Aug. 11, 1931. F. H. WEITZ 1,818,771

COAL MINING AND LOADING MACHINE

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Fig. 1.

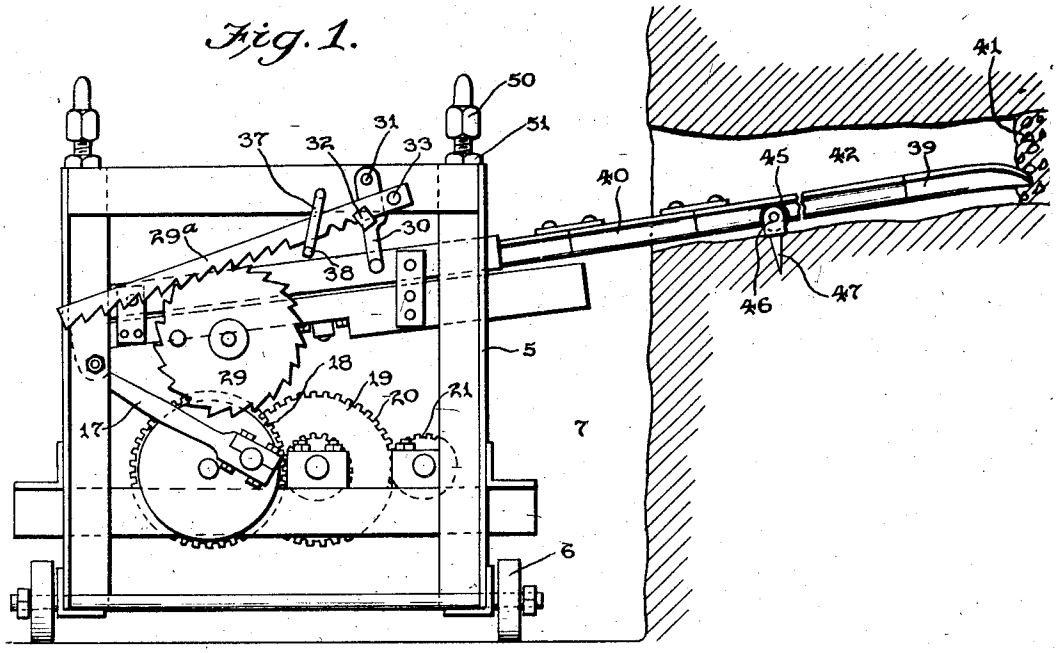
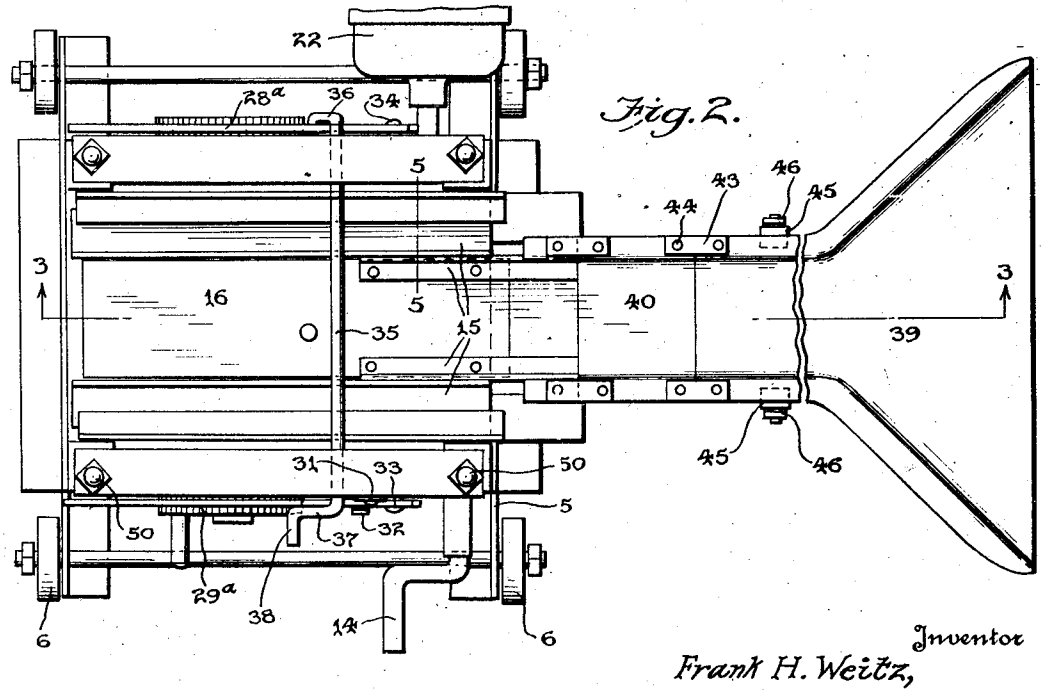



Fig. 2.




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Fig. 5.

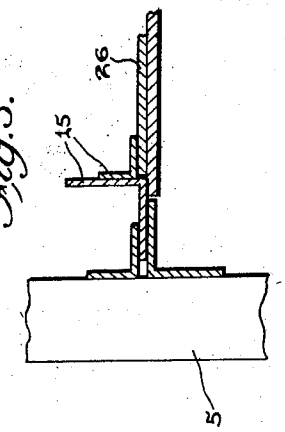



Fig. 3.




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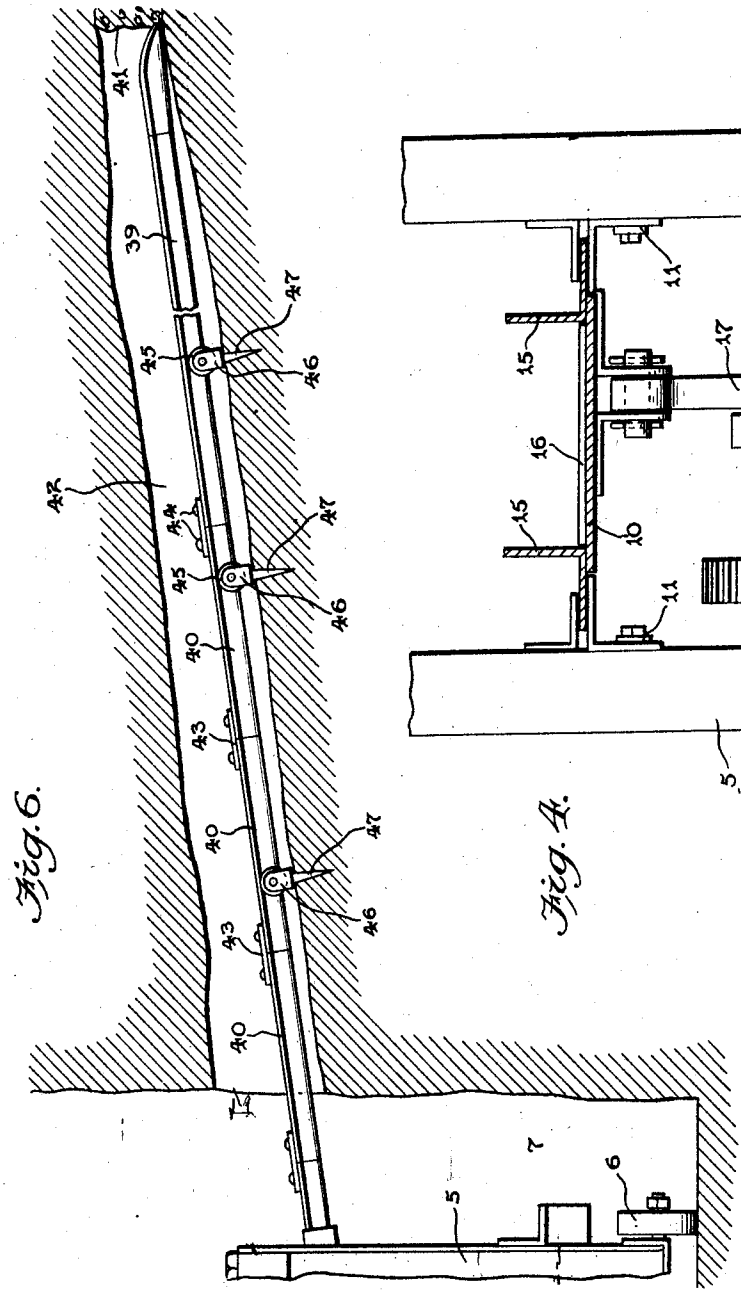



Fig. 6.




Fig. 4.

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# UNITED STATES PATENT OFFICE

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## COAL MINING AND LOADING MACHINE

Application filed September 29, 1930. Serial No. 485,235.

This invention relates to a method of and means for mining and loading coal and it has for its object to provide a mechanism adapted to enter and operate in veins of very little height, where it would be impossible for ordinary loading machines to enter. Under existing conditions in the anthracite coal field, the miners are frequently called upon to take coal from veins of such a little height that it is necessary for the miners to crawl into these veins and shovel the coal into conveyers while lying in a recumbent position. This is not only exceedingly arduous labor, but the output is greatly reduced, due to the awkward position in which the work is being done. The coal is shot down at the rear end of the vein, then the miner or miners crawl in and shovel the loose coal into a shaking or other type of conveyer, then more coal is shot down and the operation repeated, the conveyer being added to as the point of operation recedes from the point at which the conveyer is delivering the coal into the mine cars.

According to the present invention, it is proposed to substitute for the conveyer, aforesaid, a mechanism which is at once a conveyer and a shovelling mechanism, whereby the necessity of having the miners shovel the coal into the conveyer is avoided. Under the method of my invention, the only manual labor involved will be the shooting down of the coal.

The mechanism that I have devised is of such a nature as to be extended over considerable distances, through passages of very little height, and reach, pick up and convey the coal to a room where it may be delivered directly into mine cars. Further objects and advantages of the invention will be set forth in the detail description which follows.

In the accompanying drawings:

Fig. 1 is a side elevation of the mechanism, by virtue of which my method of mining may be carried out.

Fig. 2 is a plan view of said mechanism.

Fig. 3 is a vertical sectional view through said mechanism.

Fig. 4 is a rear end elevation of the mechanism of Figs. 1, 2 and 3.

Fig. 5 is a transverse vertical sectional view, illustrating the guide-way, hereinafter described.

Fig. 6 is a detail view, illustrating a plurality of conveyer sections, showing the manner of extending the effective length of the shovelling and conveying chute.

The machine of the present invention comprises a frame-work 5 which may be mounted upon ground wheels, casters, or equivalent members 6, so that it may be shifted within a room 7 to operatively dispose it with respect to different points of operation and with respect to different track sections 8 and mine cars 9 on said track sections. A tiltable frame 10 is pivotally connected at 11 to the frame 5, said tiltable frame being adapted to have its inclination varied by means of a rack bar 12 and pinion 13, the latter being provided with an operating handle 14. The tiltable frame 10 carries guide-ways 15, in which a plate 16 is mounted to reciprocate. Reciprocatory movement is imparted to this plate and to the hereinafter described conveying and shovelling sections, associated therewith, by means of a connecting rod 17, a train of gearing 18, 19, 20 and 21 and the motor 22. The plate 16 carries bearings 23 upon its under side, in which a screw 24 is mounted for rotation. This screw engages a nut 25 which depends from a chute section 26 and thus the chute section is caused to reciprocate bodily with plate 16, but is capable of being adjusted longitudinally of said plate, to be retracted to the position illustrated in Fig. 3 or to be projected materially to the right. This capability of the chute section 26 to be projected during its bodily reciprocation is utilized to feed the conveyer and shovel sections forwardly into the pile of coal. To accomplish this automatically, I provide a transverse shaft 27 which carries a pinion $27^a$, said pinion meshing with the corresponding pinion $24^a$ on the screw 24. Rotation is imparted to the shaft 27 by means of ratchet wheel and ratchet bars 28, $28^a$, 29 and $29^a$. The teeth of these ratchet mechanisms are so disposed that when the bar $28^a$ is lowered and the bar $29^a$ is raised, the movement of the screw 24 will be in one direction and that when the bar

29ª is lowered and the bar 28ª is raised, the movement of the screw will be in the other direction.

Any suitable means may be employed for effecting the movement of the bars 28ª, 29ª. As one such means, I have illustrated a lever 30 pivoted at 31 and provided with a pawl member 32 adapted to engage the teeth of the bar 29ª, said bar being pivoted at 33. When the lever 30 is swung toward the left it elevates bar 29ª out of engagement with the ratchet wheel 29. For similarly actuating pawl bar 28ª that is pivoted at 34, I extend a rod 35 across the frame of the machine and provide it with a crank end 36 which engages beneath the pawl bar 28ª. The opposite end of the rod 35 is provided with a crank extension 37 and handle 38. The chute section 26 is connected with a shovel section 39 by any desired number of intermediate chute sections 40 and it is to be understood that the necessary number of chute sections is employed to project the shovel section into contact with the coal 41 that is being mined. I find it practicable to extend these chute sections for a considerable distance into and through the passages 42, left as the result of taking the coal 41 from the veins.

The chute sections are of channel formation and are provided with horizontal outstanding flanges at their upper edges which may be coupled to each other by coupling plates 43 and bolts 44. These horizontal flanges are preferably disposed to ride upon rollers 45 that are carried by L-shaped brackets 46, said brackets being pinned or pegged, as indicated at 47, directly to the floors of the passages 42, though it should be understood that I contemplate providing any necessary guiding and supporting means for the chute sections, this being manifestly within the skill of the engineer.

At the beginning of a loading operation, the chute sections are retracted, that is to say, the chute section 26 is moved as far to the left as possible and enough intermediate chute sections 40 are put in place as may be necessary to bring the shovel section 39 to the edge of the pile of coal that has been shot down. The machine being then started as, for example, by the energization of motor 22, the shovel will be projected forcibly into the coal by the connecting rod 17 and a certain amount of coal will be picked up by the shovel and started down the chute by the shaking action. The chute and shovel sections will be fed forwardly into the coal by the action of screw 24, until practically all of the loose coal has been picked up and loaded into the mine cars 9. Then the action of the feed mechanism is reversed, the chute section 26 is retracted and said chute section may be disconnected from the chute sections that are still in the passageway and the machine may be moved to another point and connected to the chute sections there in place to load the coal that was shot down during the time that the machine was being used to load the coal at the first station, while during such second period of operation, additional coal may be shot down at the first station and the machine returned to such first station to recover and load the last mentioned coal.

Jack screws 50, provided with lock nuts 51, are adapted to engage the roof or ceiling of the room 7, and these, together with suitable chocks for wheels 6, serve to bind the machine against movement during the loading operation.

I am aware of the fact that many machines have been devised for loading coal, but as far as I am aware, I am the first to provide a machine comprising a combined conveyor and shovel section which is adapted to enter the veins of coal of such small height that even a man cannot stand erect therein and to pick up said coal, convey it from said veins and load it into mine cars in a single operation and without the use of manual labor. Consequently, it is to be understood that the invention is not limited to the particular mechanism which I have chosen to illustrate as explanatory of the invention, but that, upon the contrary, it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims. It is manifest that many ways will readily suggest themselves to the skilled mechanic for securing the desired result, while still retaining the basic principle, constituting the gist of my invention.

Having described my invention, what I claim is:—

1. A mechanism of the character described, comprising a shovel section, a plurality of conveyer sections, means for securing said sections together end to end, the innermost of said conveyer sections being mounted for reciprocatory movement, a guiding and supporting means for the last named conveyer section, means for imparting reciprocatory movement to said guiding and supporting means and consequently to the last-named conveyer section, and means for adjusting the last named conveyer section longitudinally, with respect to said guiding means, during the reciprocation of the latter.

2. A device of the character described, comprising a wheeled supporting frame, a tiltable frame mounted therein, means for adjusting said tiltable frame to varying positions of inclination, a plate slidably mounted upon the tiltable frame, a conveyer section slidably connected with respect to the plate, additional conveyer sections connected to the first named conveyer section, a shovel section connected at the end of the additional conveyer sections, mechanism for imparting reciprocation to said plate and the parts car-

ried thereby, a feed screw mounted upon the plate, a nut carried by the first-named conveyer section and engaging said feed screw, and ratchet mechanism, operative under said reciprocatory movement for imparting movement to the feed screw.

3. A device of the character described, comprising a wheeled supporting frame, a tiltable frame mounted thereon, a plate slidably mounted in the tiltable frame, a motor, a train of gearing and a connecting rod for imparting reciprocatory movement to said plate from the motor, a conveyer section slidably mounted upon said plate, a feed screw carried by the plate, a nut carried by the conveyer section and engaging the feed screw, a transverse shaft, bevelled gears between the feed screw and the transverse shaft, ratchet wheels upon the opposite ends of the transverse shaft, and ratchet bars engaging said ratchet wheels, the teeth of the ratchet wheels and ratchet bars being so set as to feed said conveyer section in one direction or the other, according to which of said ratchet bars is brought into action.

4. A structure as recited in claim 3, in combination with a plurality of additional conveyer sections, a shovel section at the end of said additional conveyer sections, and means for supporting said additional conveyer sections.

5. A coal loading machine for collecting and removing coal from veins of restricted heights comprising a traveling supporting frame of considerably greater height than the vein from which the coal is to be removed, means for mounting said supporting frame to travel longitudinally, a conveyor supported transversely of the said frame and extensible as to length outwardly beyond one side of said frame, said conveyor being located at such an elevated point upon the frame as to be adapted to discharge coal into mine cars from the opposite side of said frame, means upon the supporting frame for imparting a rapid shaking movement to the conveyor throughout all conditions of extensibility thereof, and means for automatically feeding the conveyor as a whole outwardly with respect to the supporting frame and during the shaking movement thereof.

6. A coal loading machine for collecting and removing coal from veins of restricted heights comprising a traveling supporting frame of considerably greater height than the vein from which the coal is to be removed, means for mounting said supporting frame to travel longitudinally, a conveyor supported transversely of the said frame and extensible as to length outwardly beyond one side of said frame, said conveyor being located at such an elevated point upon the frame as to be adapted to discharge coal into mine cars from the opposite side of said frame, means upon the supporting frame for imparting a rapid shaking movement to the conveyor throughout all conditions of extensibility thereof, a feed screw, connections between the feed screw and conveyor for feeding the conveyor bodily outward under the influence of the movement of said screw, and automatic means for imparting turning movement to the feed screw during the shaking movement of the conveyor.

In testimony whereof I affix my signature.

FRANK H. WEITZ.