J. F. JOY.

LOADING MACHINE.

APPLICATION FILED NOV. 18, 1916.

1,306,064.

Patented June 10, 1919.

2 SHEETS—SHEET 1.

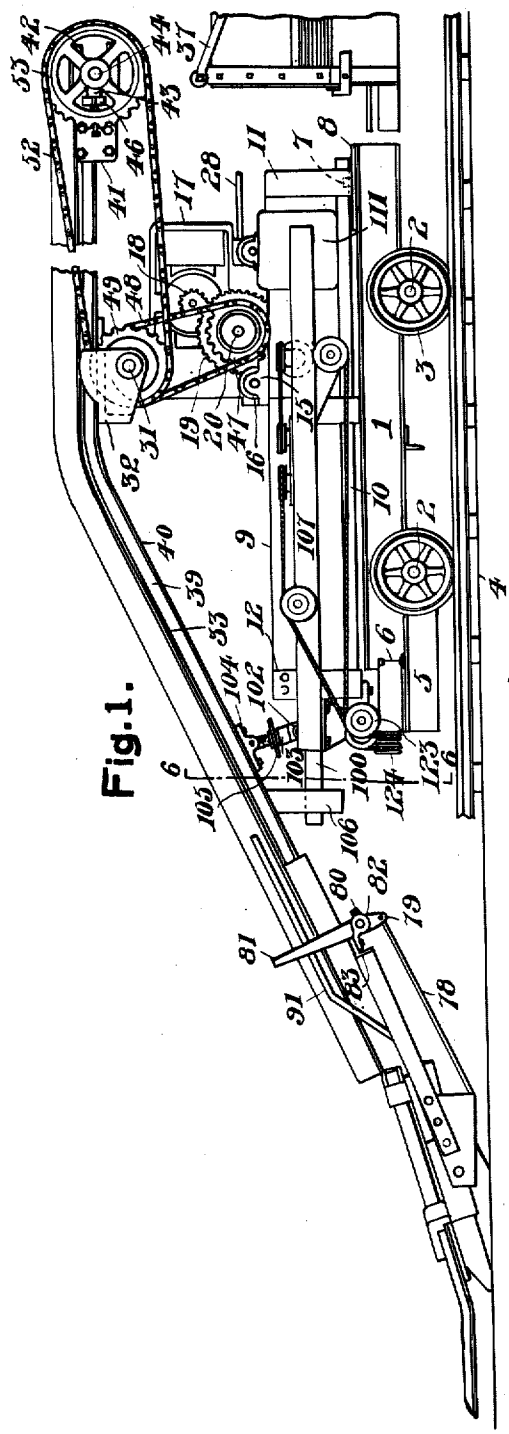


Fig. 1.

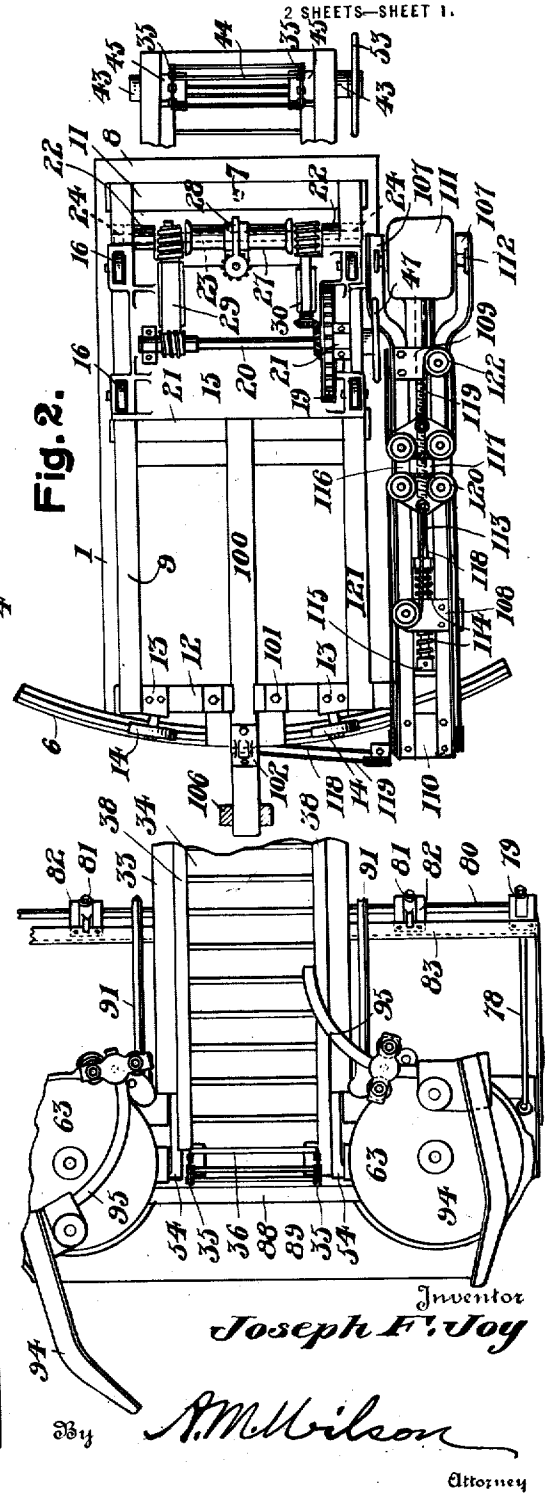


Fig. 2.

Inventor

Joseph F. Joy

By A. McWilson

Attorney

J. F. JOY.

LOADING MACHINE.

APPLICATION FILED NOV. 18, 1916.

1,306,064.

Patented June 10, 1919.

2 SHEETS—SHEET 2.

Fig. 3.

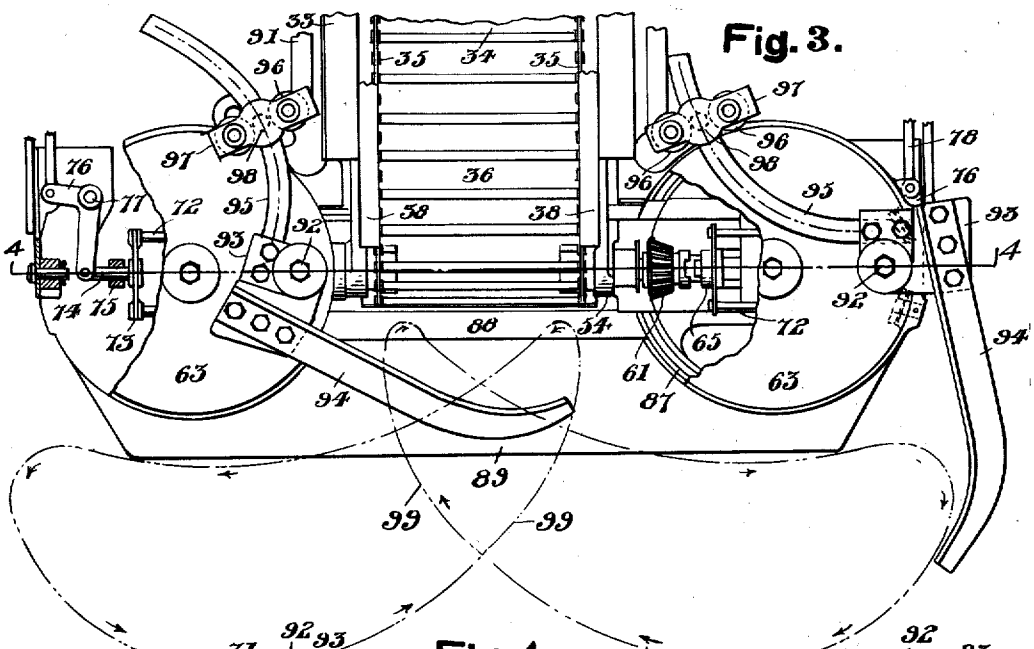


Fig. 4.

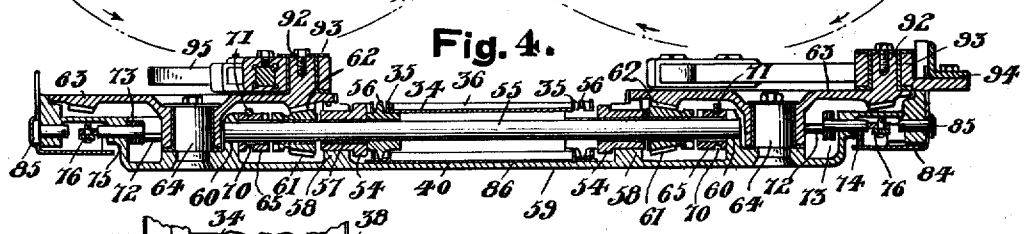


Fig. 6.

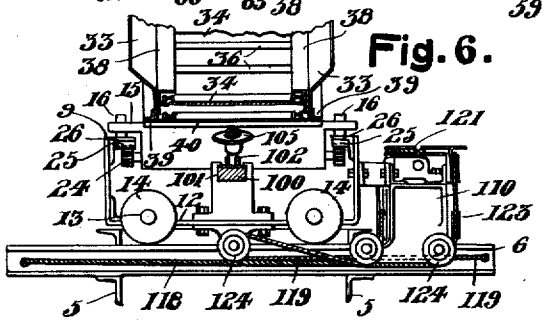
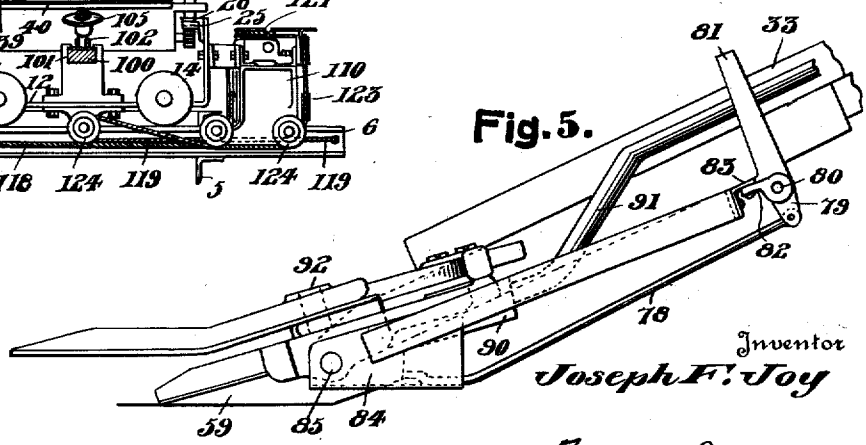


Fig. 5.



Inventor

Joseph F. Joy

By A. M. Wilson

Attorney

UNITED STATES PATENT OFFICE.

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

LOADING-MACHINE.

1,306,064. Specification of Letters Patent. Patented June 10, 1919.

Application filed November 18, 1916. Serial No. 132,175.

To all whom it may concern:

Be it known that I, JOSEPH F. JOY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Loading-Machines, of which the following is a specification.

The present invention relates to certain new and useful improvements in loading machines, and especially to that class of loading machines which are adapted to gather coal from the floor of a mine and transfer it to conveniently placed cars for transportation from the mine.

In the mining of coal it is the common practice to break the coal from its natural bed by blasting fragments from the face of the vein. By this method the broken coal is left in heaps adjacent the working face from which it must be loaded into the cars, entailing labor of the most arduous character. I am aware that machines have been proposed having inclined conveyers adapted to gather the coal from the floor of the mine and transfer it to conveniently placed cars but great difficulty has been experienced in the operation of such machines owing to the irregular size and shape of the fragments into which the coal is broken by the blasts, to the irregular surface of the floor and to the restricted space, especially vertically, in which the machine must operate.

It is the especial object of the present invention to provide in a machine of the class described, improved devices by which the coal is gathered from the floor of the mine onto the conveyer by which it is deposited in the pit cars.

A further object is to provide improved means to feed the gathering device to its work.

A further object is to provide improved means by which the gathering mechanism can be moved laterally across the working face.

These and other objects will appear in the following specification reference being had to the accompanying drawings of which

Figure 1 is a side elevation of the preferred embodiment of my invention.

Fig. 2 is a general plan view of the machine illustrated in Fig. 1, certain parts being broken away to reveal other parts.

Fig. 3 is a plan view, on an enlarged scale, of the gathering elements of the machine.

Fig. 4 is a cross sectional view along the line 4—4 of Fig. 3.

Fig. 5 is a side elevation of the device shown in Fig. 3.

Fig. 6 is a cross sectional view along the line 6—6 of Fig. 1, parts being removed and parts being broken away.

Like numerals refer to similar parts in the several figures.

Referring to the drawings, the machine comprises an inclined conveyer pivotally supported for rotation in vertical planes upon a carriage adapted to horizontal movements upon a truck adapted to travel along the tracks of the mine.

The truck consists of a frame having side sills 1, which are suitably joined together and mounted upon the axles 2 having wheels 3 adapted to travel along the rails 4 of the mine tracks. At the forward ends of the sills 1 are sill extensions 5 to which is attached the arcuate rail 6 concentric with the pivot pin 7 fixed to the cross member 8 at the opposite end of the truck. Mounted upon the truck is a guide frame comprising the longitudinal angle bars 9 and 10 which are joined together by the cross ties 11 and 12 to form a rigid frame. The rear cross tie 11, is provided with an aperture into which extends the pivot pin 7, to pivotally attach the guide frame to the truck. To the forward cross tie 12, are fixed the brackets 13, upon which are journaled the rollers 14, which bear upon the rail 6, to support the weight of, and facilitate the lateral movement of the guide frame relative to the truck. Mounted for movement longitudinally of the guide frame is a carriage comprising a base plate 15, having rollers 16, which bear upon and are adapted to travel along the upper surface of the longitudinal angle bars 9 of the guide frame. Upon this base plate 15 is mounted an electric motor 17 the armature pinion 18 of which engages the spur gear 19 fixed to the power shaft 20 journaled in bearings 21 of the base plate. Journaled in other bearings 22 of the base plate 15 is a feed shaft 23 having at each end a spur pinion 24 which engages the feed rack 25 attached to the under side of the horizontal flanges 26 of the angle bars 9 of the guide frame as best shown in Fig. 6.

Splined to the shaft 23 is a double acting clutch member 27 controlled by the hand lever 28 and adapted to connect the shaft 23 with the shaft 20 through either of the gear trains 29 or 30. The arrangement of these gear trains is such that when the lever 28 is moved to one side the shaft 23 will be rotated in a direction to cause the pinions 24 to travel forwardly along the racks 25 to feed the machine to its work, and when the lever 28 is moved to the other side the shaft 23 will be rotated in the reverse direction to withdraw the gathering device from the coal. Formed on the frame of the motor 17, is a bearing in which the shaft 31, is journaled and upon this shaft 31, is supported the hinge bearing 32 which supports the conveyer.

The conveyer is of the well known chain and scraper type and consists of an elongated trough composed of the side plates 33 and the bottom plate 34 along which travel two endless chains 35 which are joined together at spaced intervals by the scraper cross bars 36. Midway their length the side plates 33 are attached to the hinge bearing 32 to support the conveyer, and from this hinge bearing the conveyer extends horizontally rearwardly to discharge coal into a pit car 37 placed upon the mine track 4 in the rear of the machine. From the hinge bearing 32 the conveyer extends forwardly and downwardly to connect with the gathering mechanism positioned upon the floor of the mine in front of the machine.

Attached to the side plates 33 are angle bars 38 the flanges of which extend above the chains 35 to shield them from contact with the coal traveling along the trough. Other longitudinal angle bars 39 are fixed to the side plates 33 and to these are attached the bottom plate 40 which serves as a slide way for the return strand of the conveyer chains and scrapers and as a shield to protect them from accidental contact with the person of the operator. At the rear end of the conveyer are castings 41 having slideways 42 in which are slidable the journal bearings 43 of the head shaft 44. To the head shaft 44 are fixed the sprocket wheels 45 which engage the conveyer chains 35 to drive them. Adjusting screws 46 are provided to move the bearings 43 in the slide ways 42 to adjust the tension of the chains 35. A sprocket wheel 47 fixed to the power shaft 20 is connected through the chain 48, the sprocket wheel 49 and chain 52 with the sprocket wheel 53 of the head shaft 44 to drive the conveyer.

Secured to the lower ends of the side plate 33 are journal bearings 54 in which is journaled the foot shaft 55. To this foot shaft 55 are attached the foot sprocket wheels 56 which engage the conveyer chains 35. The bearings 54 have outwardly extending hubs 57 the outer surfaces of which are finished to form journals in the journal bearings 58 of the yoke casting 59 which constitutes the main frame of the gathering mechanism and upon which the conveyer has a rocking support. The foot shaft 55 extends beyond the bearings 54 on both sides of the conveyer and has additional support in the short journal bearings 60 formed on the frame casting 59.

Mounted upon the shaft 55 for free rotation adjacent the bearing 54, are two bevel pinions 61 the teeth of which engage the bevel gear teeth 62 formed on the under side of the disks 63 which are journaled on stud shafts 64 attached to the frame casting 59. The bevel pinions 61 are provided with clutch teeth adapted to engagement with the teeth of the clutch members 65 splined to the shaft 55. The clutch members 65 are formed with circumferential grooves 70 engaged by the shifting yokes 71 which are connected by the rods 72 with the cross heads 73. The cross heads 73 have stems 74 slidable in the bearings 75 of the frame casting and pivotally connected to the bell cranks 76 mounted upon pins 77 set in the frame casting. The bell cranks 76 are connected by rods 78 with the rocker arms 79 fixed to the cross shaft 80 which extends across the conveyer and is provided with hand levers 81 convenient to the hand of the operator at either side of the machine. The shaft 80 is supported in suitable bearings 82 carried by a cross angle bar 83 of the conveyer frame. By the manipulation of the hand levers 81 the clutch members 65 may be moved into or out of engagement with the bevel pinions 61 to control the rotation of the disks 63 power being derived through the conveyer chains 35 from the motor 17. A guard plate 84 is attached to the end of the frame casting 59 by the pin 85 to prevent the injury of the clutch shifting mechanism by accidental contact with the coal.

The web of the frame casting 59 forms a broad base or shoe which rests upon the floor of the mine and is slidable thereon. From the web 86 rise the annular flanges 87 shaped at their upper edges to engage the periphery of the disks 63 to form dust proof chambers for the gears 61 and clutches 65. The disks 63 are inclined forwardly and, with the rib 88 of the frame casting and the extension plate 89 forms an inclined plane or apron along which the coal may be moved onto the conveyer. Sockets are formed in the frame casting 59 at each side of the conveyer adjacent the portion indicated by 90 in Fig. 5, and in these sockets are fixed hand levers 91 by which the frame casting may be rocked on the floor to assist the edge of the plate 89 over the irregularities of the floor as it is moved forward to gather the coal.

Formed on the disks 63 are upstanding pivot studs 92 upon which are mounted the pivot blocks 93. Attached to the pivot blocks 93 are the gathering fingers 94 and the curved guide bars 95. The guide bars 95 are adapted to longitudinal movement between the rollers 96 mounted in the yokes 97 which are pivotally attached to the frame casting 59 in such manner that the center lines of the guide bars 95 will at all times coincide with the pivot points 98 about which the yokes 97 rotate. As the disks 63 revolve upon the studs 64 the guide bars 95 move longitudinally between the rollers 96 and cause the gathering fingers 94 to describe substantially reniform orbits as indicated by the broken lines 99 of Fig. 3. The fingers in traversing these orbits are moved first longitudinally forward to pass into and behind the mass of coal, then sidewise laterally and rearwardly to scrape the coal along the inclined plane into the trough of the conveyer, after which they are withdrawn longitudinally from the mass of coal to the point of beginning. The two fingers 94 work alternately to maintain a continuous movement of coal into the conveyer to be carried by the scraper flights 36 along the trough and discharged into the pit car 37.

Projecting forwardly from and attached to the base plate 15 is a longitudinal central bar 100 which is slidable in the guide block 101 attached to the cross tie 12 and this construction forms an effective guiding means for the longitudinally movable carriage. Attached to the central bar 100 by the hinge lugs 102 is a screw jack 103 the upper end of which is similarly attached to the bottom plate 40 of the conveyer by the hinge lugs 104. The screw jack 103 is provided with a hand wheel nut 105 by the rotation of which the forward end of the conveyer, together with the gathering mechanism may be lifted to clear the floor of the mine and the mine tracks when the machine is to be transported from one part of the mine to another. Guide arms 106 depending from the conveyer frame, engage the sides of the central bar 100 to maintain the perfect alinement of the conveyer and guide frame.

Attached to the guide frame at one side of the machine is an auxiliary frame comprising the longitudinal angle bars 107 which are joined together by the bracket castings 108, 109 and 110. At their rearward parts the angle bars 107 are bent outwardly to embrace the motor 111 upon the frame of which are formed trunnions 112 which bear upon the lateral flanges of the angle bars 107 to support the motor. The armature shaft 113 of the motor 111 is extended longitudinally of the frame and is anchored to the bracket 108 to prevent movement of the motor 111 longitudinally of the machine. Mounted upon the shaft 113 at either side of the bracket 108 are two compression springs 114 which abut the collars 115 fixed to the shaft 113 to afford the desired resiliency to the anchor connections. Slidably mounted on the angle bars 107 is a cross head 116 having a screw nut 117 in threaded engagement with a screw formed on the shaft 113. Attached to the cross head 116 are two oppositely extending ropes 118 and 119 which are roved around a series of sheaves 120, 121, and 122 mounted upon the cross head 116 and the brackets 108 and 109. From this series of sheaves the ropes 118 and 119 are carried around the sheaves 123 and 124 and their respective ends attached to the opposite ends of the arcuate rail 6. When now the motor 111 is actuated to cause the shaft 113 to revolve, the cross head 116 will be moved longitudinally of the auxiliary frame and the ropes 118 and 119 respectively drawn in and paid out according to the direction of the revolution of the shaft 113. As the cross head 116 moves forwardly the rope 118 will be drawn in and the rope 119 paid out to cause the rotation of the guide frame about the pivot 7 to move the forward part of the machine toward the left. Conversely as the cross head 116 moves rearwardly, the forward part of the machine will be moved to the right.

When the machine has been brought into the room where coal is to be loaded, the gathering mechanism is lowered into contact with the floor and the machine advanced along the rails 4 until the plate 89 is in close proximity to the mass of broken coal. The truck may then be blocked in any preferred manner to prevent its retrograde movement, as by the placing of blocks of wood upon the rails 4 in contact with the wheels 3, and a pit car 37 set in place at the rear of the machine to receive the coal from the conveyer. The motor 17 is then started to drive the conveyer chains 35 and the clutches 65 placed in engagement with the bevel pinions 61 to actuate the gathering fingers 94. The clutch lever 28 is then pushed to the side which causes the carriage 15 to be fed forward and the hand lever 91 is manipulated to assist the plate 84 to penetrate under the mass of coal and over the unevenness of the floor. As the coal comes within their orbits the gathering fingers 94 will draw it onto the conveyer to be carried by the scraper flights 36 to be delivered into the pit car 37. When the machine has been advanced as far as is desirable, the clutch lever 28 is moved to cause the withdrawal of the gathering mechanism far enough to clear the coal at the side of its path, after which the motor 111 will be actuated in a direction to swing the gathering mechanism to which ever side is preferred, to be again advanced along a new path to gather coal. This operation may be repeated until the coal has

been gathered across the entire width of the working place.

It is to be understood that the term "a pile of material" as used in the claims is not intended to specifically refer to loose material piled up on the floor of the mine but is also intended to include or designate the standing coal, when in its semi-solid state after being blasted.

What I claim is—

1. A loading machine of the class described including a conveyer, and a gathering mechanism including substantially horizontally arranged fingers and means to move said fingers longitudinally to penetrate a pile of material and then laterally and rearwardly to engage said material and move it onto the conveyer.

2. A loading machine of the class described including a main frame, a supplemental frame mounted for rotation upon the main frame, guideways carried by one of the frames, a carriage movable in the guideways, ropes attached to the carriage and anchored to the other frame in such manner that movements of the carriage will cause the rotation of the supplemental frame, and resiliently mounted means to move the carriage in the guideways.

3. A loading machine of the class described including a conveyer, and gathering mechanism including substantially horizontally arranged fingers and means to positively cause said fingers to travel in non-circular fixed orbital paths to engage material and move it onto the conveyer.

4. A machine of the class described including a conveyer, gathering mechanism including fingers and means to cause said fingers to travel in substantially horizontal orbital paths to engage material and move it onto the conveyer, and a substantially horizontally arranged apron beyond the end of which substantially all portions of said fingers move in the gathering operation.

5. A machine of the class described including a conveyer having a substantially horizontally arranged apron connected thereto, and gathering mechanism including fingers and means to move said fingers in substantially horizontal orbital paths, the greater portions of which extend beyond the free end of said apron.

6. A machine of the class described including a wheeled supporting frame, a conveyer mounted upon and extending downwardly in front of said supporting frame, a shoe pivotally connected to said conveyer for vertical rocking movement relative thereto, manually operable means extending rearwardly of said shoe for rocking the same, and gathering mechanism to engage material and move it onto the conveyer.

7. A machine of the class described including a conveyer, and gathering mechanism including a finger substantially horizontally arranged at each side of the conveyer and means to alternately move said fingers toward and away from the conveyer in non-circular orbital paths.

8. A machine of the class described including a conveyer having a transverse driven shaft, a shoe rockably supported about said shaft, and gathering mechanism including fingers carried by said shoe and means to move said fingers.

9. A machine of the class described including a wheeled supporting frame, a conveyer having a transverse driven shaft and mounted upon and extending downwardly in front of said supporting frame, a shoe rockably supported about said shaft, manually operable means extending rearwardly of said shoe for rocking the same and gathering mechanism to engage material and move it onto the conveyer.

10. A machine of the class described including a conveyer having a driven shaft, and a gathering mechanism including a substantially horizontally arranged finger positioned adjacent each end of said shaft, and means operatively connected to said shaft whereby said fingers are alternately moved toward and away from said conveyer in non-circular orbital paths.

11. In a machine of the class described, a gathering mechanism comprising substantially horizontally arranged fingers and means to move said fingers in orbital paths, the initial gathering movement of said fingers being longitudinal to penetrate a pile of material.

12. In a loading machine of the class described, a gathering mechanism including a substantially horizontally arranged finger and means to move the same in a fixed non-circular orbital path.

13. In a loading machine of the class described, a gathering mechanism including a plurality of fingers and means to move the same in reniform orbital paths which cross each other.

14. In a loading machine of the class described, a gathering mechanism including a substantially horizontally arranged finger and means to move the same in a substantially reniform orbital path.

15. A gathering mechanism including a support, a driven shaft carried by said support, a disk rotatably geared to said shaft, a finger pivoted eccentrically on said disk, a bar carried by said finger, and a swiveled guide for said bar carried by said support.

16. A gathering mechanism including a support, a driven shaft carried by said support, a disk rotatably geared to said shaft, a finger pivoted eccentrically on said disk, a curved bar carried by and extending laterally from said finger, and a swiveled guide for said bar carried by said support.

17. A loading machine of the class described including a main frame, a supplemental frame mounted for rotation upon the main frame, a conveyer, gathering mechanism including fingers to engage material to move it onto the conveyer and means to move said fingers in laterally extending paths, means to rotate said supplemental frame, and means to allow the supplemental frame to rotate on the main frame when said fingers encounter a relatively immovable object.

18. A loading machine of the class described including a conveyer having an apron in advance thereof, and gathering mechanism to engage material and move it onto the conveyer including fingers and means to move the fingers, said fingers being arranged and moved to clear a path in front of said apron substantially the entire width thereof.

19. A loading machine of the class described including a gathering mechanism including a plurality of substantially horizontally arranged fingers and means to move said fingers in horizontal orbital paths, and means to render any one or more of said fingers inoperative at will.

20. A loading machine of the class described including a conveyer, gathering mechanism to engage material and move it onto the conveyer, said mechanism including a plurality of spaced fingers and means to move said fingers toward each other to engage behind and grip part of a pile of material, and means to bodily move said fingers away from the pile of material when in their gripping position.

21. In a loading machine of the class described including a conveyer, gathering mechanism to engage material and move it onto the conveyer, said mechanism including a plurality of spaced substantially horizontally arranged fingers and means to move said fingers horizontally toward each other to engage behind and grip part of a pile of material, and means to bodily move said fingers away from the pile of material when in their gripping position.

22. A loading machine of the class described including a gathering mechanism including spaced substantially horizontally arranged fingers and means to move said fingers in substantially horizontal orbital paths, means to render any one or more of said fingers inoperative at will, and means to bodily move said fingers away from a pile of material independently of their movement in orbital paths.

23. A loading machine of the class described including a conveyer, and a gathering mechanism including substantially horizontally arranged fingers and means to move said fingers longitudinally to penetrate a pile of material, laterally and rearwardly to engage said material and move it to the conveyer and then forwardly and laterally away from the conveyer to the start of the longitudinally penetrating position.

24. In a loading machine of the class described, the combination of a conveyer and means to move the same longitudinally toward and away from a pile of material, with gathering mechanism including a plurality of fingers and means to move said fingers in substantially horizontal orbital paths, and means to render any one or more of said fingers inoperative at will.

25. A loading machine including a conveyer, gathering mechanism to engage material and move it onto the conveyer, said mechanism including a plurality of spaced fingers and means to move said fingers longitudinally to penetrate a pile of material and then toward each other to engage behind and grip part of the pile of material, and means to bodily move said fingers away from the pile of material when in their gripping position.

26. A loading machine of the class described including a conveyer, gathering mechanism to engage material and move it onto the conveyer, said mechanism including a plurality of spaced substantially horizontally arranged fingers and means to move said fingers horizontally longitudinally to penetrate a pile of material and then toward each other to engage behind and means to bodily move said fingers away from the pile of material and grip a part of the pile of material, when in their gripping position.

27. A machine of the class described including a conveyer having journal bearings at one end thereof, a driven shaft journaled in said bearings, a shoe rockably journaled about said bearings, means for rocking said shoe, and gathering fingers carried by said shoe at each side of the conveyer operatively connected to said shaft.

28. A machine of the class described including a conveyer having journal bearings at one end thereof, a driven shaft journaled in said bearings, a shoe rockably journaled about said bearings, means for rocking said shoe, gathering fingers carried by said shoe at each side of the conveyer operatively connected to said shaft, and means for rendering any one or both of said fingers inoperative at will.

29. A machine of the class described including a conveyer having journal bearings at one end thereof, a driven shaft journaled in said bearings, a shoe rockably journaled about said bearings, means for rocking said shoe, disks operatively connected to said shaft adjacent each end thereof, gathering fingers operatively connected to said disks, and means to disconnect any one or both of said disks from said shaft at will.

30. A loading machine of the class de-

scribed including a conveyer, gathering members, and means to cause said members to advance from each side of the conveyer to longitudinally penetrate the material to be loaded and then move rakingly toward the conveyer.

31. A loading machine of the class described including a conveyer, a supporting frame, gathering members carried by said frame and means to cause said members to advance from each side of the conveyer to longitudinally penetrate the material to be loaded and then moved rakingly toward the conveyer, the paths described by the tips of said members intersecting at a point beyond the supporting frame.

32. A machine of the class described including a conveyer having journal bearings at one end thereof, a driven shaft journaled in said bearings, disks operatively connected to said shafts adjacent each end thereof, gathering fingers operatively connected to said disks, and means to disconnect said disks from said shaft to render said fingers inoperative.

33. A machine of the class described including a conveyer having a shoe at the forward end thereof, gathering fingers carried by said shoe at each side thereof, means for operating said fingers, and means to render said fingers inoperative.

In testimony whereof I affix my signature.

JOSEPH F. JOY.

Corrections In Letters Patent No. 1,306,064.

It is hereby certified that in Letters Patent No. 1,306,064, granted June 10, 1919, upon the application of Joseph F. Joy, of Columbus, Ohio, for an improvement in "Loading-Machines," errors appear in the printed specification requiring correction as follows: Page 5, claim 26, line 98, commencing with the word "and" strike out all to and through the word "material," line 100; same page and claim, line 101, after the word "material" insert the words *and means to bodily move said fingers away from the pile of material;* page 6, line 10, claim 31, after the word "frame" insert a comma; 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 22d day of July, A. D., 1919.

[SEAL.]

R. F. WHITEHEAD,
Acting Commissioner of Patents.

Cl. 193—49.