

Feb. 22, 1938.

C. LE BLEU.

2,109,392

HYDRAULICALLY CONTROLLED DIRT MOVING MACHINE

Filed May 21, 1935

2 Sheets-Sheet 1

*Fig. 1*

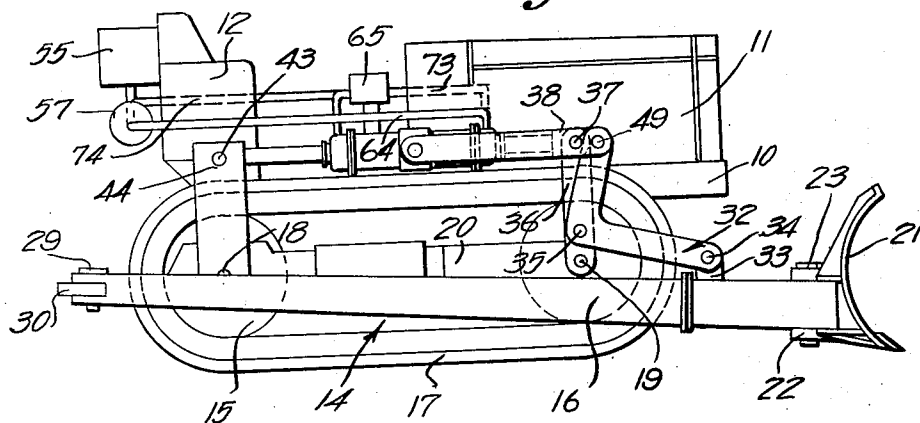
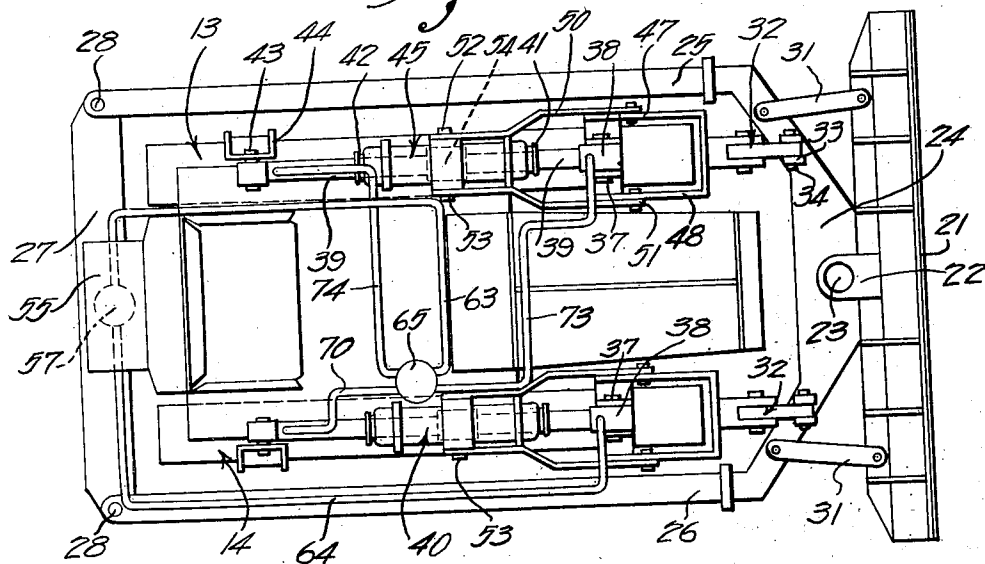


*Fig. 2*



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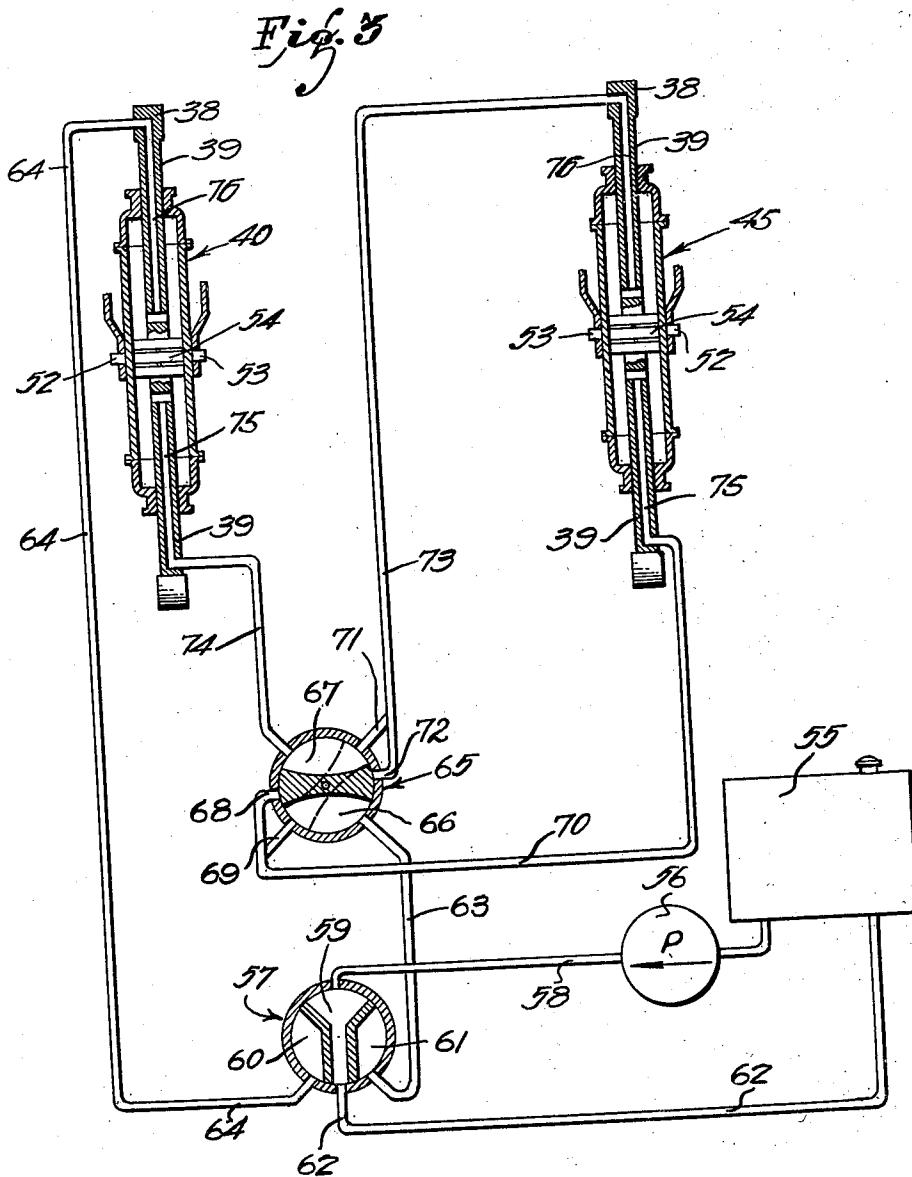
## C. LE BLEU

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## UNITED STATES PATENT OFFICE

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## HYDRAULICALLY CONTROLLED DIRT MOVING MACHINE

Charles Le Bleu, Los Angeles, Calif.

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7 Claims. (Cl. 37-144)

This invention relates to machinery for moving dirt and the like, and particularly pertains to a hydraulically controlled dirt moving machine.

5 In the operation of dirt moving machinery, particularly scrapers and the like which have a scraper disposed transversely of the forward end of the machine it is desirable to suspend the scraper blade in a manner to insure that it will 10 maintain itself in a substantially set position, irrespective of the irregularities in the roadway over which the running gear is passing, and it is further desirable to provide simple means for controlling the scraper blade so that it may be easily 15 moved and set in a desired position, and it is the principal object of the present invention to provide a dirt moving machine having a blade mounting which automatically adjusts itself with relation to the running gear of the device so that 20 the blade will maintain a set position with regard to the roadway over which the machine is passing, the supporting mechanism being provided also with means hydraulically actuated to readily tilt the blade and to maintain the blade 25 in a desired set position.

The invention contemplates the provision of a tractor of the self-laying track type, and which tractor carries a scraper blade disposed transversely of the tractor and in advance thereof, said 30 blade being articulately supported at its opposite ends from the separate track laying units, said articulate connections also including hydraulically controlled means by which the blade may be moved.

35 The invention is illustrated by way of example in the accompanying drawings in which: Figure 1 is a view in side elevation showing the present invention.

Fig. 2 is a view in plan showing the invention.

40 Fig. 3 is a view in diagram showing the control means for the device, and further indicating the double acting hydraulic ram construction.

Referring more particularly to the drawings 10 indicates a main frame of a tractor here shown as fitted with a power plant 11 carried thereon and provided with a driver's seat 12. Disposed at opposite sides of the tractor are track laying units 13 and 14. These units are of conventional type having rear sprocket wheels 15, front 45 sprocket wheels 16, and an endless track laying chain 17. The rear sprocket is mounted upon an axle 18 provided with a suitable transmission mechanism not shown, but driven from the power plant 11. The front sprockets are mounted upon 50 separate axles 19, it being understood that the

individual track laying units may swing vertically around the axis of the axle 18 and may swing separately. The front and rear axles are mounted in suitable bearings on frame units 20. Disposed in advance of the tractor is a scraper blade 5 21. This blade is intended to engage the dirt, or other material, and to push it in a desired direction, and at a desired level as the machine advances. The blade 21 is provided at a point intermediate its ends with brackets 22 receiving a king 10 pin 23. The king pin extends vertically through a central opening in a transverse bolster 24, the opposite ends of which are connected with thrust bars 25 and 26 which extend along opposite sides 15 of the tractor and parallel to the track laying units. The thrust bars are pivotally connected to a transverse equalizer bar 27 which extends transversely of the rear of the tractor and is pivoted to the thrust bars by pivot pins 28. The 20 equalizer bar is pivoted at a point intermediate its ends upon a pin 29 engaging a shackle 30 by which the thrust bar is supported at the rear of the tractor. The opposite ends of the scraper blade 21 are connected to the bolster adjacent its 25 opposite ends by links 31 which are pivoted to both the blade and the bolster. The scraper blade, the bolster, and the thrust bars are adjustably supported by bell cranks 32, the forward arms of which pivotally engage brackets 33 on the bolster 24 by pivot pins 34. Fulcrum 30 pins 35 for the bell cranks are carried by upright links 36, the lower ends of which are pivoted upon the axles 19 of the track laying units, and the upper ends of which links are connected by a pivot pin 37 to the forward end portions 38 35 of the pistons 39. By reference to Figs. 1 and 3, it will be seen that the piston 39 extends entirely through its cylinder 40 which cylinder is fitted at opposite ends with packing glands 41 and 42 to permit its reciprocation. The rear end of the 40 piston 39 is connected by a pivot pin 43 to a rigid upright frame member 44 secured to the frame 20 of each track laying unit. While this construction has been described as being a piston and cylinder unit at one side of the tractor it will be understood that such units are disposed upon opposite sides and for convenience in further description, one cylinder is designated as 40, and the opposite cylinder as 45. The cylinders 40 and 45 are thus supported from a rigidly disposed pivot 43 at the rear ends of the pistons 39 and are supported at their forward ends upon the upright links 36, and at the same time the bell cranks are pivotally supported upon pins 35 carried by the upright links 36. The bell cranks 32

as shown in Fig. 2 of the drawings, are formed with a pair of upper arms 47 and 48 which are parallel to each other and extend along opposite sides of the track laying units. Their upper ends carry pivot pins 49 by which they are connected to thrust links 50 and 51. These links extend rearwardly and are pivotally connected upon trunnions 52 and 53 which extend from opposite sides of the cylinders 40 and 45 respectively. By this arrangement it will be seen that if a fluid under pressure is introduced into the cylinders 40 and 45 at one end thereof this fluid will act against the piston 54 carried by piston rod 39 so that the cylinder will shift longitudinally and slide with relation to the piston. The sliding movement of the cylinder will impart motion to the thrust links 50 and 51 to swing the upper arms 47 and 48 of the bell cranks 32 in a corresponding direction. As this swinging motion takes place the blade 21 will be correspondingly raised or lowered.

The cylinders 40 and 45 are intended to be operated by fluid under pressure. A reservoir of this fluid is maintained in a tank 55 from which it is drawn by a pressure pump 56. This pump as shown in Fig. 3 of the drawings connects with a master valve 57 through a pipe 58. The valve is provided with a rotary valve element having a central passageway 59 therethrough and opposite side passageways 60 and 61. The central passageway 59 which normally establishes communication between a pipe 58 and an exhaust pipe 62 permits the fluid to pass to the supply tank 55. The valve 57 also is provided with pressure pipes 63 and 64. The pipe 64 is here shown as leading to the forward end of the piston 39 in cylinder 40. The pipe 63 is shown as leading to the housing of a control valve 65. The rotary member of the valve 57 may be moved from its neutral position to a position bringing the passageway 59 into register with the pipe 64 or into register with the pipe 63, at which time the one of the pipes 63 or 64 which is not in register with the passageway 59 will register with the exhaust pipe 62 through valve passageways 60 or 61 as the case may be. The control valve 65 has a rotary valve element provided with passageways 66 and 67. The element is shown in one of its positions in solid lines in Fig. 3 and in the other position in dotted lines. A pair of outlet pipes 68 and 69 communicate with the valve housing on one side thereof and are connected with a pipe 70 leading to the rear end of the piston rod 39 of cylinder 45. Diagrammatically opposite the pipes 68 and 69 are pipes 71 and 72 respectively which are connected in common with a pipe 73 leading to the opposite end of the piston rod 39 of cylinder 45. The pipes 68 and 69, and the pipes 71 and 72 are intended to be alternately closed or opened as the case may be in the two positions of the rotary valve element of the control valve 65. Diagrammatically opposed to the pipe 63 in the housing of the valve 65 is a pipe 74 which leads to the rear end of piston 39 of the cylinder 40. By reference to Fig. 3 of the drawings it will be seen that longitudinal passageways 75 and 76 occur in the portions of the piston rods 39 upon opposite sides of the pistons 54.

In operation of the hydraulic mechanism a suitable incompressible fluid is placed within the tank 55. This is continuously circulated through the master valve 57 from pipe 58 to pipe 62 and returning to the tank. In the event the rotary element of the master valve 57 is moved so that the central passageway 59 communicates with a pipe 63 the fluid will then flow through pipe 63 to the control valve 65. It will be assumed that at that time the rotary element of the control valve 65 is in the solid line position shown in Fig. 3. The fluid will then flow through the passageway 66 into the pipe 69 and thence through pipe 70 to the passageway 75 of piston rod 39 within the cylinder 45. This will force the cylinder 45 in a counter-direction since the piston 54 of that cylinder is immovable. The fluid in the opposite end of the cylinder 45 will then be displaced and will be forced outwardly through the passageway 76 into pipe 73 and thence through pipe 71 into the passageway 67 of the rotary valve element of the control valve 65. Fluid will then flow along the pipe 74 to the passageways 75 of the piston rod 39 within the cylinder 40. This will cause the cylinder 40 to move rearwardly in a corresponding direction to cylinder 45. The fluid on the opposite side of the piston within the cylinder 40 will be displaced and flow outwardly through passageway 76 in the piston rod to the pipe 64, and then to the master valve where it will flow into the exhaust pipe 62 through the passageway 60 of the rotary valve element of the master valve 57. The movement of the two pistons in a rearward direction will act through the thrust links 50 and 51 to draw rearwardly upon the upper arms 47 and 48 of the bell cranks 32. This will coordinately lift the scraper blade 21. If the rotary element of the master valve is moved so that central passageway 59 communicates with the pipe 64 a reverse action will be applied due to the fact that the fluid under pressure will enter the passageway 76 of the piston rods of both cylinders 40 and 45 from the pipes 64 and 73 respectively. This will force the cylinders 40 and 45 forwardly and swing the bell cranks 32 downwardly to lower the scraping blade 21. If the rotary element in the control valve 65 is moved to its dotted line position and the rotary element of the master valve 57 is moved to bring the central passageway 59 into register with the pipe 63 it will be seen that pressure fluid will pass from pipe 63 through valve passageway 66 of valve 65 and then into the pipe 72 connecting with pipe 73. This will conduct the fluid to the piston passageway 76 at the forward end of the cylinder 45, thus creating a pressure in advance of the piston 54 of that cylinder to move the cylinder 45 forwardly. The displaced fluid upon the opposite side of the piston within the cylinder 45 will then flow through pipe 75 to the pipe 70 and into the control valve 65 through a pipe 68. Fluid will then pass through the passageway 67 of the rotary valve element and into the pipe 74 which communicates with the passageway 75 of the piston rod 39. Fluid pressure will then act in the rear of the cylinder 40 to move it in an opposite direction from the direction in which cylinder 45 is simultaneously moving. The displaced fluid at the forward end of cylinder 40 will pass through the pipe 64 to the master valve 57 and then through valve passageway 60 to the exhaust pipe 62. By moving the rotary valve element of the master valve 57 to bring its passageway 59 into register with the pipe 64 a reverse action will be produced in the cylinders 40 and 45. By this arrangement it will be seen that power means are provided for positively lifting and lowering the opposite ends of the blade 21.

It will thus be seen that by the structure here shown it is possible to positively and conven-

iently operate the blade of a dirt moving machine to adjust it in desired positions, to set it in its adjusted position.

While I have shown the preferred form of my invention, as now known to me, it will be understood that various changes may be made in the combination, construction, and arrangement of parts, by those skilled in the art, without departing from the spirit of the invention as claimed.

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

1. A hydraulically operated dirt moving machine comprising a tractor, separate track laying units at opposite sides thereof, a dirt moving member disposed transversely of the front of the tractor, a frame member articulately connecting the dirt moving member with the tractor for raising, lowering, and tilting movement, vertical links pivotally connected with said track laying units at their lower ends, operating levers pivotally mounted on said links of the separate track laying units and connected at their forward ends to said frame, a rigid upright carried by each of said track laying units, a piston rod extending longitudinally of each track laying unit and pivotally connected to the upright at the rear thereof and to the upper end of one of said vertical links, a piston carried on the piston rod at a point intermediate its ends, a cylinder mounted on each of said pistons for longitudinal reciprocating motion with relation thereto, and an operative connection between said cylinder and an arm of the levers carrying the frame of the dirt moving member whereby longitudinal shifting of the cylinder with relation to its piston will swing the lever.

2. A hydraulically operated dirt moving machine comprising a tractor, separate track laying units at opposite sides thereof, a dirt moving member disposed transversely of the front of the tractor, a frame member articulately connecting the dirt moving member with the tractor for raising, lowering, and tilting movement, vertical links pivotally connected with said track laying units at their lower ends, operating levers pivotally mounted on said links of the separate track laying units and connected at their forward ends to said frame, a rigid upright carried by each of said track laying units, a piston rod extending longitudinally of each track laying unit and pivotally connected to the upright at the rear thereof and to the upper end of one of said vertical links, a piston carried on the piston rod at a point intermediate its ends, a cylinder mounted on each of said pistons for longitudinal reciprocating motion with relation thereto, an operative connection between said cylinder and an arm of the levers carrying the frame of the dirt moving member whereby longitudinal shifting of the cylinder with relation to its piston will swing the lever, a source of fluid under pressure, conduits connecting the same with opposite ends of the cylinder, and control means whereby the direction of flow of the fluid to and through the cylinders may be established.

3. A hydraulically operated dirt moving machine and the like, comprising a tractor having self-laying track units at the opposite sides thereof, a rigid upright secured to each of said units and adjacent the rear thereof, an upright secured to each of said units and adjacent the forward end thereof, a piston rod pivotally secured by its opposite ends to said uprights, a piston fixed on each of said rods intermediate its ends, a cylinder reciprocating upon said pis-

ton, the opposite ends of the cylinder being closed to form pressure fluid chambers, a pair of bell cranks, one of which is pivotally secured to the frame of each track laying unit, a connecting link securing the upper leg of a bell crank to a corresponding cylinder, a blade frame articulately connected to the tractor, means connecting the other leg of each of the bell cranks to said frame, and a transversely disposed blade carried by said frame.

4. A hydraulically operated dirt moving machine and the like, comprising a tractor having self-laying track units at the opposite sides thereof, a rigid upright secured to each of said units and adjacent the rear thereof, an upright secured to each of said units and adjacent the forward end thereof, a piston rod pivotally secured by its opposite ends to said uprights, a piston fixed on each of said rods intermediate its ends, a cylinder reciprocating upon said piston, the opposite ends of the cylinder being closed to form pressure fluid chambers, a pair of bell cranks, one of which is pivotally secured to the frame of each track laying unit, a connecting link securing the upper leg of a bell crank to a corresponding cylinder, a blade frame articulately connected to the tractor, means connecting the other leg of each of the bell cranks to said frame, a transversely disposed blade carried by said frame, a source of fluid under pressure, conduits therefrom connecting with the pressure chambers in the opposite ends of the cylinders, and valve means for selectively directing the flow of fluid from the source of fluid supply to one end of one of the cylinders or to a second valve means, said second valve means adapted to direct pressure fluid into one end of one cylinder and the displaced fluid from said cylinder into the opposite end of the other cylinder whereby the cylinders will shift simultaneously in opposite directions.

5. A dirt moving machine comprising a tractor having self-laying track units at the opposite sides thereof, said units being pivoted upon their rear axles to swing vertically, a rigid upright secured to each of said units adjacent the rear of a unit, an upright at the front of each unit pivoted to swing in a vertical plane, a rigid piston rod pivoted at its rear end to the rigid upright and at its forward end to the pivoted upright, a piston fixed upon the piston rod at a point intermediate the ends of the rod, a pair of cylinders, one of which is mounted on each of said pistons, the cylinders having opposite closed ends through which the ends of the piston rod reciprocate, and with which they have a tight joint, a transversely disposed material moving member in advance of the tractor, means articulately mounting said material moving member with relation to the tractor, and operative connections between the cylinders and said articulate mounting whereby the material moving member may be raised and lowered and tilted.

6. A hydraulically operated dirt moving machine comprising a tractor, separate track laying units at opposite sides thereto, a dirt moving member disposed transversely of the front of the tractor, a frame member articulately connecting the dirt moving member with the tractor for raising, lowering, and tilting movement, operating levers pivotally mounted on the separate track laying units and connected at their forward ends to said frame, a rigid upright carried by each of said track laying units, a piston rod extending longitudinally of each track lay-

- ing unit and pivotally connected to the upright at the rear thereof and to a link at the forward end thereof, a piston carried on the piston rod at a point intermediate its ends, a cylinder mounted on each of said pistons for longitudinal reciprocating motion with relation thereto, a source of fluid under pressure, conduits therefrom connected with the pressure chambers in the opposite ends of the cylinders, a first and a second valve means interposed in said conduits, said first valve means adapted to selectively direct the flow of fluid from the source of fluid supply to one end of one of the cylinders, or to the second valve means, said second valve means being adapted to be selectively controlled to direct the pressure fluid into the same ends of both cylinders or into opposite ends of both cylinders whereby the cylinders will shift simultaneously in the same or opposite directions.
- 20 7. A hydraulically operated dirt moving machine comprising a tractor, separate track laying units at opposite sides thereto, a dirt moving member disposed transversely of the front of the tractor, a frame member articulately connecting the dirt moving member with the tractor for raising, lowering and tilting movement, operating levers pivotally mounted on the separate track laying units and connected at their forward ends to said frame, rigid uprights carried

by each track laying unit, a link carried at the forward end of each track laying unit, a piston rod connected to one of said uprights at its rear end and to one of said links at its forward end, a piston carried on the piston rod at a point intermediate its ends, a cylinder mounted on each of said pistons for longitudinal reciprocating motion with relation thereto, a link connecting each of said cylinders with one of said operating levers, a source of fluid under pressure, conduits therefrom connected with the pressure chambers in the opposite ends of the cylinders, a first and second valve means interposed in said conduits, said first valve means adapted to selectively direct the flow of fluid from the source of fluid supply to one end of one of the cylinders, or to the second valve means, said second valve means being adapted to be selectively controlled to direct the pressure fluid into the same ends of both cylinders or into opposite ends of both cylinders whereby the cylinders will shift simultaneously in the same or opposite directions, and means whereby the first named valve means may be operated to return said valve to a neutral position to cause a fluid lock of the cylinders and a bypass of fluid through the valve whereby the frame may be held in any of its desired set positions.

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