

Nov. 4, 1952

C. E. COMPTON
MINING MACHINE

2,616,677

Original Filed Dec. 27, 1950

4 Sheets-Sheet 1

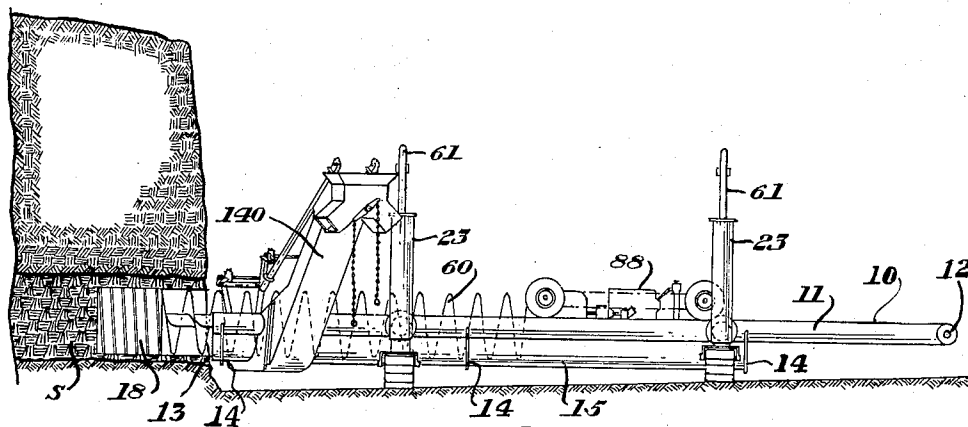


Fig. 1.

Fig. 3.

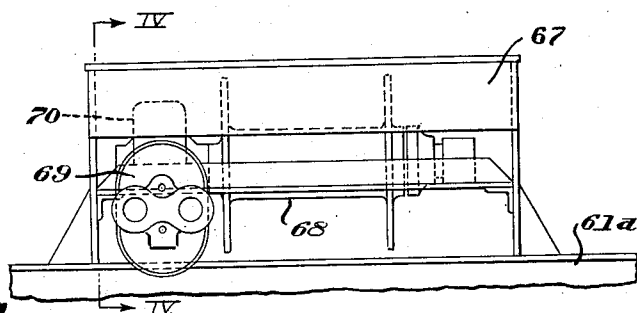
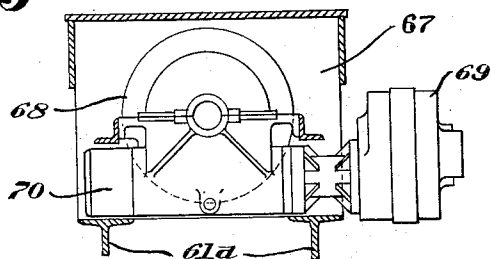


Fig. 4.



INVENTOR
CHARLES E. COMPTON

*Hoopes, Leonard & Glenn
by his attorneys.*

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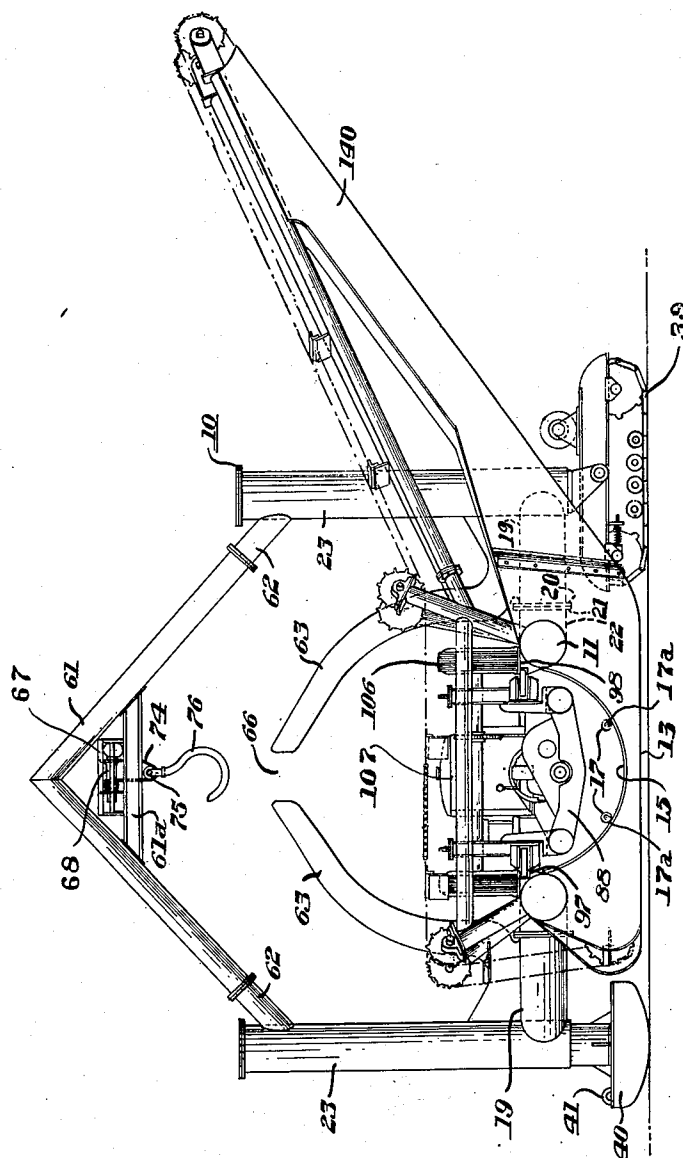
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Fig. 2.



INVENTOR
CHARLES E. COMPTON

*by Hooper, Leonard & Glenn
his attorneys.*

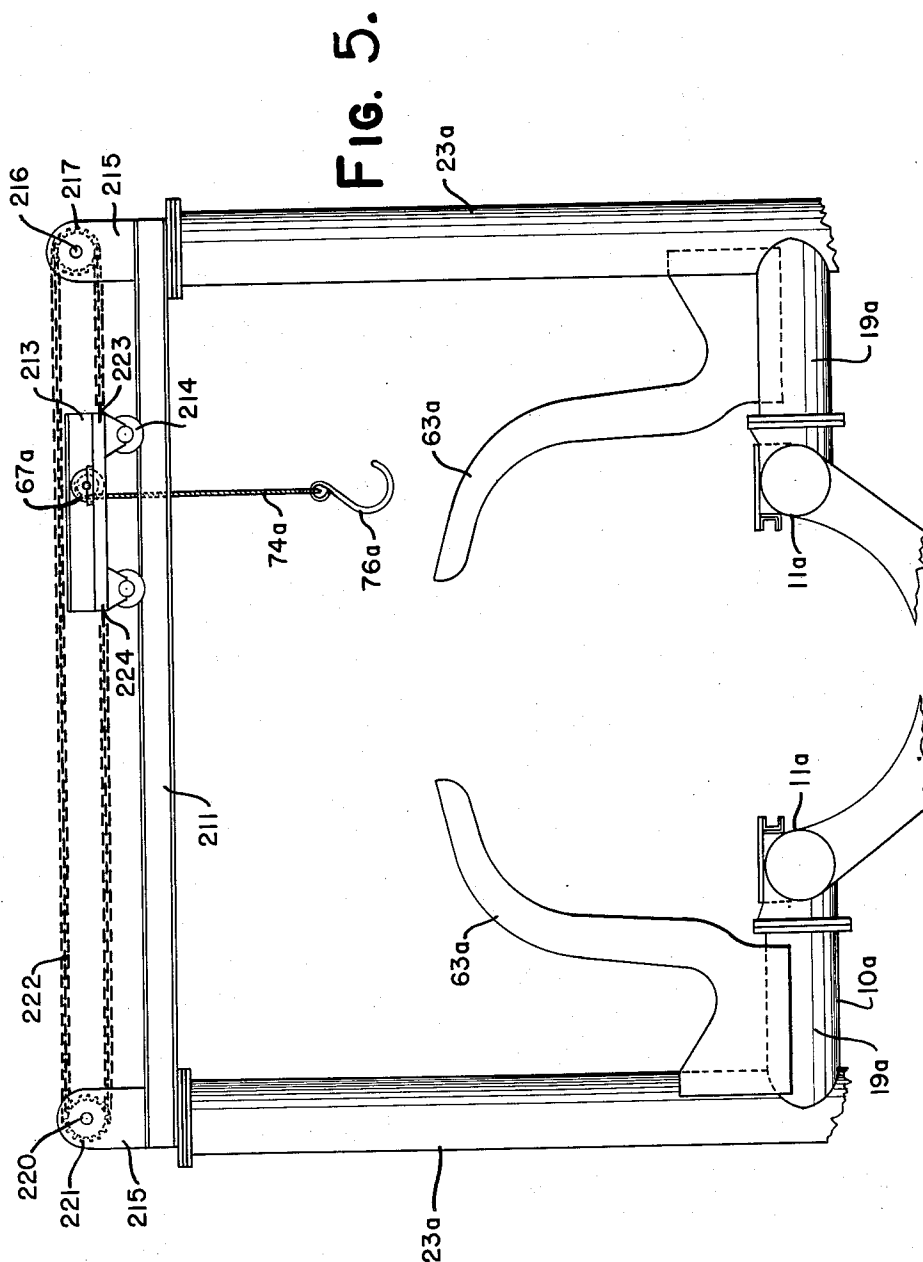
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INVENTOR.
CHARLES E. COMPTON
BY *Hoopes, Leonard & Glenn*

HIS ATTORNEYS

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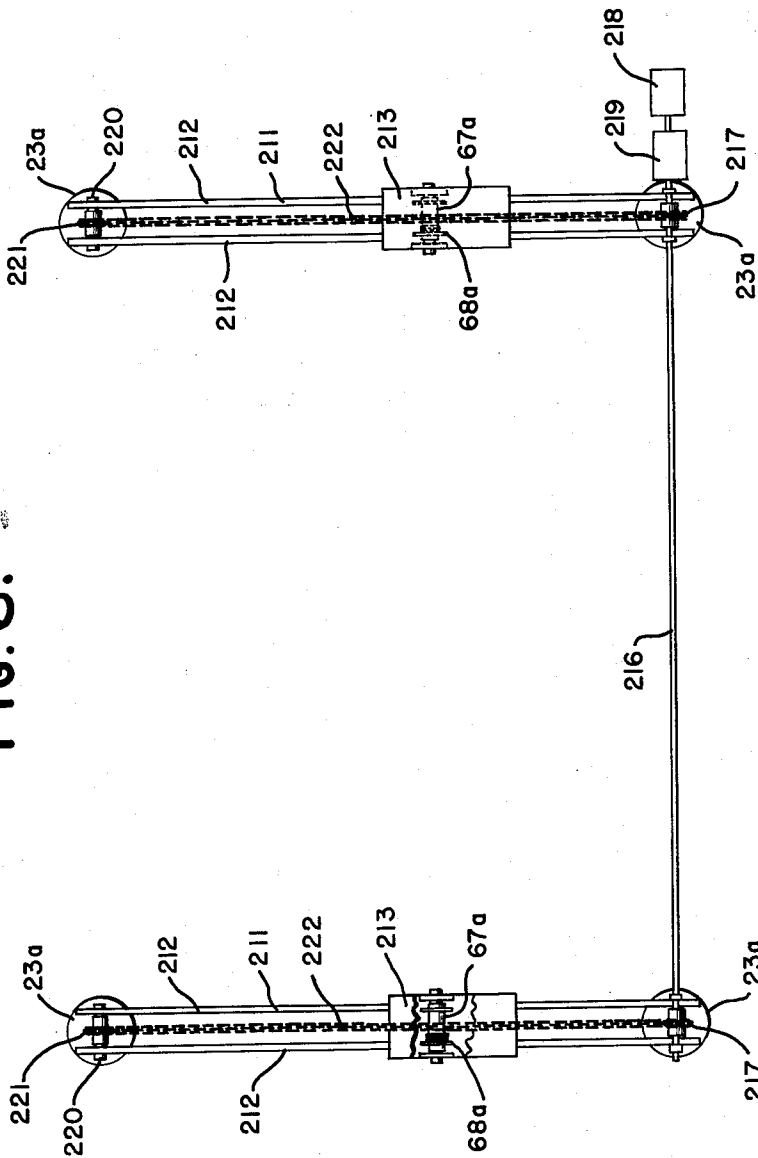
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FIG. 6.



INVENTOR.
CHARLES E. COMPTON
BY *Hooper Leonard & Glenn*
HIS ATTORNEYS

UNITED STATES PATENT OFFICE

2,616,677

MINING MACHINE

Charles E. Compton, Clarksburg, W. Va.

Original application December 27, 1950; Serial No. 202,898. Divided and this application August 18, 1952, Serial No. 304,919

3 Claims. (Cl. 262-19)

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This application is a division of my copending application Serial No. 202,898, filed December 27, 1950.

This invention relates to a mining machine in which an elongated mining assembly is rotated and is advanced and retracted in the course of a mining operation. A mining head may be used in such elongated mining assembly which conforms to the teachings of my Patents Nos. 2,562,841 and 2,594,256. In addition to such a head the elongated mining assembly comprises sectional lengths of a conveyor of a screw or helical nature to drive the head and remove the mined mineral in the course of the mining operation. Provision is made for handling and storing such sections.

Other objects and advantages of this invention will be apparent from the following description and drawings, which are illustrative only, in which

Figure 1 is a side view of a mining machine embodiment of this invention engaged in a mining operation;

Figure 2 is a front view on a larger scale of the mining machine shown in Figure 1 but omitting the elongated mining assembly;

Figure 3 is a side view of one of the winches on the superstructure of the mining machine shown in Figure 2;

Figure 4 is an end view of the winch taken along line IV-IV of Figure 3;

Figure 5 is a fragmentary view showing a portion of the supporting structure and the superstructure of a form of mining machine having winches on the superstructure movable transversely of the machine for handling conveyor sections, Figure 5 being similar to Figure 2 but omitting portions of the mechanism shown in Figure 2, which portions of the mechanism cooperate with the structure shown in Figure 5 in the same way as they cooperate with the structure shown in Figure 2; and

Figure 6 is a fragmentary plan view of a portion of the structure shown in Figure 5 and showing the superstructure, the winches and the means for moving the winches transversely of the machine.

Referring to the drawings, a massive elongated frame 10 is provided having side structural members 11 rigidly joined at the rear ends thereof by a bolster 12 welded or otherwise affixed to the structural members 11. At spaced intervals toward the forward end 13 of the frame 10, spanning structural members 14 in the form of plates having a generally invert or convex downwardly

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profile are also joined to the respective side structural members 11 by welding or otherwise. It will therefore be seen that the frame 10 is generally trough-shaped and that the forward end 13 (the left hand end viewing Figure 1) is open. A pan 15 which is also convex downwardly fits the profile of the plates 14 to which the pan 15 is bolted or welded. The upper edge of the pan 15 are affixed to the side structural members 11. The various frame members such as the sides 11 may be made of well casing pipe, for example, which is of suitable strength. The forward portion of the pan 15 is provided with supporting or pilot rollers 17 suitably journaled in brackets 17a fastened to the pan. Between mining operations the elongated mining assembly, which is designated as a whole by reference numeral 18, normally will rest on the rollers 17 and will be guidingly supported thereby when a mining operation begins.

Arms 22 are welded to sides 11. Laterally projecting tubular members 19 of suitable strength are provided with flanges 20 which cooperate with mating flanges 21 on arms 22. The upright legs 23 of the mining machine are welded to the outer ends of members 19. In this way when the mating flanges 20 and 21 are bolted together the legs 23 become an integral and rigid part of the mining machine. On the other hand, each leg 23 can be separated from the mining machine by uncoupling the respective flanges 21 and 20 if repairs are needed or the machine is to be moved over the public roads.

On at least one side of the machine the legs 23 may be provided with powered traction treads 39. In the embodiment shown in Figure 2 such traction treads in the form of endless tractor tracks are provided on the legs 23 on one side only of the machine. On the other side of the machine the legs 23 are provided with drag bases 40. These bases 40 are in the form of downwardly convex tubs and furnish a considerable support area to the legs on that side. At the same time they can readily be dragged and will slide over the ground during lateral movement of the machine when it is being moved between side-by-side mining stations along the working face of a coal seam such as the coal seam S in Figure 1 or any other mineral deposit. The drag bases 40 are provided with eyes 41 so that a tractor can be attached to the machine on that side if it is desired to drag it in a lateral direction with the drag bases 40 leading. In most situations that side of the machine having the traction treads 39 thereon will be used to move the

machine laterally with the treads 39 in the lead. Where lateral movement in both directions may frequently take place, then it may be preferable to replace the drag bases 40 with traction tread assemblies similar to assemblies 39.

In order to initially point or aim the elongated mining assembly 18 the axis of which generally coincides with the longitudinal axis of the mining machine of this invention, the mining machine axis is aligned when the elongated mining assembly 18 is retracted and out of seam S. When fully retracted, all helical conveyor sections, severally designated 60, beyond the one immediately connected to the mining head are removed and placed alongside the machine or stored in the superstructure of the machine.

That superstructure comprises the arched beams 61 welded together at the top and respectively connected to flanged extensions 62 integral with legs 23. The mating bolt flanges at the lower ends of beams 61 enable the arches to be removed whenever necessary or desirable. Each superstructure includes in addition inwardly extending and upwardly inclined racks 63 welded as shown in Figure 2 to the projecting members 19 and corresponding legs 23. These racks are generally in the plane of the respective beams 61 extending transversely over the frame 10. The inward ends of the front and rear pair of racks 63 are separated respectively to define a vertical passage 66 through which the sections 60 can be moved. The diameter of the central shaft of each conveyor section 60 is narrow enough to pass through the opening 66 when the sections are being racked. Moreover, the pitch of the helical blade of each section 60 is great enough to permit the ends of the racks to pass between the turns of the blade in such handling of them. Many such conveyor sections 60 may be stored in the racks 63 inasmuch as the blades thereof interfit side-by-side and thereby each takes up less space together than the overall diameter thereof while so stored.

In order to handle the conveyor sections 60 a conventional hydraulically operated winch 67 is fastened on a cross beam 61a in turn fastened to each arch 61 immediately beneath the peak thereof. Each winch 67 is provided with a rotatable drum 68 and a hydraulic motor 69 to turn the drum through a gear reducer 70. A cable 74 is operatively connected to each drum 68 and passes around a pulley block 75 from which a hook 76 depends. Each hook 76 is large enough to cradle the shaft of the helical conveyor sections 60 in the course of the handling thereof.

A motor carriage 88 is shown in Figures 1 and 2 for rotating, advancing and retracting the elongated mining assembly 18. A channel-shaped guide rail 97 at each side of the frame receives a portion of the carriage 88. The guide rails 97 extend along the inside of each of the side structural members 11 of the frame 10 and are rigidly fastened thereto. Thus, movement of the carriage 88 is limited by the guide rails 97 to longitudinal movement between the respective ends of the frame 10. The carriage 88 is in effect a drop-center carriage placing it relatively close to the ground for maximum force and stability in operating the elongated mining assembly 18. The lower portion of the carriage 88 travels in the trough defined by the upper surface of the pan 15. The upper flange of the guide rail 97 is provided with a widened portion or a separate plate may be used to serve as a friction track which is also fixed to the side members 11 along

the length thereof. The carriage 88 has front and rear axles carrying driving wheels 106 which are provided with conventional rubber tires riding on the track. An internal combustion engine such as a diesel engine 107 is mounted on the carriage 88 to drive the wheels 106.

A non-circular socket is provided at the rearward end of the shaft of each helical section 60. The forward ends of the helical sections 60 are provided with complementary male coupling members. When a male coupling member is inserted into a socket the two are fastened together by a transverse coupling pin. In that way the elongated mining assembly 18 can be made of indefinite length by adding such sections 60 in the course of a mining operation at a single station. Thereby the elongated mining assembly 18 can cut its way into the seam S for a distance several times as long as the length of the frame 10 of the mining machine operating the elongated mining assembly 18. In this operation the forward thrust of the elongated mining assembly 18 is substantially coaxial with and in alignment with carriage 88 so that the full forward force of the carriage 88 is transmitted to the assembly 18. Moreover, the longitudinal axes of the carriage 88 and of the elongated mining assembly 18 substantially coincide and are relatively close to the ground in front of the working face as shown in Figure 1. In this way a maximum of stability with a maximum conversion of thrust force generated by the wheels 106 is transmitted to the assembly 18. Further, the machine can work seams substantially on the same level as the machine.

Carriage 88 is moved rearwardly or retracted whenever an additional helical conveyor section 60 is to be inserted in the elongated mining assembly 18 or when the entire elongated mining assembly 18 is being removed from the bore which it has made in order that the entire machine may be moved to the next station alongside. During a retraction of elongated mining assembly 18 by the movement of carriage 88 toward the rear end of the mining machine the engine 107 will usually continue the rotation of the helical conveyor in a mining direction to clean out the bore in the course of such retraction.

In the course of a usual mining operation the elongated mining assembly 18 is rotated by carriage 88 in a direction so as to screw the helical blades into the bore being cut in the seam S by the head 18. Such a direction of rotation while the carriage 88 is moving forward causes the mineral being mined to be passed along between the turns of the blades toward a transverse opening at the forward end of the pan 15 whence it is picked up by loading conveyor 140.

At the inception of a mining operation usually but a single helical conveyor section 60 is included in elongated mining assembly 18. At such start of a mining operation, moreover, the carriage 88 is usually fully retracted and at the back near the bolster 12. In this arrangement, the front of the conveyor section 60 and the mining head are supported by the pilot rollers 17. As shown, their axes are longitudinal and parallel to the axis of the mining machine but they may be offset so as to be normal to the angle of pitch of the outer edge of the helical blades in contact therewith. Thus, as carriage 88 is moved forward with the mining head assembly 18 rotating so as to "screw" the blade following the head 18 into the working face of seam S, the rollers 17 continue their support.

However, when the mining head itself has cut a kerf into the working face of the mineral deposit or seam *S*, it frequently makes the forward end of the elongated mining assembly *18* self-supporting. Under those circumstances, if desired, the front legs *23* can be lowered very slightly, thereby lowering rollers *17* out of any possible contact with the blade without destroying the axial alignment between elongated mining assembly *18* and carriage *88*. The helical conveyor sections *60* are made sufficiently strong and rigid to avoid bending which would lead to objectionable rubbing or wear during operation of the mining machine.

Referring now to Figures 5 and 6, these figures show a mining machine having winches on the superstructure movable transversely of the machine for handling conveyor sections, only so much of the structure of the machine as is required to disclose the mounting and operation of the winches being shown in Figures 5 and 6. The machine structure as a whole is analogous to that shown in the other figures, there being a massive elongated frame *10a* having side structural members *11a* rigidly joined at the rear ends thereof by a bolster not shown similar to the bolster *12*. Laterally projecting tubular members *19a* are connected to the sides of the members *11a* at spaced intervals. The upright legs *23a* of the mining machine are welded to the outer ends of the members *19a*. Inwardly extending and upwardly inclined racks *63a* are welded to the members *19a* or the members *23a* or both, the racks *63a* lying in the transverse planes defined by the members *23a*. There are shown two opposed pairs of members *23a* with racks *63a* there-within. The racks *63a* are analogous to the racks *63* and function in the same manner.

Generally horizontally extending winch ways *211* are mounted atop the opposed members *23a* and extend transversely of the machine, there being one such winch way for each of the pairs of opposed members *23a*. Each winch way comprises a pair of spaced apart members *212* forming tracks. On each winch way rides a truck or dolly *213* having wheels *214* operating upon the tracks *212*. Each truck *213* has mounted thereon a winch *67a* which may be of any conventional construction and may be identical with the winches *67*. Each winch *67a* may be provided with a rotatable drum *68a* and a hydraulic motor to turn the drum through a gear reducer as in the case of the winch *67* shown in Figures 3 and 4. A cable *74a* is operatively connected to each drum *68a* and carries a hook *76a* similar to the hooks *76* and adapted to function in the same way. The cables *74a* extend down between the rails *212*.

Mounted atop each end of each of the winch ways *211* is a pedestal *215*. A shaft *216* extends longitudinally of the machine and is journaled in the two pedestals *215* at one side of the machine. Sprockets *217* are fixed to the shaft *216*, one sprocket at each pedestal. The shaft *216* is adapted to be turned by an oil motor *218* through a worm reducer *219*. The oil motor *218* may operate in either direction so the shaft *216* may be turned in one direction or the other as desired, the sprockets *217* turning therewith.

Journaled in each of the pedestals *215* at the opposite side of the machine is a short shaft *220* to which is fixed a sprocket *221*. Each sprocket *221* is in transverse alignment with one of the sprockets *217* at the first mentioned side of the machine. At each of the winch ways a sprocket

chain *222* passes over the opposed sprockets *217* and *221* and thence about and under the sprockets and inwardly to be dead-ended to the corresponding truck *213*. As shown in Figure 5 one end of each sprocket chain *222* is dead-ended to the corresponding truck *213* at *223* and the other end is dead-ended to the truck at *224*. Thus when the shaft *216* is turned the two trucks *213* are by the respective sprocket chains *222* moved synchronously transversely of the machine. Such movement facilitates handling of the conveyor sections from operative position to stored position in the racks *63a* and vice versa.

Since the winches *67a* are mounted for travel the hydraulic connections thereto will comprise flexible portions to compensate for the change in position of the winches relatively to the superstructure. Alternatively the winches *67a* may be electrically operated if desired.

Various changes in the details and arrangements of this invention may be made without departing from the spirit thereof or the scope of the appended claims:

I claim:

1. In a mining machine comprising a carriage, a supporting structure having a runway along which the carriage is adapted to move back and forth, an elongated mining assembly operatively coupled to the carriage at the rear end of the assembly, the assembly including screw conveyor sections connected end to end, and means for rotating the assembly, a superstructure carried by the supporting structure and extending upwardly therefrom, lifting means on the superstructure generally above the assembly for handling conveyor sections when disconnected from the assembly and carriage, the lifting means having flexible conveyor section supporting means so that the conveyor sections when held thereby are shiftable generally transversely of the path of movement of the assembly, and means constituting an upwardly open rack extending generally parallel to the path of movement of the assembly, said rack being connected with the supporting structure at a side thereof for holding conveyor sections in position generally parallel to but out of the path of movement of the assembly whereby conveyor sections can be moved between a position in the path of movement of the assembly and a position in the rack.

2. In a mining machine comprising a carriage, a supporting structure having a runway along which the carriage is adapted to move back and forth, an elongated mining assembly operatively coupled to the carriage at the rear end of the assembly, the assembly including screw conveyor sections connected end to end, and means for rotating the assembly, a superstructure carried by the supporting structure and extending upwardly therefrom, lifting means on the superstructure generally above the assembly substantially movable transversely of the runway for handling conveyor sections when disconnected from the assembly and carriage and means constituting an upwardly open rack extending generally parallel to the path of movement of the assembly, said rack being connected with the supporting structure at a side thereof for holding conveyor sections in position generally parallel to but out of the path of movement of the assembly whereby conveyor sections can be moved between a position in the path of movement of the assembly and a position in the rack.

3. In a mining machine comprising a carriage, a supporting structure having a runway along

which the carriage is adapted to move back and forth, an elongated mining assembly operatively coupled to the carriage at the rear end of the assembly, the assembly including screw conveyor sections connected end to end, and means for rotating the assembly, a superstructure carried by the supporting structure and extending upwardly therefrom, lifting means on the superstructure generally above the assembly for handling conveyor sections when disconnected from the assembly and carriage, the lifting means having flexible conveyor section supporting means so that the conveyor sections when held thereby are shiftable generally transversely of the path of movement of the assembly, and means constituting a pair of opposed upwardly open racks extending generally parallel to the path of movement of the assembly, said racks being respectively connected with the supporting structure at opposite sides thereof for holding conveyor sections in position generally parallel to but out of the path of movement of the assembly whereby conveyor sections can be moved between a position in the path of movement of the assembly and a position in one of the racks.

CHARLES E. COMPTON.

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