechanism including a cutter bar and a cuttings collecting device associated with said cutter bar and comprising a plurality of longitudinally extensible sections arranged side by side on opposite sides of said cutter bar, said sections being independently movable with respect to each other for yieldable engagement with the mine wall and having individual spring actuated devices associated therewith for moving said sections with respect to each other.

17. In a mining machine, the combination of cutting mechanism including a cutter bar and a cuttings collecting device associated with said cutter bar and comprising a plurality of longitudinally extensible sections arranged side by side on opposite sides of said cutter bar, said sections being arranged beneath said cutter bar and extending beyond the sides thereof for independent adjustable contact with the face of the mine wall and having individual spring actuated devices associated therewith for moving said sections with respect to each other.

18. In a mining machine, a cutter bar, and means associated with said cutter bar for collecting the cuttings discharged thereby comprising a pair of extensible chutes, each of said chutes being arranged beneath one side of said cutter bar for independent engagement with the mine wall.

19. In a mining machine, a track-mounted truck, a turntable thereon, a cutting element including a projecting chain carrying cutter bar carried by said turntable, a discharge opening in said turntable, and means communicating between said cutter bar and discharge opening for collecting and discharging the cuttings through the latter comprising a pair of extensible chutes arranged beneath opposite sides of said cutter bar for independent engagement with the mine wall.

20. A mining machine in accordance with claim 19 wherein the chutes have yieldable engagement with the mine wall.

21. A mining machine in accordance with claim 19 wherein individual yieldable spring actuated devices are associated with each of said chutes for yieldably engaging them with the mine wall.

WILLIAM N. A. VANDER HULST.