

July 14, 1936.

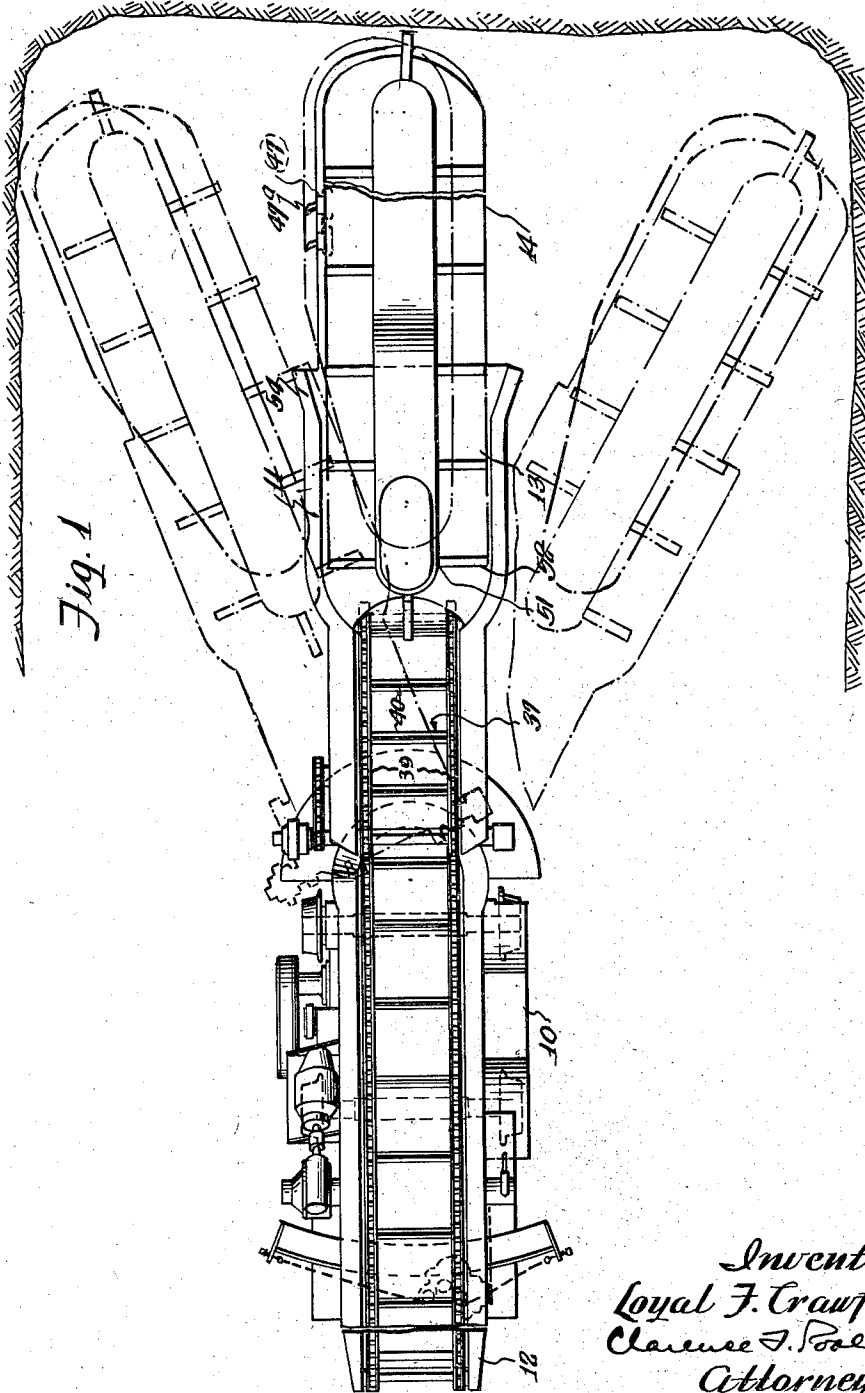
L. F. CRAWFORD

2,047,618

LOADING MACHINE

Filed May 18, 1934

4 Sheets-Sheet 1



Inventor  
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**July 14, 1936.**

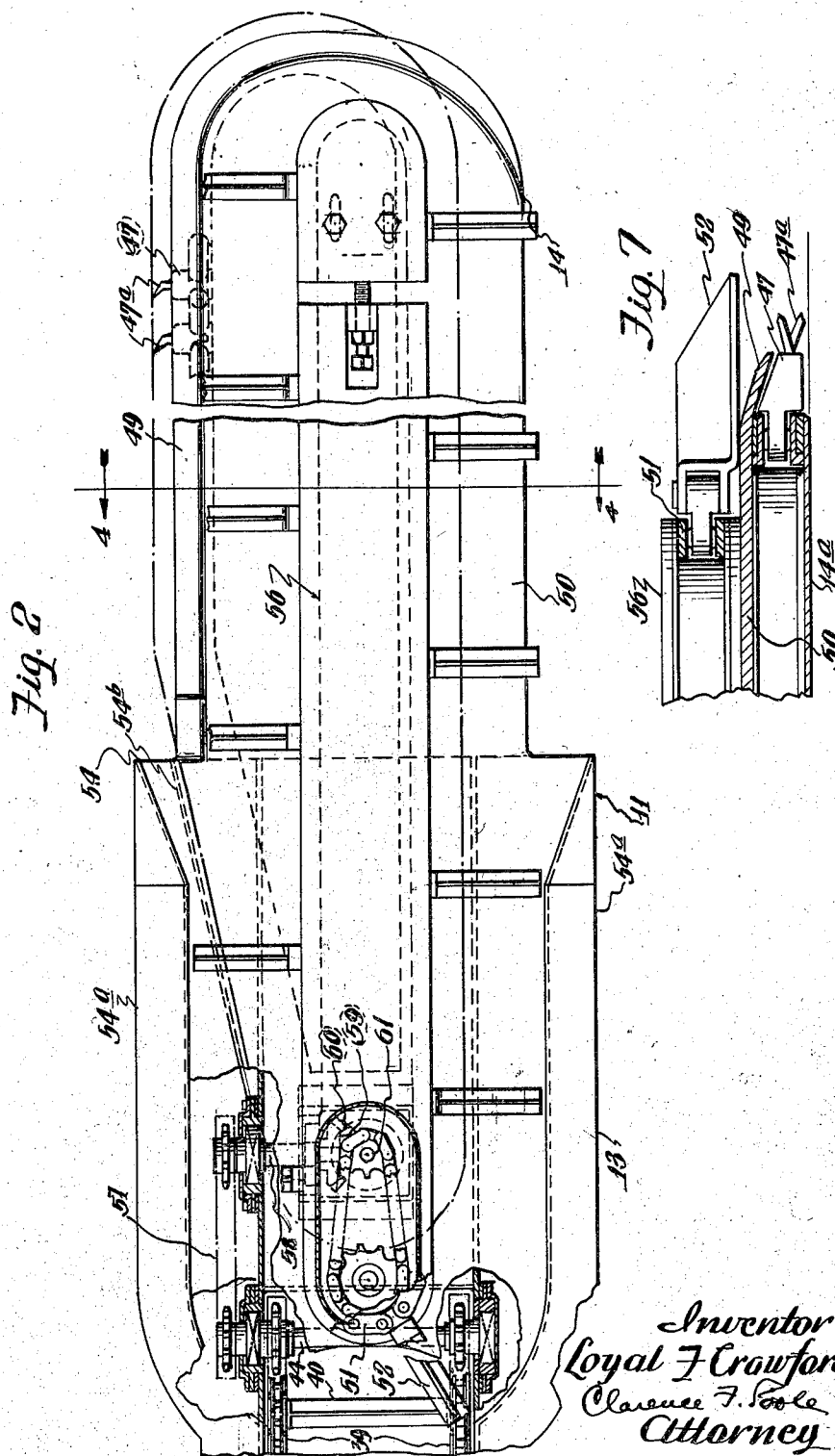
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Filed May 18, 1934

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**July 14, 1936.**

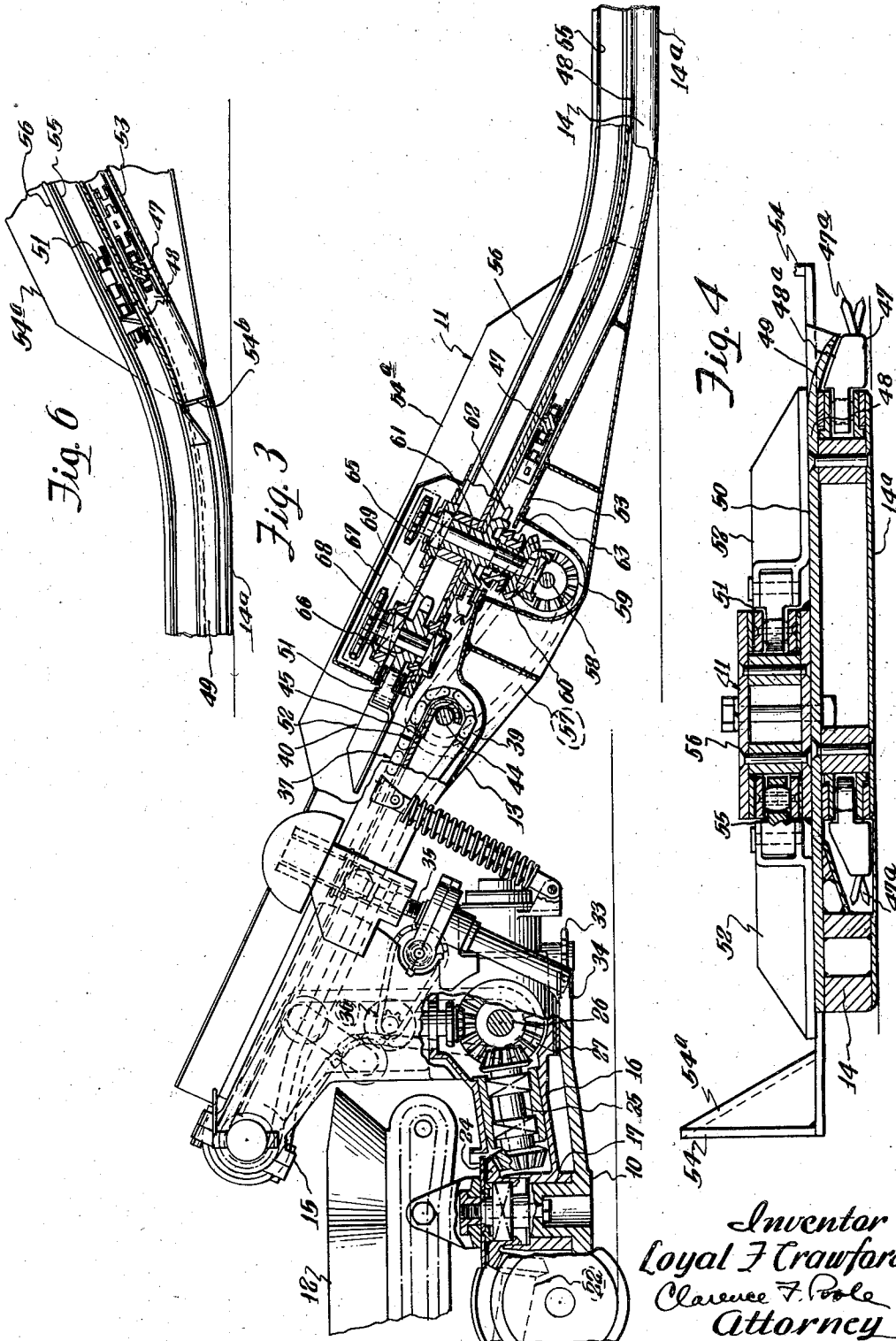
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LOADING MACHINE

Filed May 18, 1934

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L. F. CRAWFORD

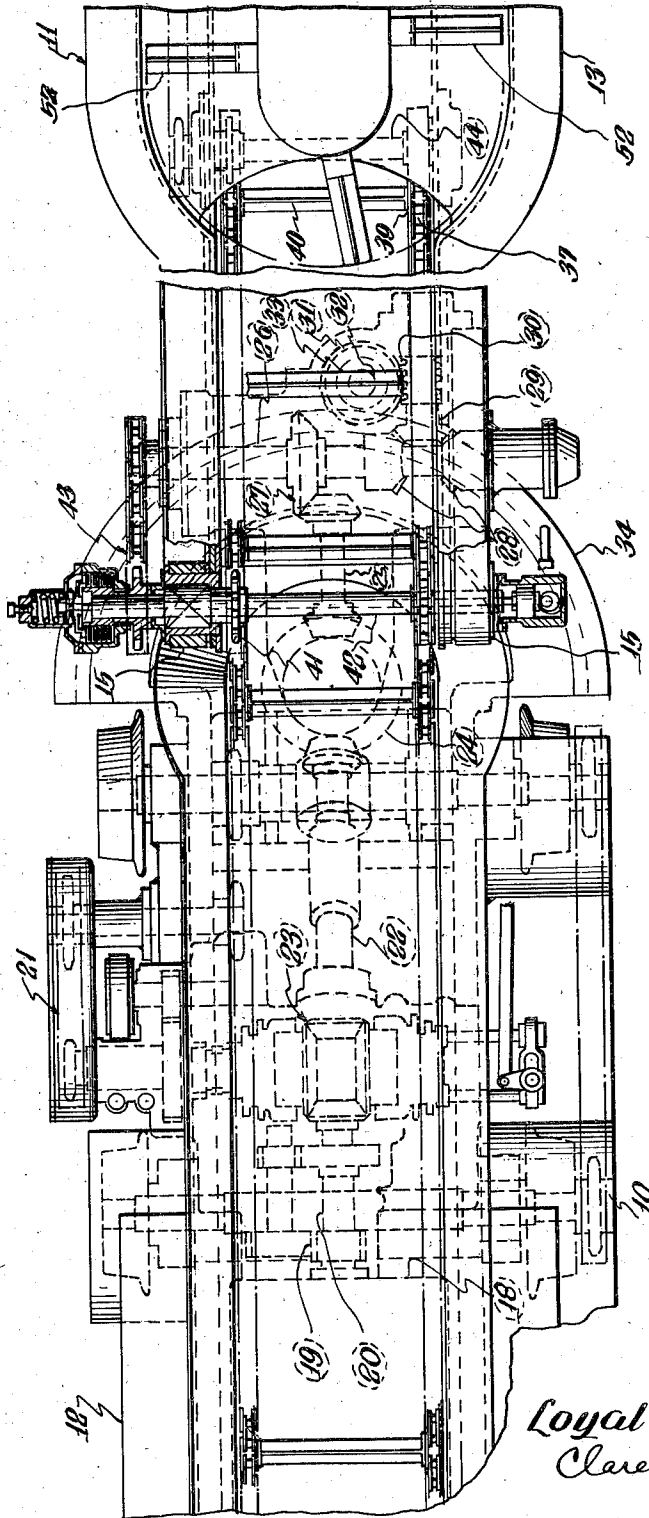
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LOADING MACHINE

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Fig. 5



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## UNITED STATES PATENT OFFICE

2,047,618

## LOADING MACHINE

Loyal F. Crawford, Chicago, Ill., assignor to  
Goodman Manufacturing Company, Chicago,  
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Application May 18, 1934, Serial No. 726,207

22 Claims. (Cl. 262—9)

The invention relates to improvements in loading machines of the type adapted to load coal at the working face of a mine and more particularly to the mechanism for initially picking up the coal and loading it onto a flight conveyor for discharge into a mine car or the like.

The principal objects of my invention are to provide a new and improved track-mounted machine of the class described arranged to continuously load by movement of the machine along the track and by movement of the gathering mechanism across the front of the track. Another object is to so arrange the gathering mechanism that progress of said gathering mechanism will not be impeded by tight coal wedged between the mine roof and mine bottom. Still another object is to provide a new and improved gathering mechanism having a cutting element associated therewith for breaking up tight coal and cutting through and dislodging unsevered coal adjacent the mine bottom or at various elevations with respect thereto.

Other objects of my invention will appear from time to time as the following specification proceeds.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a machine embodying my invention, positioned for operation at the working face of a mine;

Figure 2 is an enlarged plan view of the gathering and loading element of the machine illustrated in Figure 1 with parts broken away and in section to more clearly show certain details of my invention;

Figure 3 is an enlarged side elevation of the forward portion of the machine shown in Figure 1 with parts broken away and shown in substantially longitudinal section to illustrate certain details of my invention not shown in Figure 2;

Figure 4 is a sectional view taken substantially along line 4—4 of Figure 2;

Figure 5 is an enlarged partial fragmentary plan view of the embodiment of my invention shown in Figure 1, illustrating the arrangement of the drive to the moving parts of the machine;

Figure 6 is an enlarged fragmentary partial sectional detail view, showing certain details of the gathering and cutting mechanism; and

Figure 7 is an enlarged partial fragmentary detail front end view of the gathering and cutting mechanism.

The novel gathering and loading element form-

ing the subject matter of my invention is shown herein as applied to a loading machine, similar to that shown in a prior application, Serial No. 472,701, filed by Frank Cartlidge on August 2, 1930, and the main elements of said loading machine will only herein be described insofar as is necessary to clearly illustrate my present invention. In the form shown, the loading machine consists of a wheeled truck, or main frame 10, having a gathering and loading element 11 carried at the forward end thereof. Said gathering and loading element is supported on said main frame or truck for pivotal movement with respect thereto about a vertical axis and for vertical adjustment with respect thereto about a horizontal axis disposed above and rearwardly of the forward end of a discharge conveyor 12. Said discharge conveyor is adjustably supported on said main frame for receiving material picked up by said gathering and loading element and discharging said material into mine cars or the like.

The gathering and loading element 11 includes a frame 13 having its major portion inclined and having a forward end portion 14, which is adapted to engage the ground, said frame and said forward end forming a supporting and guiding means for suitable gathering and conveying mechanism which will hereinafter be more fully described. Said frame is curved forwardly toward its forward end portion so as to engage the ground in a horizontal plane during the normal loading operation, and a bottom plate 14a of said forward end is adapted to form a shoe upon which said gathering and loading element may slide and be moved into and across the working place. Said frame is mounted adjacent its rearward end on trunnion supports 15, 15. Said trunnion supports are herein shown as being formed integral with and extending upwardly from a horizontally swinging frame 16 which is pivoted on a boss 17 extending upwardly from said main frame 10.

The drive mechanism for pivotally moving said swinging frame across the front of said truck or main frame; for moving said machine along the track; for elevating said gathering and loading element; and for driving said gathering and loading element, is similar to the mechanism disclosed in the Cartlidge application before referred to, and is illustrated in Figures 3 and 5. A motor 18 of an ordinary construction is mounted on the main frame 10 adjacent the rearward end thereof. A motor pinion 19 is keyed on the shaft of said motor and drives a longitudinal shaft 20. A change speed reversible truck drive, generally

indicated by reference character 21, is driven from said longitudinal shaft.

The swinging and elevating mechanism is driven by said first-mentioned shaft through a longitudinal shaft 22 in alignment therewith, by means of a bevel gear train generally indicated by reference character 23. A bevel gear 24, coaxial with the axis of pivotal movement of the swinging frame 16, is driven by said last-mentioned longitudinal shaft and drives a shaft 25 carried by said swinging frame. A horizontal shaft 26 is disposed perpendicularly to the shaft 25 and is journaled in said swinging frame and driven by said shaft 25 by means of a bevel gear train, generally indicated by reference character 27. Bevel gears 28, 28 are arranged coaxially with the shaft 26 and may be selectively connected thereto by means of suitable friction clutches for reversely driving a horizontal shaft 29 under the control of friction. Said shaft 29 is journaled in said swinging frame and has a worm 30 thereon which meshes with and drives a worm gear 31 on a vertical shaft 32. A pinion 33 is secured to the lower end of said vertical shaft and meshes with an arcuate rack 34 formed on the forward end of said main frame for reversely swinging said gathering and loading element in a horizontal plane at a feeding speed.

Said gathering and loading element may be elevated about the axis of the trunnion supports 15, 15 by means of suitable screw devices, indicated by reference character 35, and interposed between said swinging frame 16 and said inclined frame 13. A power drive for said screw devices is effected from the shaft 26 through a suitable gear train, generally indicated by reference character 36, and not described in detail since it is clearly shown and described in the aforementioned Cartledge application.

Referring now in particular to several of the novel features of my invention and the details of the gathering and loading element 11, an inclined conveyor 37 extends along the upper rear-end portion of the frame 13. Said inclined conveyor may be of any form, but is herein shown as being a flight conveyor and consists of a pair of laterally spaced endless chains 39, 39 having flights 40, 40 spaced therebetween. Said endless chains are driven from sprockets 41, 41 carried on a shaft 42, arranged coaxially with the trunnion supports 15, 15, through a suitable friction clutch and chain and sprocket drive, generally indicated by reference character 43. Said flight conveyor is trained around said sprockets and extends forwardly therefrom along the under portion of said inclined frame to and around suitable sprockets on a shaft 44, extending transversely of said inclined frame, and from thence upwardly along the upper surface of a pan 45.

The gathering mechanism and means for breaking down or cutting through tightly wedged or unsevered material includes a cutter chain 47 provided with bits 47a, so guided that it may cut adjacent the mine bottom when the shoe 14a engages the ground. Said cutter chain is guided in suitable gibbed guides, indicated by reference character 48, for orbital movement in an elongated path along the lower end of the frame 13 in a plane parallel to the inclined and flattened portions thereof. Said guide means for said cutter chain is of an ordinary gibbed construction similar to that used for guiding mining machine cutter chains, so will not herein be described in detail (see Figures 3 and 4).

Said guide means extends from the forward

end of the horizontal portion 14 and rearwardly along the inclined portion of said frame to a point disposed forwardly of the forward end of the inclined conveyor 37. A portion of the forward end and the advance side of the upper surface of the shoe 14a forms a portion of the lower guides for said cutter chain. From the rearward end of said shoe said guides extend along a pan 53 which, in the form shown, is a continuation of said shoe. Said pan diverges downwardly from said cutter chain adjacent the rearward end thereof and conforms substantially to the form of the conveyor 37 as it rounds the sprockets on the shaft 44, so that material carried upwardly along said pan may be discharged into the path of said conveyor.

Said cutter chain, as herein shown, is of a well-known type having ball and socket connections between the links, so it may travel in a curved upward path, and is constructed relatively thin in order that its vertical dimensions may be kept to a minimum. The links 47 of said chain have their upper faces 48a inclined toward the ground and are overlapped adjacent the forward end and advance side of said gathering and loading element by an inclined lip 49 of an apron 50, as shown in Figure 4, so that the cutter bits 47a extend beyond said apron. In the form shown, said apron extends from the advance side of said gathering and loading element over and rearwardly along said cutter chain beyond the rearward extremities thereof and has a gathering chain 51 mounted thereon. Said gathering chain is provided with a plurality of suitable gathering arms 52, 52 and is disposed in a plane immediately above said cutter chain and spaced with respect thereto in such a manner that the cutter chain bits extend in advance of the outer ends of said gathering arms 52. The arrangement is such that material is initially engaged by the bits 47a of said cutter chain as said gathering and loading element moves into and across the working place. The inclined lip 49 extends across the entire forward end of said gathering and loading element, and said lip and apron 50 form a surface along which material may move into the path of said gathering chain as the entire gathering and loading element is advanced into the loose material.

While the cutter chain 47 is herein shown as extending in advance of the outer ends of said gathering arms on one side of the gathering and loading element only, it should be understood that said cutter chain may be so arranged as to extend to both sides of said gathering and loading element if desired. Such an arrangement is particularly desirable in loading by swinging said gathering and loading element in reverse directions across the front of the track, it being understood that with such an arrangement reverse mechanism must be provided in the drive for said gathering and cutter chains in order that the conveyor 37 may be driven in the proper direction when the direction of movement of said cutter and gathering chains is reversed.

The gathering chain 51 is also of the type wherein the links are connected together by ball and socket connections to permit movement of said gathering chain in an upwardly curved path. Said gathering chain, as herein shown, is guided in suitable gibbed guides 55 formed in a guide bar 56 secured to the upper surface of the apron 50. Said guide bar is of a usual endwise adjustable construction well known to those skilled in the art so will not herein be described in detail.

The inclined portion of the frame 13 is provided at its forward end with upright side walls 54, 54 enclosing the outer ends of the gathering arms 52 at both sides of said frame, which converge into outwardly flared side walls 54a. Said flared side walls are curved inwardly adjacent their rearward ends and converge into the outwardly flared sides of said frame. The side walls 54 and 54a are of a hopper-like formation for confining the material gathered in the path of said gathering chain. A wall 54b is provided between the top surface of the pan 53 and the undersurface of the apron 50. Said wall is arranged to conform substantially to the path of the cutter chain bits 47a to confine slack material in the path of said cutter chain to permit said cutter chain to be used for both cutting and gathering purposes.

It may thus be seen that the arrangement is such that during loading along the mine bottom, said gathering and loading element may be advanced across the face of the coal by feeding movement about its axis of pivotal connection with the main frame or truck 10. As it is advanced into the coal and an obstruction is met, the cutter chain 47, arranged in advance of the gathering chain 51 may cut through this obstruction or break it up so that it may be gathered by said gathering chain. As the cutting proceeds, material is forced upwardly along the inclined lip 49 of the apron 50 into the path of the gathering arms 52.

The drive from said inclined conveyor 37 to said gathering and cutter chains includes a chain and sprocket drive, generally indicated by reference character 57, which drives a transversely extending shaft 58 from the shaft 44. A bevel gear 59 is mounted on said transversely extending shaft and meshes with and drives a bevel gear 60 on a shaft 61 disposed perpendicularly to the cutter bar 56 and extending upwardly beyond the upper end thereof. A sprocket 62, journaled on its hub in said cutter bar, is freely mounted on the shaft 61 for driving the cutter chain 47. Said sprocket is selectively driven from said shaft 61 by means of a suitable friction clutch, herein shown as being a cone clutch including a clutch collar 63 having a frusto conical engaging surface which is adapted to engage a corresponding surface formed in said sprocket. Said clutch collar may be shifted by a suitable system of links and levers in a usual manner.

A sprocket 65 is secured to the upper end of the shaft 61 and forms a means for driving a parallel shaft 66 through a drive chain 67 and driven sprocket 68. Said last-named sprocket is secured to the upper end of said parallel shaft, which shaft is journaled adjacent the upper and lower ends of the cutter bar 56. A drive sprocket 69 is journaled on said shaft and meshes with and drives said gathering chain 51.

Thus, the cutter chain 47 may be operated at will, and if desired, may be operated only when it is desired to dislodge hanging coal or cut through tight places. It should be understood that when dislodging hanging coal, the cutter bar may be elevated for operation above the mine bottom by means of the adjusting screws 35. It should also be noted that the operation of said gathering chain 51 is continuous so that material may be continually loaded and cleared from the path of said gathering and loading element during the cutting operation. Such an arrangement speeds up the cutting and loading operation in that loose material may be cleared from said

gathering and loading element, and in that any material which may be broken down from the roof or the mine wall may readily be gathered by said gathering chain.

It will be seen from the foregoing that a new and improved loading apparatus has been provided, which includes a new and improved loading head, having a cutting mechanism associated therewith for stirring up loose material and cutting through or breaking down tight material, or material which has not been broken down during the shooting operation; that the gathering mechanism is continually in operation during the cutting operation; that gathering and cutting may be effected along the mine bottom by movement of the truck along the track and by feeding movement of the gathering and loading element across the front of the track; that the gathering and loading element may be elevated for loading or breaking down material above the ground; and that the arrangement is such that a minimum amount of vertical space is taken up by the cutter bar and cutter chain, so that said gathering and loading element may readily be moved in the loose material to be gathered and said loose material may be engaged by the gathering arms for loading either while said gathering chain is in or out of operation.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction and arrangement of the various parts may be changed or altered without departing from the spirit or scope thereof. Furthermore, I do not wish to be construed as limiting myself to the precise construction illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a loading apparatus, a gathering and loading element including an orbitally moving gathering chain having gathering arms thereon, and a cutter chain disposed beneath said gathering chain, said cutter chain being closely adjacent the under portion of said gathering chain and having an inclined lip overlapping a major portion thereof so that material may be moved upwardly along said lip upon movement of said gathering and loading element into the material to be gathered.

2. In a loading apparatus, a gathering and loading element including an inclined frame having a relatively horizontal forward end adapted to engage and slide along the ground and mounted for adjustment about a horizontal axis disposed adjacent its rearward end and for swinging movement about a vertical axis, a gathering chain movable along said frame in a closed orbital path in a plane substantially parallel with the ground when the forward end of said frame is in engagement with the ground, and a cutter chain disposed beneath and in advance of said gathering chain for movement in planes parallel to the planes of movement of said gathering chain and arranged for cutting along the ground or at various elevations with respect thereto upon swinging movement of said frame about said vertical axis.

3. In a loading apparatus, a gathering and loading element including an inclined frame having a relatively horizontal forward end adapted to engage and slide along the ground mounted for adjustment about a horizontal axis disposed adjacent its rearward end and for swinging movement about a vertical axis, a gathering chain movable along said inclined frame in a closed orbital path in an inclined plane and in a plane

substantially parallel with the ground when the forward end of said frame is in engagement with the ground, and a cutter chain disposed beneath and in advance of said gathering chain and movable in planes parallel to the planes of movement of said gathering chain for cutting along the ground or at various elevations with respect thereto upon adjustment of said frame about said horizontal axis, said cutter chain being closely adjacent the under portion of said gathering chain and arranged so as to provide a clear path for the progress of material along the ground into the path of said gathering chain.

4. In a loading apparatus, a gathering and loading element including a frame having a forward end adapted to engage and slide along the ground and mounted for adjustment about a horizontal axis disposed adjacent its rearward end, a gathering chain movable in a closed orbital path in a plane substantially parallel with the ground when the forward end of said frame is in engagement with the ground, and a cutter chain disposed beneath and in advance of said gathering chain for cutting along the ground or at various elevations with respect thereto upon adjustment of said inclined frame about said horizontal axis, said cutter chain being closely adjacent the under portion of said gathering chain and having an inclined lip overlapping a major portion thereof so that material may move over said cutter chain and upwardly along said lip into the path of said gathering chain upon feeding movement of said gathering and loading element.

5. In a loading apparatus of the class described, a main frame and an inclined gathering and loading element extending forwardly therefrom having a relatively horizontal forward end adapted to engage and slide along the ground, said gathering and loading element including an endless gathering chain moving in an inclined plane and in a plane which may be substantially parallel to the mine bottom, and a cutter chain disposed beneath said endless gathering chain movable in planes parallel to the planes of movement of said gathering chain and arranged in advance of said gathering chain.

6. In a loading apparatus of the class described, a main frame and a gathering and loading element extending forwardly therefrom having a forward end adapted to engage and slide along the ground, said gathering and loading element including an inclined conveyor, a gathering chain extending forwardly therefrom and moving in an orbit parallel to the ground and inclined upwardly therefrom to said conveyor, for gathering and elevating material onto said conveyor, and a cutter chain in advance of and beneath said gathering chain moving in planes parallel to the planes of movement of said gathering chain, arranged and adapted to cut adjacent the mine bottom.

7. In a loading apparatus of the class described, a main frame, and a gathering and loading element extending forwardly therefrom having a forward end adapted to engage and slide along the mine bottom, said gathering and loading element including an inclined conveyor, a cutter chain disposed forwardly of said inclined conveyor, and a gathering element disposed above said cutter chain for moving material onto said inclined conveyor.

8. In a loading apparatus of the class described, a main frame, and a gathering and loading element extending forwardly therefrom having a forward end adapted to engage and slide along the mine bottom, said gathering and loading ele-

ment including an inclined conveyor, a cutter chain disposed forwardly of said inclined conveyor, an apron overlapping said cutter chain and extending over the top portion thereof, and an orbitally movable gathering element on said apron for moving material onto said inclined conveyor.

9. In a loading apparatus of the class described, a main frame, and a gathering and loading element extending forwardly therefrom having a forward end adapted to engage and slide along the mine bottom, said gathering and loading element including an inclined conveyor, a cutter chain disposed forwardly of said inclined conveyor for cutting adjacent the mine bottom, an apron disposed above said cutter chain having an advance inclined lip extending downwardly over a portion of said cutter chain, and an endless gathering chain movable along said apron for depositing material onto said inclined conveyor.

10. In a loading apparatus of the class described, a main frame, and a gathering and loading element extending forwardly therefrom having a forward end adapted to engage and slide along the mine bottom, said gathering and loading element including an inclined conveyor extending forwardly of said main frame, a cutter chain having bits therein extending forwardly therefrom, an apron having a horizontal forward portion which converges into an inclined rearward portion substantially conforming to the angle of inclination of said inclined conveyor, said apron being disposed above said cutter chain in close proximity thereto and having an advance inclined lip extending downwardly over said cutter chain to the bits thereof, and an endless gathering chain movable along said apron for depositing material onto said inclined conveyor.

11. In a loading machine, an inclined track mounted main frame, a motor thereon, a gathering and loading element mounted on said main frame for pivotal movement with respect thereto about a vertical axis, means driven by said motor for swinging said gathering and loading element about said vertical axis at a feeding speed, said gathering and loading element including an inclined frame extending forwardly of said main frame and having a forward end adapted to be positioned parallel with and slide along the mine bottom, an endless chain having gathering arms thereon movable upwardly along said frame and adapted to gather material upon swinging movement of said frame, and a cutter chain movable in planes parallel to the planes of movement of said gathering arms and disposed beneath said gathering arms and in advance thereof.

12. In a loading machine, a track mounted main frame, a motor thereon, a gathering and loading element mounted on said main frame for pivotal movement with respect thereto about a vertical axis, means driven by said motor for swinging said gathering and loading element about said vertical axis at a feeding speed, said gathering and loading element including a frame extending forwardly of said main frame and having a forward end adapted to slide along the mine bottom, a conveyor on said frame, an apron extending forwardly of said conveyor having a forward end substantially parallel with the ground when the forward end of said frame is in engagement with the ground, an endless gathering chain movable along said apron, said

chain being adapted to gather material upon swinging movement of said frame and deposit said material onto said inclined conveyor, and a cutter chain disposed beneath said apron in advance of said gathering chain.

13. In a loading machine, a track mounted main frame, a gathering and loading element mounted on said main frame for pivotal movement with respect thereto about a vertical axis, a discharge conveyor disposed beneath the discharge end of said gathering and loading element, said gathering and loading element including a frame extending forwardly of said main frame and having a forward end adapted to slide along the mine bottom, an endless chain having gathering arms thereon movable upwardly along said inclined frame and adapted to gather material for discharge into said discharge conveyor, and a cutter chain disposed beneath said gathering chain in advance thereof and movable in a plane substantially parallel to the plane of movement of said endless chain for cutting along the ground.

14. In a loading machine, a track mounted main frame, a gathering and loading element mounted on said main frame for pivotal movement with respect thereto about a vertical axis, a discharge conveyor disposed beneath the discharge end of said gathering and loading element, said gathering and loading element including an inclined conveyor extending forwardly of said main frame, an apron extending forwardly therefrom having a forward portion extending substantially parallel to the ground during the loading operation, a gathering arm carrying endless chain on the upper surface of said apron and a cutter chain movable along the under surface of said apron and disposed in advance of said endless chain.

15. In a loading machine, a track mounted main frame, a motor thereon, a gathering and loading element mounted on said main frame for pivotal movement with respect thereto about horizontal and vertical axes for feeding said gathering and loading element into the material to be gathered and elevating said gathering and loading element for operation above the ground including an inclined conveyor, a gathering arm carrying endless chain disposed forwardly of said inclined conveyor, a cutter chain disposed beneath said gathering chain moving in a plane substantially parallel to the plane of said gathering chain, means driven by said motor for swinging said gathering and loading element about said vertical axis at a feeding speed, means driven by said motor for elevating said gathering and loading element, other means driven by said motor for driving said inclined conveyor, and a drive connection from said inclined conveyor to said gathering and cutter chains.

16. In a loading apparatus, a main frame comprising a track mounted truck, an inclined gathering and loading element mounted thereon for swinging movement across the forward end thereof and for vertical adjustment about a horizontal axis, said gathering and loading element including a frame having an inclined forward end parallel to and adapted to engage and slide along the ground, a cutter chain on the advance side of said frame extending therealong, and adapted to cut adjacent the mine bottom or at various elevations with respect thereto by movement of said gathering and loading element across the front of the track, and an inclined conveyor carried by said frame and disposed

rearwardly of said cutter chain for receiving material discharged by said cutter chain.

17. In a loading apparatus, a main frame comprising a track mounted truck, a gathering and loading element mounted thereon for swinging movement across the forward end thereof and vertical movement about a horizontal axis, said gathering and loading element including a frame having a forward end adapted to engage and slide along the ground, an orbitally movable endless chain having gathering arms thereon, said endless chain traveling in an inclined plane rearwardly of the ground engaging portion of said gathering and loading element which curves into a plane substantially parallel to the ground adjacent the forward end of said gathering and loading element when the forward end of said frame is in engagement with the ground, and being adapted to load by movement of said truck along the track and swinging movement of said gathering and loading element across the front of the track, a discharge conveyor disposed beneath the rearward end of said frame, and a conveyor carried by said inclined frame and extending rearwardly from said gathering arm carrying endless chain for receiving the material gathered thereby and depositing said material onto said discharge conveyor.

18. In a loading apparatus, a main frame comprising a track mounted truck, a gathering and loading element mounted thereon for swinging movement across the forward end thereof and for vertical adjustment about a horizontal axis, said gathering and loading element including a frame having a forward end adapted to engage and slide along the ground, an orbitally movable endless chain having gathering arms thereon, said endless chain traveling in an inclined plane rearwardly of the ground engaging portion of said gathering and loading element and in a plane substantially parallel to the ground adjacent the forward end of said gathering and loading element when the forward end of said inclined frame is in engagement with the ground, and being adapted to load by movement of said truck along the track and swinging movement of said gathering and loading element across the front of the track, and a cutter chain disposed beneath and in advance of said gathering chain and traveling in a plane substantially parallel to the plane of said gathering chain for cutting adjacent the mine bottom or at various elevations with respect thereto.

19. In a loading apparatus, a main frame comprising a track mounted truck, a gathering and loading element mounted thereon for swinging movement across the forward end thereof and for vertical adjustment about a horizontal axis, said gathering and loading element including an inclined frame having a forward end adapted to engage and slide along the mine bottom, an orbitally movable endless chain having gathering arms thereon, said endless chain traveling in an inclined plane rearwardly of the ground engaging portion of said gathering and loading element and in a plane substantially parallel to the ground adjacent the forward end of said gathering and loading element when the forward end of said inclined frame is in engagement with the ground, and being adapted to load by movement of said truck along the track and swinging movement of said gathering and loading element across the front of the track, a discharge conveyor disposed beneath the rearward end of said inclined frame, and a cutter chain disposed be-

neath and in advance of said gathering chain and traveling in a plane parallel to the plane of said gathering chain for cutting adjacent the mine bottom or at various elevations with respect thereto.

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20. In a loading apparatus, a gathering and loading element including a frame having a forward end adapted to engage and slide along the ground, said frame being mounted for adjustment about a horizontal transverse axis disposed adjacent its rearward end and for swinging feeding movement about a vertical axis, a gathering chain having gathering flights extending laterally therefrom guided for movement along said frame for gathering material from the ground in advance of said frame, and a cutter chain disposed beneath and in advance of said gathering chain, said cutter chain being arranged closely adjacent the under portion of said gathering chain for cutting in advance of and providing a clear path for the progress of material on the ground into the path of said gathering chain as said frame is moved along the ground.

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21. In a loading apparatus, a gathering and loading element including a frame having a forward end adapted to engage and slide along the ground, said frame being mounted for adjustment about a horizontal transverse axis disposed adjacent its rearward end and for swinging feeding movement about a vertical axis, a gathering chain having gathering flights extending laterally therefrom guided for movement along said frame for gathering material from the ground in advance of said frame, a cutter chain disposed beneath and in advance of said gathering chain

and movable in a plane parallel to the ground when said frame is in engagement with the ground and an apron disposed beneath said gathering chain and above said cutter chain forming a way along which material may be moved by said gathering chain, said apron being so arranged with respect to said cutter chain as to provide a clear path for the progress of material on the ground over said apron into the path of said gathering chain as said frame is moved along the ground.

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22. In a loading apparatus, a gathering and loading element including a frame having a forward end adapted to engage and slide along the ground, said frame being mounted for adjustment about a horizontal transverse axis disposed adjacent its rearward end and for swinging feeding movement about a vertical axis, a gathering chain having gathering flights extending laterally therefrom guided for movement along said frame for gathering material from the ground in advance of said frame, a cutter chain disposed beneath and in advance of said gathering chain and movable in a plane parallel to the ground when said frame is in engagement with the ground, and an apron interposed between said gathering chain and cutter chain and forming a way along which material may be moved by said gathering chain, said apron having an inclined lip overlapping a major portion of said cutter chain so that material may be moved over said cutter chain and upwardly along said lip upon feeding movement of said frame.

LOYAL F. CRAWFORD. 35

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CERTIFICATE OF CORRECTION.

Patent No. 2,047,618.

July 14, 1936.

LOYAL F. CRAWFORD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 41, claim 11, for the words "an inclined" read a; and line 42, same claim, for "a" second occurrence, read an inclined; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 13th day of October, A. D. 1936.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.