June 17, 1924.

1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922

6 Sheets-Sheet 1

Fig. 2.

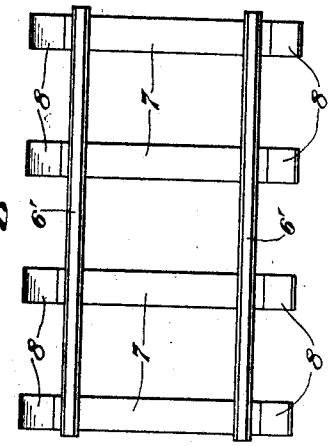


Fig. 1.

Witnesses:
Edwin Fruet

Inventor:
FREDERICK D. BUFFUM,
by: D. Anthony Jr. Co.
his Attorneys

June 17, 1924. 1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922 6 Sheets-Sheet 2

Fig. 10.

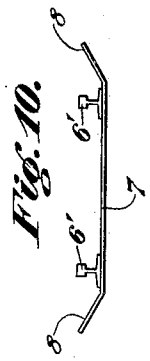


Fig. 2.

Witnesses:
Edwin Trueb

Inventor:
FREDERICK D. BUFFUM.
by: S. Anthony Usina
his Attorney.

June 17, 1924.

1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922

6 Sheets-Sheet 3

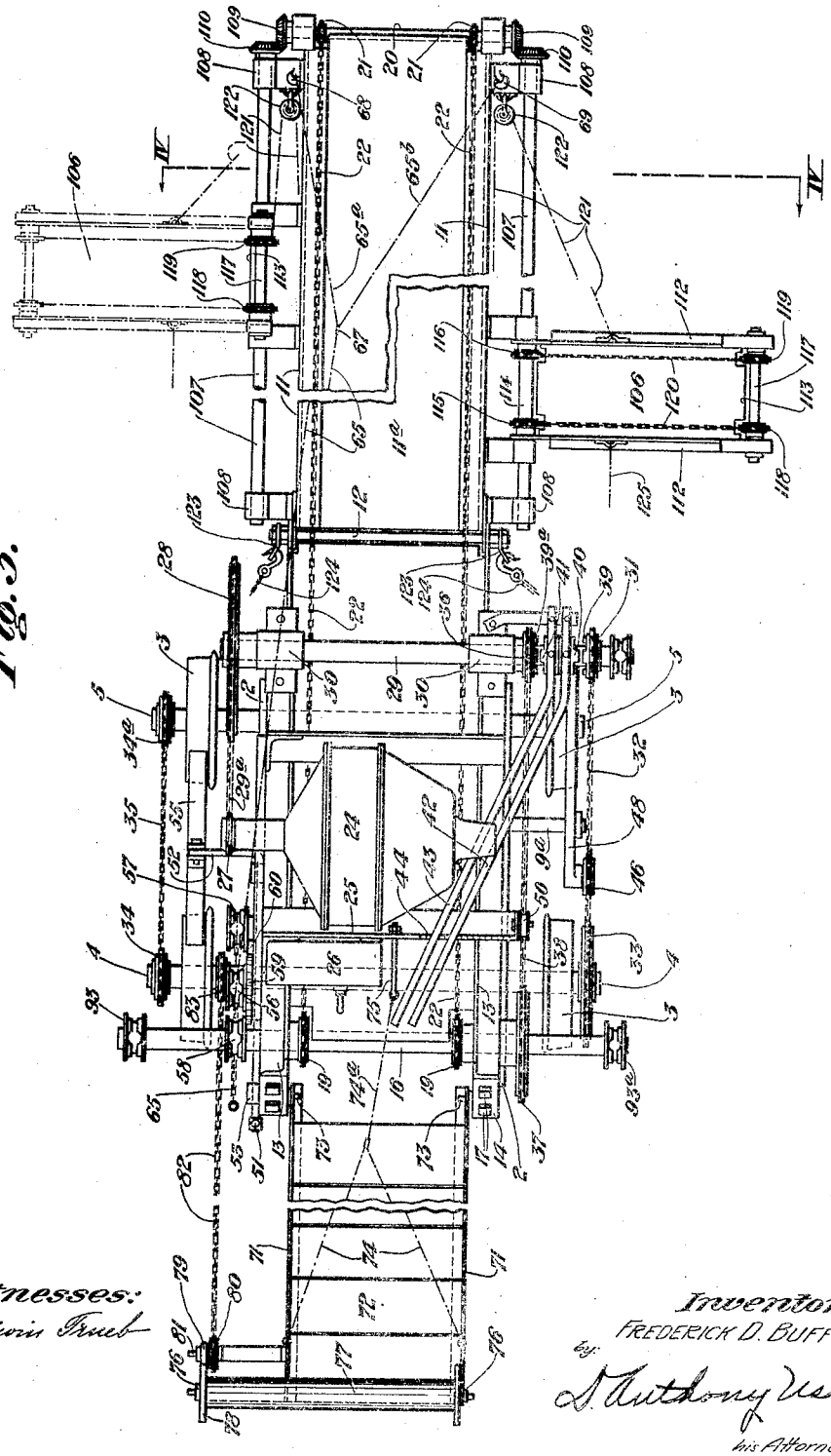


Fig. 3.

Witnesses:
Edwin Trueb

Inventor:
FREDERICK D. BUFFUM,
by
Anthony Usina
his Attorney

June 17, 1924.

1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922

6 Sheets-Sheet 4

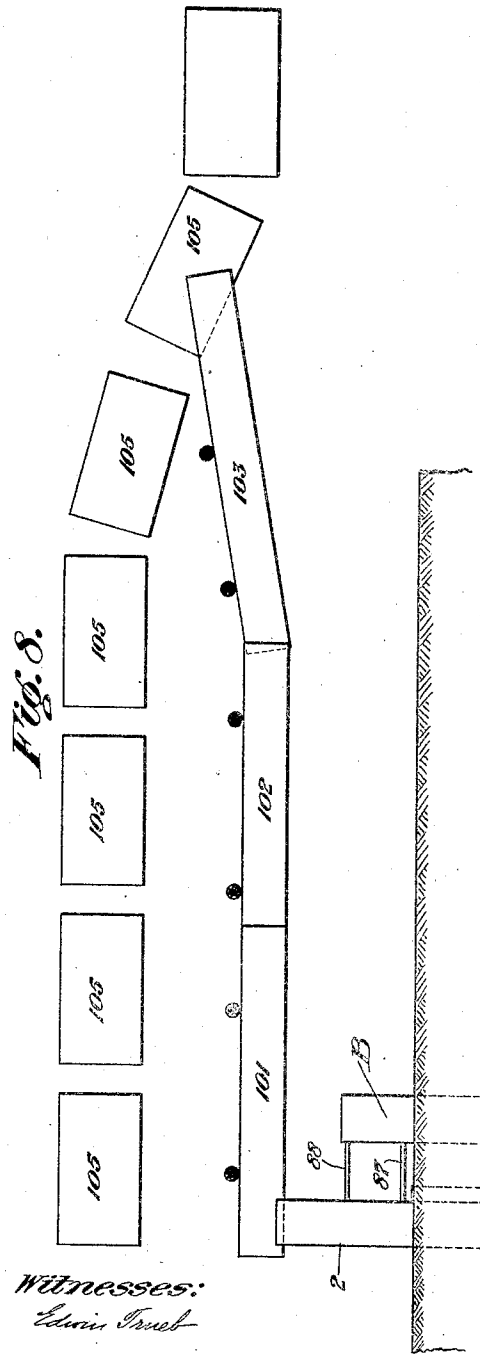


Fig. 3.

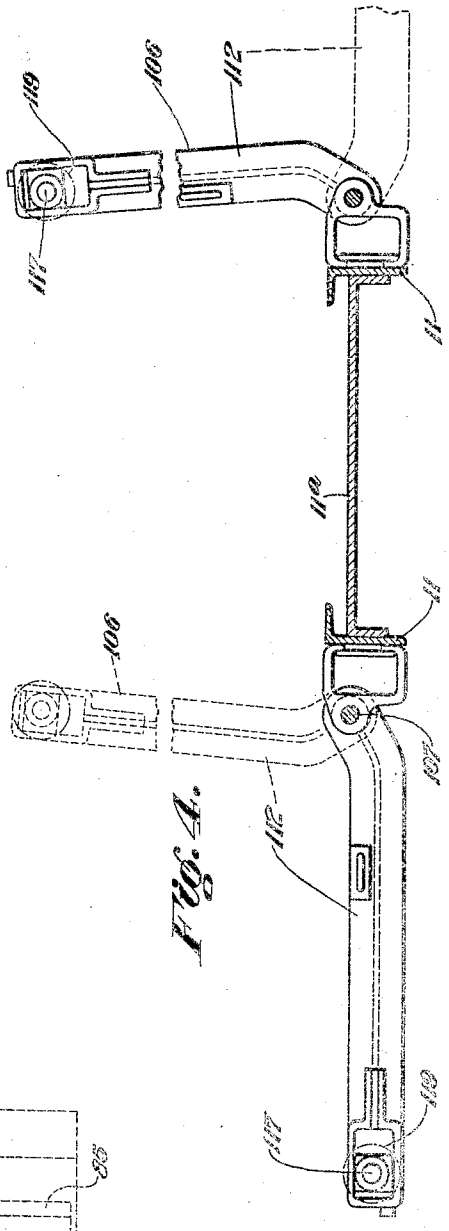


Fig. 4.

Witnesses:
Edwin Trust

Inventor:
FREDERICK D. BUFFUM,
by:
D. Antony Usina
his Attorney.

June 17, 1924. 1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922 6 Sheets-Sheet 5

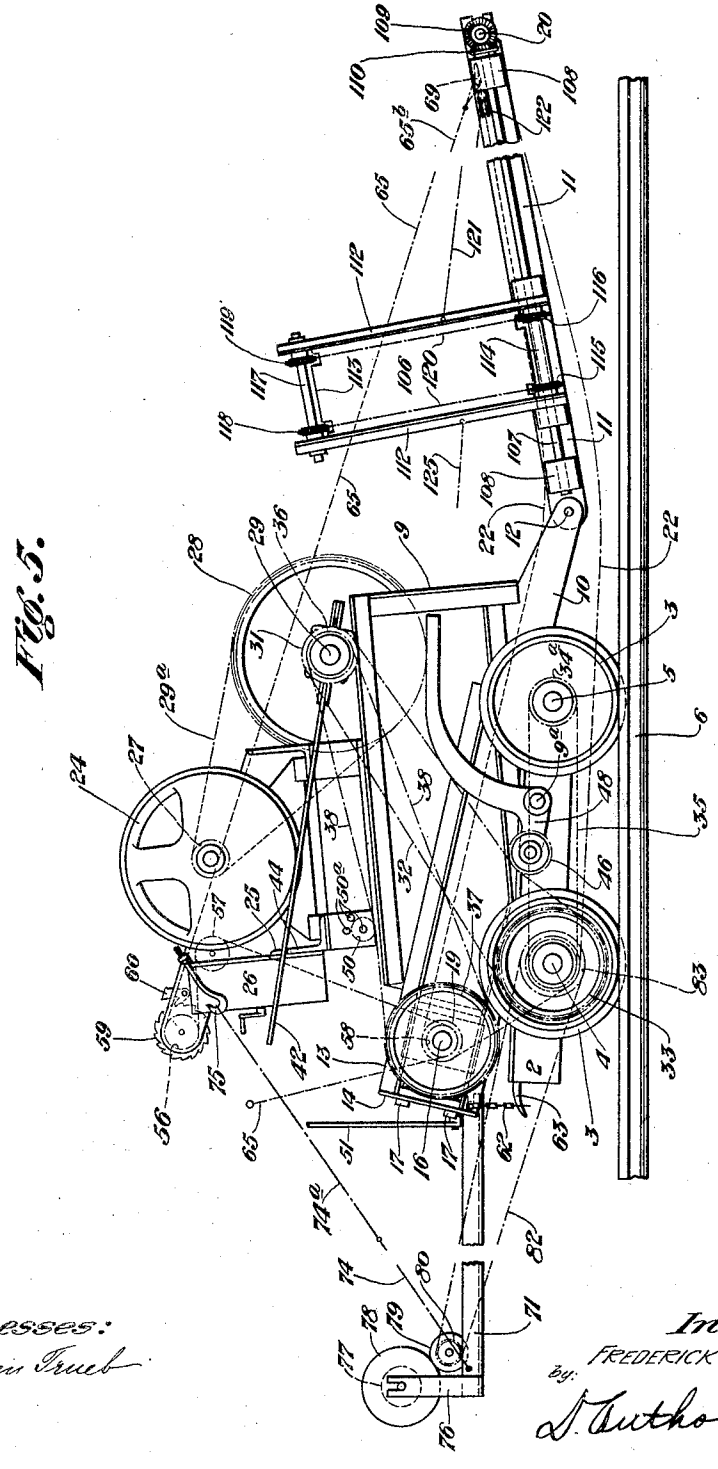


Fig. 5.

Witnesses:
Edwin Trueb

Inventor:
FREDERICK D. BUFFUM,
by: J. Anthony Rosina
his Attorney.

June 17, 1924.

1,498,506

F. D. BUFFUM

MINING COAL

Filed Jan. 27, 1922

6 Sheets-Sheet 6

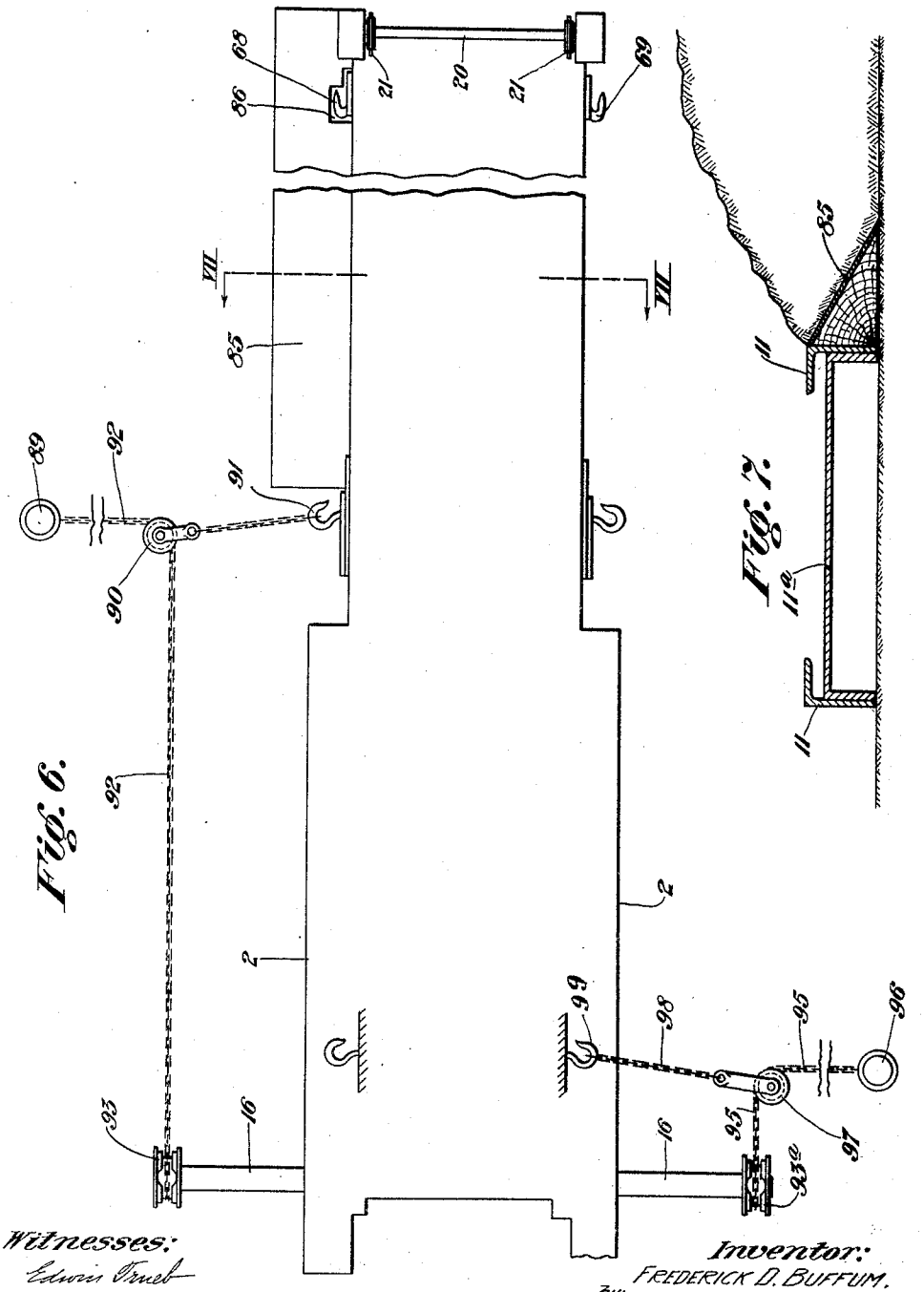


Fig. 6.

Fig. 7.

Witnesses:
Edwin Truet

Inventor:
FREDERICK D. BUFFUM.
by: D. Anthony Farina
his Attorney

Patented June 17, 1924. 1,498,506

UNITED STATES PATENT OFFICE.

FREDERICK D. BUFFUM, OF PITTSBURGH, PENNSYLVANIA.

MINING COAL.

Application filed January 27, 1922. Serial No. 532,175.

To all whom it may concern:

Be it known that I, FREDERICK D. BUFFUM, a citizen of the United States, and resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Mining Coal, of which the following is a specification.

This invention relates to apparatus for mining coal or other minerals, and has for one of its objects the provision of a novel apparatus for mechanically conveying and loading the mined coal.

In the accompanying drawings, Figure 1 is a side elevation of my novel conveyer mechanism.

Figure 2 is a vertical sectional elevation of the same.

Figure 3 is a top plan view of the conveyer having side conveyer bars.

Figure 4 is a cross sectional elevation on the line IV—IV of Figure 3.

Figure 5 is a side elevation showing the conveyer mechanism in position to be moved about a mine.

Figure 6 is a diagrammatic plan showing the conveyer mechanism equipped with a side wedge for sidewise movement into a pile of loose coal.

Figure 7 is a cross sectional elevation through the conveyer bar of Figure 6, on the line VII—VII of Figure 6.

Figure 8 is a diagrammatic plan showing the conveyer mechanism attached to a cutting machine for sidewise movement in a kerf, and also showing one method for loading the conveyed coal into the mine cars.

Figure 9 is a plan view of the skid track section upon which the conveyer is mounted when being moved sidewise into a pile of coal.

Figure 10 is an end elevation of the skid track section of Figure 9.

Referring particularly to the drawings, the conveyer mechanism comprises a flexible wheeled truck 2 provided with flanged wheels 3 which are mounted in pairs upon axles 4 and 5.

The wheels 3 of the truck are adapted to travel upon rails 6 and when it is desired to move the device sidewise into a bank of loose coal, the truck wheels will be mounted on a short track section composed of rails 6′ and skid ties 7 which are in the form of flat plates having upturned ends 8.

A conveyer frame 9 is pivotally mounted on a pivot shaft or bar 9^a journaled in the side pieces of the truck 2, and is adapted to rock thereon.

A pair of conveyer supporting arms 10 are arranged at each side of the frame 9 and inclined rearwardly and upwardly with their forward ends projecting beyond the forward end of the frame 9 and terminating approximately on a line with the track rails 6.

A conveyer bar or frame adapted to be inserted in a kerf cut in the coal to be mined is pivotally secured to the forward end of the conveyer guides 10, and comprises a pair of spaced side members 11 which are mounted on a pivot shaft 12 secured in the forward ends of the arms 10 and are held in rigid spaced relation by a spacing or bed plate 11^a.

A pair of beams or angle iron supports 13 are arranged in spaced alinement at each side of the frame 9 and have their rear ends secured together by angle members 14, their lower ends being secured to the bottom of the conveyer frame. The supports 13 as thus arranged combine to form guideways for suitable bearing blocks 15 in which is journaled a conveyer head shaft 16. The bearing blocks 15 are adjustably mounted between the supports 13 and are moved by means of bolts 17 which pass through the members 14 and are engaged in screw threaded apertures in a plate or nut 18 which is forced toward or away from the members 14 according to the direction in which the bolts 17 are rotated.

The shaft 16 is provided with a pair of suitable conveyer sprockets 19 which are keyed or otherwise secured thereon, and a second idler shaft 20 is journaled in the forward ends of the side members 11 of the conveyer bar and is provided with a pair of suitable conveyer sprockets 21. An endless flight conveyer has its endless side chains 22 trained over the sprockets 19 and 21 and is adapted to convey the mined coal rearwardly where it is discharged.

The conveyer and truck are both driven by a single motor 24 mounted on a detachable frame 25 which is bolted or otherwise detachably secured to the upper face of the conveyer frame 9. A controller and rheostat or other electrical control apparatus 26 for controlling the motor 24 is also mounted

on the frame 25 so that the electrical mechanism all forms a detachable unit which may be removed in case it becomes damaged and a new unit substituted.

The motor 24 is provided with a sprocket 27 on its armature shaft which is connected to a sprocket 28 on a drive shaft 29 by a drive chain 29a. The shaft 29 is journaled in suitable bearings 30 on the frame 17. A sprocket 31 is loosely mounted on the shaft 29 and is connected by a chain 32 to a sprocket 33 on the rear axle 4 so as to drive the conveyer along the track. The rear axle 4 and front axle 5 are provided with sprockets 34 and 34a, respectively, which are connected by a chain 35 so as to positively drive all four wheels of the truck.

A second sprocket 36 is loosely mounted on the shaft 29 and is connected to a drive sprocket 37 on the conveyer head drive shaft 16 by a chain 38.

The loosely mounted sprockets 31 and 36 are provided with clutch faces 39 and 39a, respectively, which co-operate with suitable clutch members 40 and 41, respectively, slidably keyed on the shaft 29. Clutch operating levers 42 and 43 are secured respectively to the clutches 40 and 41 and extend back to the rear of the machine where they engage a notched rack or bar 44. As will be readily understood, either or both of the clutches may be engaged at the same time with their respective sprockets, so that either the conveyer alone may be operated or the truck alone driven, or the conveyer may be operated at the same time the truck is being driven.

The chain 32 which is trained about the sprockets 31 and 33 is kept taut so as to properly engage the sprockets by a sheave 46 journaled on the short end of a weighted lever 48 which is pivotally mounted adjacent one end on the projecting end of pivot bar 9a. The lever 48 being pivoted adjacent one end, allows the remainder of the bar to over-balance the short end to which the sheave 46 is secured, thus constantly forcing said sheave against the chain 32.

The chain 38 which is trained about the sprockets 36 and 37, is kept taut by a sheave 50 which is journaled on a shaft adapted to be mounted in any one of several adjusting holes 50a in the frame 25, and adapted to be raised or lowered against the chain 38 as desired to secure the proper stretch thereof.

A brake mechanism is provided for controlling the speed of the truck travel and comprises an operating lever 51, a crank lever or arm 52 journaled in bearings 53 and 54, and a brake block 55 adapted to engage the front and rear wheels at one side of the machine when the crank lever 52 is rocked by lever 51.

The conveyer bar is adapted to be raised to substantially horizontal positions for traveling through the mine from one working place to another by a chain 65. The chain 65 is provided at one end with a ring 67 to which is secured branch chains 65a and 65b which are connected to hooks 68 and 69 on the opposite sides of the conveyer bar. The free end of the chain 65 is trained rearwardly and wrapped at least once around a pocket sheave 56 journaled on the frame 25, and then forwardly and over a second pocket sheave 57 and downwardly and around a pocket sheave 58 on the shaft 16. The pocket sheave 56 is provided with a toothed ratchet portion 59 adapted to be engaged by a pawl 60. The free end of the chain 65 is adapted to be engaged by the operator while the shaft 16 is being operated, thus pulling the chain around the several sheaves, and when the conveyer bar is raised to its desired level, the operator will release the chain 65 from the sheave 58 and the chain will still hold the conveyer bar in its raised position, due to the ratchet and pawl lock on the sheave 56.

In Figures 3 and 5 I have shown the machine equipped with a detachable platform which is secured to the rear end of the machine upon which the operator stands to control the machine, and upon which is secured a reel for paying out or taking up the electric cable through which the electric current passes to the operating motor of the machine.

The detachable platform comprises angle iron side members 71 suitably spaced apart and supporting a board platform 72. The forward ends of the side members 71 are notched and detachably supported on studs 73 on the lower support member 13. A pair of supporting cables 74 are secured adjacent the rear ends of members 71 and are joined to a single cable 74a which is secured to a hook 75 on the frame 25 to detachably hold the platform in position.

A pair of upright bearing posts 76 are secured to the side members 71 at the rear ends thereof, and a reel 77 is journaled therein. The reel 77 is provided at one end with a friction wheel 78 which is in engagement with a small friction wheel 79 on an operating sprocket 80 which is journaled on a stub shaft 81 secured to the platform. The sprocket 80 is driven by a chain 82 which is trained around the sprocket 80 and around a second sprocket 83 on the rear axle 4 so that as the axle 4 is driven to move the truck along the tracks 6 the reel 77 will be driven to pay out or take up the cable 70.

When the detachable platform is secured to the rear of the conveyer frame 9, it serves as a counter-balance, and rocks the frame 9 about the bearing shaft 9a into a substantially horizontal position. The frame 9 is adapted to be locked in this position when moving about the mine by a chain 62 which

is secured to the rear end of the frame 9 and adapted to be engaged in a split lug or crow-foot 63 on the truck frame 2.

In the construction of Figures 3, 4, and 5, I have shown the main conveyer bar equipped with side conveyer bars 106 adapted to remove loose coal from each side of the main conveyer bar, which are mounted to slide longitudinally relative to the main conveyer bar on shafts 107 journaled in suitable bearings 108 secured to the side members 11 of the main conveyer bar. The shaft 20 on the main conveyer bar is provided at each end with bevel gears 109 adapted to mesh with bevel gears 110 on the shafts 107.

The conveyer bars 106 comprise side bars 112 held in spaced relation by a bed plate 113, and provided at their rear end with a sprocket sleeve 114 slidably keyed on the shaft 107 and provided with sprockets 115 and 116. A sprocket shaft 117 having sprockets 118 and 119 is journaled in the forward end of the side bars 112 and an endless flight conveyer 120 has its side chains trained over the sprockets 115, 116, and 118, 119.

It will thus be apparent that when the conveyer on the main conveyer bar is operated, it will rotate the shaft 20, which in turn will rotate the shafts 107 through the beveled gears 109 and 110. Therefore, since the sprocket sleeves 114 are keyed on the shafts 107, they will be operated to drive the conveyers 120 on the side conveyer bars 106.

In order to move the side conveyer bars into the coal, cables 121 are secured to the forward side of the bars 106 and trained over sheaves 122 adjacent the forward end of the main conveyer bar, thence rearwardly to a point adjacent the rear end of the main conveyer bar where they terminate in a loop or eye 123 adapted to be engaged by the hook of operating chains 124. The chains 124 are adapted to be passed rearwardly and wrapped around the pocket sheaves 93 and 93^a, the loose end being held by the operator, so that when the shaft 16 and sheaves 93 and 93^a are operated, the chains 124 will be pulled rearwardly and the side conveyer bars 106 moved forwardly.

Other chains 125 are secured directly to the rear side of the conveyer bars 106 and are adapted to be engaged over the pocket sheaves 93 and 93^a to move or pull the conveyer bars out of the coal.

It will, of course, be understood that the side conveyer bars 106 are adapted to be swung up to a vertical position, either manually or otherwise, before moving the device around the mine.

In Figures 6, 7, and 8, I have shown the conveyer equipped for sidewise movement into the loose coal at the side of the conveyer bar, thus eliminating the side conveyers. In this construction, a detachable wedge member 85 is secured in position along the side of the conveyer bar. The wedge 85 is provided with a notched or cut-away portion 86 to fit around the hook 68, which serves to hold it in position against the conveyer bar while the bar is being moved into and out of the kerf. While only a left-hand wedge is shown and described, it will be understood that a right-hand wedge may also be provided to fit the right-hand side of the bar when it is desired to move the machine in that direction.

The conveyer machine may be moved bodily along the surface of the mine by coupling it to the cutting machine B used in forming the kerf as shown diagrammatically in Figure 8, in which the conveyer and cutting machine are shown coupled by members 87 and 88, or the machine may be moved by its own power by use of the mechanism shown in Figure 6. When the machine is moved by its own power, a jack or other suitable anchor 89 is secured at a point in the mine beyond the point to which it is desired to move the machine, and a sheave 90 is secured by a short length of chain to an anchor hook 91 on the end of the conveyer bar pivot 12, a pulling chain 92 is secured to the jack or anchor 89 and passed around the sheave 90 and wrapped around a power sheave 93 on the end of the conveyer head shaft 16, the loose end being held by the operator and pulled taut on the sheave as it is rotated. In order to control the movement of the rear end of the machine, which will be unobstructed by loose coal, a snub chain 95 is secured to the opposite side of the machine from the pulling chain and adjacent the rear end thereof. The snub chain 95 has one end secured to a jack 96 and is passed around a sheave 97 connected by a short chain 98 to an anchor hook 99 secured to the truck 2 of the machine. The chain 95 passes from the sheave 97 rearwardly, and is wrapped around the power sheave 93^a on the end of shaft 16, the loose end being held by an operator. As the shaft 16 is rotated, the chain 92 is pulled around the sheave 93 by its operator while the chain 95 is paid out by its operator, thus the movement of the machine is controlled so as to compel the forward end to advance through the loose coal at its side.

It will be understood that the anchor hooks 91, 99 and power sheaves 93 are duplicated on both sides of the machine so as to permit the pulling chain 92 and the snub chain 95 to be connected to either side of the machine according to the direction in which it is desired to move the machine.

It will also be understood that in moving the machine bodily sidewise it is not moved relative to the track upon which it is mounted, bu the section of track composed of rails

6a and skid ties 7 is moved with the machine as a unit, the flat ties 7 forming skids upon which the whole unit is moved.

In Figure 8 I have shown diagrammatically my conveyer mechanism in position in a kerf formed along a rib in a mine, the wedge 85 being in position along the side of the conveyer bar. The conveyer mechanism is shown coupled to the cutting machine B for the purpose of moving it sidewise under a new lot of coal preparatory to shooting or otherwise breaking it down.

A plurality of portable conveyers 101, 102, and 103 are arranged to receive and convey the coal from the main conveyer to the cars 105. The conveyers 101, 102, and 103 are of standard type, well known in this art, and their use enables the coal to be delivered at a point where a string or train composed of a number of pit cars may be pulled past the delivery point and loaded one after another, thus eliminating the necessity of loading one or two cars at a time and shifting them out of the way in order to bring up other empty cars.

By the use of this improved apparatus, manual handling of the coal is eliminated, and the cost and labor of mining the coal is greatly reduced.

One of the main features of my invention is the flexible truck and pivotal connection between the truck and the conveyer frame. This construction allows all four wheels of the truck to have traction on the tracks at all times regardless of the uneven condition of the track, it also preventing distorting strains being conducted to the conveyer frame.

While this invention has been described in detail, it will be understood that I do not wish to be limited beyond the express limitations of the accompanying claims.

I claim—

1. A loading machine comprising a wheeled truck, a conveyer frame pivotally mounted for vertical pivotal movement thereof, a main conveyer bar pivotally mounted on the forward end of said frame, a shaft journaled adjacent the rear end of said frame, a second shaft journaled in the forward end of said conveyer bar, means for driving said first mentioned shaft, sprockets secured on said shafts, a continuous conveyer member trained about said sprockets, shafts extending parallel with and journaled in bearings on the sides of said main conveyer bar, bevel gears connecting the shaft mounted in the forward end of said main conveyer bar and said last named shafts, side conveyer bars slidably mounted on said last named shafts and extending at right angles to said main conveyer bar, and endless conveyer members mounted on said side conveyer bars and adapted to be operated by said last named shafts.

2. A loading machine comprising a wheeled truck a conveyer frame pivotally mounted for vertical pivotal movement thereon, a main conveyer bar pivotally mounted on the forward end of said frame, a shaft journaled adjacent the rear end of said frame, a second shaft journaled in the forward end of said conveyer bar, means for driving said first mentioned shaft, sprockets secured on said shafts, a continuous conveyer member trained about said sprockets, shafts extending parallel with and journaled in bearings on the sides of said main conveyer bar, bevel gears connecting the shaft mounted in the forward end of said main conveyer bar and said last named shafts, side conveyer bars slidably mounted on said last named shafts and extending at right angles to said main conveyer bar, endless conveyer members mounted on said side conveyer bars and adapted to be operated by said last named shafts, and means for positively moving said side conveyer bars longitudinally relative to said main conveyer bar.

3. A loading machine comprising a wheeled truck, a conveyer frame pivotally mounted for vertical pivotal movement thereon, a main conveyer bar pivotally mounted on the forward end of said frame, a shaft journaled adjacent the rear end of said frame, a second shaft journaled in the forward end of said conveyer bar, means for driving said first mentioned shaft, sprockets secured on said shafts, a continuous conveyer member trained about said sprockets, shafts extending parallel with and journaled in bearings on the sides of said main conveyer bar, driving means connecting the shaft mounted in the forward end of said main conveyer bar and said last named shafts, side conveyer bars slidably mounted on said last named shafts and extending at right angles to said main conveyer bar, endless conveyer members mounted on said side conveyer bars and adapted to be operated by said last named shafts, and means for moving said side conveyer bars longitudinally relative to said main conveyer bar.

4. A loading machine comprising a wheeled truck, a conveyer frame pivotally mounted for vertical pivotal movement thereon, a main conveyer bar pivotally mounted on the forward end of said frame, a shaft journaled adjacent the rear end of said frame, a second shaft journaled in the forward end of said conveyer bar, means for driving said first mentioned shaft, sprockets secured on said shafts, a continuous conveyer member trained about said sprockets, a shaft extending parallel with and journaled in bearings on at least one side of said main conveyer bar, bevel gears connecting the shaft journaled in the forward

end of said main conveyer bar and said last named shaft, a side conveyer bar slidably mounted on said last named shaft and extending at right angles to said main conveyer bar, endless conveyer members mounted on said side conveyer bar and adapted to be operated by said last named shaft.

5. A loading machine comprising a wheeled truck, a conveyer frame pivotally mounted on said truck for movement about a horizontal axis, a conveyer bar pivotally mounted on the forward end of said frame, a shaft journaled adjacent the rear end of said frame, a second shaft journaled in the forward end of said bar, sprockets secured on said shafts, a continuous conveyer member trained about said sprockets, means for adjusting said first named shaft to take up the slack in said conveyer, a prime mover carried by said frame, a drive shaft journaled on said frame, and drive connections between said drive shaft and said truck and conveyer, said drive connections including manually operated clutches.

In testimony whereof I have hereunto set my hand.

FREDERICK D. BUFFUM.