

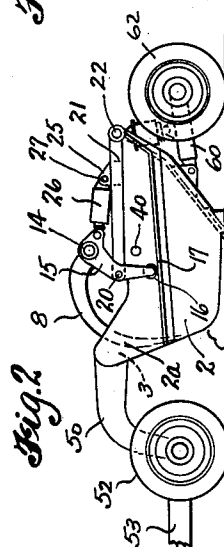
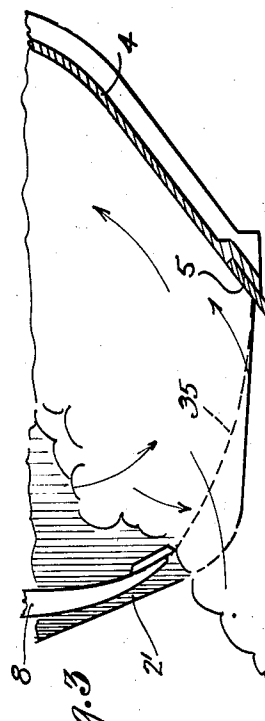
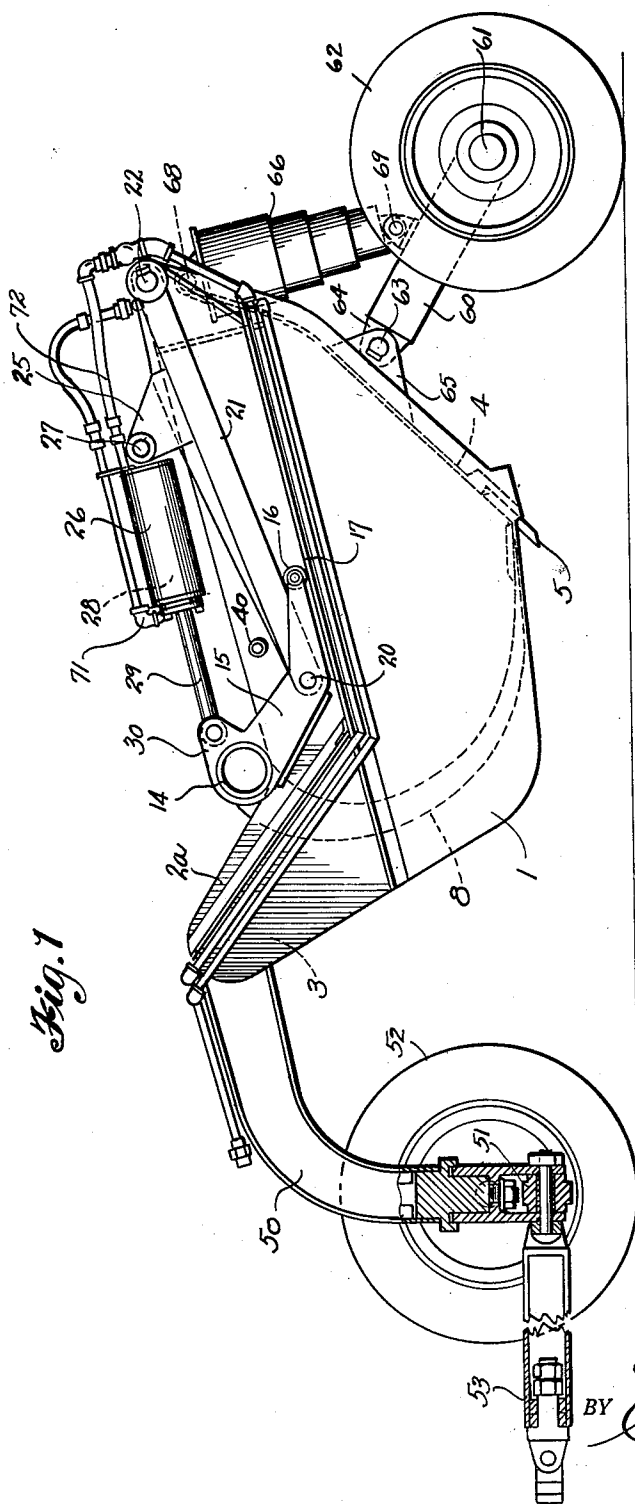
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G. S. ALLIN
SCRAPER CARRIER

2,214,240

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2 Sheets-Sheet 1



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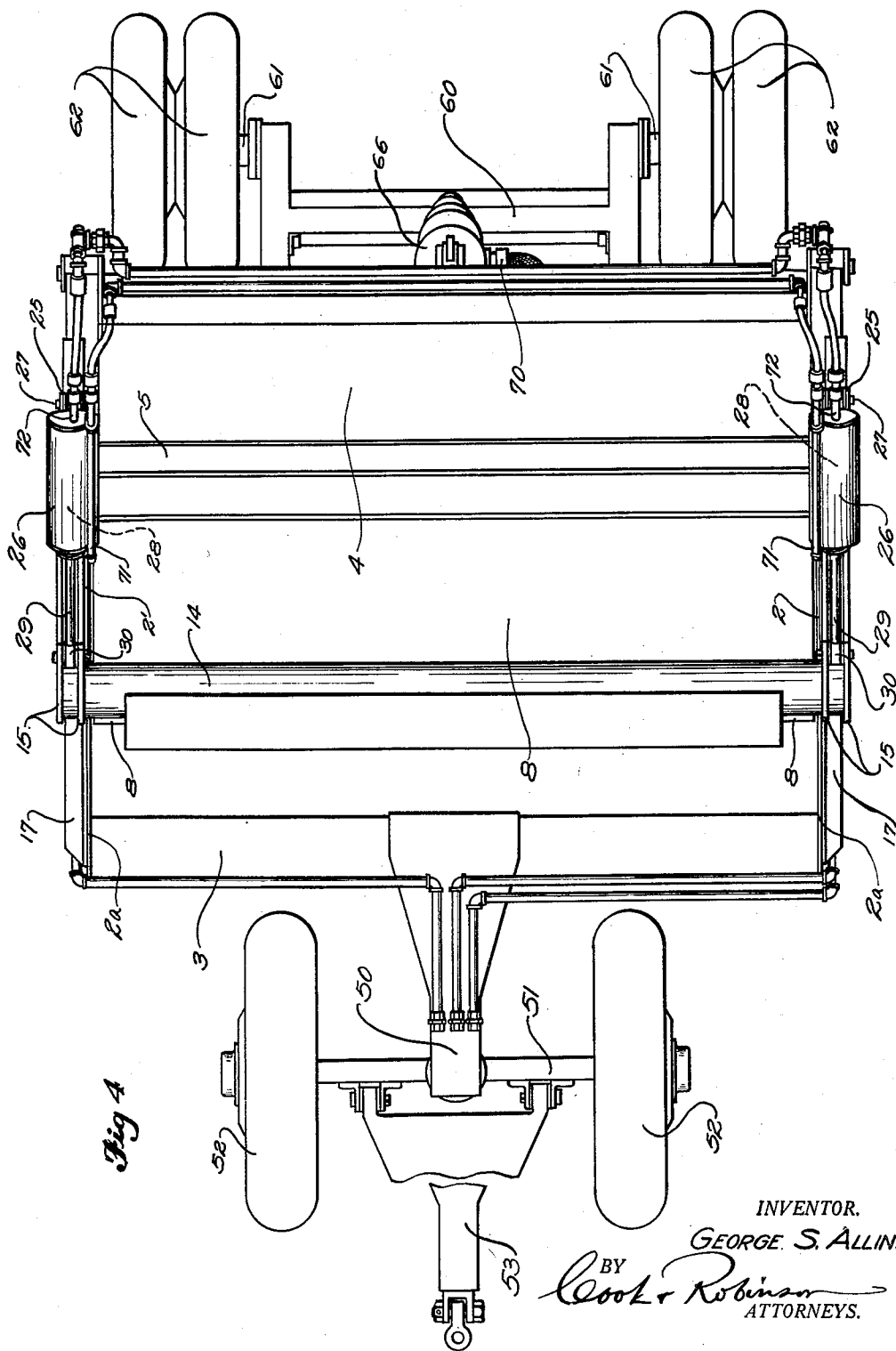
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,214,240

SCRAPER CARRIER

George S. Allin, Seattle, Wash.

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15 Claims. (Cl. 37—126)

This invention relates to improvements in scrapers and it has reference more particularly to scrapers of that character having a load carrying body arranged to receive, for transportation, the earth that is removed from a surface incident to a scraping operation; it being the principal object of this invention to provide a scraper of the above stated character wherein the blade is so disposed that loading of the scraper body is greatly facilitated; to provide a novel arrangement of gate, adapted to coact with the blade to pick up and retain the load in the scraper body; and to provide a novel mechanism for actuating the gate so that it will pick up, rather than cut through or bite off, the loosened earth that generally piles up or runs ahead of the blade.

It is also an object of this invention to provide a scraper wherein, when the bowl is raised to clear its scraping blade from ground contact, all the load supporting surfaces of the bowl will then be at an angle greater than the average angle of repose of freshly excavated dirt on steel, thereby providing for the discharge of an entire load in accordance with the opening of the gate.

It is also an object of this invention to provide a hinged supporting truck for one end of the body, that is hydraulically controlled in its position relative to the body thereby to effect the raising and lowering of the latter between scraping and load transporting positions.

It is a further object of the invention to provide means for actuating and suspending the gate, which permits it a limited yielding movement that avoids damage in the event it strikes a solid obstruction during travel of the vehicle.

Other objects of the invention reside in the details of construction and in the combination of parts, and in their mode of operation, as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

The lower edges of the opposite side walls 2 and 2a extend directly forward from the blade a substantial distance and along lines that are substantially parallel with the ground surface when the blade is just in digging contact with the ground. The forward edges of these side walls are nearly vertical and at their lower ends are rounded into the bottom edges as will be noted by reference to Figs. 2 and 3.

Fig. 1 is a side elevation of a scraper embodying the present invention; the body being shown

in elevated position, and the gate being closed as in transporting a load.

Fig. 2 is a side view, in reduced scale, of the scraper with the body lowered to scraping and filling position and the gate raised to open position.

Fig. 3 is a sectional detail showing the inclination of the rear wall and the angular setting of the blade; also indicating, in dotted lines, the path of travel of the gate edge in closing.

Fig. 4 is a plan view of the scraper.

Referring more in detail to the drawings—

The scraper body, or bowl is designated in its entirety by reference character 1, and it comprises spaced opposite side walls 2 and 2' of a substantial height, each formed at its forward end with a forwardly and upwardly directed extension 2a; these extensions being joined substantially and rigidly by a transverse connection 3, which, in this instance, is in the form of a tubular beam. The forward end of the body, that is, the space between the opposite side walls, is open, except for the gate, which will later be described, while the rear end is permanently closed by a wall 4, which is inclined forwardly and downwardly, and along its lower edge mounts a horizontal, transverse blade 5, the lower, sharpened cutting edge of which projects to some extent beyond the lower limits of the side walls of the body to adapt it for its intended scraping operation. An important feature of this invention resides in the fact that the back wall 4 of the bowl is so inclined relative to a horizontal plane that when the blade is lifted from ground contact, this wall will not support any load thereon without the cooperation of the gate. That is, should the gate be moved toward an open position, the load will be discharged in accordance with the opening of the gate and travel of the vehicle, even though the back end of the bowl should only be slightly lifted. This feature is very valuable from the standpoint of using the scraper for a leveling off operation, which is accomplished merely by raising the bowl sufficiently to cause the blade to clear the ground level; for example, a distance of two inches. Then, by slightly opening the gate, permitting the material to flow out as the scraper is moved forwardly over the surface to be leveled. The inclination of the back wall in this instance is at an angle which corresponds to the average angle of repose of dirt on steel, and this angle, considered as an average for freshly excavated materials ranging from dry sand to wet clay, is substantially 35°

with reference to the horizontal, according to the teachings of well known hand books.

The disposition of wall 4 in the bowl is such that, when the blade 5 is in digging contact with the ground, the angle of inclination of the wall will substantially coincide with the recognized average angle of repose of dirt upon steel as above explained, so that when the blade is lowered farther into the ground, this angle will be diminished and the dirt, scooped up to a certain extent, will have a tendency to be supported by the wall 4. Likewise, when the bowl is lifted and the blade raised from the ground, this angle of the wall with reference to the horizontal, will be increased beyond this average angle of repose of dirt on steel and will provide for an automatic unloading of dirt therefrom when the gate is opened. The reason for this change in angle of the rear wall 4 from one side to the other of the angle of repose incident to the bowl being raised and lowered, is by reason of the fact that the bowl is supported at a distance forward of the rear wall on a supporting pivot about which the bowl is swung in the raising and lowering movement. The character of this support, and its location, will later be fully described.

As will be observed best by reference to Figs. 1 and 3, the rear wall of the body is inclined at such an angle and the blade 5 is set at the same angle, as a flush continuation of the wall, that there will be a relatively easy scraping action and ready passage of earth, as it is scooped up, across the blade and into the body where it is retained between the two opposite side walls and partially carried by this wall. Toward the top of the body, the bottom wall curves upwardly, more toward the vertical transverse plane, and this will cause a piling up of material within the body rather than permitting it to be pushed on over the top edge of the wall. It will be observed also that the blade 5 is located at approximately the medial transverse plane of the body, and thus, the inclined rear wall 4 will operate when the gate is closed as a retaining wall for a great portion of the load, the remaining portion of which is retained by the gate when the latter is in closed position.

The scraper gate is designated in its entirety by the reference character 8, and it extends transversely between the opposite side walls to serve as a closure for the front end and bottom of the body in the transportation of a load. This gate is fixed rigidly along its top edge to a cross support in the form of a tubular beam 14 which, in turn, at its opposite ends, is rigidly and solidly fixed in the ends of lever arms 15—15, of bell crank form, and which, at their lower ends are equipped with rollers 16 adapted for rolling support on the horizontal flanges of angle iron rails 17 that are fixed to the outer faces of the side walls of the body to extend substantially horizontally.

At their medial points, the bell crank levers 15 are pivotally attached, as at 20, to the forward ends of links 21 which lie in planes parallel with and just outside the side walls of the body, above the rails 17, and at their rearward ends are pivotally mounted on the opposite ends of a horizontal cross shaft 22 that is fixed in the body walls.

Fixed on each link, near its pivotally fixed end, is a bracket 25 and mounted thereby are hydraulic cylinders 26. As shown best in Fig. 1, each cylinder is disposed above and lengthwise of its link 21, and is pivotally attached at its rearward end to its bracket, as at 27. Each cyl-

inder has a piston 28 reciprocally movable therein and connected by a rod 29 with a lug 30 at the upper end of the corresponding lever 15. Hydraulic pressure medium of a suitable kind is administered under control, to the opposite ends of the cylinders to actuate the pistons inwardly or outwardly, thereby to swing the levers 15—15 forwardly or rearwardly about their pivot points of connection 20 with the links 21, and to effect a relative travel of the rollers 16 along the rails 17 with a resultant upward and downward lifting of the gate as it is moved between open and closed positions.

As indicated in Fig. 1, the gate curves forwardly and downwardly from its supporting cross beam 14, then curves downwardly and rearwardly; the lower end portion being substantially horizontal. The linkage whereby the gate is suspended and actuated is so designed that the path of travel of the closing edge of the gate in moving from open to closed position is close to a horizontal plane, as is designated by the dotted line 35 in Fig. 3. This permits the gate to pick up a great amount of earth that runs ahead of the blade in a scraping operation and to eliminate the difficulty in closing that is usually encountered where the gate is designed to close directly downward through the piled up earth ahead of the blade. In the present instance the loose dirt is scooped or picked up rather than cut off from the load.

It is also to be noted that with the gate operating in this way, it will serve as a closure wall for the front end and bottom of the body and will cooperate with the rear wall to carry a load; and not merely serve as a retaining gate. Thus, the forwardly curving body of the gate, ahead of its closing edge, greatly increases the capacity of the body.

While normally the weight of the gate and associated parts serves to retain it properly closed, it is apparent that, should the gate, while closed, strike an obstruction, such as a rock projecting from the ground, the gate, with its whole assembly of links, levers, and hydraulic piston, can lift upwardly about pivot 22 so as to avoid damage to the machine. The extent of this upward lifting may be limited by stops 40 fixed to the side walls in position to be engaged by the lower end portions of the levers 15—15, thereby to limit their upward swinging movement of the links 21; it being understood that these stops will not interfere with the normal opening or closing movements of the gate which result from the operation of the piston in the hydraulic cylinder 26, as will be apparent by reference to Fig. 2.

At its forward end, a forwardly and downwardly curved goose neck bracket 50 is fixed centrally to the cross beam 3, and this, at its forward end, is pivotally fixed to a cross axle 51 by means permitting universal action. The axle is supported at its ends by wheels 52, and a draw bar or tongue 53 is attached to the axle for towing the device from a tractor or the like.

Transversely hinged to the rear end wall of the body is a frame 60 which, at opposite sides of its swinging end, has projecting, axially aligned spindles 61 on which ground wheels 62 are mounted. The fixed end of this frame is mounted by pivots 63 which project through ears 64 on the frame and spaced flanges 65 welded or otherwise fixed to the body wall.

The swinging action of the frame 60 is under control of a telescopic hydraulic jack 66 comprising a series of telescoping cylinders forming

a closed container for a hydraulic pressure medium. The larger cylinder, at one end of the jack is pivotally attached, as at 68, to the body at an intermediate point close to the upper edge of the rear wall 4. The lower cylinder is pivotally fixed, as at 69, to the hinged frame. Thus, by applying a pressure medium to the cylinders, the jack may be extended, thereby to cause the frame to swing downwardly relative to the body with a resultant lifting of the body. By relieving the cylinder of its hydraulic medium, the frame will be permitted to swing upwardly relative to the body and the latter will be lowered accordingly.

The hydraulic medium for the jack 66 is administered thereto through a conduit 70 connected to the upper end of the cylinder. The pressure medium for actuating the hydraulic jacks 26 is admitted to their opposite ends through conduits 71 and 72. These conduits for the jacks 26 and 66 may extend, as shown, to the forward end of the vehicle, and there be connected through proper means, with a pump and hydraulic medium supply located on the towing tractor, and under control of suitable valve devices for controlling the direction of flow and retention of pressure.

With the device so constructed, it is used as follows: Assuming that the body of the vehicle has been lowered into scraping position, and that the gate is open, as indicated in Fig. 2, it is quite apparent that, incident to forward travel of the scraper, the load will be picked up by the blade 5 and retained within the body of the vehicle. When the body has been filled to the desired extent, the gate is moved to closed position by applying the hydraulic pressure medium to the cylinder 26, whereby the gate is swung downwardly to the position shown in Fig. 1, to close against the blade 5; preferably this would be done while the vehicle is advancing, and thus the closing operation of the gate greatly facilitated.

It is to be observed that in this closing action, the gate does not cut directly through the load of material, but swings in substantially a horizontal direction, as indicated by the dotted line 35 in Fig. 3. Thus, a substantial amount of the material that runs ahead of the blade is picked up.

After the gate has been closed, or even during the closing operation of the gate, the body is lifted by an application of hydraulic medium to the jack 66, which will extend the jack, swing the frame 60 downwardly relative to the body, thereby to pick up the body, as shown in Fig. 1, for transporting the load. At the location where it is desired to discharge the load, this is accomplished merely by moving the gate to open position.

If the load is to be spread out over a surface, it is only necessary to raise the body sufficient to cause the blade to clear the ground; then to slightly open the gate. The forward travel of the vehicle then feeds the dirt out through the opening, and it will be leveled off to a depth equal to the spacing of the blade above the ground surface.

It can be understood, by reference to Fig. 3, that in the loading of the vehicle, the earth will be scooped up the blade 5 and rear wall 4, and will pile up within the body and then will roll forward to fill in the space back of the upper portion of the gate. Thus, the gate in no way will interfere with the filling of the body.

It is apparent also that, should the gate, when in closed position, come in contact with some solid obstruction, damage to the machine will be

avoided by reason of the fact that the gate may lift to a limited extent.

Machines of this character may be made in various sizes, and it is apparent that details of construction might be altered without departing from the spirit of the invention. Therefore, it is not desired that the claims should restrict the invention to the details herein shown, but that the claims should be given an interpretation commensurate with the scope of the invention disclosed.

The special advantages residing in this scraper are, to a material extent, due to the fact that when the blade is just in contact with the ground surface, the inclination of wall 4 coincides substantially with the angle of repose of dirt on steel. Thus, when the bowl is raised, discharge of material becomes automatic, and when lowered for filling, the unloading tendency is overcome. Other advantages are due to the particular shape and location of the gate.

Having thus described my invention what I claim as new therein, and desire to secure by Letters Patent is:

1. In a scraper of the character described, a bowl open at its forward side and having a blade across the bottom thereof, horizontal cam rails on the bowl, a gate, lever arms fixed to the gate and supporting it from the cam rails within the open side of the bowl, power devices coacting with the lever arms and operable to actuate the latter to swing the gate between open and closed positions and whereby the closing edge of the gate, in moving to position closed against the blade, is caused to follow a substantially horizontal plane.

2. In a scraper of the character described, a bowl having an open forward side and having a transverse blade, a gate suspended in the open side of the bowl to move between open and closed positions, a pair of links having opposite ends pivotally attached to the bowl and to the gate, power devices mounted on the links and connected with the gate to swing it between open and closed positions; said gate and power devices being bodily pivotally movable about the points of connection of the links with the bowl.

3. In a scraper of the character described, a bowl open at its forward side, horizontal rails fixed to the opposite side walls of the bowl, a gate suspended in the open side of the bowl to swing between open and closed positions; said gate having lever arms fixed thereto at its upper end and at opposite sides and resting upon said rails to support the gate, links pivotally connected with the bowl and with the arms to maintain the gate in operative position, and means for rotating the lever arms about their points of connection with the links to close or open the gate.

4. In a scraper of the character described, a bowl having an open forward side and having opposite side walls and a transverse blade across the base, rails fixed substantially horizontally to the side walls, a gate suspended in the open side of the bowl, lever arms fixed thereto with ends in supporting contact with said rails, links overlying the rails with opposite ends pivotally connected to the bowl rearwardly of the gate, and to said lever arms, power devices on the links connected to pivotally actuate the lever arms to close or open the gate; said gate lever arms, links and power devices being bodily liftable about the pivot points of connection of the links with the bowl.

5. In a scraper of the character described, a scraper bowl having opposite side walls, and having an open forward side, rails fixed horizontally

to the said side walls, a gate suspended in the open side of the bowl to swing between open and closed positions, lever arms fixed to the top of the gate at its opposite sides and extended downwardly into supporting contact at their ends with said rails, links having ends pivotally connected to the bowl and opposite ends pivotally connected to said lever arms intermediate their ends to maintain the gate in position, power mechanism connected with the lever arms to swing them about their points of connection with the said links thereby to move the gate between open and closed positions; said lever arms being fixed in such relation to the gate that, incident to opening the gate, they move from horizontally extended positions to upright positions, thereby to cause the gate to be bodily lifted as it swings to open position.

6. In a scraper of the character described, a bowl having an open forward side and having opposite side walls, a rear wall terminating in a transverse scraping blade across the medial part of the bowl, rails fixed horizontally to the opposite side walls of the bowl, a gate suspended in the open side of the bowl, lever arms fixed to the gate at opposite sides and having ends resting on the rails to support the gate, links horizontally overlying the rails and pivotally connected to the bowl, and to the lever arms intermediate their ends to maintain the transverse position of the gate, and power devices mounted on the links and having connection with said lever arms to actuate the latter for moving the gate between open and closed positions.

7. A device as in claim 6, wherein the said lever arms assume a substantially horizontal position above the said rails when the gate is closed and move toward vertical positions in opening the gate, and have rollers at their ends for travel on the rails, and operate to bodily lift the gate as it opens.

8. In a scraper of the character described, a bowl having an open side and having opposite side walls and a transverse blade across the base of the bowl, a gate suspended in the open side of the bowl, rails fixed substantially horizontally to the side walls of the bowl, lever arms fixed to the gate with ends in supporting contact with said rails, links overlying the rails with ends pivotally connected to the bowl and ends pivotally connected to the arms, power devices fixed on the links and connected to said arms for actuating the latter pivotally about their points of connection with the links to swing the gate between open and closed positions and means for limiting the upward swinging of the links while the gate is in closed position.

9. A device as in claim 8 wherein the means for limiting the upward swing of the links while the gate is in closed position comprises studs that are fixed to the bowl wall above the rails and beneath which the lever arms swing when the gate moves to closed position.

10. In a scraper, a bowl that is open at its forward side and bottom and having opposite side walls and a back wall, the back wall being equipped with a scraping blade across its lower edge, a support for the bowl forwardly thereof, means for swinging the bowl downwardly about said support whereby to engage the blade with the ground for loading and for swinging it upwardly about the support to lift the loaded bowl and blade clear of the ground for transportation, and whereby to incline the bowl for gravity flow of material from the back wall, a gate located

within the open side of the bowl between the side walls thereof, supporting means for the gate mounted on the bowl and operable for adjusting the gate between open and closed positions, and means operable incident to an opening adjustment of the gate whereby to cause it to be bodily lifted and by a closing adjustment to cause it to be bodily lowered relative to the level of the blade.

11. In a wheel supporting scraper, a bowl that is open at its forward side and bottom, and comprising opposite side walls and a back wall extended to the level of the lower edges of the side walls, and equipped with a scraping blade across its lower edge, a gate supporting means mounted on the bowl, a gate supported between the side walls by said means to rotate therein between open position and a position closed against the blade about a horizontal axial line substantially forward of the blade, power mechanism associated with the gate supporting means for rotating the gate about said axial line, and devices operated by the power mechanism in the gate closing action whereby the gate is caused to be bodily lifted relative to the blade as it opens to retain its closing edge above the horizontal level of the blade.

12. In a scraper, a vertically movable bowl open at its forward side and bottom and having opposite side walls, a back wall and a transverse scraping blade at the bottom edge thereof for filling the bowl; said back wall being sloped at a degree that will cause gravity flow therefrom when the blade is raised from ground contact, a gate mounting means movably fixed to the bowl, a gate mounted by said means within the opposite side of the bowl and rotatably movable therein about a horizontal axial line that is transverse and substantially forward and above the blade, means on the bowl for actuating the gate from a position closed against the blade to open positions; said gate being curved in a manner whereby, in closing, it will scoop up the run of material forward of the blade, and when closed, will serve as the means for sustaining the load in the bowl.

13. In a scraper, a vertically adjustable bowl open at its forward side and bottom and having a back wall and a scraping blade across the lower edge of said wall for filling the bowl, a gate mounting means on the bowl, a gate mounted thereby in the open, forward side of the bowl forwardly of the blade, means for adjusting the bowl to engage and disengage the blade with the ground for filling the bowl and for transportation of the load, means on the bowl for actuating the gate between open and closed positions and devices associated with the gate mounting means and the gate actuating means whereby, when the gate is moved from the open position, as in filling the bowl, to closed position, it will be bodily lowered and caused to dip beneath and pick up the run of material ahead of the blade thereon and to retain the load in the bowl, the back wall being inclined for gravity discharge when the blade is above ground, and the said gate being adjustable from closed position to release the entire load for discharge from the bowl.

14. In a scraper, a vertically adjustable bowl having a back wall serving as a scraping blade and inclined for gravity unloading of dirt therefrom, a gate mounted forwardly of the said back wall and means for swinging the gate between open and closed positions; said gate being adapted, in moving from open to closed position, to scoop up any run of dirt ahead of the blade, 75

and when closed against the blade, to carry the load thereon.

15. In a scraper, a vertically adjustable bowl having a back wall equipped with a scraping blade across its lower edge and inclined for gravity discharge of material therefrom when the blade is out of ground contact, a gate mounted on the bowl forwardly of the back wall to swing

about a horizontal axis between open and closed positions, and power means for actuating the gate; said gate being adapted in closing to swing beneath and scoop up a run of dirt ahead of the blade and to carry the scooped up load thereon and adapted to discharge the load by gravity flow therefrom as it is opened from the blade.

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