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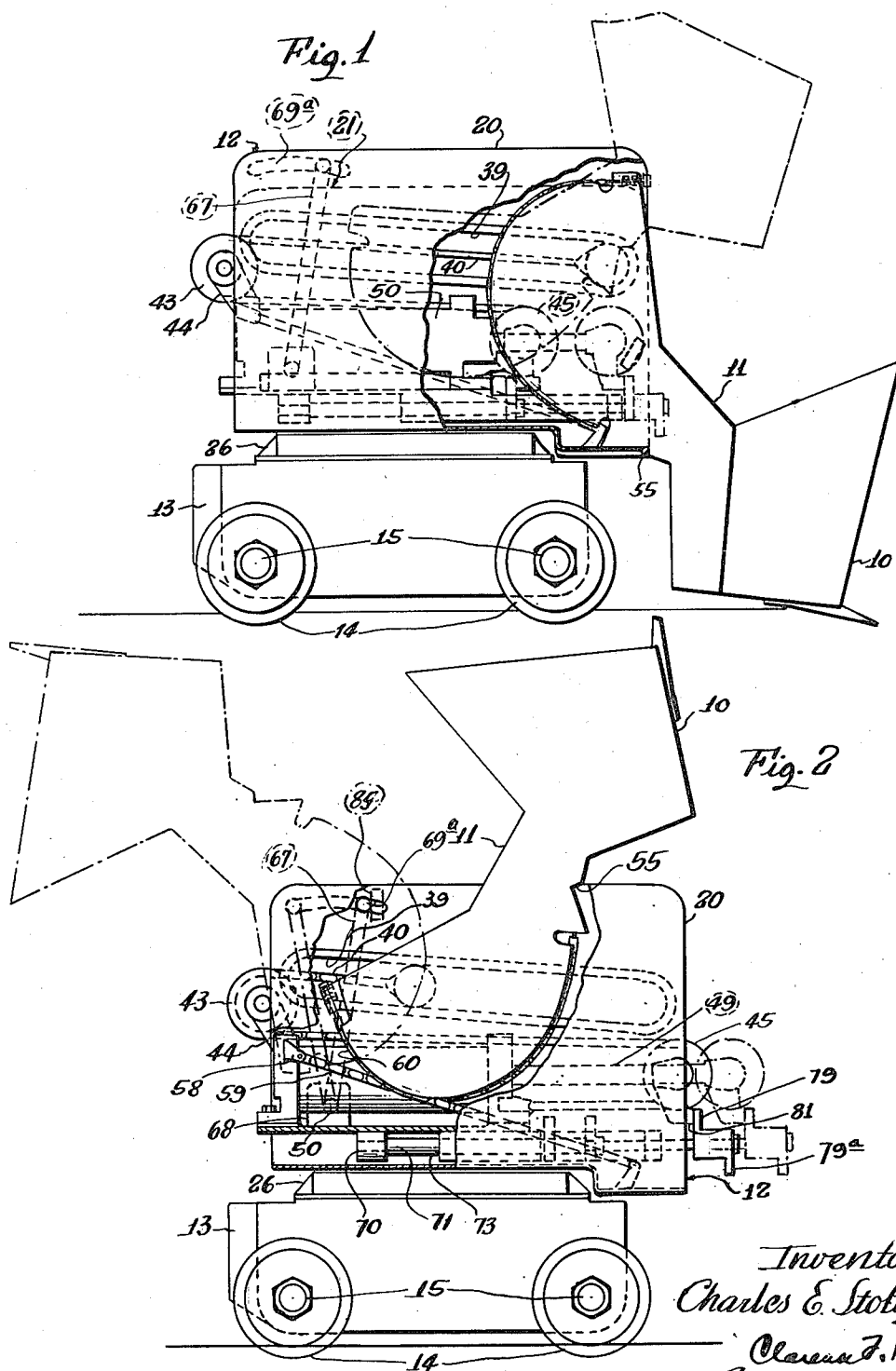
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2,231,484

MECHANICAL SHOVELING MACHINE

Filed Jan. 28, 1939

5 Sheets-Sheet 1



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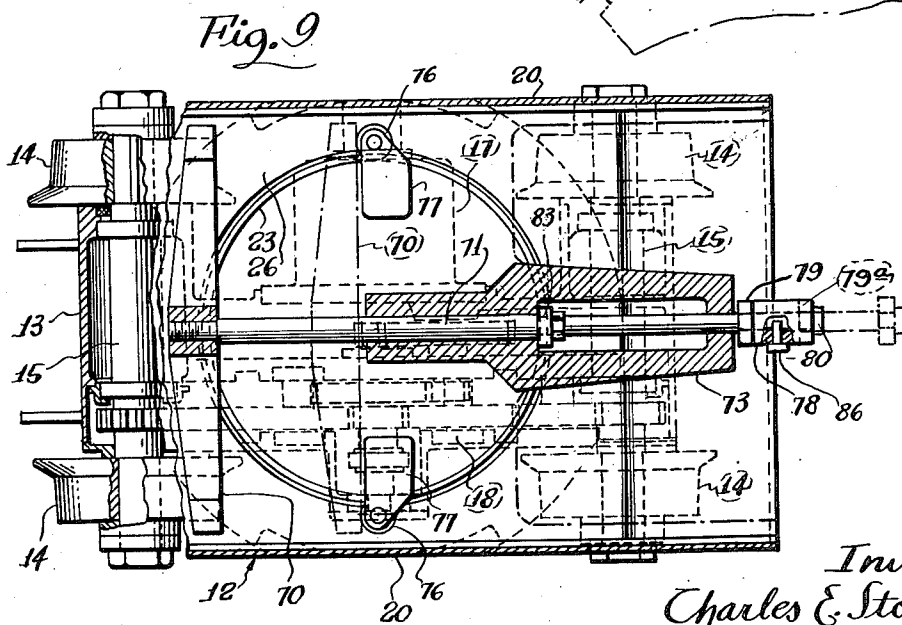
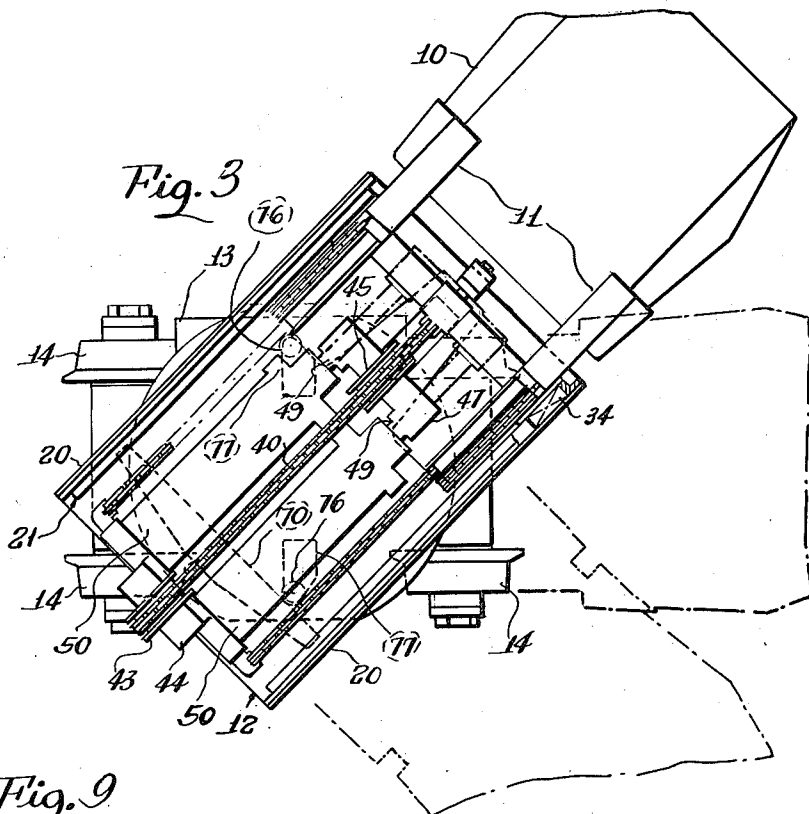
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5 Sheets-Sheet 2



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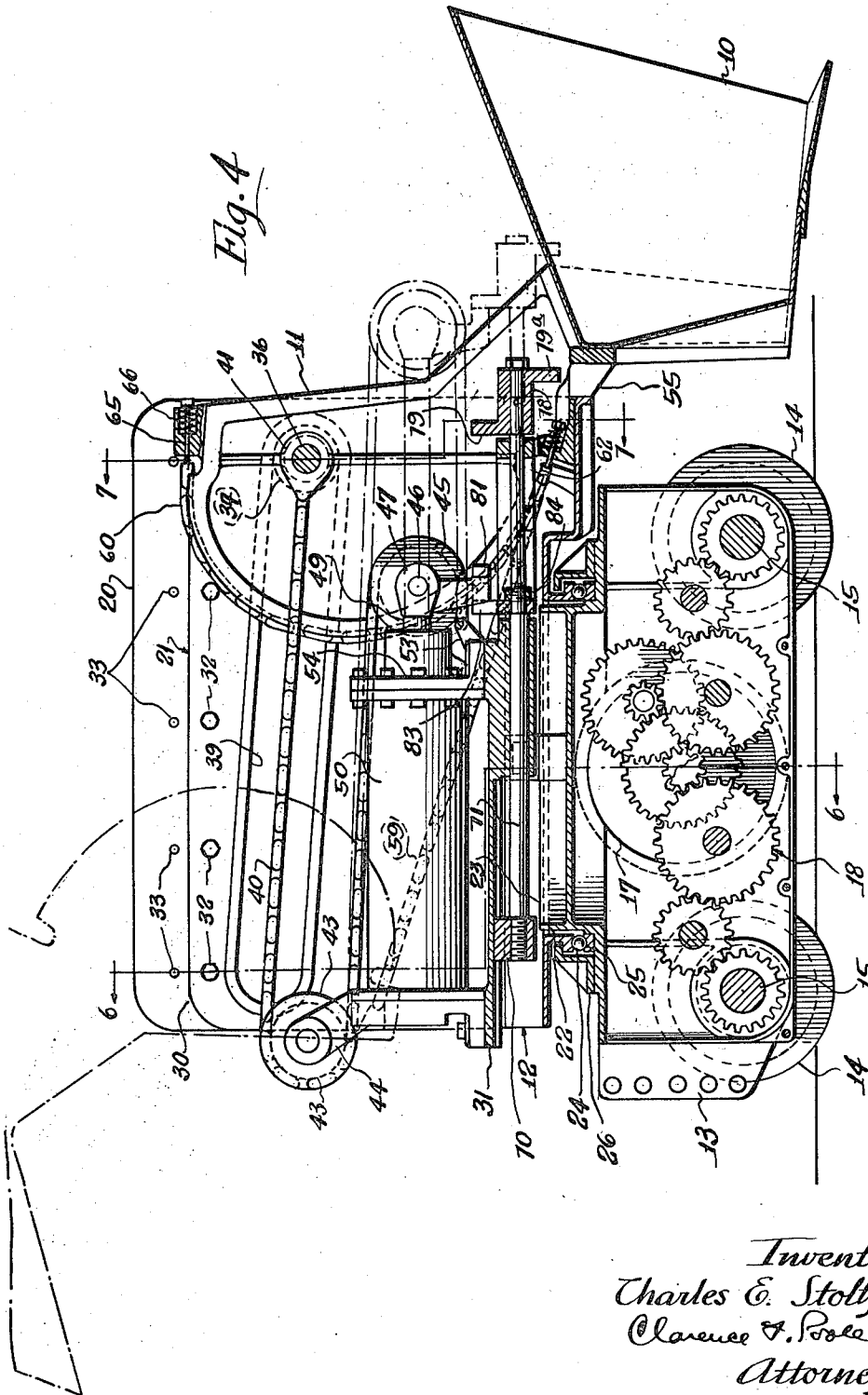
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MECHANICAL SHOVELING MACHINE

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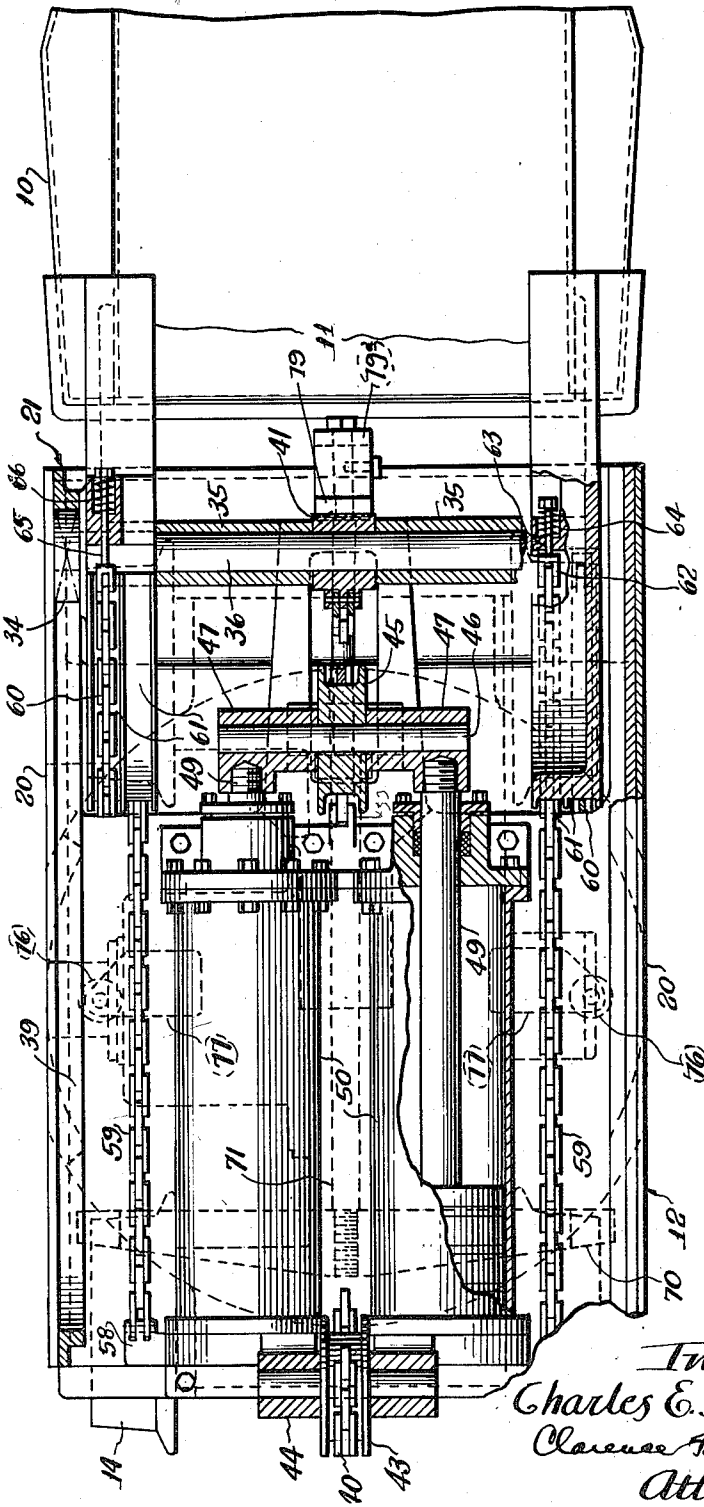
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MECHANICAL SHOVELING MACHINE

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Fig. 5



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MECHANICAL SHOVELING MACHINE

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Fig. 8

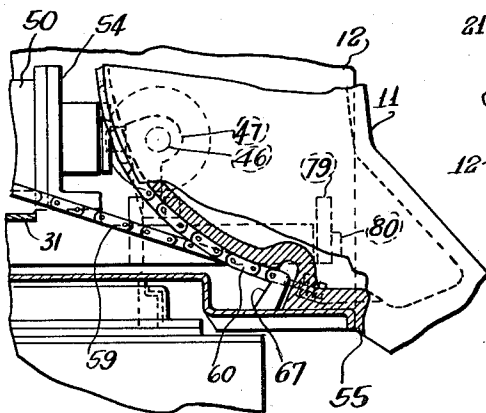


Fig. 6

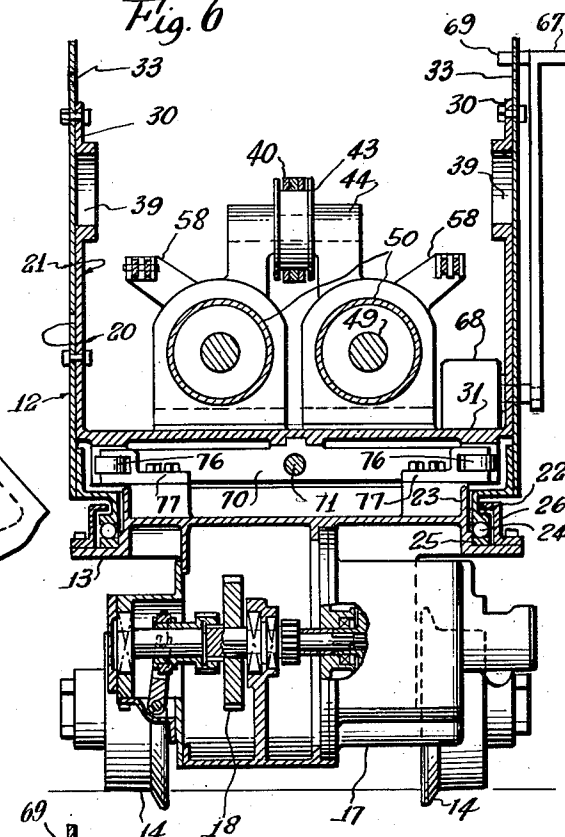
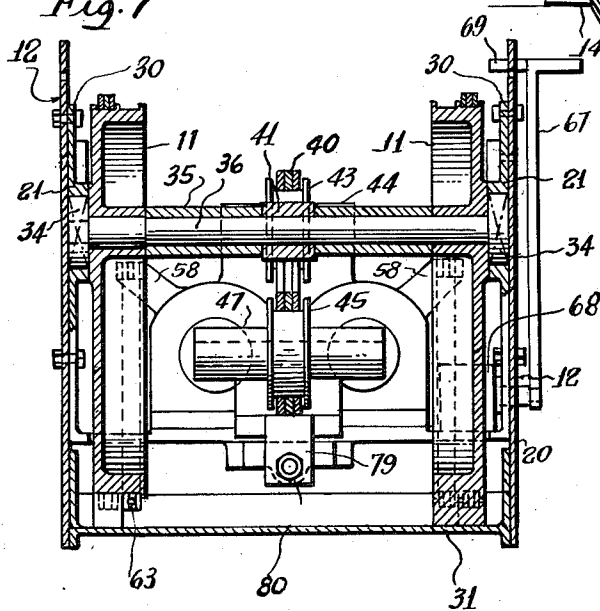


Fig. 7



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UNITED STATES PATENT OFFICE

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MECHANICAL SHOVELING MACHINE

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Application January 28, 1939, Serial No. 253,250

13 Claims. (Cl. 214—132)

This invention relates to improvements in mechanical shoveling machines of the type adapted to shovel muck or other material underground in mines.

Among the objects of my invention are to provide a mechanical shoveling machine of the mucking type which is of a light compact construction so as to readily fit in a standard mine cage without dismantling and which is simply constructed to operate in a more efficient manner than former mucking machines.

Other objects of my invention will appear from time to time as the accompanying specification proceeds and with reference to the accompanying drawings wherein:

Figure 1 is a diagrammatic view in side elevation of a mucking machine constructed in accordance with my invention with the shovel shown in a gathering position and with certain parts broken away;

Figure 2 is a diagrammatic view somewhat similar to Figure 1, but with the shovel shown in a position intermediate between the gathering and discharge position in solid lines, and shown in a discharge position by broken lines;

Figure 3 is a plan view of the device shown in Figure 1 showing the shovel positioned at one side of its supporting truck;

Figure 4 is an enlarged longitudinal sectional view of the machine;

Figure 5 is a plan view of the machine drawn to a slightly larger scale than Figure 4, and with certain parts broken away and other parts shown in horizontal section;

Figure 6 is a transverse sectional view taken substantially along line 6—6 of Figure 4;

Figure 7 is a transverse sectional view taken substantially along line 7—7 of Figure 4;

Figure 8 is an enlarged detail view showing the details of the connection of the scoop swinging means to the shovel beam; and

Figure 9 is a top plan view of the machine drawn to a somewhat smaller scale than Figure 5, with certain parts broken away and certain other parts shown in horizontal section, in order to illustrate certain details of the centering mechanism.

In the drawings, the embodiment of my invention illustrated includes generally a shovel or scoop 10 mounted on the lower ends of a pair of parallel spaced beams 11, 11 in any suitable manner. Said beams are supported by a frame 12, which is mounted on a truck 13 for turning movement with respect thereto about a vertical axis, to permit the scoop to be positioned to one side

or the other of the track. Said beams are supported by said frame for simultaneous longitudinal and swinging movement with respect thereto, for crowding the scoop into the material it is desired to load and elevating and swinging said scoop over the top of said truck to a discharge position beyond the rear end thereof.

The truck 13 is mounted on track wheels 14, 14 and axles 15, 15, which are driven by power from a motor 17, for propelling the machine about the mine along a track and crowding the scoop into the material it is desired to load. Said motor may be of any type well known to those skilled in the art but is herein preferably shown as being a fluid pressure motor of the air type. Said truck is driven from said motor through a gear train generally indicated by reference character 18, having geared connection with the front and rear axles 15, 15 for driving said axles and the track wheels 14, 14 (see Figure 4).

The shovel frame 12 includes a pair of parallel spaced upright sides 20, 20, within which a beam supporting frame 21 is mounted, and connected together by a depending flanged cylindrical portion 22. Said shovel frame is pivotally mounted on said truck on the flanged cylindrical portion 22 (see Figure 4). Said flanged portion is adapted to encircle an upwardly projecting cylindrical portion 23 of the truck 13. The bottom of the flange of said depending flanged portion forms an upper race for balls 24, 24, guided in a lower annular race 25, mounted on the frame for the truck 13 and encircling the cylindrical portion 23. An annular guiding member 26 is secured to the frame for said truck and extends around the outer side of the race 25 and upwardly and inwardly over the top of the flange of said depending flanged portion, to retain said shovel frame on said balls.

The beam supporting and guiding frame 21, mounted within the upright sides of said shovel frame, is of a channel or U-shaped formation provided with a pair of parallel spaced sides 30, 30 and a bottom 31 connecting said sides together. Said beam supporting frame is secured to the upright sides 20, 20 of said shovel frame by means of bolts 32, 32, having suitable nuts threaded thereon.

It should here be noted, with reference to Figure 4, that a series of apertures 33, 33 is provided in the upright sides 20, 20 of the frame 12, which are spaced above the apertures through which the bolts 32, 32 are shown as extending. The purpose of these apertures is to permit the elevation of the beam supporting frame 21 to be

changed and permit the bolts 32, 32 to be extended therethrough to secure said beam supporting frame to the frame 12 and thus permit adjustment of the shovel or scoop 10 to different car heights or distances of bottom below the rails. If desired, a number of sets of apertures like the apertures 33 may be provided in said sides to afford adjustability of the scoop. It should be understood that if the scoop is adjusted to load into a car of greater height, and the distance from the rail to the bottom remains unchanged, suitable spacers may be put between the beams and scoop, or the beams may be interchanged for longer beams, to support the scoop so it will engage the bottom.

With reference now in detail to the novel form and arrangement of the beams 11, 11 and their mounting in the beam supporting frame 21, each of said beams is coaxially mounted on a transversely extending shaft 36 for pivotal movement with respect thereto. Said beams are held in spaced relation with respect to each other on said shaft by means of a pair of sleeves 35, 35, abutting a connecting member 41 at their inner ends. Said shaft extends beyond the outer extremities of said beams and has an anti-friction roller 34 mounted on each end thereof. Said rollers are supported in and guided for movement along slotted rectilinear guides 39, 39, formed in the sides 30, 30 of the beam supporting frame 21. Said slotted guides, as herein shown, extend along the sides 30, 30 for substantially the entire length thereof, and are inclined in an upward direction from the front to rear end of said frame in order to properly position the scoop for discharging material therefrom, and to cooperate with the beams 11, 11 and means for moving said beams along said guides and the means for swinging said beams in an upward direction upon movement along said guides, to increase the velocity of swinging movement of the scoop as it reaches the rear end of the truck.

The shovel beams 11, 11 are each provided with a lower shouldered portion 55 which is adapted to engage the forward end of the frame 12 to limit rearward swinging movement of the scoop 10 and beams, and permit crowding of said scoop into the material it is desired to gather, by tractive effort of the track wheels 14, 14.

A flexible member 40, herein shown as being a flexible chain, is provided to move the beams 11, 11 and the scoop 10 along the guides 39, 39. Said flexible chain is secured at one of its ends to the connecting member 41, pivotally mounted on the shaft 36 between the inner ends of the sleeves 35, 35. Said chain extends from said connecting member rearwardly along the frame 12 and around a sheave 43, mounted on the upper end of a bracket 44, projecting upwardly from and secured to the bottom 31 of the beam supporting frame 21. Said flexible chain extends forwardly from said sheave to and around a sheave 45, journaled on a shaft 46 and disposed between the inner ends of a pair of brackets 47, 47, within which said shaft is mounted at its ends. Each of said brackets is herein shown as being threaded on the end of a piston rod 49, extensible from a cylinder 50. Said cylinders extend longitudinally of the frame 12 and are mounted on the bottom 31 of the beam supporting frame 21 in parallel spaced relation with respect to each other. The free end of said chain is secured to a lug 53 projecting forwardly and upwardly from the forward end of a member 54, which serves

to secure the forward ends of said cylinder to said bottom.

The cylinders 50, 50, as herein shown, are fluid pressure cylinders of the air type, although they may be of any other well known type, and are so arranged that the admission of air in the head end thereof will extend the piston rods 49, 49 therefrom and cause rearward movement of the upper strand of the flexible member 40 and the beams 11, 11 along the guides 39, 39.

The means for swinging the beams 11, 11 in an upward direction about the pivotal axis of the rollers 34, 34 and shaft 36 and swinging the scoop 10 over the truck to a discharge position beyond the rear end of the truck as it is moved longitudinally therealong in the guides 39, 39 includes two flexible members 59 and 60 having engagement with the face of each beam 11, which is the rear face thereof when the scoop is in a lowered position. The rear face of each beam is provided with two channeled guides 61, 61 of a similar formation, one of said guides being adapted to have the chain 59 trained therearound and the other of said guides being adapted to have the chain 60 trained therearound. The outer periphery of each of said guides is of a cam shaped arcuate formation, formed by a varying radius, the length of which is greatest at the point of connection of the scoop 10 to said beams, and decreases as the curve progresses away from said scoop.

Each chain 59 is secured at one of its ends to a lug 58. Said lugs project outwardly from the bracket 44 adjacent the outer sides of the cylinders 50, 50 in a plane which is at substantially the lower end of the sheave 43. The opposite ends of said chains are yieldably secured to the beam 11, adjacent the point of connection of said beams to the scoop 10, by connecting members 62, 62 extending through portions 63, 63 of said beams, which are disposed just above and rearwardly of the junction point between said scoop and beams. Each of said connecting members is encircled by a spring 64, which is interposed between a suitable nut threaded on the end of said member and the forward end of the portion 63 of said associated beam.

The chains 60, 60 are yieldably secured at one of their ends to the upper ends of the beams 11, 11 by means of connecting members 65, 65 encircled by springs 66, 66. From said connecting members said chains extend along the outer channeled guides 61, 61 of each beam and are connected at their opposite end to spaced apart lugs 67, 67 projecting upwardly from the bottom of the frame 12, adjacent the forward end thereof (see Figure 8).

It may be seen from the foregoing that as the beams 11, 11 and scoop 10 are moved rearwardly along the guides 39, 39 by the chain 40, and progress rearwardly along said frame, the chains 60, 60, fixed to the forward end of the frame 12 and to the upper ends of said beams, will be unwrapped from said beam by movement of said beams along said guides, and the pull of said chains on the upper ends of said beams will pivot said beams and scoop about their axis of connection to the frame 21, in an upward and rearward direction, until a discharge position is reached beyond the rear end of the truck, the chains 59, 59 at the same time being wrapped around the rear ends of said beams in their associated guides 61, 61. As said scoop and beams are moving to a lowered position, the chains 59, 59 exerting a pull against the beams 11, 11 adjacent

the junction point between said scoop and beams, will cause said beams to travel forwardly along the guides 39, 39 and pivot downwardly to pivot said scoop to a gathering position.

It should be noted that when the scoop 10 is in a lowered position for gathering, that the chains 59, 59 are inclined from the front to the rear end of the truck in an upward direction, and that when said scoop is in a discharge position, the chains 60, 60 are inclined from the rear to forward end of the truck in a downward direction in a plane parallel to the plane of inclination of the chains 59, 59. The form of the arcuate rear end of the beams 11, 11 formed on a radius, which decreases from the point of juncture between said scoop and beams, and the upwardly inclined angle of the slotted guides 39, 39 and relationship between said slotted guides and the angular position of the chains 59 and 60, is such that when the scoop 10 is in a lowermost position, as shown in Figures 1 and 4, a greater leverage is exerted on the scoop than when it is nearing its discharge position. This will swing said scoop forwardly and upwardly at a relatively slow speed for digging and loading, said leverage, upon initial movement of said scoop, being from the center of the transverse shaft 36 to the point of connection of the chains 60, 60 to the frame 12. As the beams 11, 11 are moved rearwardly along the slotted guide 39 by the chain 40, and as the scoop and beams at the same time are swung in an upward direction, the power required to swing said scoop decreases, and the leverage exerted on the scoop, for swinging it, decreases, due to the decreasing radius of the rear face of the channeled guides 61, 61. This causes an increase in speed of swinging movement of the scoop, as it moves upwardly to a discharge position, as shown by broken lines in Figures 2 and 4. The scoop is thus crowded into the loose material and loaded with loose material at a relatively slow rate of speed, and when loaded, is moved towards the rear of the machine at an increasing rate of speed, which permits fast loading and movement of the scoop to a discharge position.

When the scoop is in the discharge position shown by broken lines in Figures 2 and 4 and has discharged its load, the rollers 34, 34, engaging the rear extremities of said guides, will stop further movement of said scoop. At this point, said scoop is in a position overhanging the axis of pivotal movement of the beams 11, 11, a distance sufficient to prevent said scoop from returning to a lowered gathering position of its own accord. A suitable means is provided to start the scoop and beams on their return path so that said scoop and beams may return to a gathering position by gravity. Said means may be of any form, but as herein shown, includes a lever 67 which controls valves 68, for controlling admission of air under pressure to the cylinders 50, 50 (see Figures 2, 6 and 7). When said lever is moved in a direction to release air pressure from said cylinders, a lug 69 extending inwardly from said lever through a slot 69a in the side wall 20 of the frame 12 is adapted to engage a lug 85 projecting outwardly from the beam 11 adjacent said lever, and manual movement of said lever in a direction towards the forward end of the machine will pivot said beams and scoop in a forward direction, to a position where said scoop and beams may return to a lowered position by gravity. The distance the scoop must be moved to return of its own accord

and the effort required to do this is very slight, as may be seen in Figures 2 and 4.

The frame 12 may be turned manually, to position the scoop to gather from either side of the track, by the manual exertion of pressure on either side thereof. A novel form of centering mechanism operated by the piston rods 49, 49 is provided to automatically return said frame and scoop to an aligned position with respect to the truck upon upward swinging movement of said scoop, to position said scoop to discharge directly into a mine car. Said centering mechanism, as herein shown, includes a transversely extending member 70 mounted on the end of a longitudinal shaft 71. Said shaft is slidably guided in a guide 73 formed integral with the beam supporting frame 21 and depending from the bottom thereof. Said transversely extending member extends across and slidably engages the underside of the bottom 31 of the beam supporting frame 21 at its ends, and when the frame 12 is turned with respect to the truck 13, said member is adapted to engage, at either of its ends, either one of a pair of spaced apart rollers 76, 76 mounted on the frame for the truck. Said rollers are mounted in brackets 77, 77 projecting upwardly from the truck frame and outwardly from the outer portion of the upwardly projecting cylindrical portion 23 thereof. A member 78 is mounted on the end of the shaft 71 opposite from the transversely extending member 70. Said member is mounted for axial adjustment with respect to said shaft and is provided with an abutment portion 79 which is upright when in the position shown in Figure 4, and a forward spaced abutment portion 79a which depends from said shaft when in the position shown in said last mentioned figure. Said member engages a shouldered portion of said shaft and is held in engagement therewith by a nut 80 threaded on the end of said shaft. The abutments 79 or 79a are adapted to be engaged by an abutment 81 depending from the central portion of the bracket 47 (see Figures 2 and 4). An abutment 83 spaced inwardly along said shaft from the abutment 79 likewise abuts a shouldered portion of said shaft and is secured to said shaft by means of a nut 84. It should here be noted with reference to Figure 4 that the abutments 79 and 81 are spaced a substantial distance apart and that the abutment 81 does not engage the abutment 79 until the scoop is elevated above the ground to the position shown by broken lines in Figure 1. This permits upward movement of the beams and scoop above the loose material on the ground before the centering operation commences, and prevents scattering of the material caused by sidewise swinging of the scoop in the loose material before said scoop is fully loaded.

As the frame 12 is swung to one side or the other of the truck, and upon forward movement of the piston rods 49, 49 and abutment 81, said abutment will engage the abutment 79 when said piston rods are moved forwardly a distance sufficient to raise said scoop to the position shown in Figure 1, and further movement of said piston rods will longitudinally move the shaft 71 in the guide 73 in a forward direction. Upon engagement of either end of the transversely extending member 70 with either of the rollers 76, and forward movement of said transversely extending member along the underside of the frame 21, said member, bearing against one of said rollers, will swing the frame 12 and align said scoop and beams with the truck 13 when they reach a dis-

charge position, in an obvious manner. When said scoop and beams are in alignment with the truck, opposite ends of said transversely extending members will engage opposite rollers 76, 76, to hold said frame in such a position until the scoop has moved on its return path a distance sufficient for the abutment 81 to engage the abutment 83, and return the member 70 to an inoperative position.

10 The abutment 79a is provided for use where the shovel is loading around a curve and it is not desired to align the scoop with its supporting truck, but merely move it automatically a distance sufficient to permit it to discharge directly into a car. When loading under these conditions, a pin 86 is disengaged from the shaft 71 and the member 78 is rotated 180 degrees to position the abutment 79a in an upright position so it may be engaged by the member 81. Said member is then locked in this position by said pin. It will be seen that when in this position, movement of the piston rods 49, 49 and abutment 81 will move the member 70 a shorter distance than when engaging the abutment 79, so that movement of said member and turning movement of the frame 12 will stop before said member engages both of the rollers 76 to permit the scoop to load directly into a car when on a curve and when picking up material from the outside of the curve. When said scoop is picking up material from the inside of the curve, it must be moved past center to discharge into a car on a curve. Since the member 70 stops before engaging both of the rollers 76, the frame 12 and scoop 10 may be swung manually a distance past the center of the truck and thus position said scoop to discharge into a car when gathering material from the inside of the curve.

It will be seen from the foregoing that the centering mechanism for aligning the scoop with its supporting truck, when in a discharge position, is of a simplified and novel form and serves to lock the frame and scoop in an aligned position during discharge, but permits adjustment of the amount of movement of the frame to accommodate the shovel for loading when on a curve and permits free turning movement of the frame when the scoop has been returned to a lowered gathering position. It may likewise be seen that this centering mechanism does not come into effect until the scoop has been elevated above the ground a substantial distance, to prevent the scattering of the loose material by the scoop during gathering.

55 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:

65 1. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame on said truck including a pair of parallel spaced side frame members having supporting guides extending therealong, a beam supported by said guides for movement therealong and for vertical swinging movement with respect thereto about an axis disposed within the limits of said guides, a scoop on the end of said beam, said beam having an arcuate portion which is its rear portion 75 when said scoop is in a lowered position, the per-

riphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam rearwardly along said guides, a pair of flexible members cooperating with the arcuate periphery of said beam for vertically swinging said beam at increasing speeds as it is moved towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position.

2. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame mounted on said truck and including a pair of parallel spaced side frame members having supporting guides extending therealong, a beam supported by said guides for movement therealong and for vertical swinging movement with respect thereto about an axis disposed within the limits of said guides, a scoop on the end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam rearwardly along said guides, a pair of flexible members cooperating with said arcuate periphery of said beam for vertically swinging said beam at increasing speeds as it is moved towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, and the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position, and said means for moving said beam rearwardly along said guides including extensible means and a flexible power member actuated thereby and movable longitudinally of said frame and having connection with said beam at a point coaxial with its pivotal axis.

3. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame on said truck including a pair of parallel spaced upright side frame members having supporting guides extending therealong and inclined in an upward direction from the forward to rear end of said frame, a beam supported by said guides for movement therealong and for vertical swinging movement with respect thereto about an axis disposed intermediate the ends of said beam and within the limits of said guides, a scoop on one end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery

of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam rearwardly along said guides, and a pair of flexible members cooperating with said arcuate periphery of said guides for vertically swinging said beam at increasing speeds as it is moved towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position.

4. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame on said truck including a pair of parallel spaced upright side frame members having supporting guides extending therealong and inclined in an upward direction from the forward to rear end of said frame, a beam supported by said guides for movement therealong and for vertical swinging movement with respect thereto about an axis disposed intermediate its ends and within the limits of said guides, a scoop on one end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said scoop and beam longitudinally along said truck and simultaneously swinging said scoop and beam in a vertical direction at an increasing velocity from the forward to discharge end of said frame including a flexible power member having connection with said beam at a point coaxial with its axis of pivotal movement, and a pair of flexible members cooperating with the arcuate periphery of said beam, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, and the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position.

5. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame on said truck including a pair of parallel spaced side frame members having rearwardly extending supporting guides inclined in an upward direction from the forward to rear end of said frame, a beam supported by said guides for movement therealong and for vertical swinging movement with respect thereto about an axis disposed intermediate its ends and within the limits of said guides, a scoop on one end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position,

the periphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said scoop and beam longitudinally along said truck and simultaneously swinging said scoop and beam in a vertical direction at speeds which increase from the forward to discharge end of said frame including a cylinder and piston and a flexible member actuated thereby and having connection with said beam at a point coaxial with its axis of pivotal movement, and a pair of flexible members cooperating with said arcuate periphery of said beam, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame in a plane parallel with the plane of inclination of said first mentioned flexible member when said beam and scoop are in an upward discharge position.

6. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame mounted for horizontal turning movement on said truck and including a pair of parallel spaced side frame members having aligned supporting guides therein, a transverse shaft supported by said guides for movement along said frame, a beam pivotally mounted on said shaft, a scoop on the end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam along said guides, and a pair of flexible members cooperating with the arcuate periphery of said beam for vertically swinging said beam at an increasing velocity towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, and the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position.

7. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame mounted for horizontal turning movement on said truck and including a pair of parallel spaced side frame members having aligned supporting guides therein, inclined in an upward direction from the forward to rear end of said frame, a transverse shaft supported by said guides for movement along said frame, a beam pivotally mounted on said shaft, a scoop on the end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery of which is formed

on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam along said guides, and a pair of flexible members cooperating with the arcuate periphery of said beam for vertically swinging said beam at increasing speeds as it is moved towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, and the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position.

8. In a mechanical shoveling machine and in combination with a self-propelled truck, a frame mounted for horizontal turning movement on said truck and including a pair of parallel spaced side frame members having aligned supporting guides therein, inclined in an upward direction from the forward to rear end of said frame, a transverse shaft supported by said guides for movement along said frame, a beam pivotally mounted on said shaft, a scoop on the end of said beam, said beam having an arcuate portion, which is its rear portion when said scoop is in a lowered position, the periphery of which is formed on a varying radius, decreasing away from the point of connection of said beam to said scoop, means for moving said beam along said guides, and a pair of flexible members cooperating with the arcuate periphery of said beam for vertically swinging said beam at increasing speeds as it is moved towards the rear end of said truck, one of said members having connection with the rear end of said frame at one of its ends and with said beam at its opposite end at a point disposed adjacent said scoop, said member being inclined in a downward direction from the rear to forward end of said frame when said scoop is in a lowered position, and the other of said members having connection with the forward end of said frame at one of its ends and having connection with the end of said beam away from said scoop at its opposite end, and said member being inclined in an upward direction from the front to rear end of said frame when said beam and scoop are in an upward discharge position, and said means for moving said beam along said guides including an extensible member, and a flexible member actuated by said extensible member and having operative connection with said shaft.

9. In a mechanical shoveling machine, a truck, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a scoop on the end of said beam, said beam being mounted on said frame for moving said scoop from a gathering position in front of said truck to a discharge position beyond the rear end thereof, means for actuating said beam including a fluid pressure cylinder and plunger, and means actuated by said cylinder and plunger for swinging said frame laterally about said vertical axis to align said scoop and frame with said truck when said scoop reaches a discharge position and lock said frame in such a position until said scoop has moved a

predetermined distance towards an initial gathering position including a member guided in said frame for movement longitudinally thereof, a pair of laterally spaced abutments on said truck adapted to be engaged by said member and so arranged that upon longitudinal movement of said member, engagement of either of said abutments by said member will cause said frame to turn to an aligned position with respect to said truck, and engagement of both of said abutments with said member will lock said frame from swinging movement.

10. In a mechanical shoveling machine, a truck, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a scoop on the end of said beam, said beam being mounted on said frame for moving said scoop from a gathering position in front of said truck to a discharge position beyond the rear end thereof, means for actuating said beam including a fluid pressure cylinder and plunger, means actuated by said cylinder and plunger for aligning said scoop and frame with said truck when said scoop reaches a discharge position and locking said frame in such a position until said scoop has moved a predetermined distance towards an initial gathering position including a transversely extending member guided for movement longitudinally of said frame, a pair of laterally spaced abutments on said truck adapted to be engaged by said member, and means for moving said member longitudinally of said frame for swinging said frame upon engagement of said member with either of said abutments including an abutment member adapted to be moved longitudinally of said frame by said cylinder and plunger, another abutment member having operative connection with said transverse member, said first mentioned abutment member being adapted to engage said second mentioned abutment member upon upward movement of said scoop and beam to a predetermined point, and being adapted to cause longitudinal movement of said member upon further movement of said scoop and boom, for engaging said member with either one of said abutments on said truck.

11. In a mechanical shoveling machine, a truck, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a scoop on the end of said beam, said beam being mounted on said frame for moving said scoop from a gathering position in front of said truck to a discharge position beyond the rear end thereof, means for actuating said beam including a fluid pressure cylinder, a piston rod extensible therefrom, means actuated by said piston rod upon movement thereof a predetermined distance for aligning said scoop and frame with said truck when said scoop reaches a discharge position and locking said frame in such a position until said scoop has moved a predetermined distance towards an initial gathering position including a transversely extending member guided for movement longitudinally of said frame, and a pair of laterally spaced abutment members on said truck adapted to be engaged by said member so that engagement of either of said abutment members by said transverse member will swing said frame upon movement of said transverse member until both of said abutment members are engaged by said transverse member, for locking said frame from swinging movement.

12. In a mechanical shoveling machine, a truck mounted on a track, a frame mounted on said truck for turning movement with respect thereto

about a vertical axis, a shovel beam, a scoop on the end of said beam, said beam being mounted on said frame for moving said scoop from a gathering position in front of said truck to a discharge position beyond the rear end thereof, means for actuating said beam including a fluid pressure cylinder and piston, and means actuated by said cylinder and piston for aligning said scoop and frame with said track when said scoop reaches a discharge position including a transversely extending member guided for movement along said frame, an abutment having operative connection with said member, an abutment operatively connected with said piston and spaced from said first mentioned abutment when said abutment member is in a retracted position with respect to said cylinder to permit movement of said piston a predetermined distance before engagement of said abutments with each other, and a pair of abutment members on said truck, said abutment members being transversely spaced so that engagement of either of said abutment members by said transverse member will cause swinging movement of said frame upon movement of said member until both of said abutment members are engaged by said member, for locking said frame from swinging movement.

13. In a mechanical shoveling machine, a truck mounted on a track, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a scoop on the end of said beam, said beam being mounted on said frame for moving said scoop from a gathering position in front of said truck to a discharge position beyond the rear end thereof,

means for actuating said beam including a fluid pressure cylinder and piston, and means actuated by said cylinder and piston for automatically turning said frame on said truck and bringing said frame and scoop to an aligned position with respect to said track including a pair of laterally spaced abutment members on said truck, a member guided for movement longitudinally of said frame, a transversely extending member mounted on one end of said longitudinally guided member for movement therewith and adapted to engage either of said abutment members for causing turning movement of said truck upon movement of said member, and a member on the opposite end of said longitudinally guided member having a pair of spaced apart abutment surfaces, engaging means operatively connected with said piston, said member being mounted on said longitudinally guided member for axial movement with respect thereto, to permit positioning of said member so that either one of said abutment surfaces may be engaged by said engaging means, and permit said engaging means to move said transverse member a distance sufficient to center said frame on said truck when one of said surfaces is engaged by said engaging means and move said transverse member a lesser distance to turn said frame to one side of center and align said frame and scoop with a curved track when working around curves and said scoop is gathering from one side of the truck and also permit manual movement of said frame a distance past center when gathering from the opposing side of the track.

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