Jan. 4, 1938. C. E. STOLTZ 2,104,575

MECHANICAL SHOVELING MACHINE

Filed Aug. 6, 1936 3 Sheets-Sheet 1

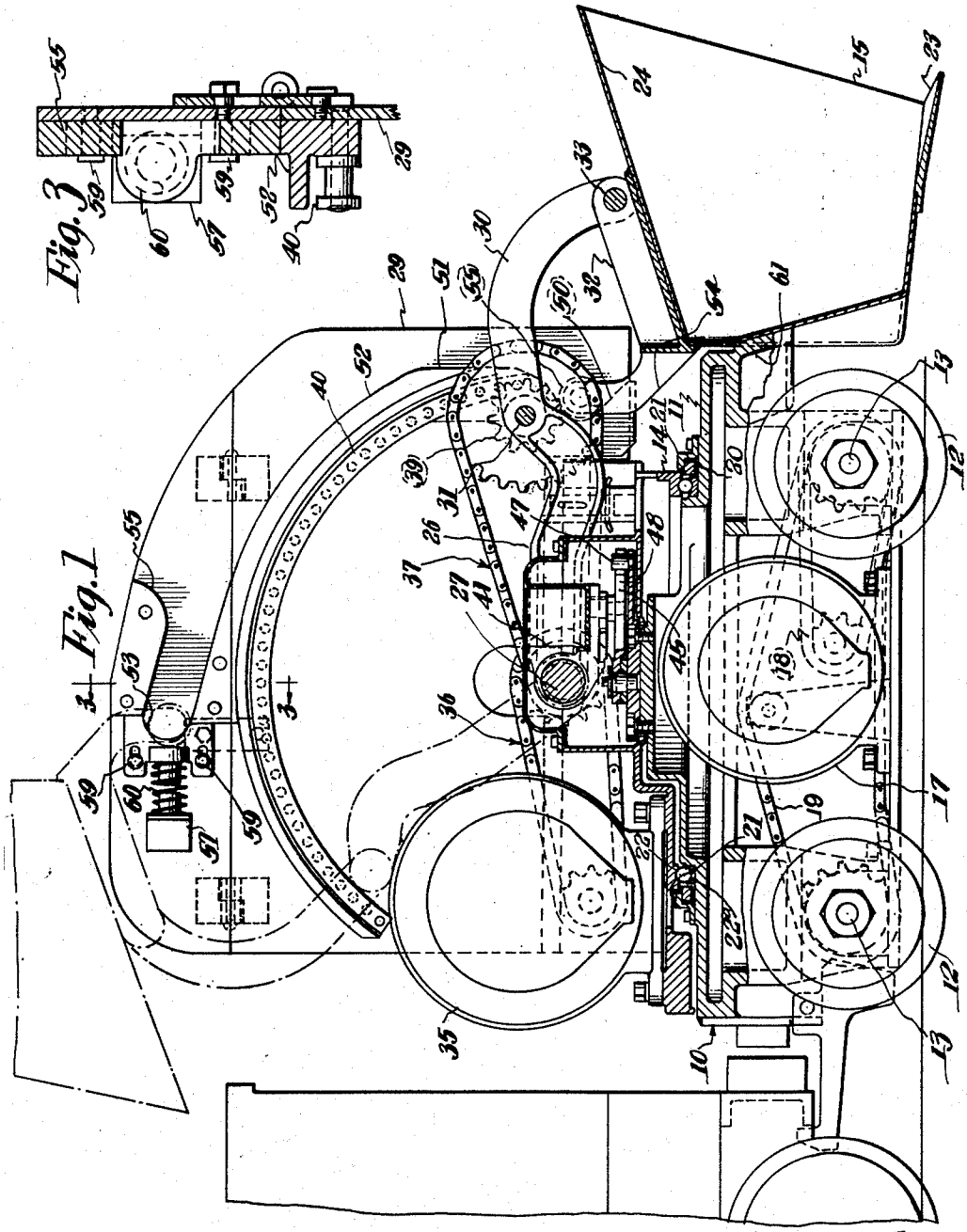


Fig. 1

Fig. 3

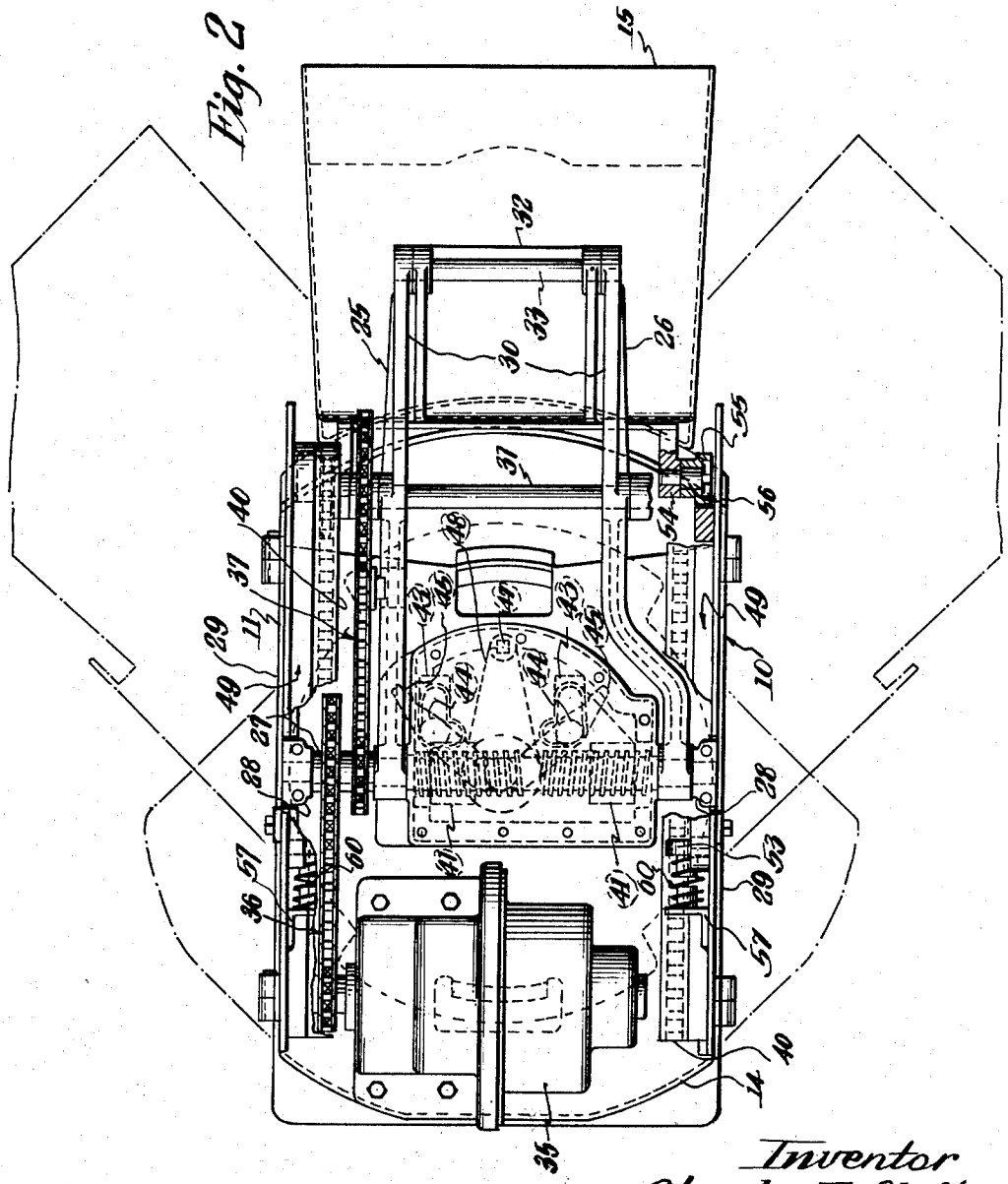
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Fig. 2



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Fig. 4

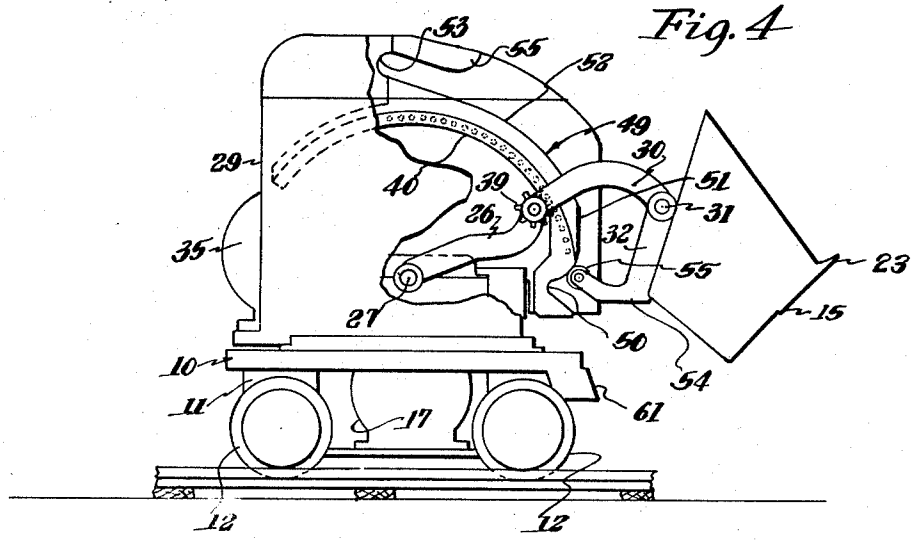
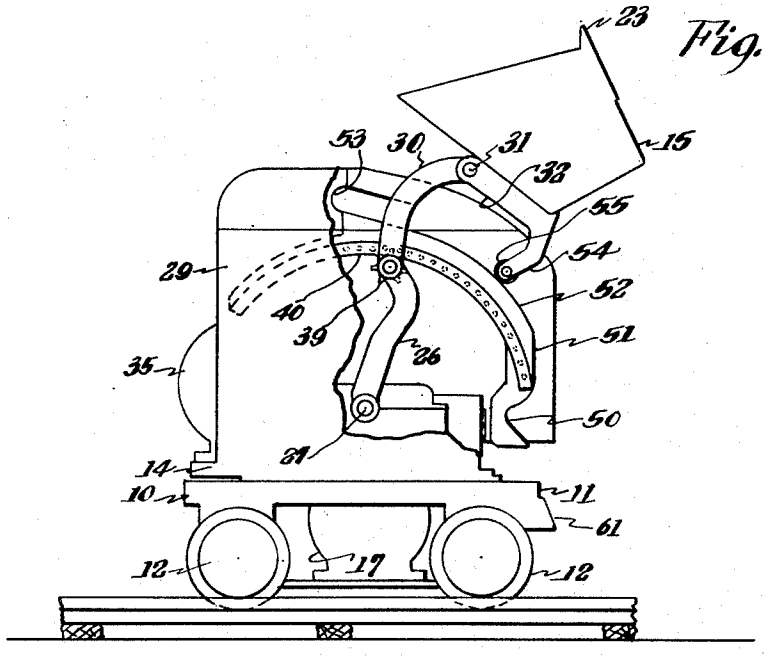


Fig. 5



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MECHANICAL SHOVELING MACHINE

Charles E. Stoltz, Chicago, Ill., assignor to Mancha Storage Battery Locomotive Company, Chicago, Ill., a corporation of Illinois

Application August 6, 1936, Serial No. 94,552

11 Claims. (Cl. 214—131)

This invention relates to improvements in mechanical shoveling machines of the mucking type which are adapted to shovel muck or other materials underground in mines and discharge it into a car or like receptacle disposed rearwardly thereof.

Among the objects of my invention are to provide a new and improved mucking machine constructed so that it will readily fit in a mine cage, and arranged with a view towards compactness and efficiency in operation. Another object of my invention is to provide a novel operating and controlling mechanism for the scoop including a novel control means for positively moving the scoop longitudinally of the machine into the material to be loaded and pivoting the scoop in an upward direction during the initial shoveling operation, and controlling movement of the scoop rearwardly along its supporting frame to a discharge position over the rearward end thereof.

A prior application, Serial No. 17,419, filed April 20, 1935, now Patent No. 2,077,159, dated April 13, 1937, discloses a device similar to that shown by my present invention. My present invention, however, differs from my prior invention in the means for controlling movement of the scoop.

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

Figure 1 is a side elevation of a shoveling machine constructed in accordance with my invention with certain parts broken away and shown in longitudinal section;

Figure 2 is a plan view of the machine shown in Figure 1 with certain parts broken away and shown in section;

Figure 3 is an enlarged sectional view taken substantially along lines 3—3 of Figure 1; and

Figures 4 and 5 are diagrammatic views showing the scoop in several operative positions.

Referring now to the drawings, the embodiment of my invention illustrated includes a truck 10 which comprises a frame 11 mounted on track wheels 12, 12 and axles 13, 13. A turntable 14, forming a support for a shovel or scoop generally indicated by reference character 15, is mounted on said truck frame for turning movement with respect thereto in a horizontal plane and the axis of turning movement of said turntable is herein shown as being substantially at the center of said truck frame.

The machine is propelled along the rails from working place to working place and fed into the material it is desired to load during the loading operation by means of a motor 17 mounted on the truck frame 11 in a suitable manner. Said motor may be of any type well known to those skilled in the art but is herein preferably shown as being an air motor of an ordinary construction. The drive from said motor to the track wheels includes a chain and sprocket drive 18 connected with the forward axle 13 and a chain and sprocket drive 19 connecting the forward and rearward axles together.

The turntable or shovel supporting frame 14 conforms generally to the form of the top surface of the truck frame 11 and is provided with a depending annular flange 20 which is guided in an annular gibbed guide member 21 secured to said truck frame and extending over the upper side of said flange. Said turntable is supported on said frame on balls 22, 22 mounted in an annular race 22a on the upper side of said truck frame.

The scoop or shovel 15 is of a box like construction with an open forward end, a lower digging lip 23 and an upwardly inclined upper side 24, which side is the lower side of said scoop when in a discharge position and serves as a chute to permit material to be readily discharged therefrom. Said scoop is supported on the turntable 14 for swinging movement with respect thereto by means of a pair of parallel spaced beams 25 and 26. Said beams, as herein shown, are freely mounted on a transverse shaft 27, which shaft is journaled adjacent its ends in suitable bearing members 28, 28. Said bearing members are disposed adjacent the inner and lower side of side plates 29, 29 which side plates extend upwardly along opposite sides of the turntable 14 and are secured thereto.

The beams 25 and 26 each have a downwardly curved depending forward end 30, extending a substantial distance in front of the truck frame and the supporting connection from said forward ends of said beam to said scoop includes a transversely extending shaft 33 mounted on the free ends of said beams and pivotally connected to a bracket 32 secured to the side of the scoop which is its upper side when in a loading position. Said transverse shaft, as herein shown, is positioned adjacent the transverse center of the said scoop when in the position shown in Figure 1.

A motor 35 is provided to swing the beams 25 and 26 by power and move the scoop from a gathering to a discharge position. Said motor, as herein shown, is of the usual air type and is mounted on the turntable 14 adjacent the rearward end thereof. The transverse shaft 27 is driven from said motor by means of a chain and sprocket drive generally indicated by reference character 36. A transverse shaft 31 is mounted intermediate the ends of said beams and is driven from the transverse shaft 27 by means of a chain and sprocket drive generally indicated by reference character 37. Said shaft has sprockets 39, 39 secured to its outer ends, which mesh with the under side of arcuate racks 40, 40. Said

racks are secured to and extend upwardly and longitudinally rearwardly along the side plates 29, 29. Thus, when power is applied to the motor 35, the sprockets 39, 39 meshing with the arcuate racks 40, 40 will pivotally move the beams 25 and 26 about their axis of pivotal connection to the shaft 27 for raising or lowering the scoop 15 with respect to the ground.

A suitable means is provided for centering the scoop with respect to the truck frame 11 when in a discharge position which means as herein shown is similar to that disclosed in a prior application, Serial No. 53,453, filed December 9, 1935, and includes a pair of nuts 41, 41 threaded on the transverse shaft 27. Said nuts have slotted arms 43, 43 projecting forwardly therefrom, the slots of which arms are adapted to engage pins 44, 44 extending upwardly from swinging arms 45, 45. Said swinging arms are pivotally mounted on the truck frame 11 for movement about coaxial axes at a point which is herein shown as being disposed adjacent the transverse center of the shaft 27. Either one of said arms is adapted to engage a pin 47, depending upon which side of the truck frame the scoop is positioned, for swinging said turntable towards the center of said truck upon movement of said arms. Said pin is mounted on a forwardly projecting arm 48 secured to said truck frame and fixed from movement with respect thereto.

Thus, when the turntable is moved to position the scoop to one side or the other of the truck 10, and the scoop is then moved toward a discharge position, the nuts 41, 41 will travel toward the center of said turntable which will in turn move the arms 45, 45 in the same direction until one of said arms engages the pin 47. Further movement of said arms will swing the turntable to an aligned position with respect to the truck, at which position both of said arms will engage said pin to lock said turntable from swinging movement with respect to said truck. Upon movement of the scoop to an initial loading position, said arms will move away from said pin which will permit said scoop to be swung to one side or the other of the track.

Referring now particularly to the means for controlling the path of movement of the scoop 15 from the forward end of the frame 11 to the discharge end thereof in cooperation with the beams 25 and 26, and one of the novel features of my invention, a guide cam 49 is mounted on the inside of each side plate 29. Each of said guide cams is provided with an inwardly disposed recessed or notched portion 50 at the lower forward end thereof which leads to a vertical surface 51 adjacent the forward end of the truck. Said vertical surface in turn leads to an arcuate supporting surface 52 which extends upwardly and rearwardly along the side plate 29 and terminates at a stop 53.

It should herein be noted that the upper portion of each side plate 29 is hinged to permit said side plates to be folded downwardly along the outer sides of the main portion thereof to decrease the travelling height of the machine, and that the stop 53 and upper portion of said guide cams are mounted on this hinged upper portion.

The path of movement of the scoop from a gathering to a discharge position is controlled by means of controlling arms 54, 54 which extend angularly rearwardly and upwardly from the side of the scoop which is its upper side when in the gathering position shown in Figure 1. Each of said arms has a roller 55 mounted on its free end, on the outer side thereof by means of a shaft 56. Said rollers are adapted to engage and ride along the guide cams 49, 49 and form a means for supporting said scoop on said cams when moving from the forward to rearward end of the truck frame.

The stops 53, 53 are so formed as to be a continuation of the guide cams 49, 49 and their engaging faces, as herein shown, are concave and of a semi-circular formation, the upper end of each of which faces terminates in a guide member 57. The under surface of each of said guide members together with the upper surface of its associated guide cam 49 forms a slot to hold the roller 55 from vertical displacement with respect to said guide cam.

Each stop 53 is slidably mounted on the hinged upper portion of a side plate 29 on suitable cap screws 59, 59, which are threaded in said side plates and extend through suitable slots formed in said stop. A compression spring 60 abuts the rearward end of said stop and is interposed between said stop and a member 57 extending outwardly from the hinged portion of the side plate 29 to permit yieldability of said stop when engaged with respective of said rollers.

When the scoop is in the initial loading position shown in Figure 1 the roller 55 will engage the notch formed in the lower end of the guide cam 49. At the same time the rear end of said scoop will abut a depending projection 61 projecting from the forward end of the truck frame 11. Said projection has a forward inclined engaging surface adapted to engage said scoop to permit the truck to force said scoop into the material it is desired to load when moved along the track in a forward direction.

As the beams 25 and 26 are pivotally moving in an upward and rearward direction from an initial gathering position of the scoop, engagement of the roller 55 with the notch 50 will cause said scoop to pivot in an upward direction and, at the same time, move longitudinally forward with respect to the truck (see Figures 1 and 4) and thus move said scoop to engage and gather the loose material and position said scoop so as to prevent spillage of material therefrom. Upon still further movement of said beams in a rearward direction, said rollers will ride along the upper surface of said cams to guide said scoop rearwardly along said frame in a loaded position to the rearward end thereof (see Figure 5). At the rearward end of said guide cams said rollers will engage the stops 53, 53 which will pivot said scoop to the discharge position shown by broken lines in Figure 1 for discharging material beyond the rear end of the truck.

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

I claim as my invention:

1. In a mechanical shovel, the combination of a frame, a beam horizontally pivoted on said frame, a scoop pivoted on said beam, and means for controlling movement of said scoop upon swinging movement of said beam and pivotally moving the forward end of said scoop forwardly and upwardly with respect to said frame and supporting said scoop in a loaded condition as it

moves rearwardly over the top of said frame to a discharge point beyond the rear end of said frame including a guide cam extending along said frame, and a controlling arm rigid with respect to said scoop and having a free end extending rearwardly from the side of said scoop which is pivotally connected to said beam, said arm being adapted to have slidable engagement with said cam at a point spaced from said scoop for pivotally moving said scoop in an upward direction and supporting said scoop in a loaded position during movement over the top of said frame.

2. In a mechanical shovel, the combination of a frame, a beam horizontally pivoted on said frame, a scoop pivoted on said beam, and means for controlling movement of said scoop upon swinging movement of said beam and pivotally moving the forward end of said scoop forwardly and upwardly with respect to said frame and supporting said scoop in a loaded condition as it moves rearwardly over the top of said frame to a discharge point rearwardly of said frame including a guide cam extending along said frame, and a controlling arm rigid with respect to said scoop and having a free end extending from the side of said scoop which is pivotally connected to said beam in a direction which is inward and upward when said scoop is in a loading position, said control arm having a free end adapted to engage and ride along said cam and forming a support means for the rearward end of said scoop while moving over the top of said frame.

3. In a mechanical shovel, the combination of a frame, a beam horizontally pivoted on said frame, a scoop pivoted on said beam, and means for controlling movement of said scoop upon swinging movement of said beam and pivotally moving the forward end of said scoop forwardly and upwardly with respect to said frame and supporting said scoop in a loaded condition as it moves rearwardly along said frame to a discharge point rearwardly of said frame including a guide cam extending rearwardly along said frame, and a controlling arm rigid with respect to said scoop and having a free end extending from the side of said scoop which is pivotally connected to said beam in a direction which is rearward and upward when said scoop is in a loading position, said arm having a free end adapted to engage said cam, and said cam having an inwardly disposed notch on the lower end thereof adapted to be engaged by the free end of said controlling arm upon the initial upward movement of said beam.

4. In an apparatus of the class described, a frame, a scoop, said scoop having an open forward end with a digging lip at the lower side thereof, and the side of said scoop which is its upper side when in a gathering position being its lower side when in a discharge position, and means for supporting said scoop and moving it over said frame from the forward to rearward end thereof comprising a beam pivotally mounted on said frame for movement about a transverse axis disposed adjacent the center of said frame, a pivotal connection from the free end of said beam to said scoop, a guide cam extending along said frame, and a controlling arm extending in rigid relation with respect to said scoop from the side of said scoop which is its upper side when in a loading position, the free end of said arm being adapted to engage and move along said cam for pivotally moving said scoop forwardly and upwardly with respect to said frame during initial upward movement of said beam and supporting said scoop in a loaded position, with its open end disposed upwardly, during movement along said frame from the forward to rearward end thereof, and a stop at the rearward termination of said cam adapted to be engaged by said arm for pivoting said scoop to a discharge position beyond the rear end of said frame.

5. In an apparatus of the class described, a frame, a scoop of a box like construction having an open forward end with a lower digging lip adapted to be disposed adjacent the ground when in a gathering position, and having an upper side which is inclined in a forward and upward direction, which side is adapted to form a downwardly inclined discharge side when said scoop is in a discharge position at the rear of said frame, and means for moving said scoop forwardly of said frame and upwardly and rearwardly over said frame to a discharge position beyond the rearward end thereof comprising a beam pivotally mounted on said frame for movement about a transverse axis, power operated means for swinging said beam with respect to said frame, a pivotal connection from the free end of said beam to said scoop at a point disposed intermediate the ends of said scoop and on the side of said scoop which is the upper side thereof when in a loading position, a guide cam extending along said frame, and a controlling arm rigidly secured to the same side of said scoop as said beam and having a free end extending rearwardly and upwardly therefrom to said guide cam, and having engagement therewith.

6. In an apparatus of the class described, a frame, a scoop of a box like construction having an open forward end with a lower digging lip adapted to be disposed adjacent the ground when in a gathering position, and having an upper side which is inclined in a forward and upward direction, which side is adapted to form a downwardly inclined discharge side when said scoop is in a discharge position at the rear of said frame, and means for moving said scoop forwardly of said frame and upwardly and rearwardly over said frame to a position for discharging material beyond the rearward end thereof comprising a pair of parallel spaced beams pivotally mounted on said frame for movement about a transverse axis disposed adjacent the center of said frame, a pair of spaced arcuate racks extending over the top of said frame, a pair of toothed members mounted on the outer sides of said beams and meshing with the underside of said racks and a pivotal connection from said beams to said scoop at a point disposed a substantial distance in advance of said sprockets and intermediate the ends of said scoop, a guide cam extending rearwardly along each side of said frame, and controlling arms extending from said scoop in rigid relation with respect thereto and having engagement with said guide cams.

7. In an apparatus of the class described, a frame, a scoop of a box like construction having an open forward end with a lower digging lip adapted to be disposed adjacent the ground when in a gathering position, and having an upper side which is inclined in a forward and upward direction, which side is adapted to form a downwardly inclined discharge side when said scoop is in a discharge position at the rear of said frame, and means for moving said scoop forwardly of said frame and upwardly and rearwardly over said frame to a position for discharging material beyond the rearward end thereof comprising a

pair of parallel spaced beams pivotally mounted on said frame for movement about a transverse axis disposed adjacent the center of said frame, a pivotal connection from the free ends of said beams to said scoop at a point disposed intermediate the ends of said scoop, a guide cam extending along each side of said frame from the forward to the rearward end thereof, and controlling arms rigidly secured to the side of said scoop which is its upper side when in a loading position and extending rearwardly and upwardly therefrom to said guide cams for engagement therewith.

8. In an apparatus of the class described, a frame, a scoop of a box like construction having an open forward end with a lower digging lip adapted to be disposed adjacent the ground when in a gathering position, and having an upper side which is inclined in a forward and upward direction, which side is adapted to form a downwardly inclined discharge side when said scoop is in a discharge position at the rear of said frame, and means for moving said scoop forwardly of said frame and upwardly and rearwardly over said frame to a position for discharging material beyond the rearward end thereof comprising a pair of parallel spaced beams pivotally mounted on said frame for movement about a transverse axis disposed adjacent the center of said frame, a pivotal connection from said beam to said scoop at a point disposed intermediate the ends of said scoop, a guide cam extending along each side of said frame from the forward to the rearward end thereof, and controlling arms rigidly secured to the side of said scoop which is its upper side when in a loading position and extending rearwardly and upwardly therefrom to said guide cams for engagement therewith, the free ends of said arms being adapted to engage and move along said cams for pivotally moving said scoop forwardly and upwardly with respect to said frame during the initial upward movement of said beams and for supporting said scoop in a loaded position with its open end disposed upwardly during movement along said frame from the forward to rearward end thereof, and stops at the rearward terminations of said cams adapted to be engaged by said arms for pivotally moving said scoop in the same direction as formerly to discharge material beyond the rear end of said frame.

9. In a mechanical shovel, a track mounted truck, a scoop, means for moving said scoop over the top of said truck to a discharge position beyond the rearward end of said truck including a beam pivoted on said truck, an arcuate rack extending over the top of said truck, a cam track disposed above said rack, a sprocket journaled intermediate the ends of said beam and meshing with said arcuate rack, a motor on said truck for driving said sprocket, the forward end of said beam extending forwardly of said sprocket and being curved in a downward direction towards the ground when said beam is in a lowermost position and having said scoop pivotally connected thereto at a point spaced beneath said sprocket and intermediate the ends of said scoop, and a controlling arm rigid with respect to said scoop and extending inwardly from the side of said scoop which is pivotally connected to said beam, the free end of said arm having slidable engagement with said cam at a point spaced from said scoop for pivotally moving said scoop in a forward and upward direction during the initial upward movement of said beam and supporting said scoop in a loaded position during movement thereof over the top of said truck.

10. In a mechanical shovel, a track mounted truck, a scoop, means for moving said scoop over the top of said truck from a loading to discharge position beyond the rearward end of said truck including a beam pivoted on said truck, an arcuate rack extending over the top of said truck, a cam track disposed above and extending along said rack, a sprocket journaled intermediate the ends of said beam and meshing with the underside of said arcuate rack, a motor on said truck for driving said sprocket, the forward end of said beam extending beyond said truck and being curved in a downward direction toward the ground and having said scoop pivotally connected thereto at a point spaced beneath said sprocket and intermediate the ends of said scoop, a controlling arm rigid with respect to said scoop and having a free end extending inwardly from the side of said scoop which is pivotally connected to said beam, said cam track being inwardly recessed at its lower forward end and terminating in a stop at its upper rearward end, the free end of said arm being adapted to engage said cam and move therealong at a point spaced from said scoop for pivoting said scoop in an upward direction during the initial upward movement of said beam and supporting said scoop in a loaded position during movement across the top of said truck and thence pivoting said scoop to a discharge position upon engagement of the free end of said arm with said stop.

11. In a mechanical shovel, a track mounted truck, a scoop, means for moving said scoop over the top of said truck to a discharge position beyond the rearward end of said truck including a pair of spaced beams pivoted on said truck, a pair of spaced arcuate racks extending over the top of said truck, a pair of spaced sprockets mounted on the outer sides of said beams intermediate the ends thereof and meshing with the undersides of said arcuate racks, a motor on said truck for driving said sprockets, the forward ends of said beams extending beyond said frame and being curved in a downward direction towards the ground and having said scoop pivotally connected thereto at a point spaced beneath said sprockets and intermediate the ends of said scoop, a pair of guide cams extending upwardly and rearwardly along said frame above said racks, said cams having an inwardly extending recess at their lower ends and terminating in stops at their upper ends, and a pair of spaced controlling arms, rigid with respect to said scoop, extending from the side of said scoop which is pivotally connected to said beam in a direction which is inward and upward with respect thereto when said scoop is in a loading position, said controlling arms having free ends adapted to engage and ride along said cams and pivot said scoop in a forward and upward direction during the initial part of the upper movement of said beams upon engagement with said lower recesses and pivot said scoop to a discharge position over the rear end of said truck upon engagement with said stop.

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