

Jan. 29, 1929.

1,700,294

N. D. LEVIN

LOADING MACHINE

Original Filed July 21, 1921

2 Sheets-Sheet 1

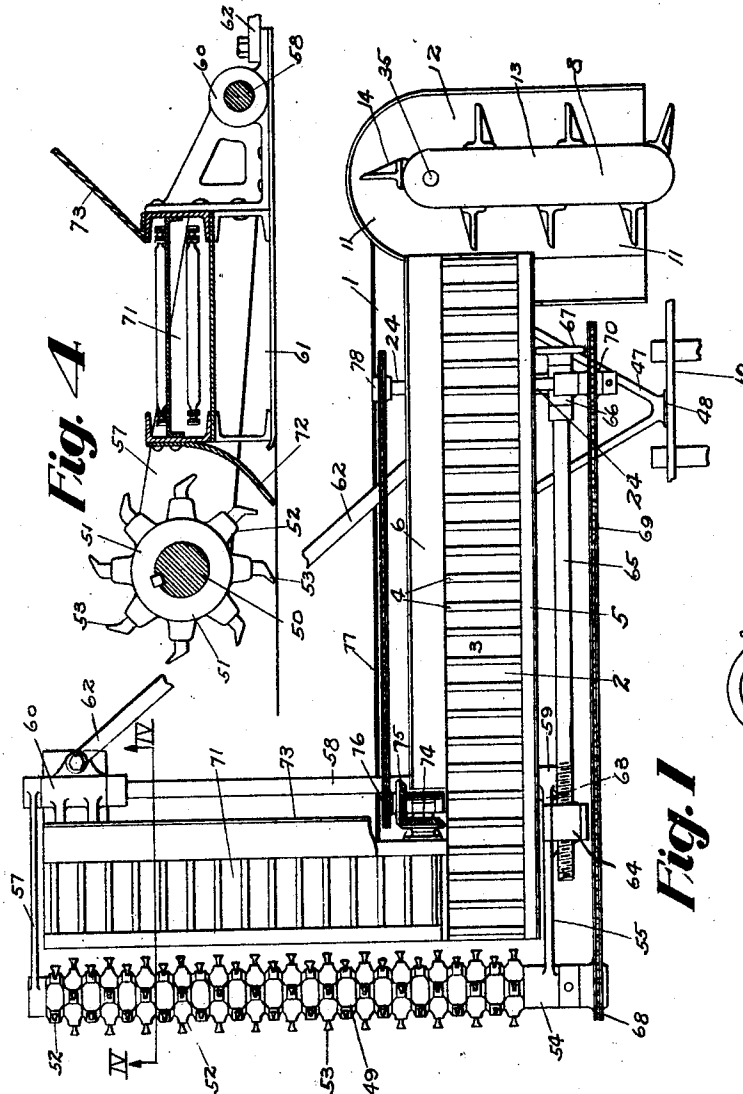


Fig. 1

Fig. 1

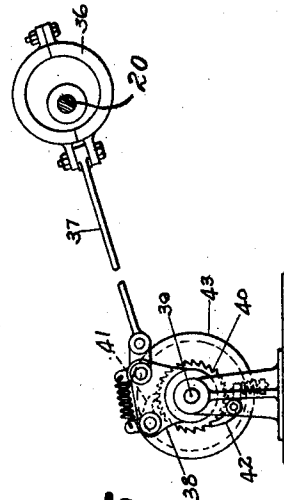


Fig. 6

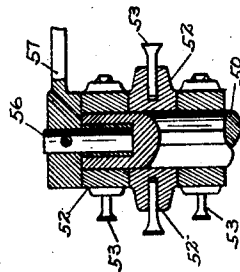


Fig. 5

R.D. Nichols.
Dudley C. Fisher

BY

INVENTOR
Nils D. Levin
J.H. Bliss
ATTORNEY

Jan. 29, 1929.

1,700,294

N. D. LEVIN

LOADING MACHINE

Original Filed July 21, 1921 2 Sheets-Sheet 2

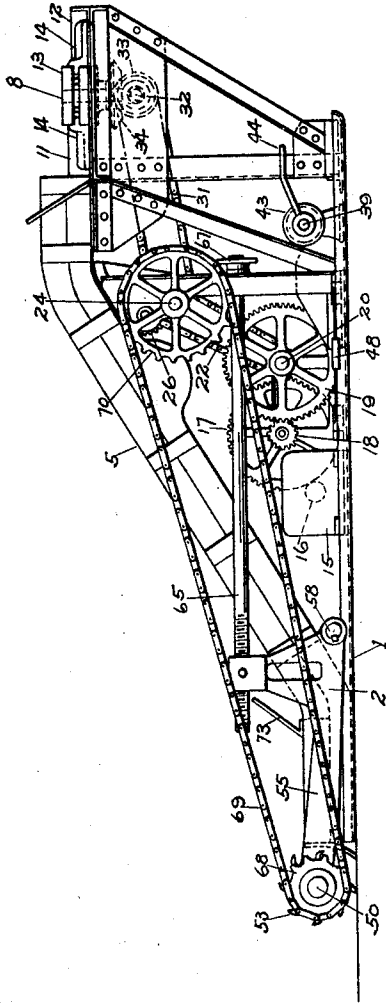


Fig. 2

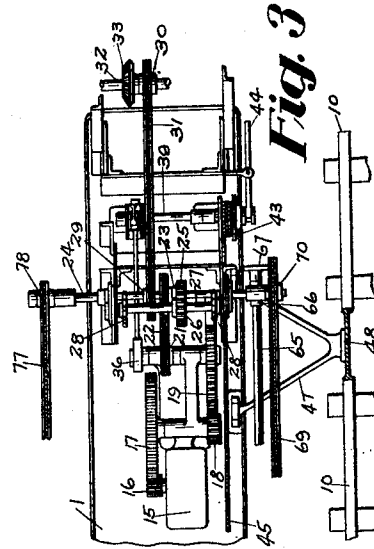


Fig. 3

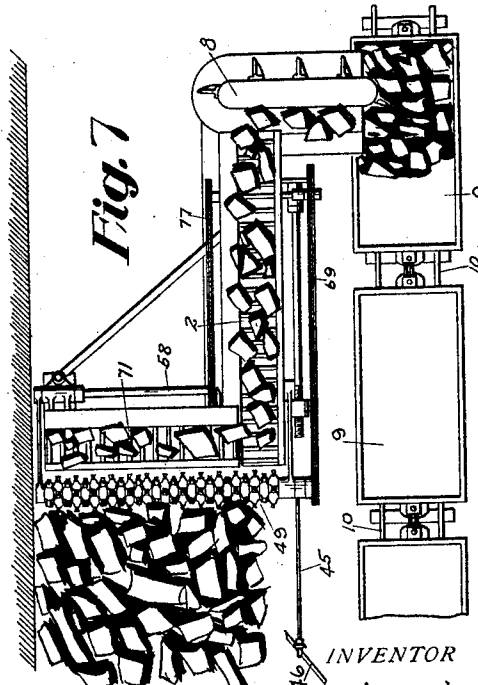


Fig. 7

R. D. Nichols.
Wadley J. Fisher.

BY

INVENTOR
N. D. Levin
J. H. Bliss
ATTORNEY

UNITED STATES PATENT OFFICE.

NILS D. LEVIN, OF COLUMBUS, OHIO, ASSIGNOR TO THE JEFFREY MANUFACTURING COMPANY, OF COLUMBUS, OHIO, A CORPORATION OF OHIO.

LOADING MACHINE.

Application filed July 21, 1921, Serial No. 486,651. Renewed January 5, 1927.

The present invention relates to certain new and useful improvements in loading machines adapted to gather the dislodged coal from the floor of a mine and load it into suitably disposed cars for transportation from the mine.

The usual method of mining coal comprises the drilling of holes into the body of the vein, and the explosion therein of suitable explosive to blast out fragments which are afterwards loaded into cars for transportation from the mine.

It is a common, though not universal, practice to form kerfs in the coal body, usually as near the mine floor as possible, to facilitate the breaking down of the coal above the kerf. These kerfs are commonly formed by mining machines having supporting devices positioned in a somewhat lower plane than the cutting devices by which the kerfs are produced, resulting in an uneven floor composed of a succession of off-sets, or steps. Numerous attempts have been made to adapt loading machines, comprising conveyors associated with gathering devices of various sorts, to the mechanical taking up of the loose, broken coal from the floor of the mine and loading it into suitably positioned cars for transportation from the mine. The irregularities of the mine floor produced by the action of the mining machine above referred to, or to the irregular breaking of the coal when, no under kerf is formed, have constituted obstructions which seriously interfere with the economical operation of loading machines such as have been heretofore constructed. Frequently the force of the blast is expended without thoroughly disrupting the coal which is left standing in comparatively large fragments interlocked in a mass too compact to be handled by the gathering devices of the machine heretofore constructed. In such cases these interlocked fragments must be manually dislodged, materially increasing the labor of loading and correspondingly reducing the efficiency of the machine.

It is the especial object of this invention to provide an improved machine adapted to expeditiously and conveniently remove broken coal from the floor of a mine chamber and load it into suitably disposed cars for transportation from the mine.

A further object is to provide a machine

of the class described having gathering devices adapted to engage the masses of coal which have been partially shattered by the blast and complete its disruption to render possible the gathering and loading of the fragments for transportation.

A further object is to provide a machine of the class described having means to dislodge the bottom coal which adheres to the sub stratum and thereby provide an even floor over which the machine may be advanced.

A further object is to provide a machine of the class described having means to vertically adjust the bottom coal dislodging mechanism to cause it to follow the inclinations of the strata.

The devices by which I attain these objects are fully set forth in the following specification and illustrated in the accompanying drawings of which

Fig. 1 is a general plan view of one embodiment of my invention.

Fig. 2 is a side elevation of the machine illustrated in Fig. 1.

Fig. 3 is a fragmentary plan view having certain parts broken away to disclose the power devices by which the machine is actuated.

Fig. 4 is a section taken along the line IV—IV of Fig. 1.

Fig. 5 is a fragmentary detail partly in sections showing the method of supporting the inner end of the gathering bar.

Fig. 6 is a detail of the feeding mechanism.

Fig. 7 is a diagrammatic view illustrating one method of operating the machine.

Like numerals refer to similar parts in the several figures.

Preferably my improved loading machine is mounted upon a base plate 1 adapted to rest upon and slide over the floor of the mine.

Extending longitudinally of the base plate 1 is a main conveyor which may be of any preferred construction. For purposes of illustration I have shown a conveyor 2 of the type illustrated in Patent 1,351,953 issued to me on September 7th, 1920, which comprises an elongated trough 3 along which travels a plurality of spaced scraper cross bars 4 attached to and propelled by a pair of endless chains which are not shown in the draw-

ings. As conveyors of this type are well known in the art and as its details form no part in the present invention further description is not thought to be required at this time. This conveyor has a receiving portion disposed in horizontal planes adjacent the mine floor, and an inclined elevating portion adapted to lift the coal to a suitable elevation above the mine floor. The trough 3 is provided with side plates 5 and 6 to prevent the overflow of material along the sides of the conveyor.

I have also provided a transversely extending delivery conveyor 8 adapted to receive material from the main conveyor and discharge it over the side of a mine car 9 suitably positioned upon a track 10 which extends parallel to the working face of the coal. This delivery conveyor may be of any preferred type. For purposes of illustration I have shown a conveyor of the same general class as that illustrated in Patent No. 1,246,762, issued to me on November 13th, 1917, and comprising two parallel troughs 11 and 12 positioned in the same horizontal plane one at each side of the guide frame 13. Around the guide frame 13 travels a suitable endless chain, not shown in the drawings, which propels the laterally extending scraper flights 14 by which material is propelled along the trough 11. As such conveyors are well known in the art, and as its details form no part of the present invention, further description is not thought to be required at this time.

Mounted upon the base plate 1 is a motor 15 by which the several elements of the machine are actuated. This motor may be of any preferred type suitable to the conditions under which the machine is operated. For purposes of illustration I have shown an electric motor which may receive electric current in any convenient manner from any convenient source of supply, and which may be controlled through any suitable controlling devices, but as such devices are well known in the art and form no part in the present invention their illustration and description is not thought to be required at this time.

The motor 15 is provided with a pinion 16 connected through a train of gears 17, 18 and 19 with a power shaft 20 supported in suitable bearings of the main frame. To the power shaft 20 is attached a sprocket wheel 21 which is connected by a suitable chain 22 with a similar sprocket wheel 23 on the counter shaft 24. The counter shaft 24 is supported in suitable journal bearings of the main frame and is connected through a pair of spur gears 25 and 26 with the conveyor driving shaft 27 upon which are mounted two sprocket wheels 28 adapted to engage the chains of the conveyor 2 to drive them. Power is transmitted from the

counter shaft 24 through the sprocket wheels 29 and 30 and the driving chain 31 to the driving shaft 32 of the auxiliary conveyor. The shaft 32 carries a bevel gear 33 which engages a similar bevel gear 34 upon the vertical head shaft 35 of the auxiliary conveyor to actuate it.

Fixed to the power shaft 20 is an eccentric 36 having an eccentric rod 37 connected with a rocker arm 38 adapted to oscillate about the feed shaft 39. The feed shaft 39 is supported in suitable journal bearings of the main frame and carries a ratchet wheel 40 arranged to be engaged by a pawl 41 mounted upon the rocker arm 38. When the power shaft 20 revolves the eccentric 36 causes the oscillation of the rocker arm 38 and, through the engagement of the pawl 41 with the ratchet 40 causes the revolution of the feed shaft 39. A second pawl 42 mounted upon the frame work of the machine is arranged to engage the ratchet wheel 40 to prevent retrograde movement thereof.

Mounted for free rotation upon the feed shaft 39 is a winding drum 43 which is connectable with said shaft by suitable clutch mechanism of any preferred type, but as such clutches are well understood in the art and form no part in the present invention further description and illustration is not thought to be required at this time. Suitable means, such as the operating lever 44, is provided for the control of said clutch mechanism and the engagement or disengagement of the winding drum with the feed shaft. Windable upon the drum 43 is a feed rope 45 the free end of which is adapted to be connected with a suitable anchor jack 46 positioned in advance of the machine. When the winding drum 43 is caused to revolve to wind the rope 45 the tension upon said rope tends to draw the machine bodily towards the anchor jack 46 and thereby feed the apparatus to its work. The reaction of the gathering mechanism upon the material which is to be loaded tends to crowd the rear end of the machine outwardly from the coal face and I have provided a strut 47 having a sliding shoe 48 adapted to engage the rails of the mine track 10 to counteract such tendency and maintain the machine in proper working relation.

As shown in the drawings, the gathering mechanism comprises a rotary cutter bar 49 which consists of a shaft 50 to which is keyed a plurality of spider sections 51. The spider sections 51 are formed with sockets 52 in which are secured renewable cutter bits 53 of the type commonly used in coal mining machinery. The cutter bar 49 extends horizontally across the forward end of the main conveyor and projects perpendicularly inward therefrom. At its outer end the shaft 50 is supported in journal bearings 54 formed on the forward end of a longitudinally ex-

tending arm 55 positioned outside of the main conveyor. At its inner end there is formed a longitudinally extending aperture into which projects the stud shaft 56 formed on the forward end of a similar longitudinally extending arm 57. The arms 55 and 57 are keyed to the shaft 58 which is supported for rotation in a journal bearing 59 attached to the base plate 1 and in a journal bearing 60 attached to the supplemental base plate 61 which rests upon and is slidable over the mine floor. The supplemental base plate 61 is rigidly connected with the main frame of the machine by a diagonal brace bar 62. Keyed to the shaft 58 is an upwardly extending arm 63 to which is pivotally connected a nut 64 having an adjusting rod 65 screw threaded therein. The adjusting rod 65 extends rearwardly of the machine through a suitable bearing 66 attached to the main frame, and is provided with a hand wheel 67 by which it may be rotated to cause the arms 55 and 57 to rock about the axis of the journal bearings 59 and 60, to vertically adjust the rotary cutter bar 49. A sprocket wheel 68 keyed to the shaft 50 is connected by a suitable chain 69 with the sprocket wheel 70 upon the counter shaft 24 to rotate the cutter bar.

Extending perpendicularly inward from the forward end of the main conveyor 2, is an auxiliary gathering conveyor 71 the forward side of which lies parallel with and in close proximity to the rotary cutter bar 49. The conveyor 71 is preferably of the same type as the conveyor 2. At its outer end the gathering conveyor 71 is supported upon the frame work of the main conveyor, and at its inner end upon the supplemental base plate 61. Along its forward side there is a downwardly and forwardly projecting plate 72 which forms a shield to prevent loose material passing under the supplemental conveyor, and along its rearward edge there is an upwardly extending plate 73 which serves to prevent material spilling along the rearward side of the conveyor. The head shaft of the supplemental gathering conveyor is provided with a miter gear 74 which engages with a similar gear 75 attached to a suitable cross shaft to which is attached a sprocket wheel 76. The sprocket wheel 76 is connected by a chain 77 with the sprocket wheel 78 on the counter shaft 24 to drive the gathering conveyor. The construction of the conveyors 2 and 71 is such that their vertical dimensions may be confined within extremely narrow limits, greatly facilitating the gathering of material into their troughs.

During the operation of the machine the rotary cutter bar 49 revolves in such a direction that the cutter bits 53 along the advancing side of the bar will travel upward to engage material on the floor of the mine

and throw it by centrifugal force onto the conveyor. Normally the cutter bar 49 is so adjusted that the lowermost points in the path of travel of its cutter bits is at the line of the mine floor, and bottom coal adhering to the sub stratum will be engaged by these cutter bits and cut or torn loose to form an even floor over which the machine may be conveniently advanced.

Should the coal above the kerf be so little shattered by the force of the blast that it fails to fall down upon the mine floor in suitable condition for loading, the cutter bar 49 may, by the manipulation of the hand wheel 67, be adjusted upwardly to engage the partially severed coal and tear it apart, after which the cutter bar may be restored, to its initial position to load the dislodged coal from the mine floor.

Machines such as are above described are especially adapted to use in mines operating upon the longwall system of mining. In such a mine the coal is undercut and blasted down, or otherwise prepared, along a face of considerable length, and the track 10 is arranged in suitable relation parallel to the working face. The loading machine is initially positioned at one end of the face, the strut shoe 47 is arranged to engage the track rail 10, and the feed rope 45 sufficiently unwound from the winding drum 43 and attached to the anchor jack 46 positioned adjacent the pile of dislodged material and in advance of the machine. The mine cars 9 may be arranged in a continuous train upon the track 10 with the first car in suitable position beneath the delivery conveyor 8. As the machine advances along the coal face material is taken up by the gathering mechanism from the end of the pile, is carried rearward and upward by the main conveyor, and loaded by the delivery conveyor into the cars. Commonly a mine locomotive is provided to move the train relative to the loading machine at such a speed that the coal will be distributed throughout the entire length of the train without interrupting the operation of the machine. It is obvious however that the cars may be handled separately, but with a less efficient use of the apparatus.

What I claim is:

1. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending in horizontal planes adjacent the mine floor and a delivery portion extending laterally at an angle to said receiving portion, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of the receiving portion of said conveyor, cutter bits attached to said bar and adapted to engage material at the level of the mine floor, and means to cause the revolution of said bar about its

longitudinal axis to cause said bits to engage said material and lift it onto the receiving portion of said conveyor.

2. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending in horizontal planes adjacent the mine floor and a delivery portion extending laterally at an angle to said receiving portion; means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of the receiving portion of said conveyor, cutter bits attached to said bar and adapted to engage material at the level of the mine floor, and means to cause the revolution of said bar about its longitudinal axis to produce upward and rearward movement of said bits on the advancing side of said bar to cause them to lift said material onto the receiving portion of said conveyor.

3. In a machine for loading coal in mines, the combination with a supporting frame adapted to rest upon and slide over the floor of the mine, of conveyor mechanism mounted upon said frame having a receiving portion extending in horizontal planes adjacent the mine floor and a delivery portion adapted to discharge material into a suitably disposed receptacle for transportation from the mine, devices upon the frame adapted to bodily move and guide the machine relative to the material to be loaded, a rotary bar parallel with and adjacent the side of the receiving portion of the conveyor, a plurality of cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis, and means to vertically adjust said rotary bar to cause said bits to engage material at the level of the mine floor or at levels above said floor and lift it onto said conveyor.

4. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of said conveyor, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis, and means to vertically adjust said rotary bar to cause said bits to engage material at the level of the mine floor or at levels above said floor and lift it onto said conveyor.

5. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, arms extending transversely of said conveyor and pivotally supported in the rear thereof, a horizontal bar in advance of

said conveyor extending parallel to and adjacent the side thereof and supported in journal bearings at the forward end of said arms, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis, and means to rotate said arms about their pivotal supports to cause said cutter bits to engage material at the level of the mine floor or at levels above said floor and lift it onto said conveyor.

6. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of said conveyor, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis to cause said cutter bits to engage material in advance of the machine and lift it onto said conveyor, and means between said bar and the receiving portion of said conveyor to prevent loose material passing beneath said conveyor.

7. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of said conveyor, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis to cause said cutter bits to engage material in advance of the machine and lift it onto said conveyor, and a scraper between said bar and the receiving portion of said conveyor.

8. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of said conveyor, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis to cause said cutter bits to engage material in advance of the machine and lift it onto said conveyor, and a scraper carried by the conveyor frame between said bar and the receiving portion of said conveyor.

9. In a machine for loading coal in mines, the combination with a supporting frame adapted to rest upon and slide over the floor of the mine, of conveyor mechanism mounted upon said frame having a receiving portion extending in horizontal planes adjacent the mine floor and a delivery portion disposed at an angle to said receiving portion adapted to discharge material into a suitably disposed

receptacle for transportation from the mine, devices upon the frame adapted to bodily move and guide the machine relative to the material to be loaded, and a plurality of coal engaging elements arranged adjacent the side of the receiving portion of the conveyor and adapted to upward and rearward movement whereby the coal will be lifted from the floor of the mine onto the receiving portion of said conveyor.

10. In a machine for loading coal in mines, the combination with a supporting frame adapted to rest upon and slide over the floor of the mine, of conveyor mechanism mounted upon said frame and having a receiving portion extending in horizontal planes adjacent the mine floor and a delivery portion disposed at an angle to said receiving portion adapted to discharge material into a suitably disposed receptacle for transportation from the mine, devices upon the frame adapted to bodily move and guide the machine relative to the material which is to be loaded, a rotary bar parallel with and adjacent the side of the receiving portion of said conveyor, a plurality of cutter bits attached to said bar, and means to cause the revolution of said bar about its longitudinal axis to cause said cutter bits to engage said material and lift it onto the receiving portion of said conveyor.

11. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor and a delivery portion at an angle to said receiving portion, means to move said conveyor laterally over said floor, a horizontal shaft extending longitudinally of said conveyor in advance of and parallel to its advancing side, a plurality of teeth attached to said shaft and adapted to engage material upon the mine floor as said conveyor advances, and means to cause the revolution of said shaft about its longitudinal axis to produce upward and inward movement of said teeth whereby said material will be transferred from said mine floor to the receiving portion of said conveyor.

12. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion laterally from said conveyor extending in horizontal planes adjacent the mine floor, of means to move said conveyor laterally over said floor, and a gathering mechanism extending along the advancing side of said conveyor comprising a plurality of teeth adapted to engage material at the level of the mine floor as the conveyor advances, and means to impart upward and inward movement to said teeth whereby said material will be transferred from said floor to said conveyor.

13. In a machine for loading coal in

mines, the combination with a conveyor having a receiving portion extending laterally from said conveyor in planes adjacent the mine floor, means to move said conveyor transversely over said mine floor, a gathering mechanism comprising a plurality of coal engaging elements adapted to initially contact with the coal along lines transversely of the conveyor, and means to actuate said coal engaging elements to cause them to engage the coal in advance of the machine and transfer it to said conveyor.

14. In a machine for loading coal in mines, the combination with an elongated conveyor having a receiving portion extending laterally from said conveyor in horizontal planes adjacent the mine floor, means to move said conveyor laterally over said floor, a horizontal bar extending parallel to and adjacent the advancing side of said conveyor, cutter bits attached to said bar, means to cause the revolution of said bar about its longitudinal axis to cause said cutter bits to engage material in advance of the machine and lift it onto said conveyor, a downwardly projecting apron at the forward side of said conveyor arranged to prevent material passing under said conveyor, and an upwardly projecting apron attached to the rearward side of said conveyor arranged to prevent material being thrown beyond the conveyor.

15. In a machine of the class described, the combination of a suitable supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a receiving conveyor extending laterally from the lower end of said main conveyor and adapted to lie in close proximity to a mine floor, and a material gathering device in front of said receiving conveyor to lift and deliver material thereto.

16. In a machine of the class described, the combination of a suitable supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a receiving conveyor extending laterally from the lower end of said main conveyor and adapted to lie in close proximity to a mine floor, and a rotary material gathering device in front of said receiving conveyor to lift and deliver material thereto.

17. In a machine of the class described, the combination of a suitable supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a receiving conveyor extending laterally from the lower end of said main conveyor and adapted to lie in close proximity to a mine floor, and a rotary cutter bar in front of said receiving conveyor to lift and deliver material thereto.

18. In a machine of the class described,

the combination of a suitable supporting frame; an elongated, inclined, main conveyor mounted on said frame, a receiving conveyor extending laterally at right angles from the lower end of said main conveyor in close proximity to the mine floor, a material gathering device in front of said receiving conveyor to lift and deliver material thereto, means for raising and lowering said device, a delivering conveyor extending from the upper end of said main conveyor at right angles thereto and in an opposite direction from that of said receiving conveyor, means for advancing said machine, and means to prevent the machine turning under thrusts against said gathering device.

19. In a machine of the class described, the combination of a suitable supporting frame; an elongated, inclined, main conveyor mounted on said frame, a receiving conveyor extending laterally at right angles from the lower end of said main conveyor in close proximity to the mine floor, a rotary material gathering device in front of said receiving conveyor to lift and deliver material thereto, means for raising and lowering said device, a delivering conveyor extending from the upper end of said main conveyor at right angles thereto and in an opposite direction from that of said receiving conveyor, means for advancing said machine, and a thrust resisting bar extending from said machine to prevent the machine turning under thrusts against said gathering device.

20. In a machine of the class described, the combination of a support adapted to slide over the floor of a mine, an elongated inclined main conveyor mounted on said support, a receiving conveyor extending laterally at right angles from the lower end of said main conveyor in close proximity to the mine floor, a rotary cutter bar in front of said receiving conveyor to gather and lift material thereto, manually operable means for raising or lowering said cutter bar, a delivering conveyor extending from the upper end of said main conveyor at right angles thereto and in an opposite direction from that of said receiving conveyor, a motor on said support to drive said conveyors and cutter bar, and motor operated means for advancing said machine over the mine floor.

21. In a machine of the class described, the combination of a support adapted to slide over the floor of a mine, an elongated inclined main conveyor mounted on said support, a receiving conveyor extending laterally at right angles from the lower end of said main conveyor in close proximity to the mine floor, a rotary cutter bar in front of said receiving conveyor to gather and lift material thereto, manually operable means for raising or lowering said cutter

bar, a delivering conveyor extending from the upper end of said main conveyor at right angles thereto and in an opposite direction from that of said receiving conveyor, a motor on said support to drive said conveyors and cutter bar, motor operated means for advancing said machine over the mine floor, and a thrust resisting bar extending from the rear of the machine in a direction opposite to the direction of said cutter bar to prevent the machine turning under thrusts against said cutter bar.

22. In a machine of the class described, the combination of a support adapted to slide over the floor of a mine, an elongated inclined main conveyor mounted on said support, a receiving conveyor extending laterally at right angles from the lower end of said main conveyor in close proximity to the mine floor, a rotary cutter bar in front of said receiving conveyor to gather and lift material thereto, manually operable means for raising or lowering said cutter bar, a delivering conveyor extending from the upper end of said main conveyor at right angles thereto and in an opposite direction from that of said receiving conveyor, a motor on said support to drive said conveyors and cutter bar, motor operated intermittent mechanism for advancing said machine step by step, and a thrust resisting bar extending from the rear of the machine in a direction opposite to the direction of said cutter bar to prevent the machine turning under thrusts against said cutter bar.

23. In a machine of the class described, the combination of a supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a material gathering device extending laterally from the lower end of said main conveyor, a receiving conveyor extending laterally from the lower end of said main conveyor and in position to receive material from said gathering device and deliver it to said main conveyor, and a delivering conveyor extending laterally from the upper end of said main conveyor and adapted to receive material from the upper end of said main conveyor.

24. In a machine of the class described, the combination of a supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a material gathering device extending laterally from the lower end of said main conveyor, a receiving conveyor extending laterally from the lower end of said main conveyor and parallel to said gathering device to receive material and deliver it to said main conveyor, and a delivering conveyor extending laterally from the upper end of said main conveyor in a direction opposite to the direction of said receiving conveyor and adapted

to receive material from the upper end of said main conveyor.

25. In a machine of the class described, the combination of a supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a rotating material gathering device extending laterally from the lower end of said main conveyor, a receiving conveyor extending from the lower end of said main conveyor in rear of and parallel to said gathering device to receive material therefrom and deliver it to said main conveyor, a receiving hopper at the upper end of said main conveyor to receive material therefrom, and a delivery conveyor in said hopper to deliver material laterally therefrom.

26. In a machine of the class described, the combination of a supporting frame, a main conveyor mounted on said frame and adapted to receive material at a low level and deliver it at a higher level, a receiving conveyor extending laterally from the lower end of said main conveyor, a gathering device extending across the front of said main conveyor and parallel with said receiving con-

veyor to gather material and deliver it to said conveyor, means for adjusting said gathering device vertically, and a delivering conveyor at the upper end of said main conveyor to receive material therefrom and deliver it laterally of said main conveyor.

27. In a coal mining machine, a horizontally extending kerf cutter comprising a body portion and a cutter bar projecting therefrom adapted for forming a kerf cut under a pile of loose coal, an endless conveyor secured to the body portion of said kerf cutter and having a portion projecting in spaced parallelism with said cutter bar whereby when the latter is forming said kerf the projecting portion of said conveyor will be moved through said kerf and will carry away the coal falling thereupon, and a vertically inclined board carried by the inner side of the projecting portion of said conveyor and extending laterally with its free edge underlying the path of travel of the cutters on the cutter bar for scraping up coal between the cutter bar and the conveyor as the same are moved laterally through said kerf.

In testimony whereof, I affix my signature.

NILS D. LEVIN.