

April 11, 1933.

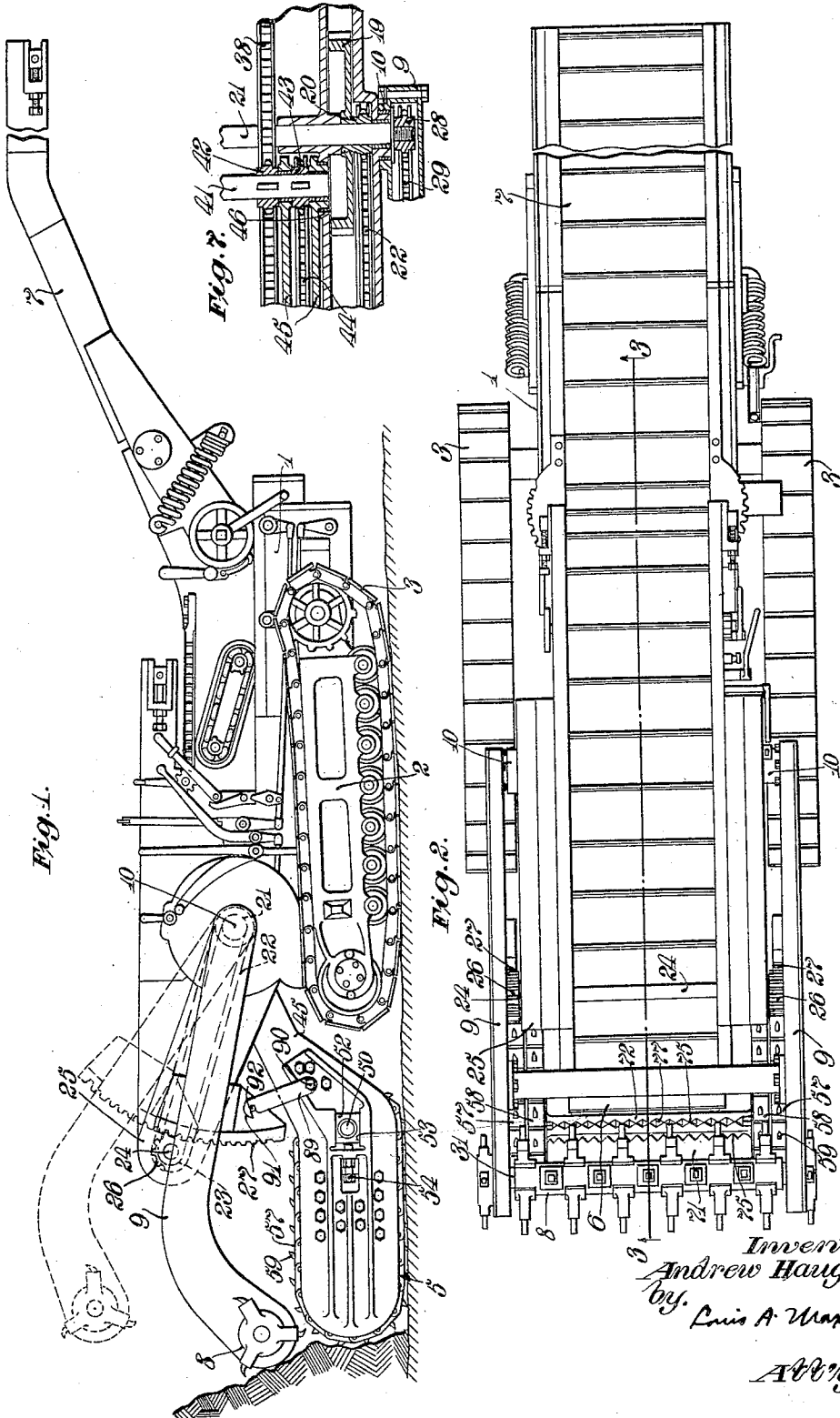
A. HAUGE

1,903,673

LOADING MACHINE

Filed July 9, 1929

3 Sheets-Sheet 1



Inventor:
Andrew Hauge.
by. Luis A. Maxson.
Atty.

April 11, 1933.

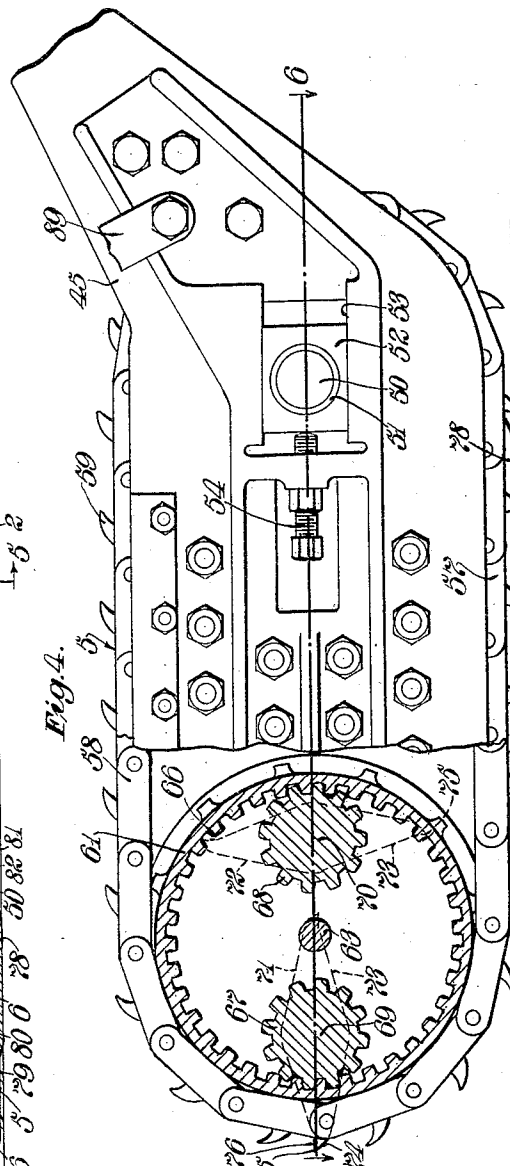
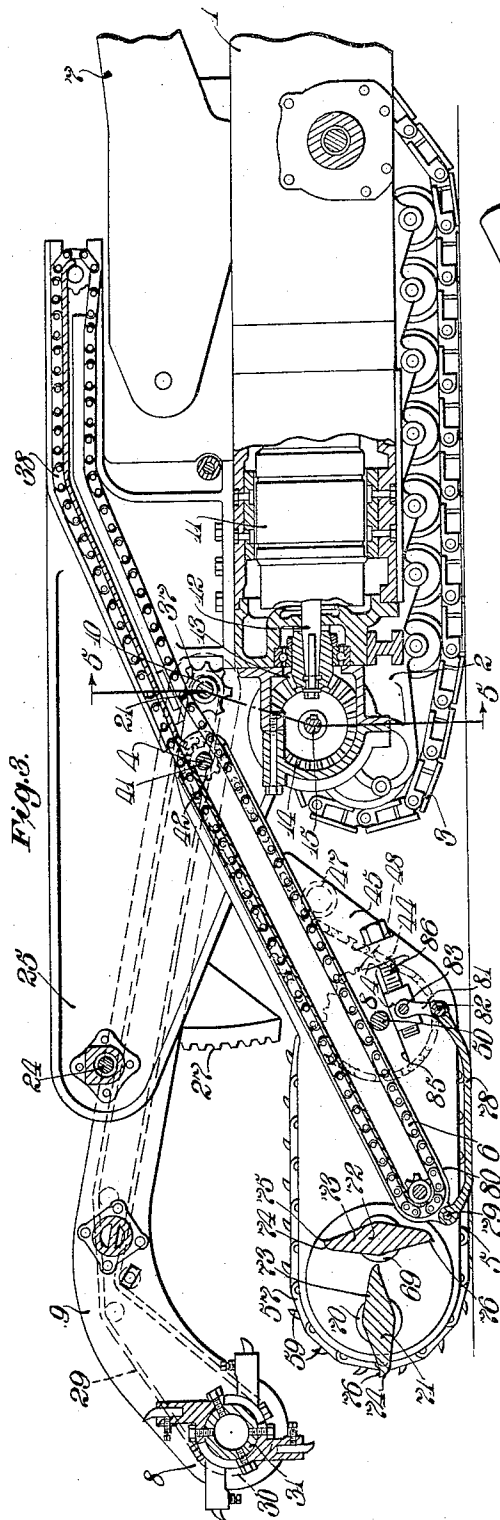
A. HAUGE

1,903,673

LOADING MACHINE

Filed July 9, 1929

3 Sheets-Sheet 2



Inventor:
Andrew Hauge.
by Louis A. Maxson.

Att'y.

April 11, 1933.

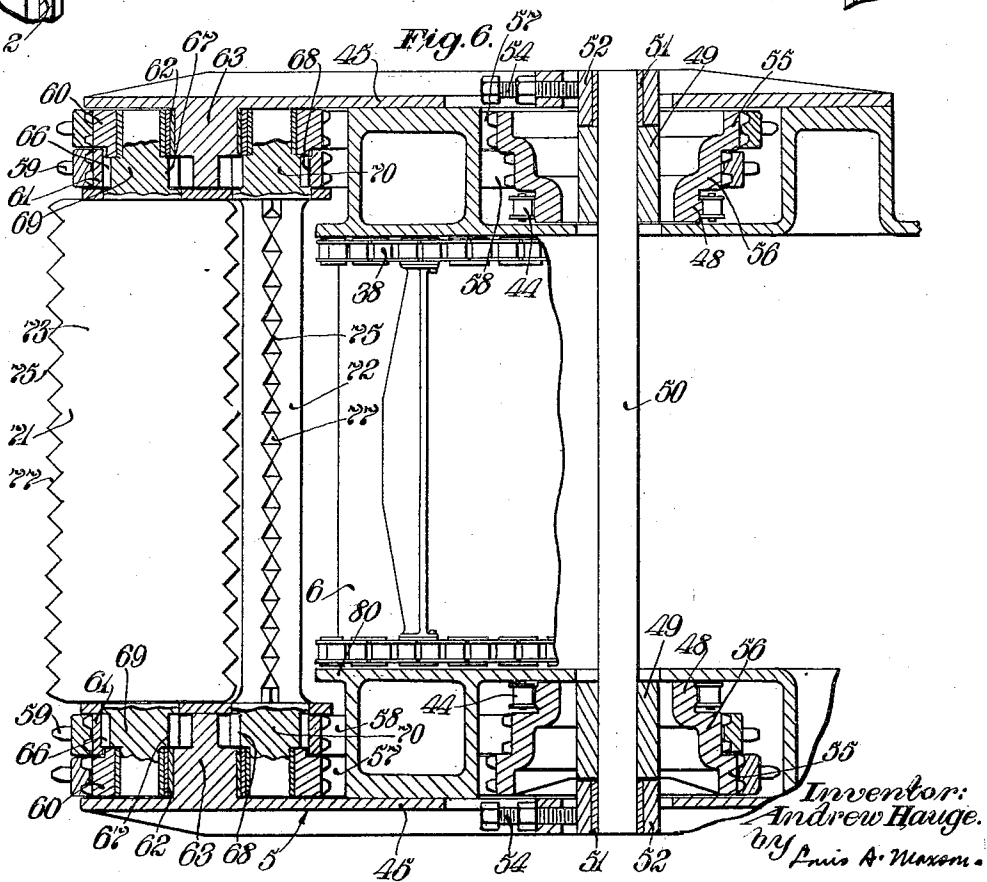
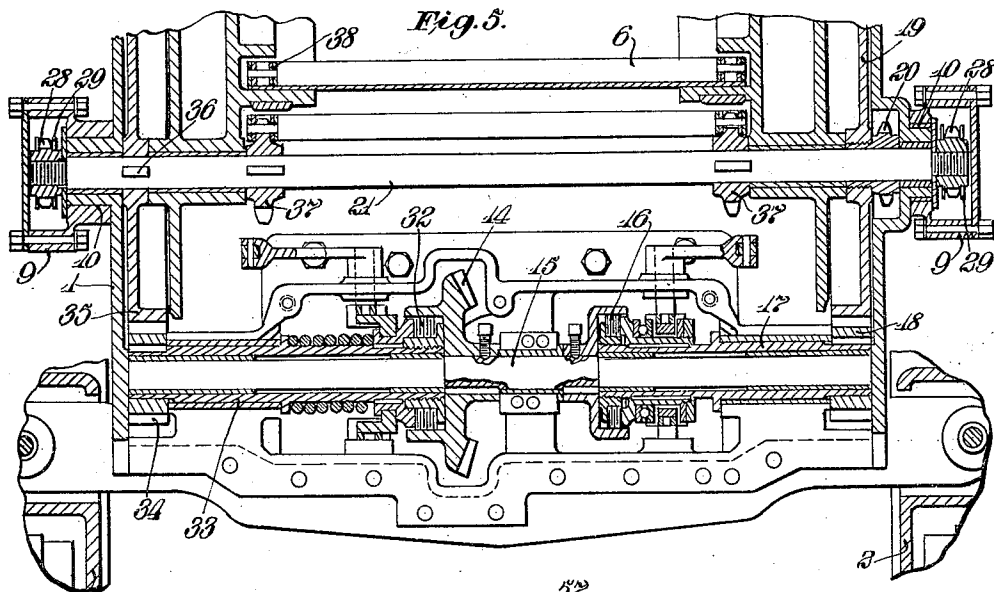
A. HAUGE

1,903,673

LOADING MACHINE

Filed July 9, 1929

3 Sheets-Sheet 3



Inventor:
Andrew Hauge.
by Louis A. Maxson.

Atty.

UNITED STATES PATENT OFFICE

ANDREW HAUGE, OF MICHIGAN CITY, INDIANA, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS

LOADING MACHINE

Application filed July 9, 1929. Serial No. 376,948.

This invention relates to loading machines and more particularly pertains to gathering mechanism for such machines.

An object of this invention is to provide an improved loading machine. Another object is to provide an improved loading machine having an improved gathering mechanism. Another object is to provide in a machine of the aforesaid character improved gathering mechanism including a gathering device adapted to elevate the material to be loaded and move the same onto the conveyor mechanism of the machine. Still another object is to provide an improved gathering mechanism of the above type having associated therewith a co-acting raking and digging device adapted to dislodge the material to be loaded and move the same toward said gathering device whereby the material may be loaded in an improved and more effective manner. Yet another object of this invention is to provide an improved gathering mechanism for a loading machine wherein a plurality of revolving shovel-like blades or paddles are utilized for moving the material onto the conveyor mechanism of the machine. A still further object of this invention is to provide an improved gathering mechanism of the plural blade or paddle type having improved actuating means therefor whereby the paddles are moved about their own axes, as well as orbitally to thereby penetrate and elevate the material to be loaded and move the same rearwardly onto the conveyor mechanism of the machine. These and other objects and advantages of this invention will, however, subsequently more fully appear.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevational view of a loading machine having the improved gathering mechanism incorporated therewith, the raking and digging device being shown in a plurality of positions.

Fig. 2 is a plan view of the loading machine shown in Fig. 1.

Fig. 3 is a central longitudinally extending, vertical sectional view taken substan-

tially on line 3—3 of Fig. 2, parts being omitted to facilitate illustration.

Fig. 4 is an enlarged detail sectional view partially shown in elevation, illustrating a portion of the improved gathering mechanism.

Fig. 5 is a transverse vertical sectional view taken substantially on line 5—5 of Fig. 3.

Fig. 6 is a detail horizontal sectional view taken substantially on line 6—6 of Fig. 4 with parts omitted.

Fig. 7 is a fragmentary sectional view through the pivotal mountings for the arms supporting the roller and the gathering device, and illustrating the driving connections for the gathering device.

In this illustrative construction the improved gathering mechanism is shown incorporated with a loading machine of the same general type as that described in a copending application of one Frank A. Hallock, Serial No. 160,486, filed Jan. 11, 1927, and generally comprising a main frame 1 mounted on the tractor base 2 having endless traction treads 3 for propelling the machine. Pivotaly mounted on the main frame 1 at 4 is the improved gathering device generally designated 5 which is adapted to elevate and move the material to be loaded onto the front elevating conveyor 6 as hereinafter described. The front elevating conveyor discharges onto a rear discharge conveyor 7 adjustably mounted on the rear end of the main frame 1. Coacting with the improved gathering device 5 is a rotary raking and digging device 8, herein a toothed roller, arranged transversely of the machine above the gathering device 5 and supported for vertical adjustment by parallel arms 9 pivotaly connected at 10 at their rear ends on the sides of the frame of the machine as clearly shown in Fig. 7. This rotary gathering device is adapted to rake down the material to be loaded and move the same into adjacency with the gathering device 5, which in turn moves the material onto the front elevating conveyor 6.

Now referring to the mechanism for actuating the rotary raking and digging de-

vice 8 and for vertically adjusting this gathering device, it will be noted that disposed within the main frame 1 is a motor 11, which may be of any suitable type, having its power shaft 12 horizontally disposed and extending longitudinally of the machine. As clearly shown in Fig. 3, the motor shaft 12 has rigidly fixed thereto a bevel pinion 13 which meshes with a bevel gear 14 (see also Fig. 5) rigidly fixed to a horizontal shaft 15. This shaft is suitably journaled within the main frame and is arranged transversely thereof. Referring more particularly to the mechanism for rotating the rotary raking and digging device 8, it will be observed that the shaft 15 is connectable by a friction clutch 16 of a usual design to a hollow shaft 17 arranged coaxially with the shaft 15 and similarly journaled within the machine frame. This hollow shaft has fixed thereto a spur pinion 18 meshing with a large spur gear 19 rigidly secured to the hub of a drive sprocket 20. As illustrated, this drive sprocket is journaled on a horizontal transversely extending shaft 21 having its axis aligned with the pivotal axis of the support arms 9 for the device 8 and arranged parallel with and above the shaft 15 and similarly journaled within the machine frame. This drive sprocket 20 is connected by an endless chain connection 22 to a chain sprocket 23 fixed to a horizontal transversely extending shaft 24 suitably rotatably supported within forwardly projecting side frames 25. Suitably rigidly fixed to the opposite ends of this shaft 24 are spur pinions 26 meshing with arcuate racks or gear segments 27, respectively, suitably rigidly secured to the supporting arms 9 for the device 8. It will thus be seen that when the clutch 16 is applied the drive pinions 26 may be rotated by the motor 11 to effect vertical adjustment of the device 8. The actuating means of the device 8 comprises chain sprockets 28 rigidly fixed to the opposite ends of the shaft 21 and these drive sprockets are connected by endless chain connections 29 housed within the supporting arms 9 with sprockets 30 suitably rigidly fixed to the driving shaft 31 of the device 8. Connectible by a friction clutch 32 of a usual design to the shaft 15 is a hollow shaft 33 suitably journaled within the machine frame. This shaft has fixed thereto a spur pinion 34 meshing with a spur gear 35 keyed at 36 to the shaft 21. It will be evident that the rotary raking and digging device 8 may be connected to the motor at will simply by applying friction clutch 32, it being possible to vertically adjust the roller at will during such rotation simply by applying the friction clutch 16. Also secured to the shaft 21 are chain sprockets 37 engaging and driving the endless side chains 38 of the front conveyor 6. It will be thus seen that when the device 8 is ro-

tated the front elevating conveyor is simultaneously driven under the control of the friction clutch 32.

The improved gathering device 5 and the driving mechanism therefor will now be described. Referring to Figs. 3 and 7, it will be observed that a horizontal transversely extending shaft 41, suitably journaled within the machine frame, is arranged in axial alignment with the pivotal axis 4 about which the gathering device 5 is vertically adjustable. Rigidly secured to this shaft 41 are chain sprockets 42 which are engaged and driven by the endless front conveyor as shown in Figs. 3 and 7. Also fixed to the shaft 41 are sprockets 43 which engage and drive endless chain connections 44 housed within supporting arms 45 for the gathering device 5, these arms being pivotally mounted at 46 on the machine frame. Suitable adjustable sprockets 47 carried by supporting arms 45 are employed for adjusting the tension of the chains 44. Therefore whenever the front conveyor is driven the chains 44 are simultaneously driven. These chains 44 engage and drive sprockets 48 formed integral with a rotatable hub 49 journaled on a horizontal transversely extending shaft 50 journaled in bearings 51 supported by the arms 45 as clearly shown in Fig. 6. The bearings 51 for the ends of the shaft 50 are supported by slidable blocks 52 mounted in guideways 53 formed on the arms 45. Engaging these blocks and threadedly connected to the arms are set screws 54. Also formed integral with each of the hubs 49 are differential sprockets 55 and 56 driving endless chain connections 57 and 58, respectively, supported by the arms 45. Upon adjustment of the set screws 54 the blocks 52 may be slid in their guideways to move the sprockets forward or rearward to adjust the tension of the chains 57 and 58. It will be noted that the endless chains 57 and 58 are provided with cutter teeth 59 to enable these chains to cut a path in the material for the arms 45. These chains engage and drive relatively rotatable sprockets 60 and 61, respectively. The sprockets 60 are each journaled on bearing sleeves 62 supported by inwardly projecting stub shafts 63 herein formed integral with the arms 45. Formed integral with each of the sprockets 61 is an internal gear 66. Meshing with each internal gear 66 are planetary gears 67 and 68, herein formed integral with horizontal transversely extending parallel shafts 69 and 70, respectively. These shafts are suitably journaled within the sprockets 60 as shown in Fig. 6. Formed integral with shafts 69 and 70 are shovel-like blades or paddles 71 and 72. Each of these paddles or shovels is provided with oppositely extending portions 73 having curved surfaces 74 terminating in a penetrating edge 75 and a concave surface 76 extending away from each penetrating

edge. The diametrically opposite penetrating edges of the blades or paddles are provided with teeth or serrations 77 and the paddles are so geared together that they will always be substantially at right angles to each other. In this instance the ratio of the sprockets 56 to 55 may be 5 to 6, causing sprocket 61 to rotate five-sixths as fast as sprocket 60, while the pitch diameter of the gears 67 and 68 is one-third of the pitch diameter of the internal gear 66. With this arrangement the sprocket 61 loses one-sixth of a revolution for each complete revolution of sprocket 60, which means that the gears 67 and 68 will be rotated by the sprocket 60 but one-half of a revolution for each full revolution of sprocket 60.

This will be readily understood when it is borne in mind that if 60 and 61 rotated at the same angular rates the members 71 and 72 would each make one complete turn during each full revolution of 60 and 61. Since 61 lags one-sixth of a revolution during each revolution of 60, gear 61 will cause the pinions 67 and 68 each to turn backwards (having in mind that the pitch diameter ratio of 60 to 67 and 68 is 3 to 1) $\frac{1}{6} \times \frac{3}{1}$ or $\frac{1}{2}$ a revolution. Thus the forward rate of revolution of the paddles will be $1\frac{1}{2}$, or one-half a revolution for each revolution of 60. Thus the digging edges of the paddles will move in a non-circular path. Each paddle has a longitudinal motion, an upward motion and a rearward motion. It will thus be evident that by this motion of the paddles 71 and 72 a scooping or penetrating, elevating, and discharging action is obtained, thereby facilitating the penetrating, elevating and discharging of the material to be loaded onto the front conveyor 6, one of the paddles moving to a position to scoop up the material at the same time the other discharges the material onto the front conveyor.

Referring more particularly to Fig. 3, it will be noted that the rotary gathering device 5 is supported by an adjustable shoe 78 slidably engaging the mine floor and this shoe is pivotally mounted at 79 on a transverse frame 80 suitably rigidly secured to the arms 45. As shown in Fig. 3, suitable adjusting means is provided for the shoe 78 and herein comprises a link 81 pivotally connected at 82 to the rear end of the shoe. This link is pivotally connected at 83 to a sliding nut 84 mounted in guideways 85 on the frame 80. Threadedly engaging this nut is an adjusting screw 86. Upon suitable adjustment of this screw the shoe 78 may be swung upward or downward about its pivot 79 to thereby change the elevation of the gathering device 5. As illustrated, the conveyor 6 extends forward and downward to a position closely adjacent the rear blade 72 of the gathering device and the side chains 38 thereof

are mounted in suitable guideways on the frame 80 and the main frame of the machine. This conveyor is so arranged relative to the pivotal axis of the gathering device as to permit the forward end of the conveyor to be adjusted vertically with the gathering device. Means is provided for elevating the gathering device 5 and herein comprises a link 89 pivotally connected at 90 on the side of the gathering device 5 and having a hook portion 91 connectible to a projecting pin 92 carried by one of the supporting arms 9 for the rotary raking and digging device 8. It will thus be noted that when it is desired to elevate the gathering device 5, the hook 91 is swung into engagement with the pin on the arm 9 and upon application of the friction clutch 16 the raking and digging device 8 may be swung upward by power, moving therewith the gathering device 5. Any suitable means may be employed for maintaining the raking and digging device 8 and the gathering device 5 in their elevated positions, for instance, the latch described in the co-pending application mentioned above.

The general mode of operation will now be described. The loading machine is propelled about the mine by the traction treads 3, it being understood that the gathering devices 5 and 8 are in their elevated position at that time. When the working place is reached, the arms 9 supporting the raking and digging device 8 are lowered, thereby lowering the gathering device 5 onto the mine floor, the gathering device 5 being slidably supported on the mine floor by the shoe 78 at that time. The raking and digging device 8 is then upwardly moved into its elevated position and the machine is fed forwardly, moving the gathering device 5 into engagement with the material to be loaded. The blades or paddles 71 and 72 are then driven and the material is elevated and moved rearwardly onto the front conveyor 6. During this loading operation the raking and digging device 8 may be used to dislodge the material and rake the same down toward the gathering device 5, a biting action being obtainable. The material is conveyed rearwardly lengthwise of the machine by the front conveyor 6 which in turn discharges onto the rear conveyor 7. During the loading operation the blades 71 and 72 move both about their own axes and orbitally, thereby causing the blades to scoop up the material, the blades being so driven that when one of the same discharges its load the other blade is in a position to receive the material and to move the same onto the front conveyor.

As a result of this invention it will be noted that an improved loading machine is provided having improved gathering means whereby the material to be loaded is elevated and moved rearwardly onto the front conveyor in an improved manner. It will

further be noted that by providing a plurality of gathering devices the loading range and capacity of the machine is greatly increased, the lower gathering device elevating the material from the mine floor while the upper adjustable gathering device rakes down the material within loading range of the lower gathering device, the two being adapted to cooperate, as it were, with a biting action. It will still further be noted that by providing a gathering device having a plurality of gathering blades or paddles it is possible to load a large amount of material with great rapidity. These and other uses and advantages of this invention will, however, be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a loading machine, a gathering mechanism including a plurality of shovel-like blades disposed in parallel relation for rotation on parallel horizontal axes spaced materially less than the maximum dimension of said blades transverse to their said axes and for orbital movement, and mechanism for simultaneously positively rotating said blades unidirectionally about their own axes and orbitally moving said blades to cause said blades to penetrate, elevate and discharge rearwardly the material to be loaded.

2. In a loading machine, a gathering device including a frame, a plurality of coacting gathering elements mounted on said frame for rotation about parallel horizontal axes spaced materially less than the maximum dimension of said elements transverse to their respective horizontal axes and for orbital movement with said axes both moving in a common cylindrical surface and substantially opposite to each other therein, and mechanism for simultaneously rotating said elements uniformly in the same angular direction and for moving the same orbitally.

3. In a loading machine, a gathering device including a frame, a pair of coacting rotary gathering elements having parallel penetrating edges and mounted on said frame for rotation on parallel horizontal axes spaced materially less than the distance separating the parallel penetrating edges of either gathering element, and for orbital movement about an axis between said horizontal axes, and mechanism for simultaneously effecting unidirectional rotation of and orbitally moving said elements to move the

penetrating edges thereof in non-circular closed paths.

4. In a loading machine, a gathering mechanism including a frame, a pair of rotary gathering elements having parallel penetrating edges and arranged in parallel relation on said frame for rotation about parallel horizontal axes and for orbital movement, and mechanism for moving the penetrating edges thereof in non-circular closed paths, said driving mechanism including planet gears fixed to said elements, a rotatable member supporting said elements, an internal gear meshing with said planet gears, a rotatable member supporting said internal gear, and means for simultaneously rotating said rotatable members at different speeds.

5. In a loading machine, a gathering device including a frame having parallel side arms, a pair of rotary gathering elements mounted on said frame for rotation on parallel horizontal axes and simultaneous bodily movement about a third axis parallel to and intermediate the other two, and mechanism for rotating said elements including endless chain connections mounted on said side arms, said chain connections having cutters thereon operative to cut a path in the material for said arms as said gathering device advances into the material.

6. In a loading machine, a gathering device including a frame having parallel side arms, a pair of rotary gathering elements mounted on said frame for rotation on parallel horizontal axes and simultaneous bodily movement about a third axis parallel to and intermediate the other two, and mechanism for rotating said elements including parallel endless relatively movable chain connections mounted on each of said arms and having cutters thereon operative to cut a path in the material to admit said arms as said device advances into the material.

7. In a loading machine, a gathering device including a pair of double-edged shovel members, means for supporting the same for bodily orbital movement in vertical planes to bring them successively into gathering relation to the material to be loaded, and means for turning said shovel members during their orbital movements to effect presentation of their individual edges in alternation to the material to be gathered, said supporting means and said turning means arranged to maintain said shovel members constantly in relative positions in which they are spaced less than half the maximum distance between the edges of either shovel member.

8. In a loading machine, a gathering device including a frame, a pair of shovel-like blades mounted on said frame for rotation about parallel horizontal axes spaced materially less than the maximum dimension of

said blades transverse to said axes, said blades being arranged with their planes substantially 90 degrees apart, and mechanism for simultaneously rotating said blades and
5 maintaining their planes at said angle of substantially 90 degrees.

In testimony whereof I affix my signature.

ANDREW HAUGE.

10

15

20

25

30

35

40

45

50

55

60

65