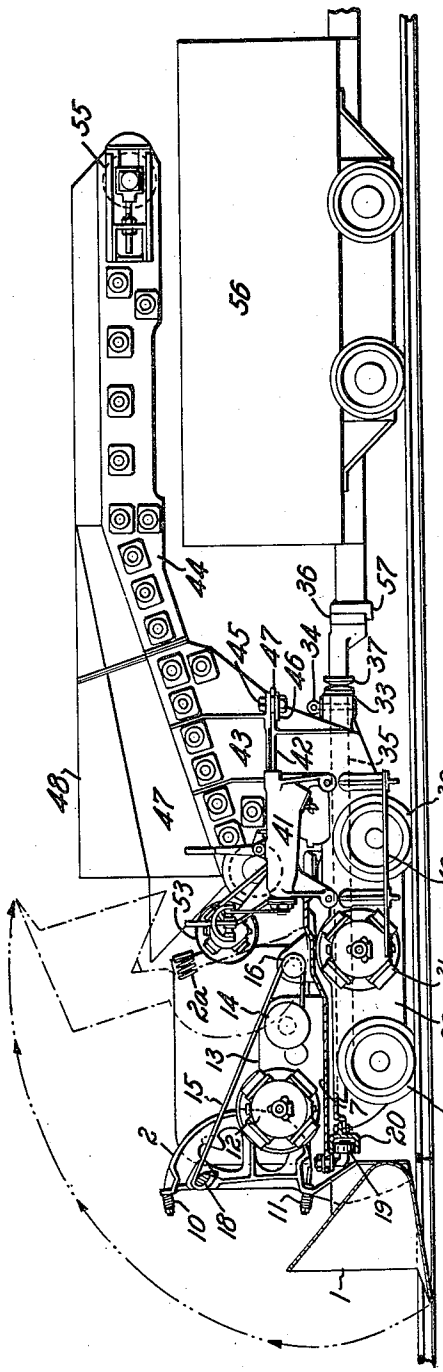
April 14, 1942. E. B. ROYLE 2,279,529

SHOVELING MACHINE

Filed Aug. 15, 1940 4 Sheets-Sheet 1

Fig. 1.



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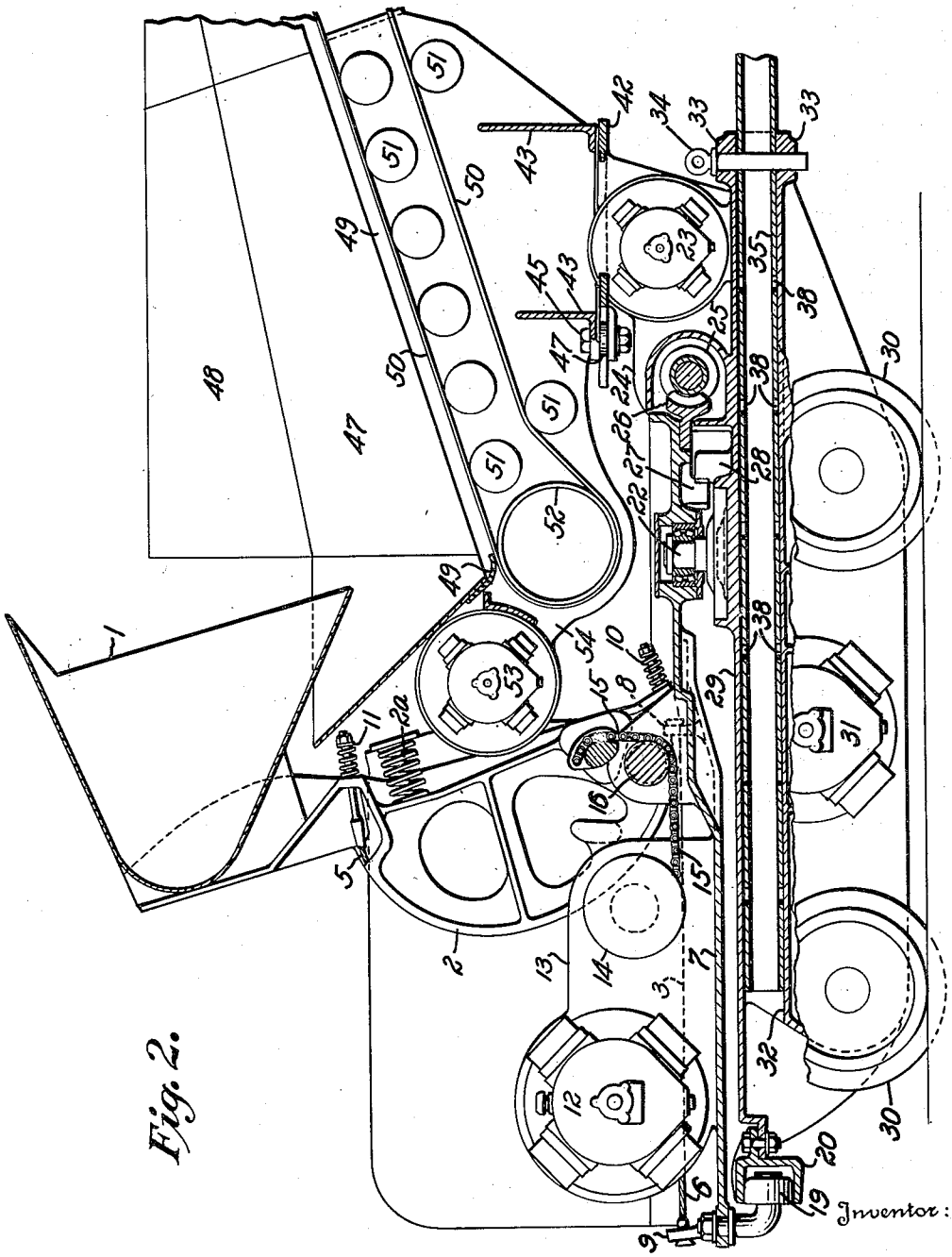


Fig. 2.

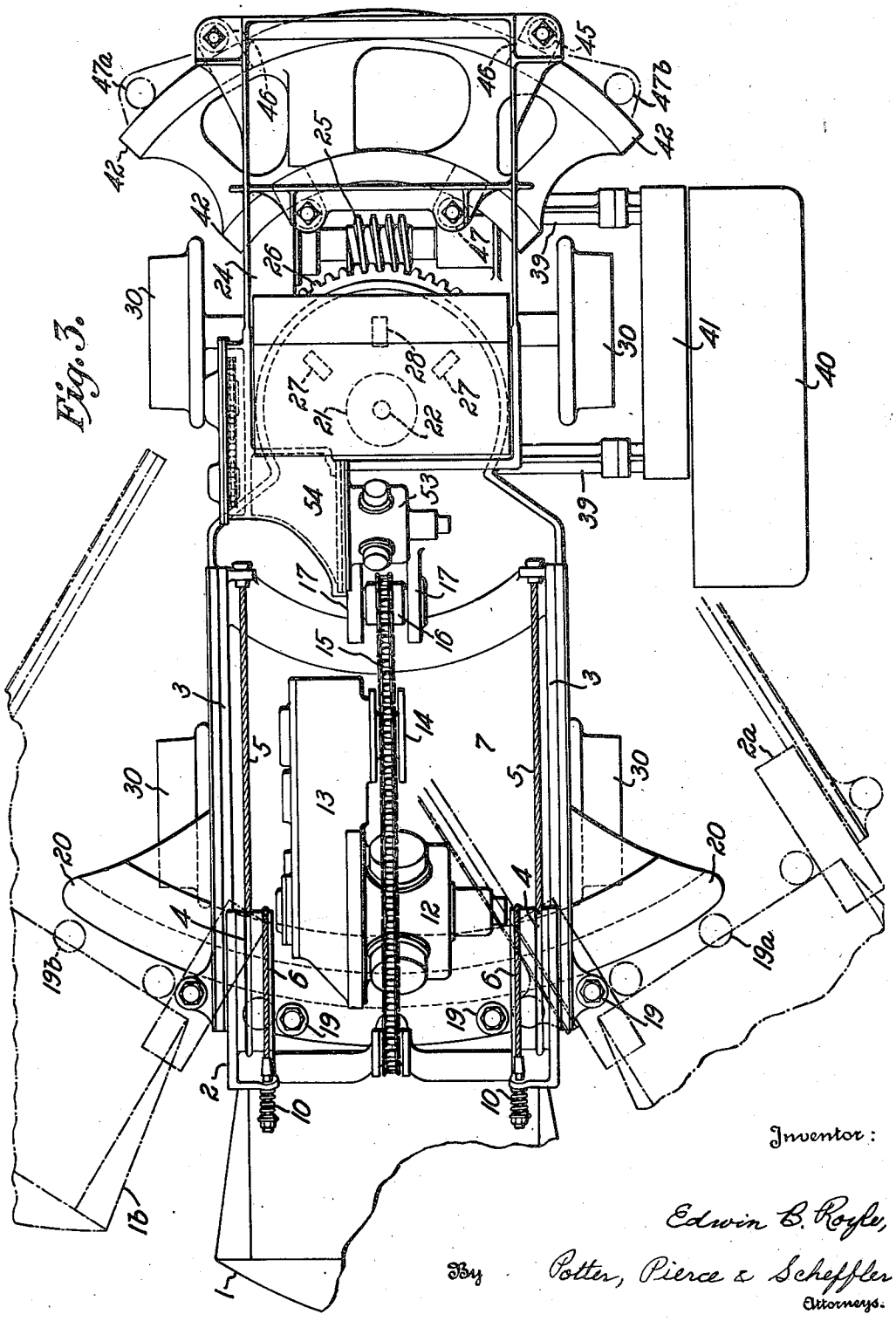
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SHOVELING MACHINE

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Fig. 3.



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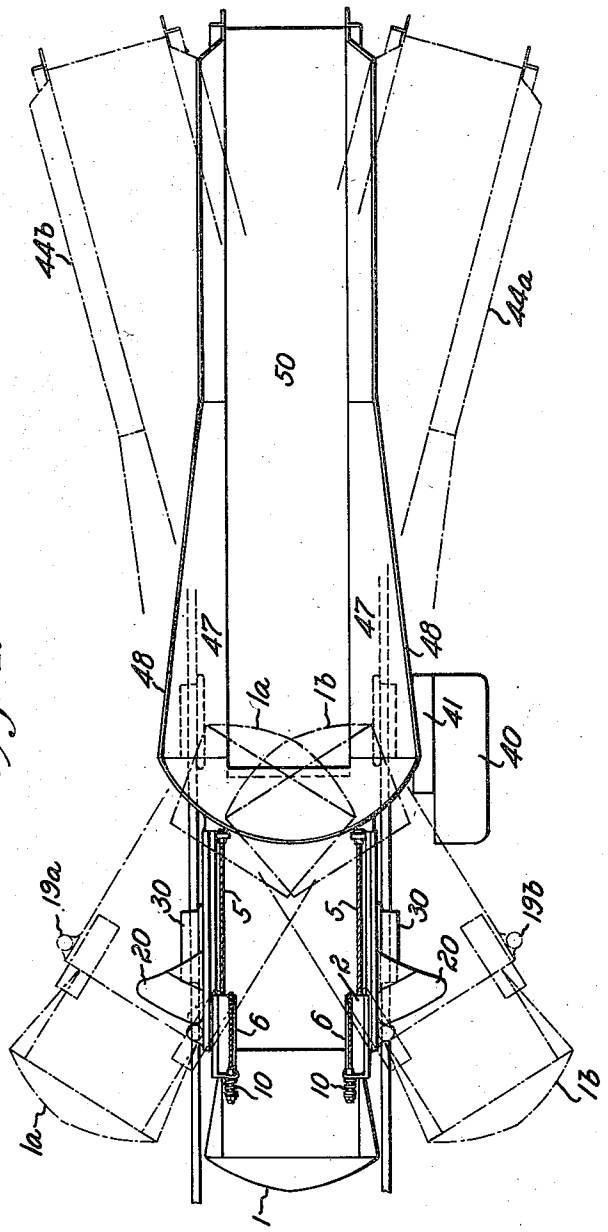
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SHOVELING MACHINE

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Fig. 4.



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2,279,529

SHOVELING MACHINE

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Application August 15, 1940, Serial No. 352,785

8 Claims. (Cl. 214—90)

This invention relates to shoveling machines and particularly to shoveling machines or "muckers" adapted for loading muck or other materials into cars or trucks in underground, or surface, works.

Shoveling machines of the general type contemplated by the present invention are described in United States Letters Patent Nos. 1,906,000 and 1,906,001 to John S. Finlay and Edwin B. Royle, and Nos. 2,134,582 and 2,205,732 to Edwin B. Royle. These machines include a car, tractor or equivalent movable supporting structure carrying a table or deck, a scoop or bucket at one end of a rocker structure having curved surfaces for rolling upon the deck of the supporting structure whereby to move the scoop from a lowered position at the front of the car in an arcuate path upward and backward to an elevated dumping position at the rear of the car, using the force of momentum at least in part to aid the discharge of material from the scoop, and a motor or motors for moving the car and actuating the rocker structure.

An object of the invention is the provision of a shoveling machine, of the general type or class above described, having a considerable capacity for lateral digging (that is to say, ability to move the scoop, in digging position, at a substantial angle with respect to the major axis of the machine). Another object of the invention is the provision of a shoveling machine capable of loading cars or trucks that are of unusual length and/or cars or trucks that are substantially to one side or the other of the machine's axis as well as cars or trucks in line with the latter. A further inventive object is the provision of a mucker adapted to muck easily around a curve. Still another object is the provision of a light, mobile, easily handled mucker adapted to move on one track of a double track and to load a car or truck located on the opposite track. An additional object of the invention is the provision of adjustable means for maintaining a pre-selected relationship between the shoveling machine and a car or truck to which the former discharges material. Other objects of the invention will be apparent from a consideration of the following description and claims.

The shoveling machine of the present invention comprises a mobile base, a scoop-supporting and guiding structure pivotally attached to said mobile base, power means for swinging said scoop-supporting and guiding structure about the pivotal connection between the latter and said mobile base, a scoop (or bucket), a scoop-rocking mechanism on said scoop-supporting and guiding structure for swinging the scoop from a digging position upwardly and backwardly through a curved path to an elevated discharge point above and substantially over said pivotal connection, a hopper positioned to receive material from said scoop at said discharge point, and a laterally swingable conveyor adapted to receive material from said hopper and to move the material to a car or truck.

The mobile base may be provided with any suitable tractor mount depending on the particular requirements and for purposes of illustration is shown as including a track wheel-mounted chassis. The scoop-supporting structure may be a table or deck, mounted on said mobile base and with a pivotal connection between it and the latter, on which table or deck the scoop-rocking mechanism moves, e. g., in a predetermined fixed path. The hopper is so positioned as to receive material from said scoop regardless of the horizontally lateral position of the scoop-supporting and guiding structure; that is to say, is positioned at the point of discharge common to all digging positions. The conveyor may be, and preferably is, mounted, at the receiving end thereof, on an arcuate track supported by the mobile base and adapted to be swung laterally (with respect to said mobile base) about an axis which coincides, or substantially coincides, with the pivotal connection between the table or deck and the mobile base.

The shoveling machine above generally described may be, and preferably is, provided with adjustable means for maintaining preselected relationships between the former and a car or truck. The same may be in the form of an adjustable coupler.

The invention will now be described more specifically and with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of a mucking machine embodying the principles of the invention with certain parts broken through in section, and showing the alternate position of the scoop, and also a car coupled to the mucker as in the process of loading;

Figure 2 is an enlarged substantially central longitudinal section through the front part of the machine, certain parts being shown in elevation;

Figure 3 is a plan section with certain parts removed for clarity; and

Figure 4 is a diagrammatic plan indicating

the digging range and relative position of the elements of the machine.

In the following description and in the figures of the drawings, the same numbers refer to the same parts.

In the drawings, the reference numeral 1 indicates a scoop or dipper, to which latter are attached the rockers 2—2. These rockers 2 form a rigid unit with the scoop and are positioned so that they rock upon guide rails 3—3 and are fashioned with grooves 4—4 within which cradle cables 5—5 and 6—6 play as the rocker swings. These cradle cables are attached to the rockers 2 by spring pressed bolts 10—10 and 11—11. The guide rails 3 are made integral with an upper deck 7 which has formed upon it lugs, at 8—8 and 9—9, within the sockets of which the balled ends of the cradle cables 5 and 6 are placed. Also mounted upon the upper deck 7 is a motor 12 which, through a train of gears in the housing 13, drives a flanged drum or reel 14. Attached at one end thereof to the drum 14 is a chain 15 which is led around an idle roller 16 journalled in lugs 17 projecting upwardly from the upper deck 7: the chain 15 has its other end fastened to the center part of a yoke bar 18, which latter is framed between the rockers 2. 2a indicates a resilient stop, e. g., a spring carried by the upper deck for stopping rockers 2.

The front end of the upper deck 7 has attached to it several rollers at 19. These rollers fit and roll within a guide 20, U-shaped in cross section, which guide is made in the form of an arc as viewed from above. The radius of this arc is struck from a point toward the back of the upper deck 7, where a boss 21 is formed in the said deck, and within the boss 21 an anti-friction bearing king pin 22 forms a pivot upon which the entire upper deck 7 (and rockers 2 and scoop 1) can be swung by means of the motor 23 through gears within the housing 24 that drive the worm 25 which latter engages the sector of a worm wheel 26. This worm wheel sector 26 is firmly attached to the upper deck 7. The extent of lateral swing is limited by lugs 27 and 27, integral with the upper deck 7, that come in contact with a lug 28 integral with the lower deck 29.

The motor 23, gear housing 24, and worm 25 with its housing, are attached to or form parts of lower deck 29, and the supporting base or flange of the king pin 22 is fastened to the deck 29 also, as is the arcuate guide 20. The lower deck 29 is so fashioned as to function as a truck frame for the track wheels 30, and within this frame a suitable set of gearing transmits the power of the motor 31 to said wheels 30.

The central part of lower deck 29 is cored out lengthwise of the deck, with an opening 32 of square cross section. The walls of this core, as it ends at the back of the deck, are enlarged to form bosses 33, and these latter are drilled to receive a pin 34. Slidably mounted within the square core is the square tubular shank 35 of a coupling 36 which is made flexible at 37. The shank 35 of the coupling is also drilled with a series of spaced holes 38, suitable to receive the pin 34. By means of brackets 39 an operator platform 40 is supported by lower deck 29, and to the same brackets the air control manifold 41 is bolted.

In Figure 1 are shown the several control levers for regulating the action of the various motors, but neither the hose that supplies the air nor the piping that leads to the motors is shown. At the rear of the truck an upward projection of the lower deck 29 terminates in an arc-shaped platform 42 which forms a segmental turntable upon which the pedestal 43 of a boom conveyor 44 rests. The connection of the pedestal 43 with the turntable platform 42 is so devised with rollers 47, bolts 45, and clamp plates 46, that while the pedestal or base 43 of the boom conveyor is held in contact with and parallel to the turntable top, the pedestal, and with it the boom conveyor, can be turned through a range of arc against the predetermined friction that holds the conveyor at the angle set.

The conveyor 44 is provided with a hopper 47 having high side boards 48, at the receiving end, and skirting, at 49, along the remaining portions of the conveyor. The side boards 48 and skirting 49 seal against the endless belt 50 which is supported on rollers 51 and leads around the tail pulley 52. This tail pulley is driven by the motor 53, through gears, chain and sprockets enclosed in the housing 54. At 55 is the head pulley and customary take-up bearings for the endless belt.

A car is shown at 56. The coupling 57 of the car 56 engages the coupling 36 of the mucking machine. The pin 34 in the bosses 33 is equipped with a linkage connection (not shown) which permits the operator to withdraw the pin 34 to a point where it is free of the spaced holes 38 in the shank 35 of the coupling. By using the tension or compression between mucker and car, as the pair advance or retreat from the work, the operator can completely fill the car from end to end by dropping the pin 34 successively into holes of the spaced series 38, which brings the discharge end of the conveyor into similarly spaced loading spots over the car 56.

The operation of the shoveling machine or "mucker" is as follows: With scoop 1 in lowered or digging position, the mucker, by actuation of propelling motor 31, is advanced toward and crowded against a muck pile so as to fill scoop 1 with the material. Actuation of motor 12 lifts the loaded scoop to discharge position through the agency of the gears within housing 13, the chain reel 14, chain 15, and rockers 2 rocking upon guide rails 3. At the end of the upward and backward travel of the scoop and scoop-rocking structure, movement of said parts is stopped by the operation of the resilient stop or bumper 2a against rockers 2, material is discharged from scoop 1, and the latter descends to lowered, digging, position by gravity when motor 12 is reversed. The stopping point of said travel is substantially over pivot 22, and hence discharged material falls to the substantially same point of reception regardless of the angularity of position of upper deck 7. Actuation of motor 23 serves, through the agency of the gearing in housing 24 and worm drive 25 engaging worm wheel 26, to move upper deck 7 and the parts attached to the latter horizontally laterally with respect to the major axis of the mucker. Similarly, the conveyor system may, in effect, be swung horizontally laterally about pivot 22 while maintaining the center of hopper 47 in substantial alignment with pivot 22. The horizontally lateral movement of the conveyor system may be effected manually or it may, without departure from the invention, be effected by mechanical or power means.

Figure 2 shows the relative position the scoop occupies in the discharge position with the discharge lip formed by the side wall opposite the digging edge disposed lowermost and in overlapping arrangement with the end wall of the

conveyor hopper. Figure 3 and Figure 4 show the lateral range in each direction through which the motor 23 is able to force the upper deck 7 with the rockers 2 and scoop 1, to permit of digging to the sides of the track. Figure 4, in particular, brings out the fact that, in any of the positions scoop 1 might assume in digging, the point of discharge is always back to the common center point located within the hopper 47. This figure also shows the possible movement of the conveyor 44 about the connection to the lower deck, and illustrates how easily this machine could be used to muck around a curve in a tunnel; or, in a double tracked job, could even be used to load a car on the opposite track.

While the invention has been specifically described above with reference to a preferred embodiment of the apparatus, it will be apparent that the invention is not limited to the specific assemblage. Thus, as noted hereinbefore, the mobile base and the car or truck need not operate on a pre-laid track but may operate on its own track (i. e., may be a crawler type of chassis) or may include a rubber-tired chassis. Again, while air motors have been shown for actuating the various parts, it will be apparent that other sources of power might be substituted therefor.

I claim:

1. A shoveling and loading machine of the class described, comprising in combination a mobile base, a scoop-supporting and guiding structure pivotally connected to said base to swing in a substantially horizontal plane, a scoop, a scoop-rocking mechanism on said scoop-supporting and guiding structure for rocking said scoop in a curved path from a forward digging position to a backward and elevated dumping position substantially over said pivotal connection, power means for swinging said scoop-supporting and guiding structure horizontally laterally about said pivotal connection, the combination wherein a hopper-ended conveyor system swingably is mounted on said mobile base posteriorly of the scoop-supporting and guiding structure and with the center of its hopper disposed above and substantially over the pivotal axis of the scoop-supporting and guiding structure, and means for adjustably coupling said mobile base to a car to be loaded with material.

2. A shoveling and loading machine of the class described, comprising in combination a mobile base, a scoop-supporting and guiding structure pivotally connected to said base to swing in a substantially horizontal plane, a scoop, a scoop-rocking mechanism on said scoop-supporting and guiding structure for rocking said scoop in a curved path from a forward digging position to a backward and elevated dumping position substantially over said pivotal connection, power means for swinging said scoop-supporting and guiding structure horizontally laterally about said pivotal connection, the combination wherein a hopper-ended conveyor system swingably is mounted on said mobile base posteriorly of the scoop-supporting and guiding structure and with the center of its hopper disposed above and substantially over the pivotal axis of the scoop-supporting and guiding structure, and an adjustably extensible coupler carried by said mobile base for coupling said mobile base to a car to be loaded with material.

3. A shoveling and loading machine of the class described, comprising in combination a mobile base, a scoop-supporting and guiding structure pivotally connected to said base to swing in a substantially horizontal plane, a scoop, a scoop-rocking mechanism on said scoop-supporting and guiding structure for rocking said scoop in a curved path from a forward digging position to a backward and elevated dumping position substantially over said pivotal connection, power means for swinging said scoop-supporting and guiding structure horizontally laterally about said pivotal connection, the combination wherein a hopper-ended conveyor system swingably is mounted on said mobile base posteriorly of the scoop-supporting and guiding structure and with the center of its hopper disposed above and substantially over the pivotal axis of the scoop-supporting and guiding structure, and an articulated adjustably extensible coupler carried by said mobile base for coupling said mobile base to a car to be loaded with material.

4. A shoveling and loading machine of the class described, comprising in combination a mobile base, a scoop-supporting and guiding structure pivotally connected to said base to swing in a substantially horizontal plane, a scoop, a scoop-rocking mechanism on said scoop-supporting and guiding structure for rocking said scoop in a curved path from a forward digging position to a backward and elevated dumping position substantially over said pivotal connection, power means for swinging said scoop-supporting and guiding structure horizontally laterally about said pivotal connection, the combination wherein a hopper-ended conveyor system swingably is mounted on said mobile base posteriorly of the scoop-supporting and guiding structure and with the center of its hopper disposed above and substantially over the pivotal axis of the scoop-supporting and guiding structure, and a coupler for adjustably coupling said mobile base to a car to be loaded with material, said coupler comprising telescoping members carried by said mobile base and a coupling member carried by one of said telescoping members and adapted to engage a complemental coupling member on the car.

5. A shoveling machine of the type described comprising, in combination, a mobile base, a scoop-supporting and guiding structure pivotally connected to said mobile base to swing in a substantially horizontal plane, a scoop swingable on said scoop-supporting and guiding structure along a curved path upward and backward, a hoppered conveyor system swingably mounted on said mobile base with its pivotal axis adjacent to the pivotal axis of said scoop-supporting and guiding structure, said hoppered conveyor system being adapted to receive material from said scoop regardless of the lateral position of said scoop-supporting and guiding structure and to deliver such material to a car behind said mobile base, and an articulated adjustably-extensible coupler carried by said mobile base and adapted to control and vary the spatial relationship between said mobile base and such car.

6. A shoveling and loading machine of the class described comprising a mobile base, a horizontally swingable deck structure mounted on said mobile base and pivotally connected adjacent the rear end thereof to said base to permit lateral swinging of the forward end thereof, a rigid scoop supporting and rocking structure mounted for longitudinal rocking motion on said deck forwardly of the pivotal connection between said deck and said base, a scoop rigidly secured

thereto having a digging edge on one side and a discharge lip on the opposite side thereof, means for rocking said scoop supporting and rocking structure on said deck structure to move said scoop from a forward digging position through a curved path upwardly and rearwardly to an elevated backward dumping position effective to discharge the contents thereof substantially over said pivotal connection, a conveyor system supported on said base extending rearwardly of said horizontally swingable deck structure and swingable about a vertical axis substantially coincident with the pivotal axis of the latter, said conveyor system including a hopper mounted thereon and disposed above and substantially centered with respect to the pivotal axis of said horizontally swingable deck structure, said hopper having a forward wall extending forwardly and laterally of the dumping position of the discharge lip of the scoop in all relative positions of the deck and conveyor system whereby the discharge lip of the scoop in dumping position will overlap the hopper wall and discharge directly into the hopper in all relative positions of the deck and conveyor system.

7. A shoveling and loading machine of the class described comprising a mobile base, a horizontally swingable deck structure mounted on said mobile base and pivotally connected adjacent the rear end thereof to said base to permit lateral swinging of the forward end thereof, a rigid scoop supporting and rocking structure mounted for longitudinal rocking motion on said deck forwardly of the pivotal connection between said deck and said base, a scoop rigidly carried thereby, means for rocking said scoop-supporting and rocking structure on said deck structure to move said scoop from a lowered forward-facing digging position through a curved path upwardly and rearwardly to an elevated backward facing dumping position effective to discharge the contents thereof substantially over said pivotal connection, a conveyor system connected on said mobile base rearwardly of said deck structure, and a hopper for the receiving end of the conveyor positioned with its center substantially coincident with the pivotal axis of said horizontally swingable deck structure, said hopper having a forward wall extending forwardly and laterally of the dumping position of the edge of said scoop in all positions of said deck whereby to receive directly material discharged from said scoop in all lateral positions of said deck and to deliver the same to the conveyor.

8. A shoveling and loading machine of the class described comprising a mobile base, a horizontally swingable deck structure mounted on said mobile base and pivotally connected adjacent the rear end thereof to said base to permit lateral swinging of the forward end thereof, a rigid scoop supporting and rocking structure mounted for longitudinal rocking motion on said deck forwardly of the pivotal connection between the deck and base, a scoop rigidly secured to said rocking structure comprising spaced walls providing a digging edge on one side and a discharge lip on the opposite side thereof, means for rocking said scoop supporting and rocking structure on said deck structure to move said scoop from a lowered forward-facing digging position in advance of said base wherein the digging edge is on the underside thereof through a curved path upwardly and rearwardly to an elevated backward-facing dumping position wherein the discharge lip is on the underside thereof and effective to discharge the contents thereof substantially over said pivotal connection, a conveyor structure supported on said base extending rearwardly of said horizontally swingable deck structure and swingable about an axis substantially coincident with the pivotal axis of the latter, said conveyor structure including a receiving hopper supported thereby and disposed above and substantially centered with respect to the pivotal axes of the deck structure and conveyor system, said hopper having a substantially semi-circular end wall extending above, forwardly and laterally of the dumping position of the discharge lip of the scoop in all relative positions of the deck and conveyor system whereby in all relative lateral positions of the deck and conveyor structure the hopper is disposed in position to receive directly material discharged by said scoop.

EDWIN B. ROYLE.