

March 15, 1938.

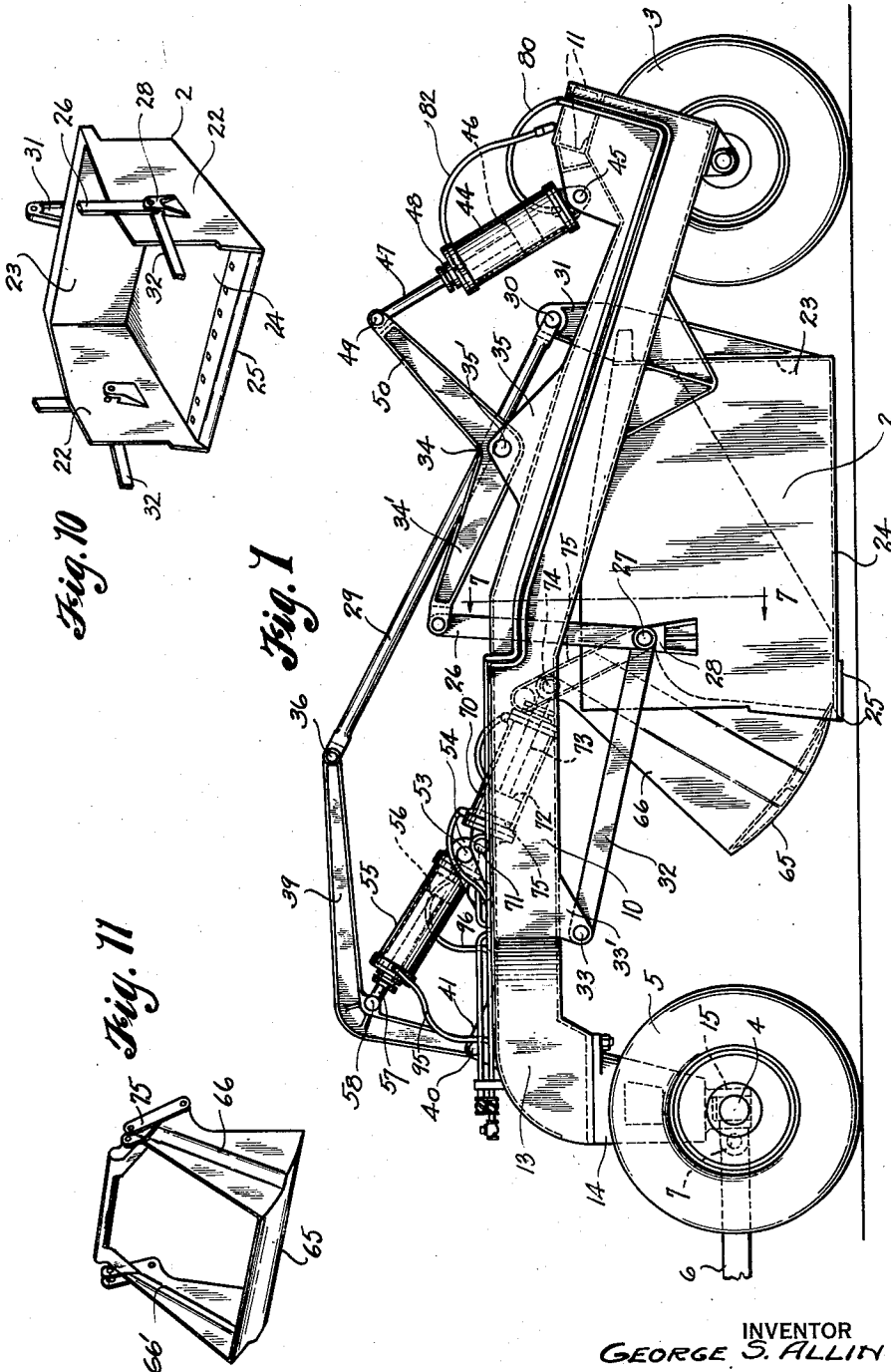
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2,111,134

SCRAPER

Filed April 4, 1934

4 Sheets-Sheet 1



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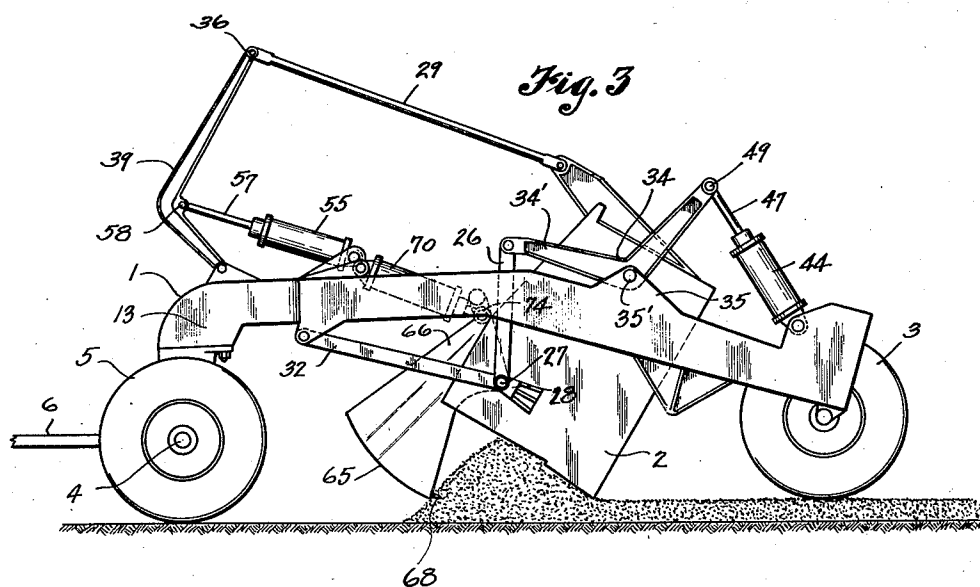
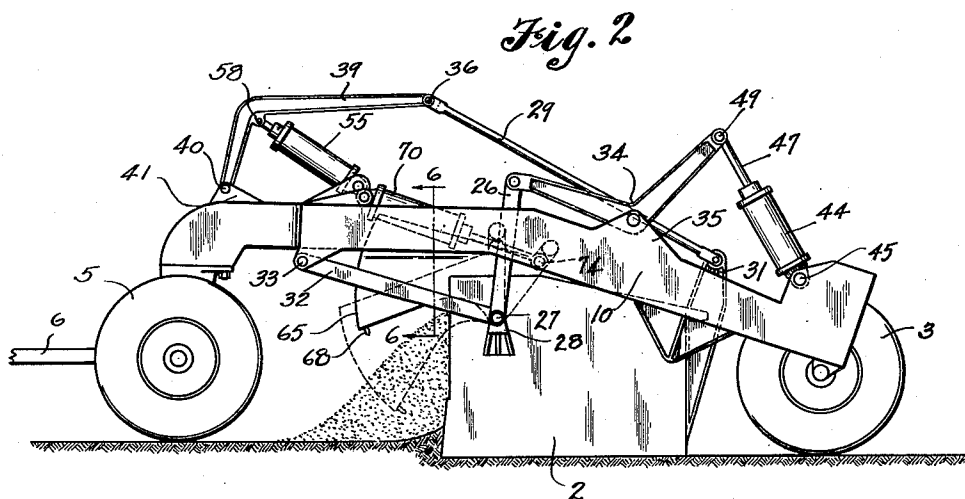
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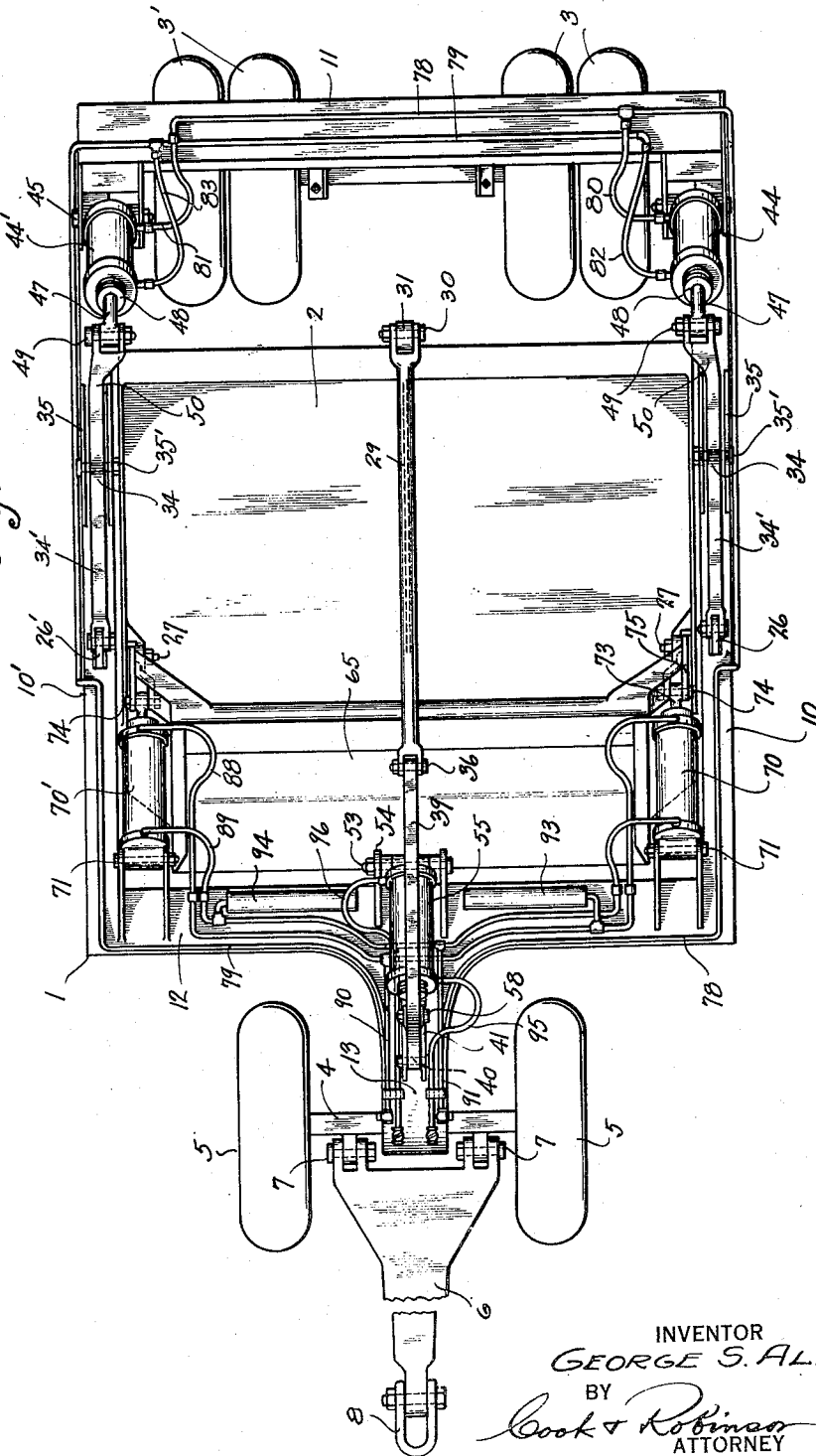
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Fig. 4



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Fig. 5

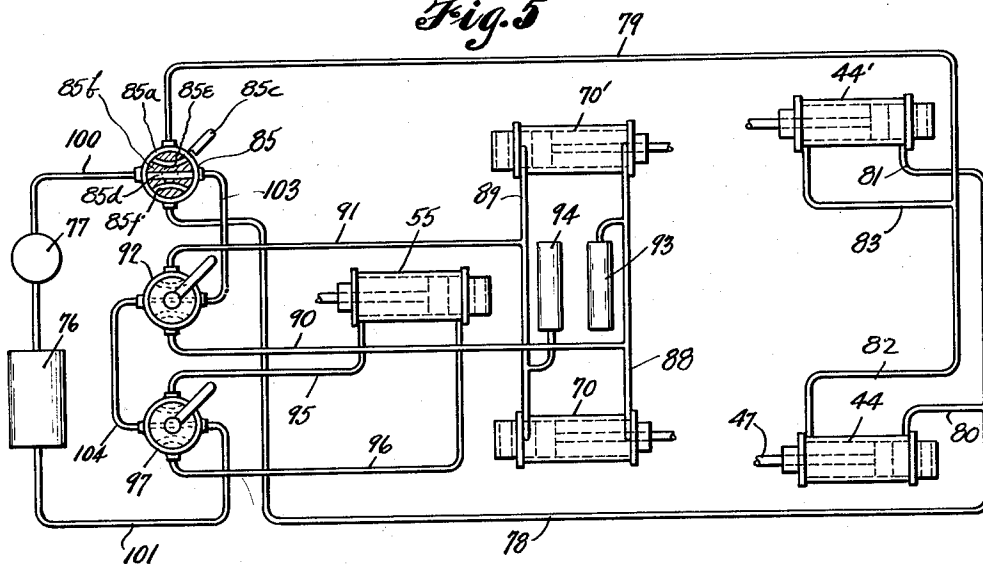


Fig. 6

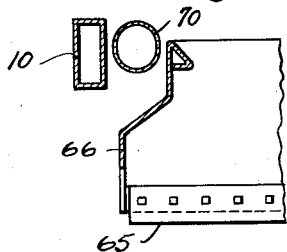


Fig. 7

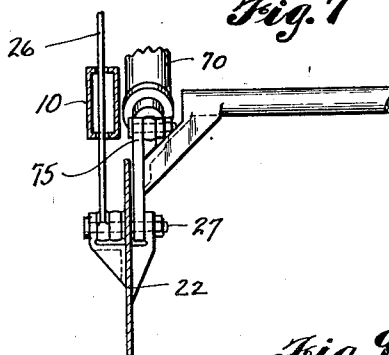


Fig. 8

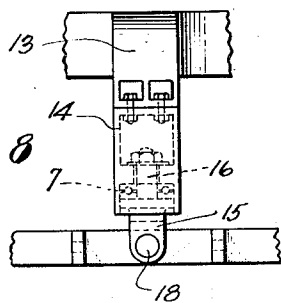
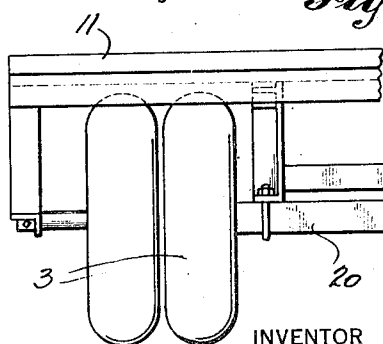


Fig. 9



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SCRAPER

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Application April 4, 1934, Serial No. 718,937

5 Claims. (Cl. 37—126)

This invention relates to dirt moving equipment and more particularly to machines especially useful in road building and which are known in trade as "carry scrapers", that is, a type of scraper whereby a load of dirt, sand or other material to be moved may be scooped up and carried in the scoop to a point of use or place of distribution and there discharged; the present device being in the nature of a trailing vehicle for a tractor or the like, and designed to handle large volumes of material.

It is the principal object of this invention to provide a scraper of the above stated character having a wheel supported frame wherein the scoop, or scraper, is adjustably suspended by mechanisms whereby it may be properly adjusted for causing its cutting edge to enter the ground to various depths and held positively at a definite depth as the vehicle advances and the scoop becomes filled, then for lifting the scoop for transportation of the load, and finally tilting for dumping or spreading the load.

It is also an object of the invention to provide the scoop with a hinged gate that may be swung upwardly away from the entrance to the scoop to permit the filling operation and then swung to closed position to retain the load during the period of transportation to a point of disposition.

Another object of the invention resides in the provision of hydraulic means for controlling the raising, lowering, tilting and dumping of the scoop and in the provision of control devices whereby the scoop may be held at various positions. Also, in the provision of hydraulic means for actuation of the gate between open and closed positions.

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

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

Fig. 1 is a side elevation of a machine embodied by the present invention; the scoop being shown in raised position as in transporting a load.

Fig. 2 is a side elevation with the scoop lowered and the gate opened for reception of a load.

Fig. 3 is a similar view illustrating the scoop in dumping position.

Fig. 4 is a plan, or top view of the machine.

Fig. 5 is a view diagrammatically illustrating the hydraulic system for controlling the action of the scoop and gate.

Fig. 6 is a cross sectional detail of the frame structure as seen on line 6—6 in Fig. 2.

Fig. 7 is a cross sectional detail of parts as seen on the line 7—7 in Fig. 1.

Fig. 8 is a front elevation of the supporting connection for the front end of the vehicle frame pivoted on the front axle.

Fig. 9 is a rear elevation of a rear wheel mounting.

Fig. 10 is a perspective view of the scoop.

Fig. 11 is a perspective view of the scoop gate detached from the scoop.

Referring more in detail to the drawings—

The present vehicle is in the nature of a trailer comprising a frame structure 1 of rectangular form within which a scoop 2 for carrying dirt, or the like, is suspended. This frame is supported at its rear end by two pairs of wheels 3 and 3' respectively, and at its forward end has pivoted connection with a transverse axle 4 mounted by guide wheels 5—5'. A tongue 6 is hingedly attached to the axle 4 by means of bolts 7—7 and, at its forward end, the tongue has a clevis 8 designed for connection with the draw bar of a tractor or other draft vehicle, not herein shown.

The frame structure 1 comprises longitudinally extending opposite side beams 10—10' with a transverse, connecting beam 11 across the rear end and a transverse connecting beam 12 at the forward end from which latter beam a centrally located and forwardly directed arm 13 projects. Bolted to the forward end of this arm, as seen in Fig. 8, and extending downwardly is a supporting post 14 which, in its lower end, mounts a yoke 15 having a vertically extending pivot shank 16 revolvably fixed in the post, with the base of the yoke resting against an anti-friction bearing 17. The yoke 15 embraces the axle 4 at the central point and pivot pin 18 connects the two to permit of a relative upward and downward action of opposite ends of the axle.

The two sets 3 and 3' of paired wheels which support the rear end of the frame are revolvably mounted on the opposite ends of a transverse axle 20 that is secured to the under side of the frame at its rear end as seen in Fig. 9.

As will be observed by reference to Fig. 1, the forward part of the main frame is quite high off the ground and the front wheels in making short turns, may pass thereunder. The rearward part of the frame extends in a downwardly inclined manner to approximately the height of the wheel axle 20 that is secured thereto. The frame is clear and open between the opposite side and end

beams to contain the scoop and to permit freedom of the scoop for loading and dumping.

The scoop 2 is of approximately the same width as the frame and it comprises parallel and vertical opposite side walls 22—22', a vertical rear wall 23 and a horizontal bottom wall 24. A blade 25 is fixed along the forward edge of the bottom wall to aid in cutting into the ground.

The scoop 2 is suspended within the frame by means of links 26 and 26' which, respectively, have their lower ends pivotally connected by pivot bolts 27 to brackets 28—28' fixed to the opposite side walls 22—22' of the scoop near their upper forward corners; and by a dumping link 29 which connects pivotally as at 30 to a bracket 31 that is fixed to the rear wall of the scoop at a point intermediate its opposite sides. Drag links 32 are pivotally attached to the pivots 27 and, at their forward ends, to pivots 33 in depending ears 33' 20 in the forward ends of the side beams of the frame.

The upper ends of the links 26—26' are pivotally attached to the forwardly directed arms 34' of bell crank levers 34 mounted by pivots 35' in brackets 35 on the opposite side beams of the frame. The link 29 extends in a forwardly and upwardly inclined direction over the scoop and at its forward end is pivotally attached by bolt 36 to the rearwardly directed end of an angular lever 39 that is pivotally attached at 40 to a bracket 41 on the forwardly directed arm 13 of the main frame structure.

Mounted on the rear end of the main frame, at opposite sides, are hydraulic cylinders 44—44', each of which has its lower end pivotally connected, by a pivot bolt 45, to a part of the main frame. A piston 46 is reciprocally contained in each cylinder with a rod 47 slidable through a packed gland 48 at the swinging end of the cylinder and the rod is pivotally connected by a bolt 49, with an upwardly and rearwardly directed arm 50 of the bell crank lever 34 or 34' at that side of the frame. Movement of the pistons in their respective cylinders is synchronized, as presently understood, for equal and simultaneous actuation of the bell crank levers 34—34', and it is readily apparent that through the linkage provided when the pistons move inwardly, that is, toward the pivoted ends of their cylinders, the scoop will be lifted. Likewise, when the pistons move outwardly in their cylinders, the scoop will be lowered accordingly by reason of the downward swinging of the forward ends of the bell crank arms 34'; it is to be understood that drag links 32 and link 29 in their connection with the frame and scoop provide a sort of parallel link operation whereby the bucket maintains substantially the same slope while being raised or lowered.

Pivotally mounted by a pivot 53 on a bracket 54 fixed on the forward transverse beam of the main frame at a medial point is a hydraulic cylinder 55 containing a piston 56 with a piston rod 57 pivotally attached at its outer end as at 58 to the lever 39 which in turn is connected by link 29 to the rear wall of the scoop. The arrangement is such that when the piston is actuated to extend the rod, the lever 39 will be swung upwardly and the rear end of the bucket will be lifted and the bucket will pivot about the support 27. Raising or lowering of the scoop bodily may be effected while maintaining it substantially in a level position, as seen in Fig. 1, by action of rearward hydraulic cylinders 44—44'.

For the purpose of retaining a load in the scoop 75 for transportation, especially if a long haul is

to be made, I have equipped the scoop with a gate 65 having opposite end flanges 66—66' extended along the inside of the opposite side walls 22 of the scoop and pivotally mounted on the inner ends of the pivot bolts 27 so that the gate may swing forwardly and upwardly from its closed position. The gate has an opening and closing action relative to the scoop like that of a jaw and it has a sharpened plate 68 along its closing edge whereby it may more readily cut through the dirt or other scooped up material, when actuated to closed position.

For opening and closing the gate, I have provided a pair of hydraulic cylinders 70—70' pivotally mounted on the main frame at opposite sides and forwardly of the bucket. The cylinders have ends fixed to the frame by pivots 71 and each contains a piston 72 with a rod 73 connected pivotally at its outer end by bolt 74 with an upwardly extended arm 75 on the end wall 66 of the scoop, the point of connection being somewhat above the pivots 27 so as to provide sufficient leverage for actuation of the gate.

When the scoop is either in loading or in carrying position the gate may be swung from open to closed position by actuation of the pistons inwardly in the hydraulic cylinders 70—70', that is, toward the pivoted ends of the cylinders. It is important in this connection that the length of the piston rods and various connections are such that with the scoop lowered and the gate closed, there will still remain a clearance between the piston and cylinder end wall, as designated at 75 in Fig. 1. This clearance is provided because a farther movement of the piston takes place in maintaining the gate in closed position when the scoop is bodily raised for transportation. The reason will be better understood when it is considered that the gate is pivoted on the scoop while the cylinder is attached to the main frame. Thus, relative movement of the gate and cylinder incident to raising the scoop, will effect a movement of the piston in its cylinder. Otherwise it would effect an opening movement of the gate, but since the gate must be kept closed, it is necessary to compensate for the raising of the scoop by a farther inward movement of the piston in its cylinder.

In Fig. 5 is diagrammatically illustrated the hydraulic system, including the various cylinders and their piping connections. It is to be understood that the tractor or vehicle to which the present device is attached is equipped with a tank or reservoir 76 for a supply of liquid pressure medium, such as oil, and has a pump 77 operable to forcibly circulate this medium to the various cylinders under control of suitable manually manipulated valve devices. Pipes 78 and 79 for application of the pressure medium extend along opposite sides of the main frame and across the rear thereof. Pipe 78 has connections 80 and 81 leading respectively to the pivoted ends of cylinders 44 and 44', while pipe 79 has connections 82 and 83 leading, respectively, to their other ends. When it is desired to lower the forward end of the scoop, pressure medium is admitted under pressure through pipe 78, thus to drive the pistons 46 outwardly and to rock the bell cranks 34 to lower the scoop accordingly. When it is desired to raise the scoop the pressure medium is applied through pipe 79. Application of pressure medium is made through a fourway valve 85 later described, which provides for an exhaustion of the liquid from corresponding ends of the two

cylinders 44—44' while it is delivered into their other ends.

The two cylinders 70—70' have their corresponding ends directly connected by pipes 88 and 89 and pipes 90 and 91 extend from these, respectively, to opposite sides of a fourway valve 92 that may be manipulated like valve 85 to actuate the pistons in the cylinders 70—70' for closing or opening the gate 65. This valve 92 also may be set at a neutral position for retaining the liquid in the cylinders against circulation and thereby hold the gate at set positions. It will be observed also, by reference to Fig. 5, that there are air tight relief tanks 93 and 94 connected, respectively, with the pipes 88 and 89 for reception of liquid crowded from the cylinders incident to the raising or lowering of the scoop, when the valve 92 is in neutral position and the gate locked thereby in closed position. In closing the gate, some liquid will be forced into relief tank 93, compressing the air in the tank to the maximum pressure delivered by the oil pump while tank 94 is at zero pressure. When valve 92 is placed in holding position these pressure differences are locked in the system. The high pressure locked in tank 93 will maintain the gate in closed position regardless of the movement of the linkage in raising or lowering of the scoop.

Pressure medium pipes 95 and 96 connect with opposite ends of cylinder 55, and the pressure medium is administered by a four way valve device 97 with which these pipes connect. The valve 97 may be adjusted from a neutral position, to administer the pressure to either end of the cylinder while medium escapes from the other end. The valves 85, 92 and 97 are alike in construction and mode of operation. Each comprises a casing with which pipe connections are made at diametrically opposite points leading to opposite ends of the cylinder or cylinders which the valve controls. Each valve also contains a rotatable member or plug with a diametric port and with by-passes at opposite sides extending across a chord of ninety degrees. These rotatable plugs have hand levers whereby they may be individually operated.

In Fig. 5 I have illustrated the valve 85 in cross sectional detail, but it is to be understood that its description applies equally to valves 92 and 97. In this figure 85a designates the housing, 85b designates the rotatable plug and 85c designates the actuating lever for rotating the plug. In the plug is the diametric channel 85d and the opposite side channels 85e and 85f.

The valve 85 has a pipe connection 100 leading directly to pump 77. Valve 97 has a pipe connection 101 leading back to tank 76. Opposite sides of valve 92 have pipe connections 103 and 104, respectively, leading to valve 85 and valve 97. Pipes 103 and 104 connect to valve housing 92 in alinement at right angles to pipe connections 90 and 91 therewith. Likewise, pipes 100 and 103 connect with valve housing 85 in alinement at right angles to connections of pipes 78 and 79 therewith. Also, pipes 101 and 104 connect with valve 97 in alinement at right angles to pipe connections 95 and 96. This provides that with the rotatable plugs of the various valves all set at by-passing position, as illustrated in Fig. 5, the pump will merely circulate the liquid medium therethrough and back to the tank 76. When it is desired to actuate the cylinders, the valve corresponding thereto is moved to a position at which the circulated medium will be diverted into the cylinders. Ex-

haust from the cylinders returns to the system through the valve. When a valve is in by-passing position the connections with the cylinders are closed and the pistons are locked at set positions.

With the machine so constructed, it is apparent that when the scoop is lowered with its forward edge engaging the ground, and the machine advancing forwardly, the scoop will be filled as indicated in Fig. 2. Then the gate may be lowered to closed position, the scoop raised clear of the ground and the load transported to a point of disposal. To dump the load, the gate is first opened, then the rear end of the scoop is elevated, as in Fig. 3, to dump its contents, which may be evenly spread over an extended surface if the vehicle is advanced while the scoop is in this position; it being understood that the depth to which it is spread is dependent on the elevation of the scoop blade.

This machine is especially useful in road building and in grading as it provides for carrying of large loads, while serving as a grader and leveler. Furthermore, it is easy of manipulation and can be turned in a short radius.

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

1. A scraper of the character described comprising a frame structure, supporting and guiding wheels for the frame, a scoop, links at its forward and rearward ends suspending the scoop pivotally in the frame in a forwardly opening position, a gate for the scoop hingedly attached thereto to swing upwardly to open position about the pivot connections of the forward suspending links, power actuated means on the frame supporting the scoop suspending links and operable to lower the scoop against the ground for filling and for lifting it clear of the ground for travel and for tilting the scoop to aid in filling and for dumping a load, and means for actuating the gate between open and closed positions and for holding it in either of said positions.

2. A scraper of the character described comprising a wheel supported frame, a scoop disposed therein having opposite side walls, a rear wall and a bottom wall; the latter wall having a forward cutting edge, a pair of drag links pivotally attached to the frame and to opposite side walls of the scoop at points in horizontal and transverse alinement, a gate for the scoop pivotally mounted to swing about said transversely alined pivots between open and closed positions, means for actuating said gate, bell crank levers mounted on the frame at opposite sides, scoop suspending links pivotally attached to the scoop and to arms of said bell cranks, hydraulic cylinders on the frame with pistons having rods connected to the other arms of said bell cranks, means for effecting a controlled application of pressure medium to said cylinders to actuate the links to raise and lower the scoop, a link pivotally connected with the rear wall of the scoop and extended forwardly of the scoop, and a hydraulic cylinder operatively connected with the latter to actuate it for tilting the scoop for loading and for dumping a load.

3. A scraper of the character described comprising a frame structure, a scoop disposed therein, suspending links for the scoop pivotally attached thereto at its opposite sides at points transversely and horizontally alined, means for raising and lowering the scoop by said links, a pair of drag links pivotally attached to the frame and to

the scoop at said points of connection of the suspending links, a dumping lever pivotally mounted on the forward part of the frame, and a link extending rearwardly therefrom and pivotally attached to the rear wall of the scoop; said last mentioned link and said drag links having a parallel link relationship whereby said bucket is kept substantially level during raising and lowering movements by the suspending links.

4. In a scraper, a frame structure, a scoop, means for raising and lowering the scoop, a gate for the scoop hingedly attached thereto, a hydraulic cylinder having a piston with a rod connected to the gate, a source of hydraulic pressure medium, pipes connecting said source with opposite ends of the cylinder, valve mechanism for controlling direction of flow through said pipes

to actuate the piston for opening or closing the gate, and an air tight relief tank connected with each of said pipes.

5. In a scraper, a frame structure, a scoop suspended therein, means for raising and lowering the scoop bodily within the frame, a gate horizontally attached to the scoop for closing its open end, a lever arm extending from the gate, a hydraulic cylinder mechanism on the frame having its piston connected with the arm for opening and closing the gate and means associated with the hydraulic cylinder to compensate for movement of the piston in the hydraulic cylinder incident to raising and lowering of the scoop while maintaining the gate in closed position.

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