J. F. JOY,

GATHERING MECHANISM FOR COAL LOADING MACHINES.

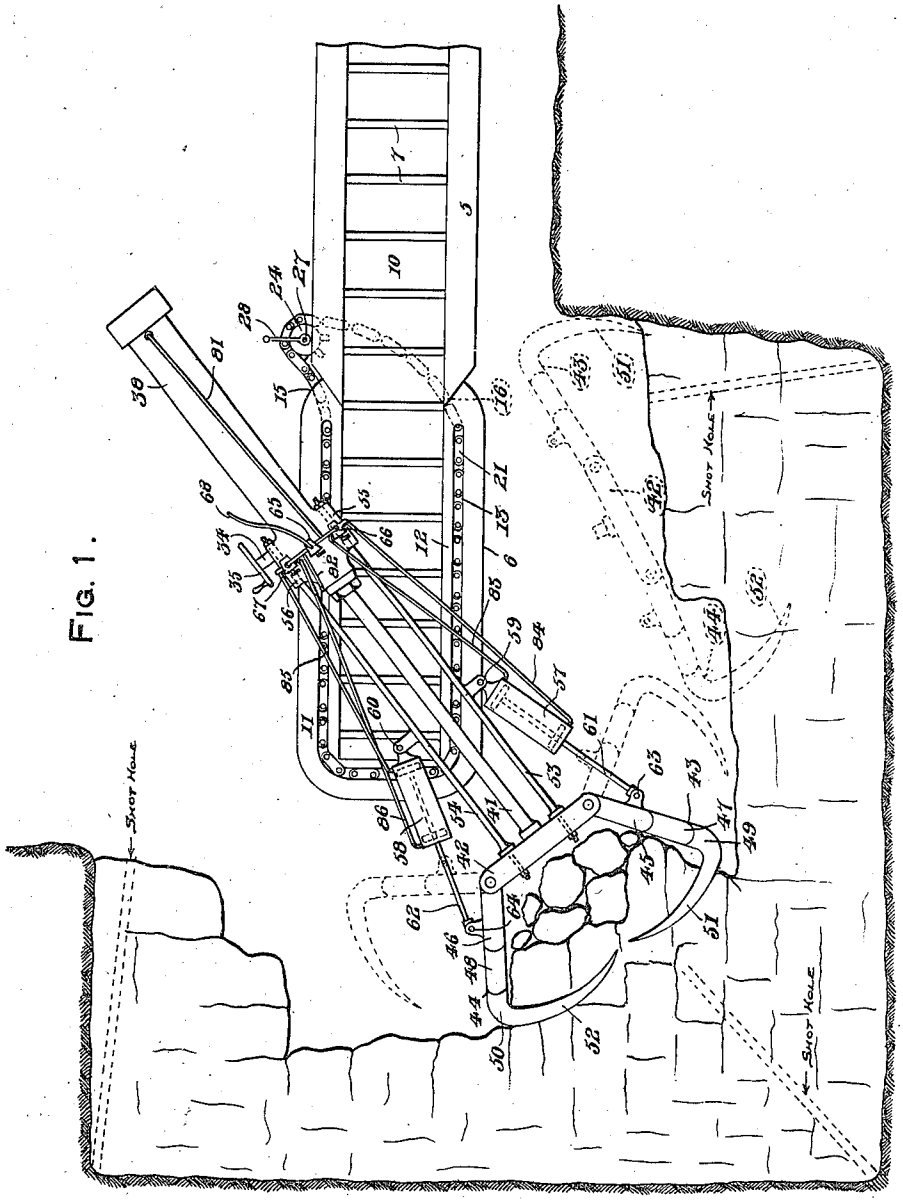
APPLICATION FILED APR. 19, 1918.

1,307,009.

Patented June 17, 1919.

2 SHEETS—SHEET 1.

FIG. 1.



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2 SHEETS—SHEET 2.

FIG. 2.

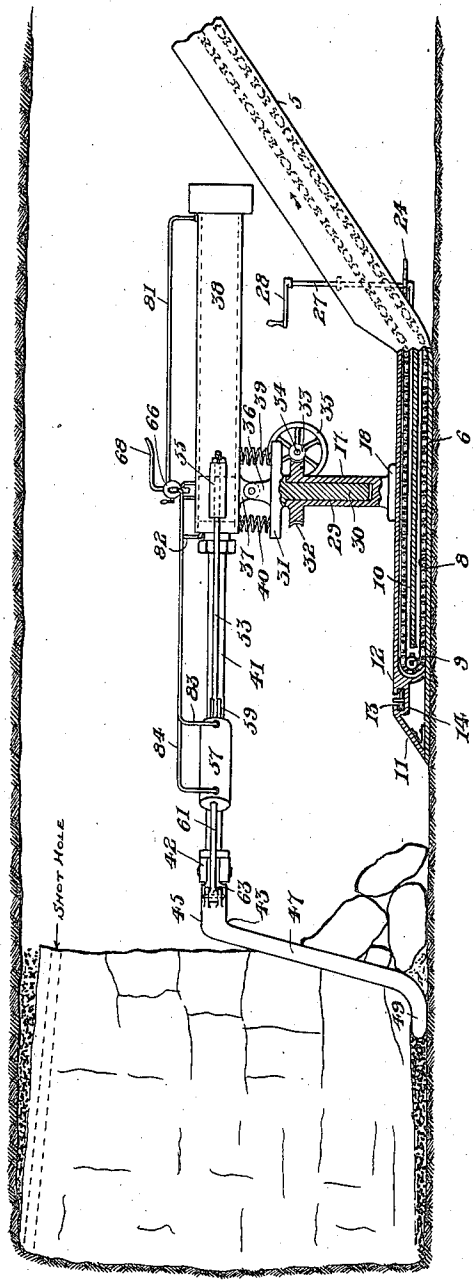


FIG. 4.

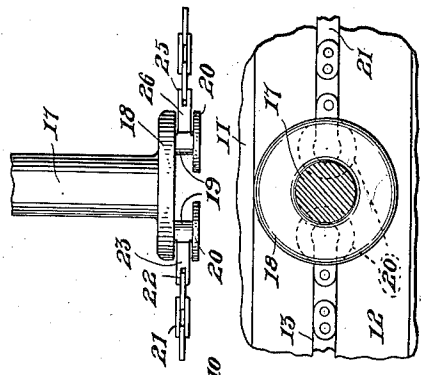


FIG. 5.

FIG. 3.

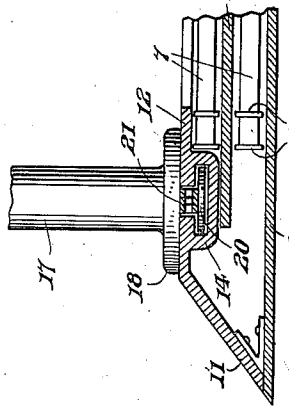


FIG. 6.

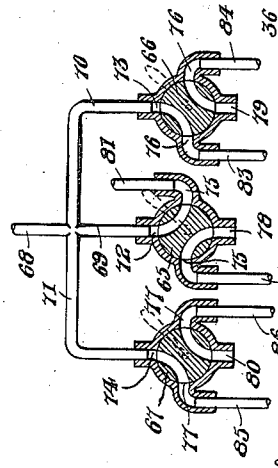
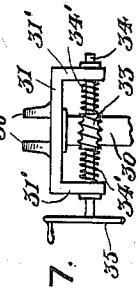


FIG. 7.



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UNITED STATES PATENT OFFICE.

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GATHERING MECHANISM FOR COAL-LOADING MACHINES.

1,307,009. Specification of Letters Patent. Patented June 17, 1919.

Application filed April 19, 1918. Serial No. 229,554.

To all whom it may concern:

Be it known that I, JOSEPH F. JOY, a citizen of the United States of America, residing at Belle Vernon, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Gathering Mechanisms for Coal-Loading Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in gathering mechanisms for coal loading machines, and more particularly for that class of loading machines adapted to transfer coal from a mine floor to conveniently placed cars for transportation from the mine, an example of which is disclosed in my pending application Serial No. 132,175, filed November 18, 1916.

In the mining of coal it is customary to undermine or undercut the face usually to a depth equal to the thickness of the vein, after which it is blasted by a charge of explosive. 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, it is merely shattered and the miner resorts to wedges and crow bars to win the coal from the semi-solid state which it is in as the result of a blast, rather than resort to heavy blasting which is attendant with great hazards, such as more or less disastrous mine explosions. In the customary method of shooting the coal entirely loose from its natural bed down onto the floor of the mine, in addition to increasing the hazards of mining, the value of the coal is decreased, due to the pulverizing effects of the excessive use of explosives. In some cases mechanical picks have been used to break the coal down which also causes an undesirable amount of fine coal and dust.

Heretofore, the gathering mechanisms of these machines have mostly been of such a nature that the coal to be loaded had to be entirely broken down from the face of the mine before they could effectively operate to engage the coal and move it onto the conveyer which transferred it to the cars.

It is the especial object of the present invention to provide a gathering mechanism which will not only move the coal from the mine floor onto the conveyer, but will also tear or pull down in desirable large lumps the coal which has been shattered but left standing after the face of the vein has been "shot," thus materially reducing the quantity of explosive necessarily used and rendering practically unnecessary the use of mechanical picks or the breaking down of the coal by hand.

A further object is to provide a gathering mechanism including a plurality of spaced fingers or arms, means to move said fingers or arms toward each other to longitudinally penetrate the shattered coal and engage behind and grip the same, and means to bodily move said fingers away from the coal when in their gripping position to thereby tear down the coal and move the same onto a conveyer.

A still further object is to provide a gathering mechanism with a mounting means which may be readily adjusted or moved from one side of a conveyer to the other side thereof to gather pillar coal from behind corners in the mine wall, to insure maximum loading efficiency for the gathering mechanism under varying conditions and to allow free movement of the coal by the conveyer.

A still further object is to provide a gathering mechanism yieldably mounted for vertical rocking movement and adjustably and yieldably mounted for horizontal swinging movement relative to the conveyer.

A still further object is to provide a gathering mechanism including a pair of spaced pivotally mounted gathering arms and effective manually controlled power operated means to swing the arms toward and away from each other as well as to bodily move the arms toward and away from the conveyer.

With these general objects in view and others that will be apparent when the nature of the invention is better understood, the same consists in the novel combination, form and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claims.

In the drawings forming part of this application and in which like designating characters refer to corresponding parts throughout the several views:—

Figure 1 is a plan view of a fragment of

a loading conveyer with the preferred embodiment of the present invention associated therewith in a mine room, the gathering arms being shown in separated relation, and in a position to extract pillar coal, by dotted lines.

Fig. 2 is a side view, partly in vertical longitudinal section, of the device shown in Fig. 1.

Fig. 3 is an enlarged fragmentary detail view showing the lower portion of the support or mounting post for the gathering mechanism in elevation and the side marginal portion of the shoe of the conveyer in vertical section.

Fig. 4 is an enlarged fragmentary detail view showing the lower portion of the support or mounting post for the gathering mechanism in elevation and detached from the shoe of the conveyer, portions of the operating chain for moving the post being shown attached thereto.

Fig. 5 is a plan view of the device shown in Fig. 3, partly broken away.

Fig. 6 is a view, partly in section, diagrammatically illustrating the valve arrangement for controlling the flow of air or water to and from the operating cylinders.

Fig. 7 is an enlarged detail view, partly broken away, of the mounting member detached, and showing the manner of supporting the worm 33 for yieldable sliding movement.

In carrying out the embodiment of the invention herein illustrated, the gathering mechanism is associated with the usual conveyer 5 which transfers the coal to conveniently placed cars. The discharge end of this conveyer is usually suitably supported on and above a wheeled truck the required distance above the floor of the mine and said conveyer extends or inclines downwardly as shown, the same being provided with a substantially horizontal shoe portion 6 adapted to rest upon and slide along the floor. The conveyer 5 is preferably of the well known chain and scraper type whose transverse scraper bars 7 (see Fig. 1) are suitably spaced and have their ends connected to parallel spaced endless chains, one of which is shown at 8 in Fig. 2, passing around the sprocket wheel 9 and lying above and below the partition 10.

The marginal portion 11 of the shoe 6 is inclined downwardly to form an approach or inclined way at the sides and forward end of said shoe up which the coal is moved onto the conveyer, and the substantially horizontal portion 12 of the shoe 6 adjacent and concentric to the portion 11 is slotted as at 12. Below the slot 13 is a channel form of web 14 which with said slot forms an inverted substantially T-shaped guideway (see Fig. 3) extending along both sides of the shoe and across the front end thereof, said guideway being open at the rear end of the shoe at 15 and 16.

A vertical supporting post 17 having an enlarged base 18 slidably resting on the shoe portion 12 is provided with a pair of downwardly projecting headed studs 19 positioned in the guideway formed by the slot 13 and web 14, upward displacement of the post 17 away from the shoe 6 being prevented by the heads 20 of said studs 19. A sprocket chain 21 has one of its ends attached as at 22 to a laterally projecting lug 23 formed on one of the studs 19 and said sprocket chain is extended in the guideway around the forward portion of the shoe 6 and then backwardly along one side thereof out the open end 16 of said guideway. From this point, the chain is passed around a sprocket wheel 24 into the guideway at the open end 15 thereof and has its other end attached as at 25 to the lug 26 extending laterally from the other stud 19. The sprocket wheel 24 is secured on the lower end portion of a vertical suitably supported rotatable shaft 27 having an operating crank handle 28 on the upper end thereof, and it will be readily apparent that rotation of said handle 28, shaft 27 and sprocket wheel 24 will cause movement of the chain 21 in the guideway in a direction corresponding with the direction of rotation imparted to wheel 24, thus imparting similar movement to post 17.

The post 17 has an axial bearing socket 29 open at the upper end of said post 17 and journaled in this socket is the stem 30 of the mounting member 31. The upper end of the post 17 has a worm gear 32 rigid therewith which meshes with a worm 33 keyed on a rotatable shaft 34 suitably supported from and by the mounting member 31 and operated by a hand wheel 35. It will be evident that a rotation of wheel 35 will cause axial rotation of worm 33 and, by reason of the post 17 being held against rotation by the studs 19 in the shoe guideway, said worm 33 will also orbitally move around the worm gear 32 and thereby horizontally rotate the mounting member 31 and parts substantially rigid therewith which includes the gathering mechanism *per se* to be hereinafter described.

Projecting upwardly from the mounting member 31 is a pair of lugs 36 pivotally connected by a horizontal pin to a lug 37 depending from the large fluid pressure cylinder 38. This construction allows vertical rocking movement of the cylinder 38 and parts connected thereto, which movement is yieldingly resisted by helical compression springs 39 and 40 arranged between the cylinder 38 and member 31 forwardly and rearwardly of the lugs 36 and 37.

Cylinder 38 has the usual form of recipro-

cable piston arranged therein and connected to the piston rod 41. Rod 41 extends through the forward end of cylinder 38 to a point somewhat in advance of the latter where it is rigidly connected to a cross bar 42 having a pair of undermining gathering arms or fingers 43 and 44 hinged to the ends thereof for horizontal swinging movement toward and away from each other. The gathering arms 43 and 44 are provided with upper substantially horizontal portions 45 and 46 from which extend depending substantially vertical portions 47 and 48 whose lower ends are directed horizontally and forwardly as at 49 and 50 for a short distance and then laterally in opposite directions toward each other to form a pair of substantially pointed claws 51 and 52.

A pair of guide rods 53 and 54 are arranged at opposite sides of and parallel with the piston rod 41 and have their forward ends rigidly secured to the cross bar 42, while their other ends are slidably extended through longitudinal bores formed in the laterally extending guide lugs 55 and 56 formed on opposite sides of the cylinder 38.

A pair of pressure cylinders 57 and 58, somewhat smaller than the cylinder 38, are provided, respectively having their rear ends pivotally connected as at 59 and 60 to the guide rods 53 and 54. The cylinders 57 and 58 have the usual form of reciprocable pistons therein and extending from said pistons are piston rods 61 and 62 which are respectively pivotally connected at their forward ends to the upper horizontal portions 45 and 46 of the gathering arms 43 and 44 as at 63 and 64.

Suitably supported upon the forward end of the cylinder 38 are three manually operable turn plugs or valves 65, 66 and 67 which are respectively utilized to control the operation of the pistons in the cylinders 38, 57, and 58 as will presently be apparent. A flexible conduit or hose 68 extends from a suitable means for supplying fluid under pressure and is connected by branches 69, 70 and 71 with inlet ports 72, 73, and 74 of the valves 65, 66 and 67, said valves being respectively provided with two outlet ports 75, 76, and 77 and exhaust ports 78, 79 and 80. A conduit 81 is connected to one of the outlet ports 75 of the valve 65 and extends rearwardly to and into the rear end portion of cylinder 38, while a conduit 82 is connected to the other port 75 and extends into the forward end of cylinder 38. A slightly flexible conduit 83 is connected to one of the ports 76 of valve 66 and extends forwardly to and into the rear end portion of the cylinder 57, while a similar conduit 84 is connected to the other port 76 and extends forwardly to and into the forward end portion of the cylinder 57. A slightly flexible conduit 85 is connected to one of the ports 77 of valve 67 and extends forwardly to and into the rear end portion of the cylinder 58, while a similar conduit 86 is connected to the other port 77 and extends forwardly to and into the forward end portion of cylinder 58. The rotatable members of the valves 65, 66 and 67 each have a pair of oppositely curved passageways therethrough as shown clearly in Fig. 6 and when the movable member of valve 65 is in the position shown in this figure, fluid or air under pressure is supplied through conduit 81 behind the piston in cylinder 38 to force the rod 41 and parts connected thereto including the gathering arms 43 and 44 forwardly toward the material to be gathered, said arms 43 and 44 being separated at such time as shown by dotted lines in Fig. 1. After the arms 43 and 44 have been forced against the material, the air or similar motive agent is supplied to cylinders 57 and 58, by positioning the movable members of valves 66 and 67 as shown in Fig. 6, through the conduits 83 and 85 and behind the pistons in said cylinders 57 and 58. This forces the rods 61 and 62 forwardly and thereby causes the gathering arms 43 and 44 to swing toward each other to the position indicated by full lines in Fig. 1 wherein the same are engaged behind and gripping part of the material, it being noted that the claws or working portions 51 and 52 of the arms 43 and 44, when moved toward each other, longitudinally penetrate the material. When the gathering arms are in the gripping position, the movable member of valve 65 is turned toward the left for a partial revolution, thus establishing communication between conduit 81 and exhaust port 71 and between inlet branch 69 and conduit 82. This exhausts the motive agent from the cylinder 38 behind the piston therein and simultaneously supplies the motive agent to said cylinder in front of the piston therein, thereby causing a rearward movement of rod 41, gathering arms 43 and 44 etc. to tear down the coal and move the same toward and onto the conveyer 5.

As shown in Fig. 7, shaft 34 is journaled in depending spaced brackets 31′ rigid with the mounting member 31, and worm 33 is keyed on shaft 34 to longitudinally slide thereon. Worm 33 is yieldably maintained substantially midway between the brackets 31′ by means of springs 34′, one of which surrounds shaft 34 at each side of said worm, and this construction allows the gathering mechanism *per se* to bodily yieldably swing horizontally.

From the foregoing description, the operation of the present invention will be readily understood, it being noted that when the gathering arms 43 and 44 move toward the

shoe 6, said arms will be allowed to ride up the inclined portion 11 by reason of the provision of the pivotal connection 36—37. By rotating the hand wheel 35, the gathering mechanism may be swung horizontally at any desired angle to the conveyer 5 to gather coal from any part of the face of the vein, while the supporting means including post 17 may be moved to any desired position at either side of the shoe 6 by rotating the handle 28 in the proper direction, it being noted that when the gathering arms are positioned to one side of the shoe 6, the post 17 is preferably located at the other side thereof so as not to interfere with the movement of the coal by conveyer 5.

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

What I claim as new is:—

1. The combination with a conveyer having a shoe portion at the forward end thereof, a gathering mechanism, and means carried by said shoe portion to support said gathering mechanism, of means to move said supporting means to either side of said shoe portion.

2. The combination with a conveyer having a shoe portion at the forward end thereof and a guideway adjacent to and along the margin of said shoe portion, a gathering mechanism, and means carried by said shoe portion and movable in said guideway to support said gathering mechanism, of means to move said supporting means in said guideway to any desired point along and adjacent to the margin of the shoe portion.

3. The combination with a conveyer having a shoe portion at the forward end thereof, a gathering mechanism, and means carried by said shoe portion to support said gathering mechanism, of means to move said supporting means to any desired point along and adjacent to the margin of the shoe portion.

4. The combination with a conveyer having a gathering mechanism at the lower forward end thereof, and means to support said gathering mechanism, of means to move said supporting means to either side of said conveyer.

5. In combination, a conveyer shoe portion having a downwardly inclined margin and a substantially horizontal portion concentric and adjacent to said inclined margin provided with a guideway, a supporting member guided in said guideway, a gathering mechanism yieldingly supported for vertical rocking movement by said supporting member and including gathering members movable up and down said inclined margin, and means to move said supporting member in said guideway.

6. In combination, a conveyer shoe portion having a downwardly inclined margin, a gathering mechanism including gathering members movable up and down said inclined margin, means carried by said shoe portion to support said gathering mechanism for vertical and horizontal movements, means to horizontally move said gathering mechanism, and means to move said supporting means to any desired point along and adjacent to the margin of said shoe portion.

7. In combination, a conveyer having a gathering mechanism at the lower forward end thereof, means to support said gathering mechanism for horizontal movement, means to horizontally move said gathering mechanism, and means to move said supporting means to either side of said conveyer.

8. In combination, a conveyer having a shoe portion at the forward end thereof, a gathering mechanism, means carried by said shoe portion to support said gathering mechanism for horizontal and vertical movements, means to horizontally move said gathering mechanism, and means to move said supporting means to either side of said shoe portion.

9. In combination, a conveyer shoe portion having a guideway along and adjacent to the margin thereof, a gathering mechanism, a supporting member for said gathering mechanism on which the latter is mounted for horizontal swinging movement and having its lower end retained and guided in said guideway, means to horizontally swing said gathering mechanism, and means to move said supporting member in said guideway.

10. A device of the class described including a vertical supporting post having an axial bearing socket open at the upper end thereof, a mounting member having a stem journaled in said socket, means associated with said post and said mounting member to rotate the latter, and an undermining coal gathering mechanism pivoted to said mounting member for vertical rocking movement.

11. In combination, a conveyer shoe portion having a guideway along and adjacent to the margin thereof, a gathering mechanism supporting post guided in said guideway, a flexible member in said guideway having its ends connected to and extending from opposite sides of said supporting post, and means to longitudinally move said flexible member in said guideway.

12. A device of the class described including a supporting member, a pressure cylinder carried by said supporting member and having a cross bar rigidly secured to the outer end of the piston rod thereof, a pair of gathering arms carried by said cross bar, a pair of pressure cylinders, each

having their piston rods operatively connected to one of said gathering arms, and means to control the operation of said cylinders to cause said gathering arms to move toward and away from each other and to bodily reciprocate said gathering arms in unison.

13. A device of the class described including a supporting post, a pressure cylinder pivotally carried by said supporting post for vertical rocking movement, a piston rod associated with said cylinder and having a cross bar rigidly secured to its outer end, gathering arms pivoted to said cross bar in spaced relation, guide rods connected to said cross bar, a pair of pressure cylinders pivoted to said guide rods and having piston rods pivoted to said gathering arms, means to control supply of motive agent to the first named cylinder to reciprocate the piston rod thereof and the gathering arms connected therewith, and means to control the supply of motive agent to the pair of cylinders to cause the gathering arms to swing toward and away from each other.

14. In combination, an inclined conveyer, a gathering mechanism supported on the lower end of said conveyer for lateral movement and including a pair of spaced arms to engage material and move it onto the conveyer, means to move said arms toward each other in laterally extending paths, means to laterally move said gathering mechanism, and means to allow said gathering mechanism to move laterally when either of said arms encounters a relatively immovable object.

15. In combination, an inclined conveyer, a gathering mechanism supported on the lower end of said conveyer for horizontal swinging movement and including a pair of spaced arms to engage material and move it onto the conveyer, means to move said arms toward each other in laterally extending paths, means to horizontally swing said gathering mechanism, and means to allow said gathering mechanism to swing horizontally when either of said arms encounters a relatively immovable object.

16. In combination with an inclined conveyer, a gathering mechanism mounted on the lower end thereof including a pivotally mounted gathering arm, means to swing said arm laterally to longitudinally penetrate material, and means to bodily move the arm toward and away from the conveyer.

17. A device of the class described including a supporting member, a pressure cylinder carried by said supporting member, a piston rod associated with said cylinder and having a cross bar rigidly secured to its outer end, guide lugs carried by said cylinder, a pair of guide rods guided in said lugs and rigidly secured to said cross bar, gathering arms pivoted to said cross bar in spaced relation, pressure cylinders pivoted to said guide rods and having piston rods pivoted to said gathering arms, and means to control the operation of said cylinders.

18. A device of the class described including a vertical supporting post having an axial bearing socket open at the upper end thereof, a mounting member having a stem journaled in said socket, means associated with said post and said mounting member to rotate the latter, and a coal gathering mechanism carried by said mounting member including a pair of undermining gathering arms movable horizontally toward and away from each other.

19. The combination with a coal gathering mechanism for coal loading machines, and a supporting post therefor, said gathering mechanism including a pair of undermining gathering arms movable horizontally toward and away from each other, of means interposed between said post and said gathering mechanism to allow horizontal swinging and vertical rocking movements of the latter, and means to horizontally swing said gathering mechanism.

20. The combination with a coal gathering mechanism for coal loading machines, and a supporting post therefor, said gathering mechanism including a pair of undermining gathering arms movable horizontally toward and away from each other, of a mounting member interposed between said post and said gathering mechanism to allow horizontal swinging and vertical rocking movements of the latter, means to horizontally swing said gathering mechanism, and means interposed between said mounting member and said gathering mechanism to yieldingly resist vertical rocking movement of the latter.

21. In combination with an inclined conveyer, a coal gathering mechanism mounted on the lower end thereof including a plurality of undermining horizontally movable gathering arms, means to move said arms horizontally toward each other to longitudinally penetrate shattered coal and engage behind and grip part of the same, and means to bodily horizontally move said arms away from the coal when in their gripping position to tear down the coal and move the same onto the conveyer.

22. In combination with an inclined conveyer, a coal gathering mechanism mounted on the lower end thereof including a pair of spaced undermining horizontally movable gathering arms, means to move said arms horizontally toward and away from each other, and means to bodily horizontally move the arms in unison toward and away from the conveyer.

23. In combination with an inclined conveyer, a coal gathering mechanism mounted

on the lower end thereof including a pair of spaced pivotally mounted undermining gathering arms, means to horizontally swing said arms toward and away from each other, and means to bodily horizontally move the arms in unison toward and away from the conveyer.

24. In combination with an inclined conveyer, a coal gathering mechanism mounted on the lower end thereof including a pair of spaced pivotally mounted undermining gathering arms, manually controlled power operated means to horizontally swing said arms toward and away from each other, and manually controlled power operated means to bodily horizontally move the arms in unison toward and away from the conveyer.

25. In a loading machine, an inclined conveyer, a gathering mechanism including a supporting structure yieldably mounted on the lower end of said conveyer for horizontal swinging movement, said gathering mechanism including an undermining gathering arm carried by said supporting structure, and means to swing said arm horizontally relative to said supporting structure.

26. A device of the class described including a supporting structure, a horizontal cross bar connected thereto, a pair of horizontal undermining gathering arms carried by said cross bar, a pair of motors, each operatively connected to one of said gathering arms, means to control the operation of said motors to cause said gathering arms to move horizontally toward and away from each other, and motor operated means to bodily horizontally reciprocate said arms in unison.

27. In a coal loading machine, a gathering mechanism including a plurality of gathering members, means to cause said members to penetrate and engage behind part of the coal left standing after the face of a vein has been blasted, means to bodily move said gathering members away from the face of the vein when engaged behind the coal, a conveyer shoe portion, a supporting member for said gathering mechanism carried by said shoe portion, said gathering mechanism being horizontally swingable, means to horizontally swing said gathering mechanism, and means to move said supporting member to either side of said shoe portion.

In testimony whereof I affix my signature.

JOSEPH F. JOY.