

May 16, 1950

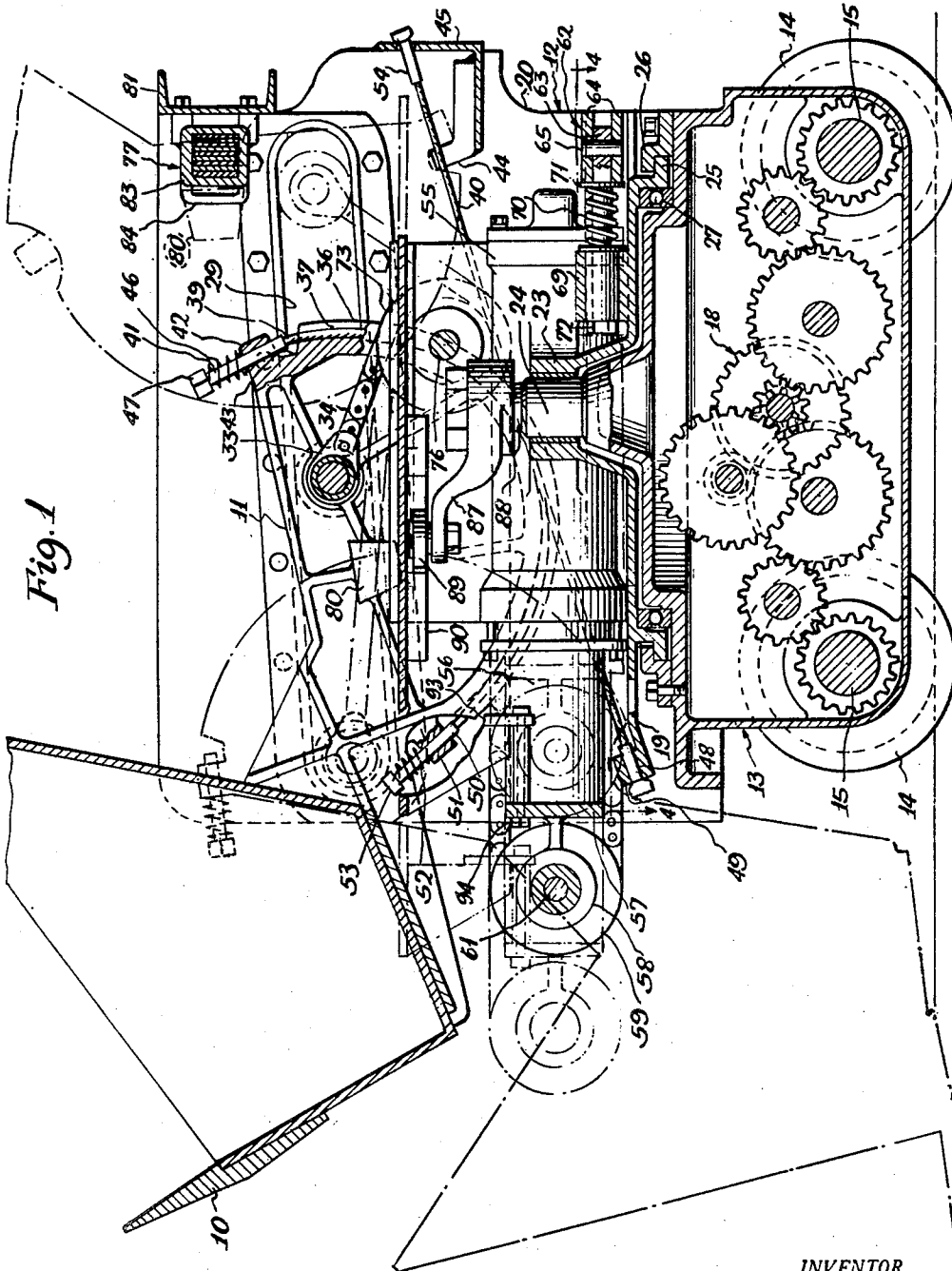
M. W. SHERWOOD

2,507,548

MECHANICAL SHOVELING MACHINE

Filed Dec. 5, 1947

5 Sheets-Sheet 1



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MECHANICAL SHOVELING MACHINE

2,507,548

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5 Sheets-Sheet 2

Fig. 2

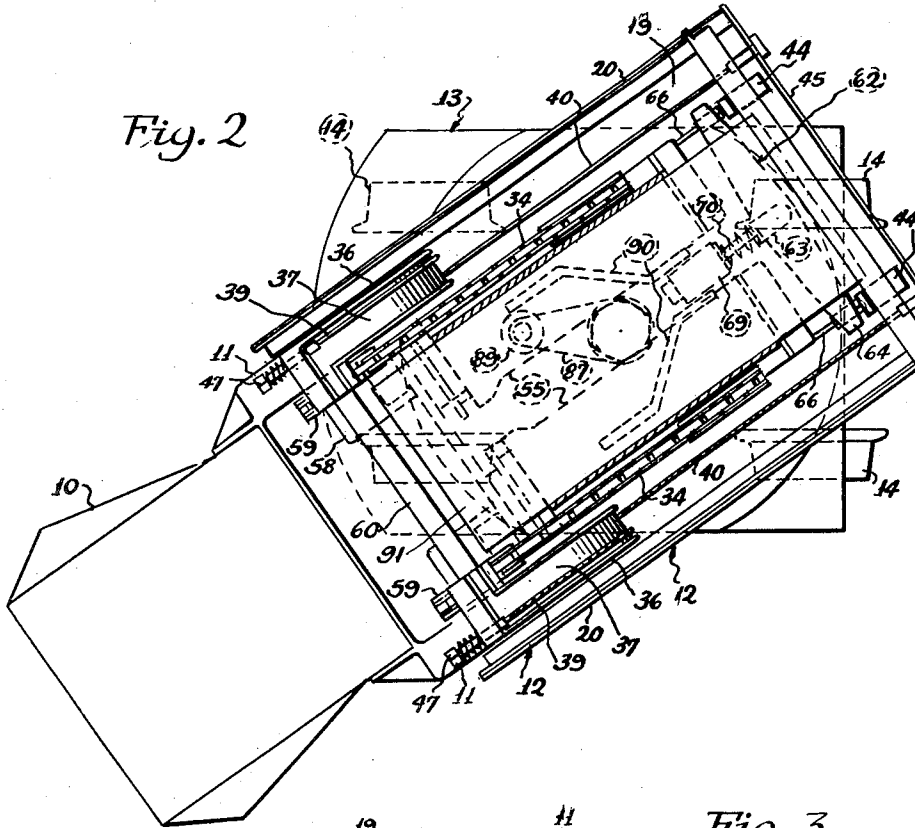
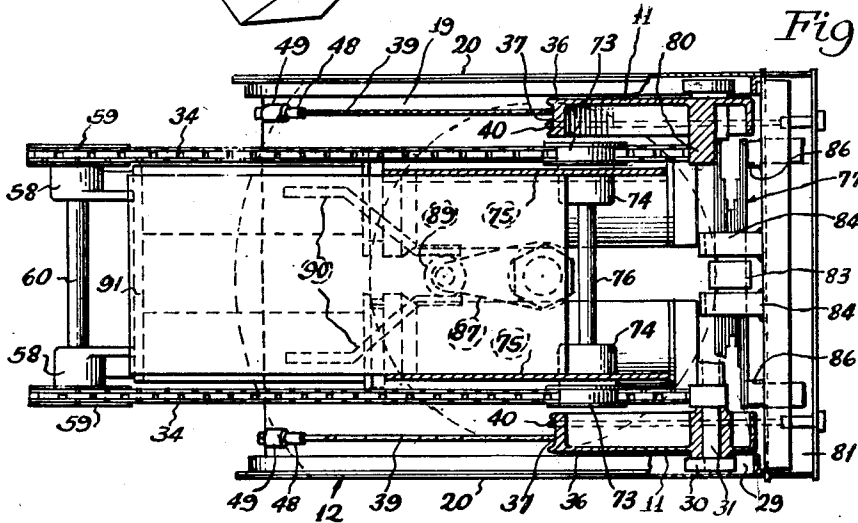


Fig. 3



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MECHANICAL SHOVELING MACHINE

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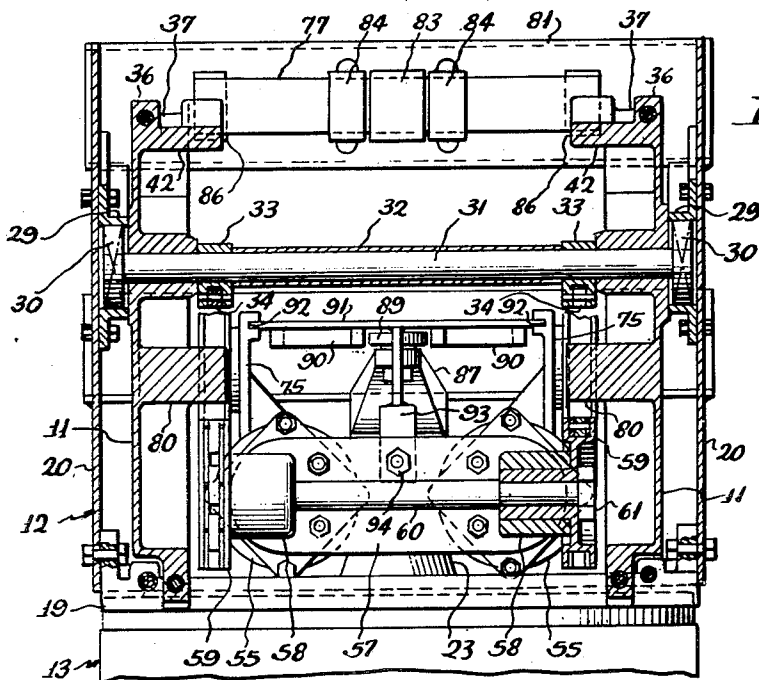


Fig. 6

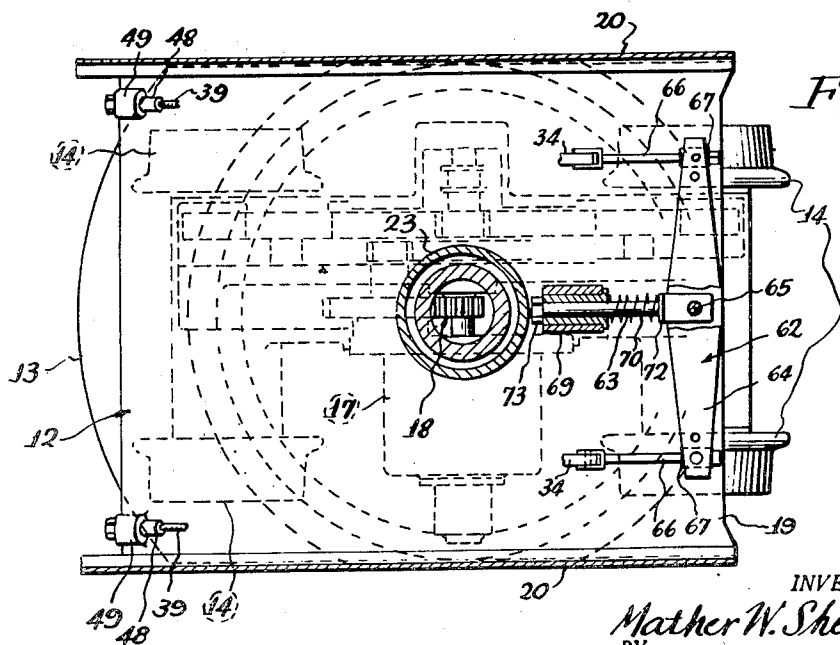


Fig. 4

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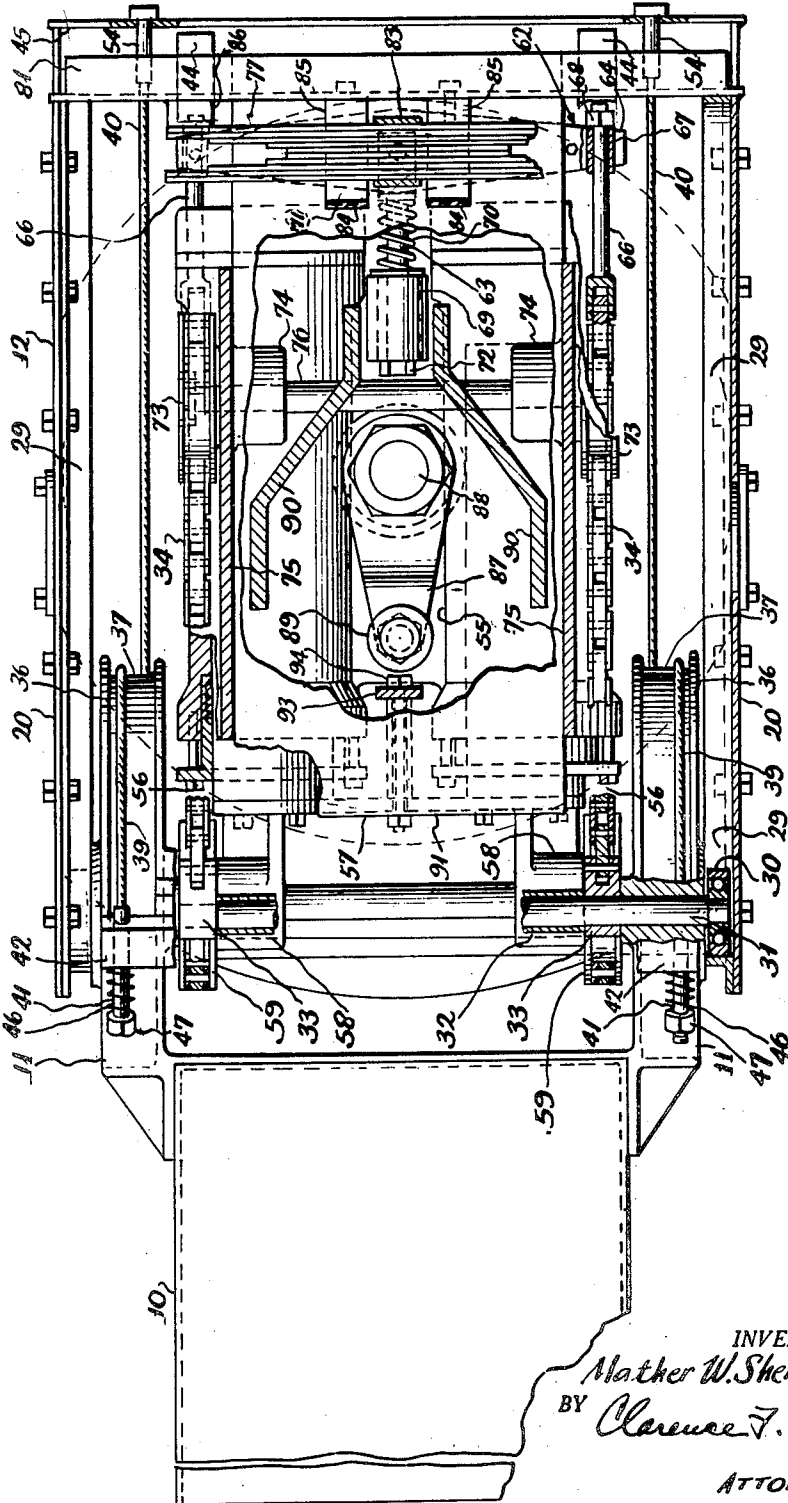
2,507,548

MECHANICAL SHOVELING MACHINE

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5 Sheets-Sheet 4

Fig. 5



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MECHANICAL SHOVELING MACHINE

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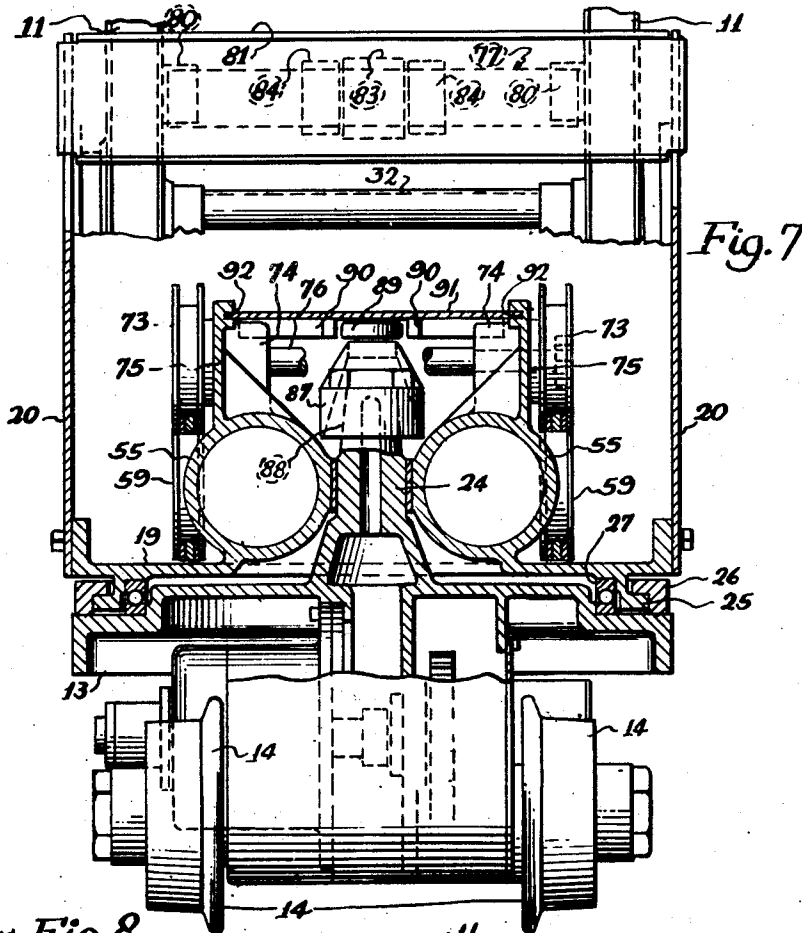


Fig. 7

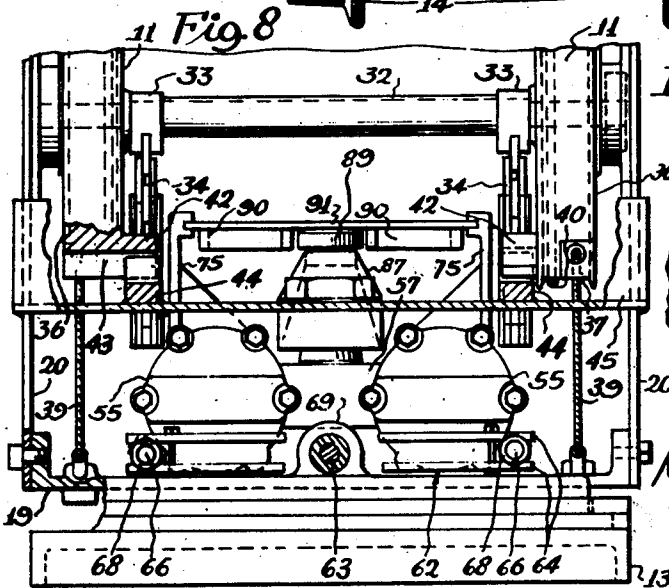


Fig. 8

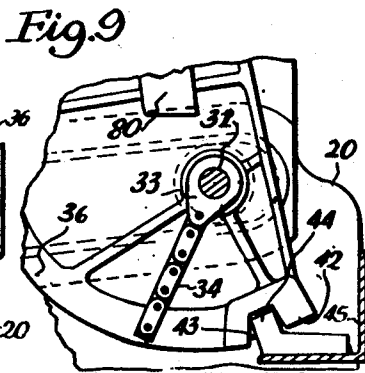


Fig. 9

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UNITED STATES PATENT OFFICE

2,507,548

MECHANICAL SHOVELING MACHINE

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Application December 5, 1947, Serial No. 789,804

11 Claims. (Cl. 214—132)

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

Among the objects of my invention are to provide a novel and efficient form of mechanical shoveling machine of the mucking type, of a simple, compact, and light construction, and arranged with a view towards utmost simplicity and efficiency in operation.

A more specific object of my invention is to provide an improved form of mechanical shoveling machine of the mucking type wherein a shovel or bucket on the end of a rocking beam is moved from a gathering position in front of the machine to a discharge position over the top of the machine and beyond the rear end thereof, by flexible means operated by fluid pressure means, and wherein the flexible means is so arranged as to arrest the motion of the bucket as it moves to a discharge position while the fluid pressure means is still moving in a direction to elevate the bucket, to diminish the violence with which the bucket reverses its direction of travel, and to pull the bucket forwardly towards a gathering position until gravity can exert itself to move the bucket downwardly to a gathering position.

A still further object of my invention is to provide a simplified form of centering device for aligning the bucket with the truck when in a discharge position, and so positioned as to avoid clogging with dirt and muck.

The device of my invention is somewhat similar to that disclosed in Patent No. 2,231,484, which issued to Charles E. Stoltz, February 11, 1941, but differs therefrom in that the means for elevating the bucket also serves to check it and start it on its downward path, and also differs in the means for aligning the bucket with the truck, when in a discharge position.

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

Figure 1 is a view in side elevation of a mucking machine constructed in accordance with my invention, with certain parts thereof shown in substantially longitudinal section;

Figure 2 is a plan view of the mucking machine drawn to a smaller scale than Figure 1, and showing the bucket positioned to pick up material from one side of its supporting truck;

Figure 3 is a plan view of the machine, drawn to the same scale as Figure 2 and showing the

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bucket in centered relation with respect to its supporting truck, and also showing certain parts broken away and certain other parts in horizontal section, in order to illustrate certain details of my invention;

Figure 4 is a horizontal sectional view taken substantially along line 4—4 of Figure 1;

Figure 5 is a plan view of the machine drawn to substantially the same scale as Figure 1, with certain parts broken away and certain other parts shown in horizontal section in order to illustrate certain details of my invention not shown in Figures 2 and 3;

Figure 6 is a fragmentary front end view of the machine with certain parts thereof shown in transverse section;

Figure 7 is a rear end view of the machine with certain parts broken away and certain other parts shown in transverse section;

Figure 8 is a fragmentary rear end view of the machine with certain other parts shown in transverse section than in Figure 5; and

Figure 9 is a partial fragmentary detail view showing certain details of the interengaging connection between the beams and shovel frame, when the bucket is in a discharge position.

In the drawings the embodiment of my invention illustrated includes generally a shovel or dipper bucket 10 suitably mounted on the lower ends of a pair of parallel spaced rocking beams 11, 11. Said beams are supported on and movable along a frame 12, mounted on a truck 13, for turning movement with respect thereto about a vertical axis, to permit the bucket to be positioned for gathering from one side or the other of the track.

The truck 13 is mounted on track wheels 14, 14 and axles 15, 15 which are driven by power from a motor 17 through a gear train 18, for propelling the machine about the mine and for crowding the bucket into the material it is desired to load (see Figures 1 and 4). Said motor may be of any type desired, but is herein preferably shown as being a well known form of fluid pressure motor of the air type and said motor and gear train are not herein shown or described in detail since they form no part of my present invention.

The shovel frame 12 includes a base plate 19 having a pair of parallel spaced side walls 20, 20 extending upwardly from opposite sides thereof. Said base plate also has an integrally formed upwardly extending central bearing boss 23, journaled on an upright boss 24, extending upwardly from the central portion of the truck 13. Said

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base plate also has a depending annular flanged portion 25 engaged by sectors of annular gibbed retaining guides 26, 26, secured to the top of the truck frame, for guiding said shovel frame for movement about the axis of the boss 24 and for preventing tilting movement of said frame with respect to said truck during operation of the machine. An annular bearing 27, herein shown as being an anti-friction bearing, is mounted inwardly of the annular flanged portion 25 and forms a support for said plate on said truck.

Rectilinear supporting guides 29, 29, for the beams 11, 11, are mounted on the insides of the side walls 20, 20 and extend inwardly therefrom and longitudinally therealong, in a slightly upwardly inclined direction from the forward to the rear end of said frame (see Figure 1). Said guides form guide tracks for supporting and guiding rollers 30, 30 journaled on opposite ends of a transverse shaft 31. Said shaft forms a support for the beams 11, 11. Said beams are laterally spaced on said transverse shaft by means of a sleeve 32, mounted on said shaft, and by connecting collars 33, 33 journaled on said shaft and abutting the insides of the hubs of said beams and the outer ends of said sleeve (see Figure 6). Said collars are each adapted to have a flexible member such as a chain 34 pivotally connected to an eared portion thereof, for moving said rollers and beams upwardly along said guides 29, 29 and moving said bucket to a discharge position.

Each beam 11 is provided with an integrally formed rocker 36 having an outwardly facing channelled guide 37 formed in its outer periphery and adapted to be engaged by flexible cables 39 and 40, secured at one of their ends to opposite ends of said rocker and secured at their opposite ends to the front and rear ends of the frame 12, as will hereinafter more clearly appear as this specification proceeds. Said rockers are each of an arcuate formation, formed on a varying radius, the length of which is greatest at the point of connection of the bucket 10 to said beams, and which decreases as said rocker extends away from said bucket, in order to provide a greater leverage on the bucket when initially gathering the muck and to accelerate said bucket as it moves upwardly to a discharge position.

The cable 39 is secured at one of its ends to a connector 41 in a suitable manner, such as swedging. Said connector is slidably mounted in a lug 42 at the end of the beam 11, which is its upper end when the bucket 10 is in a lowered gathering position. Said lug extends inwardly of said beam and has a notch 43 formed therein and extending thereacross and opening towards the ground, when said bucket is in a discharge position. The portions of said notches extending inside of said rockers are adapted to engage laterally spaced lugs 44, extending angularly forwardly and upwardly from the horizontal leg of an angle iron 45. Said angle iron extends across the side plates 20, 20, and is suitably connected thereto, as by welding. This interengaging connection between said beams and lugs provides a reaction means for said beams and dipper when said dipper is in a discharge position and initially reverses its direction of travel. A spring 46 encircles said connector and is interposed between a nut 47 threaded on the outer end of said connector and the outer side of said lug 42. Said spring may be preloaded a predetermined amount, to hold said cable 39 taut at all times and to yield only upon overload conditions. Said

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cable 39 extends from said lug 42 in the guide 37 around the outer periphery of the rocker 36 towards the forward end of the machine, and is connected at its forward end to a connector 48 mounted in a lug 49 projecting upwardly from the forward end of the plate 19.

The cable 40 is secured at its forward end to a connector 50 slidably mounted in a lug 51, at the opposite end of the rocker 36 from the lug 42 and connector 41. A spring 52 encircles said connector and is interposed between a nut 53 on the end of said connector and the outer side of said lug. Said spring is preloaded to hold said cable taut at all times, and to yield only upon overload conditions. Said cable extends around the periphery of the rocker 36 in a rearward direction and is secured at its rear end to a connector 54, mounted in the vertical leg of the transverse angle iron 45.

As the dipper 10 and beams 11, 11 are moved from a lowered gathering position rearwardly along the guides 29, 29 by the chains 34, 34, the cables 39, 39 connected with the upper ends of the rockers 36, 36 will pull against said rockers as they are unwrapped therefrom and pivot said beams and dipper upwardly about the axis of the transverse shaft 31, to move said dipper into position to discharge from the rear end of the frame 12 over the top thereof. At the same time, the cables 40, 40 will be wrapped on the peripheries of the rockers 36, 36, and will pivot said dipper and beams downwardly to a gathering position, upon forward movement of said beams along said guides 29, 29.

The means for moving the beams 11, 11 and bucket 10 upwardly along the rectilinear guides 29, 29, includes two laterally spaced fluid pressure cylinders 55, 55 mounted on and extending along the plate 19 on opposite sides of the boss 23, and having pistons 56, 56 extensible therefrom. Said cylinders and pistons may be of any well known form, but are herein shown as being single acting cylinders and pistons of the air type, and are not herein shown in detail since they form no part of my present invention. Said pistons are connected together by a cross member 57 having two laterally spaced bearing bosses 58, 58 extending in advance thereof and having the hubs of sheaves 59, 59 journaled therein (see Figures 1 and 6). A shaft 60 extends through the hubs of said sheaves, and nuts 61, 61 threaded on the outer ends of said shaft, hold said sheaves to said shaft and bosses.

The lifting chains 34, 34 are connected at their ends opposite the collars 33, 33 to opposite ends of an equalizing yoke 62, pivotally mounted at the rear of the base plate 19, on a yieldable plunger 63, to assure that the loads on the two lifting chains be equal. Said yoke, as herein shown, includes two vertically spaced connected cross members 64, 64, pivotally connected intermediate their ends to opposite sides of the plunger 63 on a pivotal pin 65. The connection between each chain and the respective end of said yoke includes a rod 66 extending through a sleeve 67. Said sleeve is trunnioned between said cross members for movement about a vertical axis. A nut 68 threaded on the outer end of said rod abuts the outer end of said sleeve, to retain said rod to said yoke. The opposite end of said rod is bifurcated and has an end link of the chain pivotally connected between the furcations thereof.

The yieldable plunger 63 is slidably mounted in a longitudinal guide 69 extending upwardly

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from the base plate 19. A spring 70 encircles said plunger and is interposed between the rear end of said guide and a collar 71, adjacent said yoke. A nut 73 on the inner or forward end of said yoke, abuts the forward end of said guide and is provided to retain said plunger in said guide (see Figures 1 and 5). Said nut also serves to preload said spring so said plunger will normally act as a solid member and will only yield upon abnormal shock loads, so as to avoid placing undue stress on said chains.

The chains 34, 34 extend forwardly from opposite ends of the yoke 62 and around the sheaves 59, 59, extensible with the pistons 56, 56. From thence said chains extend in a rearward direction to and around sheaves 73, 73 located beneath and forwardly of the rear ends of the guides 29, 29. Said chains then extend forwardly from said sheaves, when the bucket is in the lowered position shown by broken lines in Figure 1, to the collars 33, 33 to which they are pivotally connected.

The sheaves 73, 73 are mounted in laterally spaced bosses 74, 74 extending inwardly from walls 75, 75, formed integrally with and extending upwardly from the cylinders 55, 55. A shaft 76 extends through the hubs of said sheaves, and nuts (not shown) threaded on the outer ends of said shaft serve to retain said sheaves on said bosses.

Since the sheaves 73, 73 are located beneath and forwardly of the rear ends of the guides 29, 29, the chains 34, 34 will pull the beams 11, 11 upwardly along said guides and lift the bucket 10 until the shaft 31 is substantially in alignment with the shaft 76. At this point said beams will be carried a further distance along said guides by their own momentum, and the pull of said chains will then be reversed while the pistons 56, 56 are still moving outwardly in a forward direction. This will check rearward movement of said beams along said guides and will then tend to reverse the direction of movement of said beams and dipper along said guides, to produce a snubbing effect on said beams and bucket and reduce the violence at which said beams and bucket reverse their direction of travel, and will then pull said beams and bucket backwardly, after the load has been dumped by said bucket, to a position where the center of gravity of said beams and bucket will be such as to cause said bucket to swing downwardly to a loading position.

A yieldable bumper 77, engaged by lugs 80, 80 extending inwardly from the beams 11, 11, is provided to stop rearward movement of the bucket 10 and to aid in starting it on its return path. Said bumper, as herein shown, is of a leaf spring construction and is mounted on the upper rear end portion of the frame 12 on a transverse channel 81, connected between the upper rear ends of the side walls 20, 20. The leaves of said spring extend through and are assembled in a rectangular clip 83 at the transverse center of said spring, and are so assembled that the shortest leaves are at the middle of the spring. The leaves of said spring progressively increase in length from the middle leaf, on opposite sides thereof, and the longest leaves are at the outsides thereof. Said spring is slidably mounted in two U-shaped straps 84, 84 secured to the inner face of the channel 81 and extending inwardly or forwardly therefrom, and abuts blocks 85, 85 on the insides of said straps and abutting the forward face of said channel (see Figure 5). The outer ends of the rear leaves of said spring abut stops 86, 86 extending

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forwardly from the forward face of the channel 81, and the outer ends of the forward leaves of said spring are abutted by the lugs 80, 80, when the bucket 10 is in a discharge position. Said bumper thus serves to yieldably stop movement of the bucket 10 when it reaches a discharge position and tends to reverse its direction of travel, and being of a leaf spring construction provides resiliency through a greater range of movement of the spring than could be obtained with the conventional forms of coil spring bumpers heretofore used on muckers of the type disclosed.

The frame 12 may be turned manually by the manual exertion of pressure on either of the side plates 20, 20, to turn said frame about the axis of the boss 23 so as to position the bucket 10 to gather material from either side of the track, and may be aligned with respect to the longitudinal center line of the truck 13, as it discharges its load, by a centering device operated by extensible movement of the pistons 56, 56 from the cylinders 55, 55. As herein shown, a crank arm 87 is secured to the upper end of a pintle 88 which extends upwardly from and is formed integrally with the boss 24. A roller 89 is journaled on the upper end of said crank arm and forms a reaction member spaced from the pivotal axis of said frame and adapted to be engaged by either one of a pair of ribs 90, 90, depending from and extending along the bottom of a slidable plate 91. Said ribs, as herein shown, form a substantially Y-shaped guide with the open part of the Y facing the forward end of the machine, and with the stem of the Y forming a longitudinally extending guide, extending along the center of said plate, to positively hold said frame 12 from swinging movement during discharge of the bucket 10. The ends of said rib forming the open ends of said Y extend parallel to the sides of said plate to delay swinging of said frame until said bucket has moved above the pile of material being picked up, to avoid scattering of the material by said bucket.

The slidable plate 91 is slidably guided at its opposite sides in facing channelled guides 92, 92 extending inwardly from the upper ends of the walls 75, 75. A connecting member 93 is secured to and depends from the forward end of said plate and is secured to the central portion of the cross member 57 as by a nut and bolt 94. Thus as the pistons 56, 56 are extended from the cylinders 55, 55, to elevate the bucket 10 to a discharge position, the plate 91 will move forwardly therewith. When the frame 12 has been swung to one side of the truck 13, to position the bucket 10 to gather from either side of the track, and when said bucket is being elevated to a discharge position, the roller 89 engaging the inside of the forward end of one of the ribs 90, will move along the parallel portion of said rib and will swing said frame towards an aligned position with respect to said truck as said ribs and plate move forwardly and said roller comes into engagement with the inwardly extending angular portion of the respective rib. Said bucket will be aligned with respect to said truck when said roller enters the longitudinal channel formed by both of said ribs, and will be locked in such a position until said bucket moves downwardly to a gathering position, when said plate will move rearwardly with respect to said truck and said roller will move out of engagement with said longitudinal channel.

It should here be noted that besides providing a simple and efficient means for aligning the bucket 10 with the longitudinal center line of the truck 13 when in a discharge position, to

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assure that all of the material in said bucket be discharged into a mine car on the track directly behind the mucking machine, that the centering device is located above the top of the truck and on the bottom of the plate 91, to avoid clogging of said centering device with the dirt or muck in which the machine is working.

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 my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having a longitudinally extending rectilinear beam supporting guide extending therealong, a beam supported in said guide for movement therealong and for vertical swinging movement with respect thereto about a transverse axis disposed within the limits of said guide, a bucket on the end of said beam, means for swinging said bucket and beam vertically over the top of said frame for the discharge of material beyond the rear end thereof upon rectilinear movement of said beam along said guide, and means for moving said beam along said guide including a sheave and a fluid pressure cylinder and piston for moving said sheave forwardly of said frame, a flexible member connected with said frame and beam at its opposite ends and trained around said sheave intermediate its ends, and a fixed sheave for reversing the direction of said flexible member and located in advance of the rear end of said guide so as to cause said flexible member to arrest the travel of said bucket to a discharge position, and to pull said bucket forwardly at the rear end of its travel along said guide to a position where gravity can exert itself to pull said bucket downwardly to an initial loading position while said first mentioned sheave is still moving forwardly of said main frame.

2. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having a longitudinally extending rectilinear beam supporting guide extending therealong, a beam supported in said guide for movement therealong and for vertical swinging movement with respect thereto about a transverse axis disposed within the limits of said guide, a bucket on the end of said beam, means for swinging said bucket and beam vertically over the top of said frame, for the discharge of material beyond the rear end thereof upon rectilinear movement of said beam along said guide, and means for moving said beam along said guide including a sheave and a fluid pressure cylinder and piston for moving said sheave forwardly of said frame, a flexible member connected with said frame and bucket at its opposite ends and trained around said sheave intermediate its ends, a second sheave rotatable about a fixed axis and spaced beneath and forwardly of the rear ends of said guide for reversing the direction of said flexible member to extend forwardly for attachment to said beam, when said bucket is in a lowered position, said second mentioned sheave being located forwardly of the rear end of said guide a distance sufficient to permit said flexible member to extend rearwardly therefrom and cause said flexible member to reverse its direction of pull on said beam, as said bucket

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discharges its load, to snub said beam and bucket and start said beam and bucket in a return direction to a point where it may be returned to an initial loading position by gravity, while said first mentioned sheave continues to move in a forward direction.

3. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having a longitudinally extending rectilinear beam supporting guide extending therealong, a beam supported in said guide for movement therealong and for vertical swinging movement with respect thereto about a transverse axis disposed within the limits of said guide, a bucket on the end of said beam, flexible means for swinging said bucket and beam vertically over the top of said frame for the discharge of material beyond the rear end thereof upon rectilinear movement of said beam along said guide, and means for moving said beam along said guide including a sheave and a fluid pressure cylinder and piston for moving said sheave forwardly of said frame, a flexible member connected with said frame and bucket at its opposite ends and trained around said sheave intermediate its ends, a yieldable bumper adapted to be engaged by said beam at the rear end of its path of travel along said guide, and a second sheave rotatable about a fixed axis spaced beneath and forwardly of the rear end of said guide, for reversing the direction of said flexible member to extend forwardly therefrom when said bucket is in a gathering position, said second mentioned sheave being so located that said flexible member will extend rearwardly therefrom as said bucket reaches a discharge position, to cause said flexible member to reverse its direction of pull on said beam and snub said beam and bucket as said beam engages said bumper, and with the action of said bumper start said beam and bucket in a return direction to a point where it may return to an initial loading position by gravity, while said first mentioned sheave continues to move in a forward direction.

4. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having a longitudinally extending rectilinear beam supporting guide extending therealong, a beam supported in said guide for movement therealong and for vertical swinging movement with respect thereto about a transverse axis disposed within the limits of said guide, a bucket on the end of said beam, flexible means for swinging said bucket and beam vertically over the top of said frame for the discharge of material beyond the rear end thereof upon rectilinear movement of said beam along said guide, and means for moving said beam along said guide including a sheave and a fluid pressure cylinder and piston for moving said sheave forwardly of said frame, a flexible member connected with said frame and bucket at its opposite ends and trained around said sheave intermediate its ends, a yieldable bumper adapted to be engaged by said beam as it reaches the rear ends of its path of travel along said guide, a lug on said frame adapted to have interengaging connection with the end of said beam which is its bottom end when said bucket is in a discharge position, and form a reaction means for said beam as it engages said bumper, and a second sheave rotatable about a fixed axis spaced beneath and forwardly of the rear end of said guide, for reversing the direction of said flexible member to extend forwardly therefrom when said bucket is in a gathering position, said second mentioned sheave being so located that said flexible member

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will extend rearwardly therefrom as said bucket reaches a discharge position, to cause said flexible member to reverse its direction of pull on said beam and snub said beam and bucket as said beam engages said bumper and pull said beam forwardly about said interengaging connection with said lug, and with the aid of said bumper start said beam and bucket in a return direction to a point where it may return to an initial loading position by gravity, while said first mentioned sheave continues to move in a forward direction.

5. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having two parallel spaced side walls having aligned rectilinear beam supporting guides extending longitudinally therealong, a roller mounted in each of said guides, a transverse shaft mounted thereon, a beam mounted on said shaft and pivotally movable about the axis of said rollers, a bucket on the end of said beam, flexible means fixed to said beam and frame and engaging the periphery of said beam for swinging said beam vertically upon movement of said beam along said guides, means for moving said beam rearwardly along said guides including a flexible member, a connection from one end of said flexible member to said frame, adjacent the rear end of said frame, and a connection from the opposite end of said flexible member to said shaft, a forwardly extensible sheave engaging said flexible member intermediate its ends, and a fluid pressure cylinder and piston for extending said sheave by power, and a fixed sheave disposed rearwardly of said extensible sheave and forwardly of the rear ends of said guides for reversing the direction of said flexible member and guiding said flexible member to extend forwardly therefrom, when said bucket is in a lowered position, said sheave being so located as to cause said flexible member to extend rearwardly therefrom when said bucket reaches a discharge position, and to pull said beam forwardly near the rear end of its travel along said guides, to a position where gravity can exert itself to pull said bucket downwardly to an initial loading position while said extensible sheave continues to move in a forward direction.

6. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having two parallel spaced side walls having aligned rectilinear beam supporting guides extending longitudinally therealong, a roller mounted in each of said guides, a transverse shaft mounted thereon, a beam mounted on said shaft and pivotally movable about the axis of said rollers, a bucket on the end of said beam, flexible means fixed to said beam and frame and engaging the periphery of said beam for swinging said beam vertically upon movement of said beam along said guides, means for moving said beam rearwardly along said guides including a flexible member, a connection from said flexible member to said frame, adjacent the rear end of said frame, and a connection from the opposite end of said flexible member to said shaft, a forwardly extensible sheave engaging said flexible member intermediate its ends, and a fluid pressure cylinder and piston for extending said sheave by power, and a fixed sheave for reversing the direction of said flexible member and guiding said flexible member to extend forwardly therefrom, when said bucket is in a lowered position, said fixed sheave being located forwardly of and beneath the rear ends of said guides to guide said flexible member rearwardly therefrom when said bucket nears a discharge position, and to snub and positively pull said beam and bucket

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forwardly as said bucket reaches a discharge position, until gravity can exert itself to pull said beam and bucket downwardly to an initial loading position while said extensible sheave continues to move in a forward direction.

7. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having two parallel spaced side walls having aligned rectilinear beam supporting guides extending longitudinally therealong, a roller mounted in each of said guides, a transverse shaft mounted thereon, a beam mounted on said shaft and pivotally movable about the axis of said rollers, a bucket on the end of said beam, flexible means fixed to said beam and frame and engaging the periphery of said beam for swinging said beam vertically upon movement of said beam along said guides, means for moving said beam rearwardly along said guides including a flexible member, a connection from one end of said flexible member to said frame, adjacent the rear end of said frame, and a connection from the opposite end of said flexible member to said shaft, a forwardly extensible sheave engaging said flexible member intermediate its ends, and a fluid pressure cylinder and piston for extending said sheave by power, and a fixed sheave for reversing the direction of said flexible member and guiding said flexible member to extend forwardly therefrom, when said bucket is in a lowered position, a yieldable bumper mounted between said side plates, adjacent the upper rear ends thereof and adapted to be engaged by said beam at the rear end of its path of travel along said guides, for yieldably stopping said bucket at its discharge position, said fixed sheave being located forwardly of and beneath the rear ends of said guides, to guide said flexible member rearwardly therefrom, as said bucket nears a discharge position, and to snub said bucket as it engages said bumper and cooperate with said bumper to move said beam and bucket forwardly from a discharge position while said extensible sheave continues to move in a forward direction, until gravity can exert itself to pull said beam and bucket downwardly to an initial loading position.

8. In a shoveling machine, a self-propelled truck, a frame mounted on said truck and having two parallel spaced side walls having aligned rectilinear beam supporting guides extending longitudinally therealong, a roller mounted in each of said guides, a transverse shaft mounted thereon, a beam mounted on said shaft and pivotally movable about the axis of said rollers, a bucket on the end of said beam, flexible means fixed to said beam and frame and engaging the periphery of said beam for swinging said beam vertically upon movement of said beam along said guides, means for moving said beam rearwardly along said guides including a flexible member, a connection from one end of said flexible member to said frame, adjacent the rear end of said frame, and a connection from the opposite end of said flexible member to said shaft, a forwardly extensible sheave engaging said flexible member intermediate its ends, and a fluid pressure cylinder and piston for extending said sheave by power, and a fixed sheave for reversing the direction of said flexible member and guiding said flexible member to extend forwardly therefrom, when said bucket is in a lowered position, a yieldable bumper mounted between said side plates, adjacent the upper rear ends thereof and adapted to be engaged by said beam at the rear end of its path of travel along said guides, for

yieldably stopping said bucket at its discharge position, a lug on said frame adapted to have interengaging connection with the end of said beam which is its lower end when said bucket is in a discharge position and to form a reaction means for said beam as it engages said bumper; and said fixed sheave being located forwardly of and beneath the rear ends of said rectilinear guides, to guide said flexible member rearwardly therefrom, as said bucket nears a discharge position and said extensible sheave continues to move in a forward direction, and to snub said bucket as it engages said bumper and pull said bucket forwardly about said interengaging connection to a position where gravity can exert itself to pull said beam downwardly to an initial loading position.

9. In a shoveling machine, a self-propelled truck, a frame mounted on said truck for movement about a vertical axis and having two parallel spaced side walls having aligned rectilinear beam supporting guides extending longitudinally therealong, a roller mounted in each of said guides, a transverse shaft mounted thereon, beams mounted for movement along said guides and for pivotal movement about an axis disposed within the limits of said guides, a bucket on the end of said beams, flexible means fixed to said beams and frame and engaging the peripheries of said beams for swinging said beams vertically upon movement of said beams along said guides, means for moving said beams rearwardly along said guides including a pair of laterally spaced flexible members, each having operative connection with one of said beams at one of its ends and with said frame at its opposite end, two forwardly extensible sheaves, each of said sheaves engaging said flexible members and changing the direction thereof, and fluid pressure cylinders and pistons for extending said sheaves by power, fixed sheaves for reversing the directions of said flexible members, to extend forwardly for connection to said shaft when said bucket is in a lowered position, said fixed sheaves being so located as to cause said flexible members to extend rearwardly therefrom as said bucket nears a discharge position, to snub said bucket and pull it forwardly near the rear end of its travel along said guides, while said extensible sheaves move outwardly, and a yieldable equalizing yoke connecting said flexible members to the rear end of said frame and including a yieldable plunger, a cross bar pivoted thereto intermediate its ends, and connections from said flexible members to opposite ends of said cross bar.

10. In a shoveling machine, a truck, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a bucket on the end of said beam, said beam being mounted on said frame for moving said bucket from a gathering position in front of said truck to a discharge position over the top of said truck, means for actuating said beam including a fluid pressure cylinder and piston, and means actuated by said cylinder and piston for aligning said frame with said truck when said bucket reaches a discharge position including a stationary reaction member mounted on

said truck and disposed above the bottom of said frame and spaced from the pivotal axis thereof, a substantially Y-shaped guide disposed above the bottom of said frame and opening towards the front of said frame and having converging sides leading to a central channel, adapted to engage said reaction member, for aligning said frame with said truck upon movement of said guide with respect to said truck, and an operative connection between said piston and guide, for rectilinearly moving said guide with said piston and engaging said guide with said reaction member, when said frame has been swung laterally with respect to said truck, for swinging said frame to an aligned position and for engaging said reaction member with said central channel, when said bucket reaches a discharge position, for holding said frame in aligned relation with respect to said truck during discharge of said bucket.

11. In a shoveling machine, a truck, a frame mounted on said truck for turning movement with respect thereto about a vertical axis, a shovel beam, a bucket on the end of said beam, said beam being mounted on said frame for moving said bucket from a gathering position in front of said truck to a discharge position over the top of said truck and 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 frame with said truck when said bucket reaches a discharge position including a stationary reaction member mounted on said truck and disposed above the bottom of said frame and spaced from the pivotal axis thereof, a plate disposed above said reaction member and guided in said frame for movement longitudinally thereof, an operative connection between said plate and piston, for moving said plate with said piston, and a substantially Y-shaped guide mounted on the underside of said plate and depending therefrom and adapted to engage said reaction member, said guide having converging sides opening towards the front of said frame and adapted to swing said frame laterally upon engagement with said reaction member, upon movement of said guide, and said converging sides leading to a central channel adapted to engage said reaction member when said bucket is in a discharge position, to hold said frame in aligned relation with respect to said truck during discharge of said bucket.

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