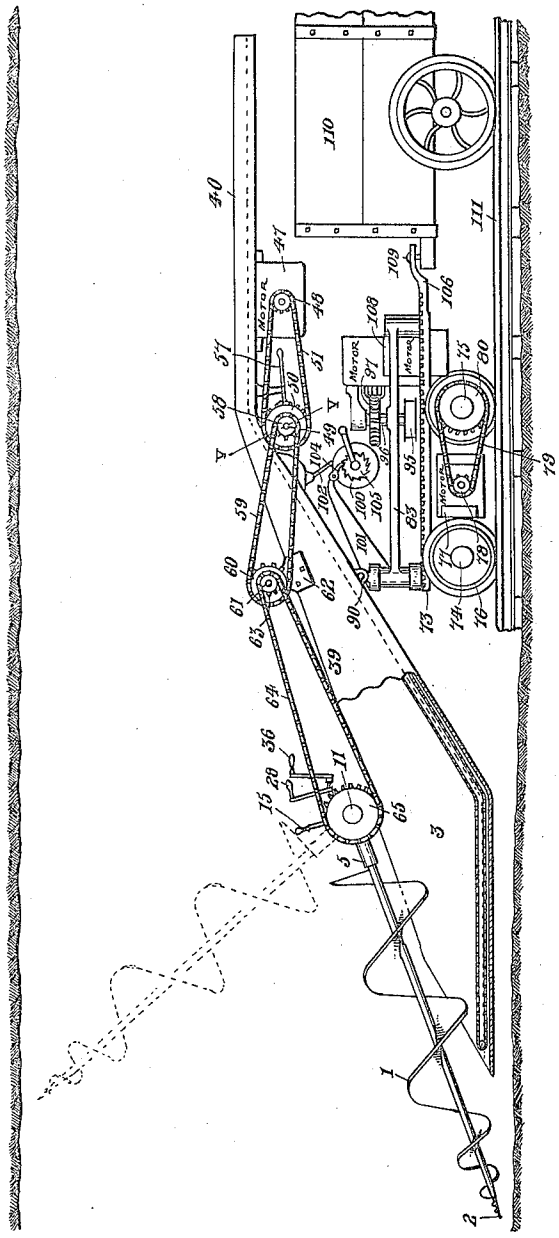
Feb. 13, 1923. 1,445,087.

J. F. JOY.

COAL LOADING MACHINE.

ORIGINAL FILED MAR. 27, 1918. 4 SHEETS—SHEET 1.

FIG. 1.



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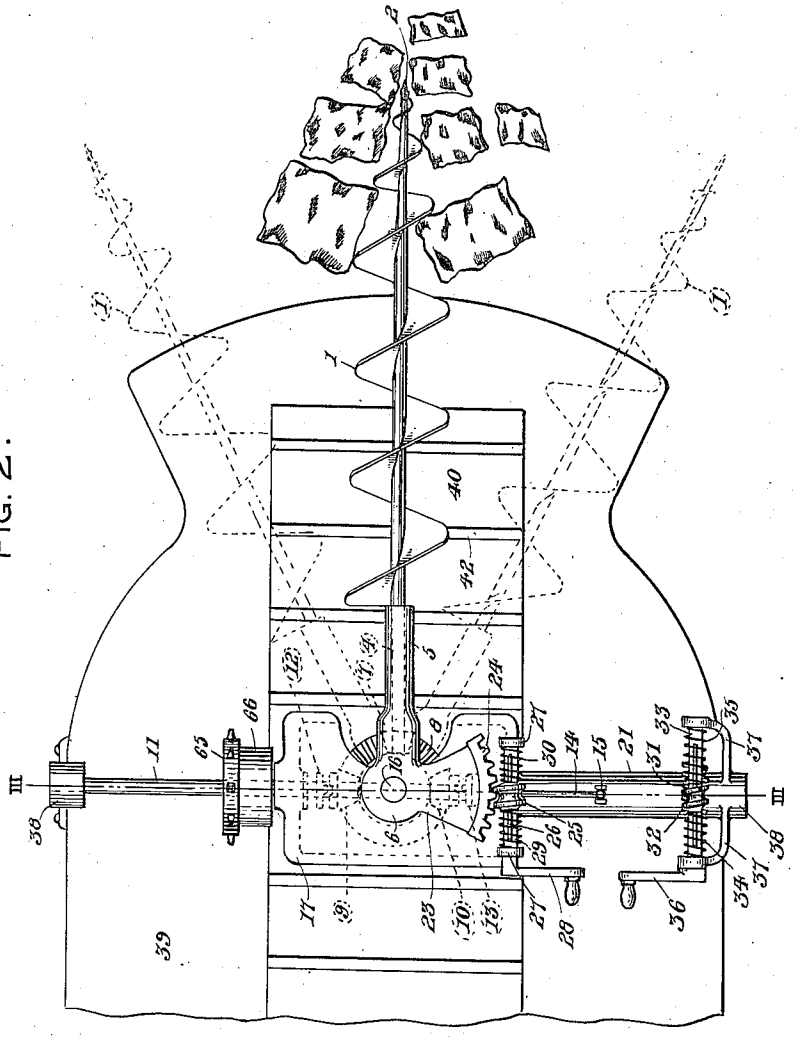
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ORIGINAL FILED MAR. 27, 1918.

4 SHEETS—SHEET 2.

FIG. 2.



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COAL LOADING MACHINE.

ORIGINAL FILED MAR. 27, 1918. 4 SHEETS—SHEET 3.

FIG. 3.

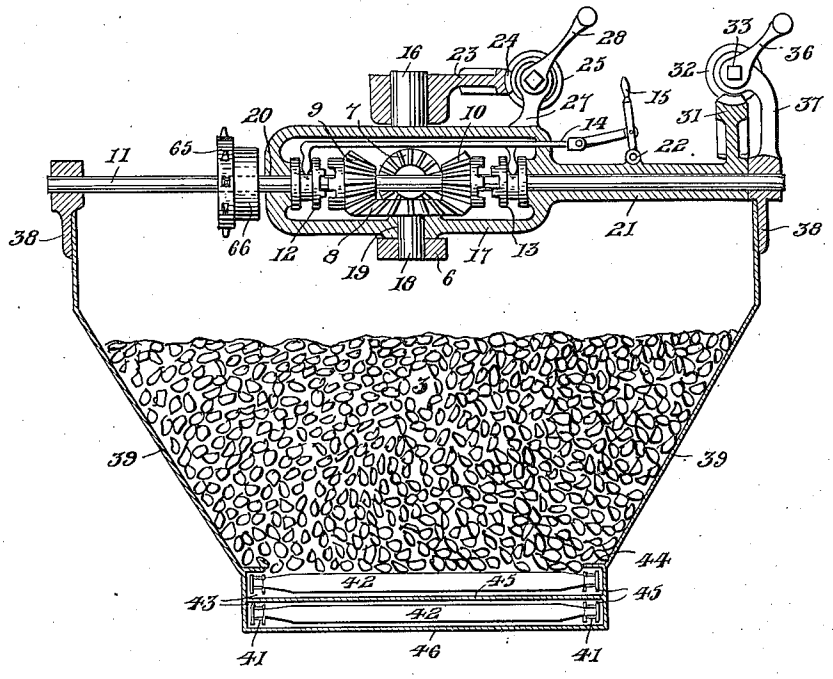


FIG. 5.

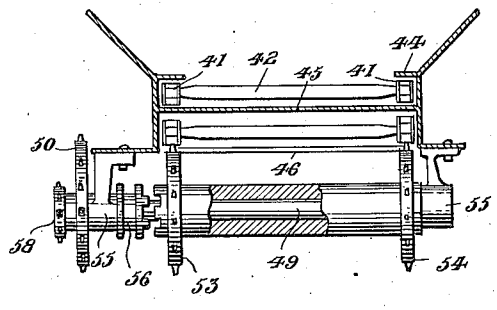
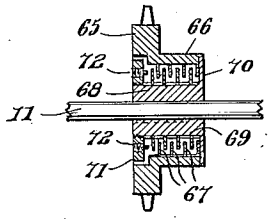


FIG. 6.



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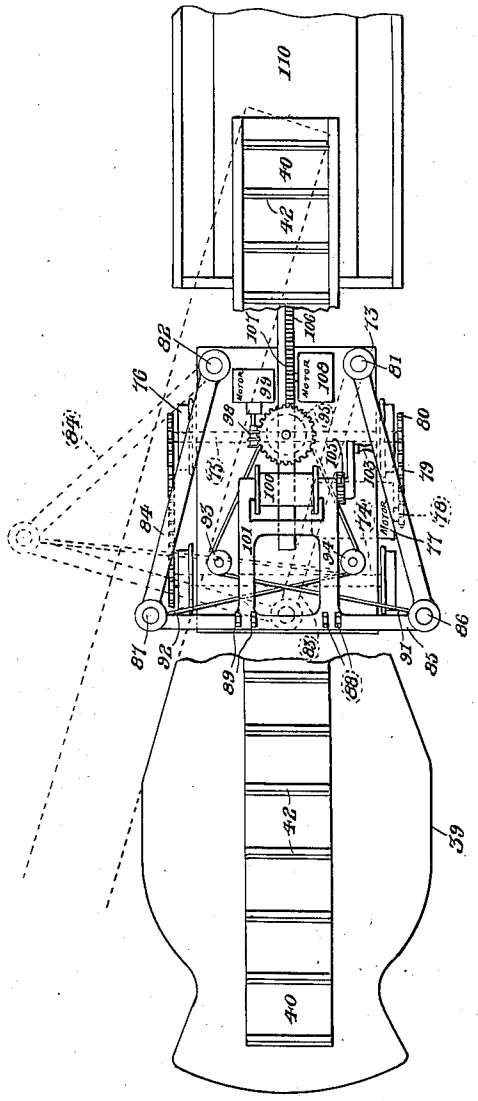
Feb. 13, 1923. 1,445,087.

J. F. JOY.

COAL LOADING MACHINE.

ORIGINAL FILED MAR. 27, 1918. 4 SHEETS—SHEET 4.

FIG. 4.



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Patented Feb. 13, 1923. 1,445,087

UNITED STATES PATENT OFFICE.

JOSEPH F. JOY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO JOY MACHINE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF DELAWARE.

COAL-LOADING MACHINE.

Original application filed March 27, 1918, Serial No. 224,983. Divided and this application filed January 5, 1920. Serial No. 349,388.

To all whom it may concern:

Be it known that I, JOSEPH F. JOY, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Coal-Loading Machines, being a division of my application Serial No. 224,983, filed March 27, 1918, of which the following is a specification.

This invention relates to certain new and useful improvements in coal loading machines and has among its objects the provision of a horizontally swingable single conveyor which is so mounted that the discharge end thereof will at all times remain over the car being loaded when the free end of the conveyor is swung across the place in which the machine is working.

Heretofore, the most widely used coal loading machines have been equipped with a second or tail conveyor which was made necessary in order to insure a discharge of coal into a car when the loading head was swung to either side of the machine, and a machine of the present type has the advantages of being lighter and cheaper than such widely used machines by reason of the elimination of the tail conveyor.

I have found, in practice, that the coal production may be increased from 30% to 50% if a means is provided for the storage of coal whereby the gathering thereof may continue while a loaded car is being replaced by an empty one, and it is a further object of the present invention to provide a storage bowl to receive the gathered coal whereby the gathering operation may be permitted to continue during the period in which a loaded car is being replaced by an empty one.

In the mining of coal, it is customary to undermine the face of a vein approximately to a depth equal to the thickness of the vein, after which the coal is blasted by an explosive charge. It is very desirable that the amount of explosive used be the very least necessary to loosen the coal sufficiently to allow its removal. When the work of loading the coal is done by hand the coal is merely shattered and the miner resorts to wedges and crow bars to win the coal from the semi-solid state in which it is left as the result of a blast, rather than to resort to heavy blasting which is attendant with great hazards and is often the cause of more or less disastrous mine fires and explosions. In methods, thus far tried out, for preparing the coal for loading machines, it is customary to shoot the coal entirely loose from its natural bed down onto the floor of the mine, and, besides requiring a great quantity of explosives and involving great risk of life, this method decreases the value of the coal due to the pulverizing effects of the excessive use of explosives. In some cases mechanical picks have been used to break the coal down, but they are undesirable also in view of their bulky nature and the fact that they too, produce a large amount of fine coal and dust.

It is a still further object of this invention to provide a means whereby the coal may be won in lumps of the most desirable size, either from the semi-solid state in which it is left as the result of a conservative use of explosives, or, in some coals, without the use of explosives at all.

It is a still further object of this invention to provide a gathering mechanism which not only serves to move the coal from the mine floor onto a conveyor, but also is adapted to break loose and tear away with a pulling and wedge-like action coal that clings to the roof and sides of the working place.

A still further object is to provide a gathering device which is so mounted as to be capable of readily yielding in all directions and thereby avoiding straining or breaking of the same as would otherwise occur by gathering irregular sizes of lumps of coal.

A still further object is to provide means whereby the car to be loaded may be moved relative to the discharge end of the conveyor so that such car may be uniformly loaded.

A still further object is to provide a gathering and breaking down device whereby coal may be dislodged from any part of the working face.

A still further object is to provide a rotary gathering and breaking down device with a safety driving means whereby damage to said gathering device or driving means is prevented should the former become overloaded or bind while in operation.

With these general objects in view and others that will become apparent as the

nature of the invention is better understood, the same consists in the novel construction, form, arrangement and combination of parts hereinafter more fully described, shown in the drawings and claimed.

In the accompanying drawings forming part of this application and in which like reference characters indicate similar parts throughout the several views,

Figure 1 is a side elevational view of the complete machine with a portion of one side of the storage bowl torn away.

Figure 2 is an enlarged plan view of the forward end of the storage bowl and conveyor and of the spiral breaking down and gathering device with its driving and controlling mechanism.

Figure 3 is a transverse sectional view taken on line III—III of Fig. 2.

Figure 4 is a top plan view of the machine with part of the conveyor broken away to show the truck arrangement, the spiral gathering member being removed.

Figure 5 is an enlarged sectional view taken on line V—V of Fig. 1, and

Figure 6 is an enlarged sectional view of the sprocket wheel and safety slip clutch.

Referring more in detail to the several views, the tapering spiral auger or gathering and breaking down member 1 is provided with a gimlet point 2 adapted to be thrust into a crevice in the coal face, previously produced by blasting, and be screwed into the coal, thereby to tear apart and loosen the same in condition to be conveyed back by the larger portion of the spiral member to the storage bowl 3. The shank 4 of the member 1 is journaled in an arm 5 of a bracket 6 and has a pinion 7 secured on the end thereof which meshes with a gear 8. Gear 8 meshes with and may be driven by either of the pinions 9 or 10, depending upon which direction of rotation is desired.

The pinions 9 and 10 are journaled on the shaft 11 and are adapted to be connected to said shaft, respectively, by clutches 12 and 13 which are actuated by the shifting rod 14 and lever 15. By throwing lever 15 outwardly clutch 12 will connect pinion 9 to shaft 11 to rotate the member 1 for gathering and by throwing lever 15 inwardly the clutch 13 will connect pinion 10 with shaft 11 to cause reverse rotation of said member 1.

Bracket 6 is hinged for horizontal rotation around a pin 16, which is secured to the gear casing 17, and the spindle 18 of the gear 8 which extends through the aperture 19 of said gear casing.

Gear casing 17 is journaled for vertical rotation around shaft 11 as at 20 and is provided at its opposite side with a sleeve-like extension 21 which is also free to rotate about shaft 11 and to which is pivoted the lever 15 as at 22. The upper arm of the bracket 6 is provided with a lateral extension 23 formed with a worm sector 24 which meshes with a worm gear 25 slidably keyed on a shaft 26 which is journaled in brackets 27 extending upwardly from the gear casing 17. A crank 28 is provided to turn shaft 26 and, through the gearing described to swing the arm 5 and member 1 in a horizontal plane. The gear 25 is yieldingly maintained midway between the ends of shaft 26 by means of springs 29 and 30 and by this construction the member 1 may yield to one side or the other without straining the gearing or other parts.

The extension 21 is provided with a worm sector 31 which meshes with a worm gear 32 and this gear is yieldably and slidably mounted on shaft 33 between springs 34 and 35 in a similar manner and for the same purpose as gear 25. A crank 36 is provided to turn shaft 33 and, through the gearing described, to rotate the casing 17 and thereby swing arm 5 and member 1 in a vertical plane. The shaft 33 is journaled in suitable brackets 37 which extend upwardly from one of the brackets 38 in which is journaled the shaft 11 and which are secured to the upper edges of the comparatively high sides 39 of the conveyor 40 which form the storage bowl 3.

The conveyor 40 may be of any well-known type, but is herein shown as of the chain and scraper variety involving broadly two endless spaced chains 41 which are connected together by transverse scraper bars 42 and which travel in guideways 43 formed by the flanges 44, the partition 45 beneath which travels the return flight of the conveyor, and the bottom 46.

Near the rear portion of the conveyor 40 and to the under side thereof is secured a suitable motor 47 to whose shaft is secured a sprocket wheel 48. Forwardly of the motor 47 and arranged transversely under the conveyor is a shaft 49 having a large sprocket wheel 50 secured thereon adjacent one end and an endless sprocket chain 51 passes around the wheels 48 and 50 to communicate rotation to shaft 49 from the motor 47. Journaled upon shaft 49 is a sleeve 52 which carries two sprocket wheels 53 and 54 which engage the conveyor chains 41. The shaft 49 is journaled in brackets 55 and has a clutch 56 slidably keyed thereon which is adapted to be actuated by the lever 57. It is obvious that, when motor 47 is started and clutch 56 is engaged with sleeve 52, the sprockets 53 will drive the conveyor through the gearing described. Secured upon the end of shaft 49 adjacent the wheel 50 is a relatively smaller sprocket wheel 58 around which passes a chain 59 which also passes around a larger sprocket wheel 60 carried by the idler shaft 61 which is supported by the bracket 62 secured to one side 39 of the conveyor. Carried by the shaft 61 is a second

and smaller sprocket wheel 63 around which passes a sprocket chain 64 which also passes around the sprocket wheel 65 carried by the shaft 11.

The driving connection between the sprocket 65 and shaft 11 involves a safety slip clutch which consists of an outer casing 66 which is a lateral tubular extension of the sprocket 65 and this casing carries a plurality of disks 67. These disks are keyed to the casing 66 so as to be compelled to rotate therewith, but are free to slide sidewise relative thereto. A hub 68 keyed to the shaft 11 is provided with a plurality of disks 69 which are keyed to said hub so as to be compelled to rotate therewith, but are also free to slide sidewise, and said hub is provided with an integral end flange 70. On the other end of the hub is a removable flange 71 which may be removed to allow the disks to be filled into the casing 66 and, after assembly of the parts, the said disks may be packed closely by adjusting the screws 72. These screws are adjusted to a point wherein sufficient friction exists between tl e disks 67 and 69 to cause motion to be imparted from the wheel 65 to shaft 11 under normal load, but when the member 1 is overloaded or binds it will cease to rotate by reason of the slipping of the disks relative to each other.

The conveyor 40 and associated parts are supported upon a truck 73 which is provided with axles 74 and 75 having traction wheels 76 secured thereon, and secured under the platform of the truck 73 is a suitable motor 77. Secured on the shaft of the motor 77 is a sprocket wheel 78 around which passes an endless sprocket chain 79 which also passes around a larger sprocket wheel 80 secured on the axle 75, and it is obvious that this gearing enables the truck to be propelled by the motor 77.

At the rear corners of the truck bed 73 are provided studs or pins 81 and 82 to which are hinged bars 83 and 84, the forward end of which are hinged to and connected together by member 85 as at 86 and 87. Member 85 is provided with hinge brackets 88 and 89 for connection to similar brackets on the bottom of the conveyor, one of which is shown at 90 in Fig. 1, and the conveyor is practically balanced at this point upon the truck. I have found that, by connecting arms 83 and 84 to member 85 at a point in line with a line radiating from the point of discharge of the conveyor and passing through the pins 81 and 82, the member 85 may be moved back and forth across the truck as desired and yet at all times it takes a position at right angles to a line radiating from the point of conveyor discharge or a point over the car into which the coal is being loaded.

In order to laterally swing the conveyor, I provide two cables 91 and 92 which are respectively secured to arms 83 and 84 adjacent the connections 86 and 87 and which respectively pass around guide pulleys 93 and 94, and thence to drum 95 to which they are secured. This drum is secured upon a shaft 96 carrying a worm wheel 97 which meshes with a worm gear 98 carried by the shaft of a motor 99 which is capable of being reversed, and it is obvious that, by winding one of the cables upon the drum 95 and at the same time paying out the other cable, the conveyor will be swung across the face of the working place.

In order to swing the conveyor on the pivotal connection 88, 89 and 90 to raise the forward end thereof, I provide a drum 100 which is journaled in bracket arms 101 carried by and extending rearwardly from the member 85. A cable 102 is attached to the conveyor and is wound upon the drum 100 by turning a crank 103, a suitable pawl 104 and ratchet wheel 105 being provided to prevent backward rotation of drum 100 except when said pawl is intentionally released to allow the forward end of the conveyor to lower by gravity.

A longitudinally movable rack push rod suitably guided in the truck bed 73 has the pinion 107 in mesh therewith and said pinion is carried by the shaft of a reversible motor 108. The end of the bar is provided with a coupling 109 adapted to be connected to the car 110 and by applying power to motor 108 motion is imparted to the rod 106 to feed the car 110 backwardly from the machine as the process of loading proceeds.

To use a machine of this type, the face of the vein is first undercut in the usual manner after which just enough explosive is used to "spring" the coal sufficiently to open up crevices therein, thus avoiding the danger of "blown out shots" which are the most general source of mine explosions.

After the coal has been blasted, the machine is then propelled into the mine room by use of motor 77, and, upon reaching the face of the vein, motor 99 is actuated to swing the conveyor and associated parts to the point most suitable for attack. The forward end of the conveyor is then allowed to lower by releasing the pawl 104 and the member 1 is adjusted by means of cranks 28 and 36 to where its gimlet point will enter a crevice in the coal face when the machine is moved forwardly on the tracks 111 by applying power to motor 77. An empty car is then coupled to the end of push rod 106, power applied to motor 47, clutch lever 15 thrown outwardly causing member 1 to rotate to the right, and the machine moved forwardly by means of propelling motor 77, thus feeding the gimlet point of member 1 into the crevice, breaking away the coal and carrying it backwardly into the storage bowl 3 and onto the conveyor. After the

car is pulled in under the discharge end of the conveyor by means of motor 108, clutch lever 57 is pulled outwardly, thus starting the loading conveyor. The mine car is slowly fed backwardly as the loading proceeds until it is full, when lever 57 is pushed inwardly to stop the loading conveyor until the loaded car has been replaced by an empty one, during which time the process of gathering and breaking down may continue.

After a path has been cleared to the back of the undercut, the machine is backed away from the face and moved to another position where the operation is repeated until the coal has been torn away and loaded across the entire width of the working place.

Should the member 1 become overloaded or bind, the safety slip clutch (Fig. 6) provides protection against straining or breaking of the mechanism, and while the member 1 is thus bound or overloaded, the machine may be propelled away from the face tearing the coal away with it, similar to the way a cork is removed by the use of a corkscrew, or lever 15 may be thrown inwardly to reverse the member 1 for removal thereof.

While the form of the invention, herein described, is what is believed to be the preferred embodiment thereof, it is nevertheless to be understood that minor changes may be made in the form and arrangement of parts without departing from the spirit and scope of the invention as claimed.

What I claim as new is:—

1. A coal loading machine including a wheeled support, a pair of diverging arms pivotally secured to said support and having their widely separated ends connected by a transverse member, a conveyor supported upon the transverse member, and means for moving said diverging arms laterally relative to the support.

2. A coal loading machine including a wheeled support, a pair of diverging arms pivotally secured to said support, a transverse member connecting the widely separated ends of said arms, a conveyor pivoted for vertical movement upon said connecting member, means for moving said arms laterally relative to the support, and means to raise the forward end of said conveyor.

3. A coal loading machine including a gathering member, an inclined pit-car loading conveyor associated with said gathering member and having a storage bowl at its lower end for reception of material gathered by the gathering member, means to operate said gathering member, means to operate said conveyor, and means to render the conveyor inoperative without rendering the gathering member inoperative.

4. A coal loading machine including a support, a pair of connected arms pivoted to said support for horizontal movement, a single conveyor connected to said arms for horizontal movement therewith relative to said support whereby the discharge end of the conveyor will remain substantially at the same point at all times, and means for moving said conveyor relative to the support.

5. A loading machine including a wheeled support having an inclined conveyor mounted thereon, said conveyor being enlarged at its lower forward end to provide a storage receptacle, a gathering member mounted upon the forward end portion of the conveyor and arranged to move material into said storage receptacle, said conveyor including a conveyor member to transfer the material rearwardly from the storage receptacle to a point above a pit car, means to operate said conveyor member, means to operate said gathering member, and means to render the conveyor inoperative without rendering the gathering member inoperative.

In testimony whereof I affix my signature.

JOSEPH F. JOY.