June 25, 1940. C. H. WILLIAMS 2,205,508

SCRAPER

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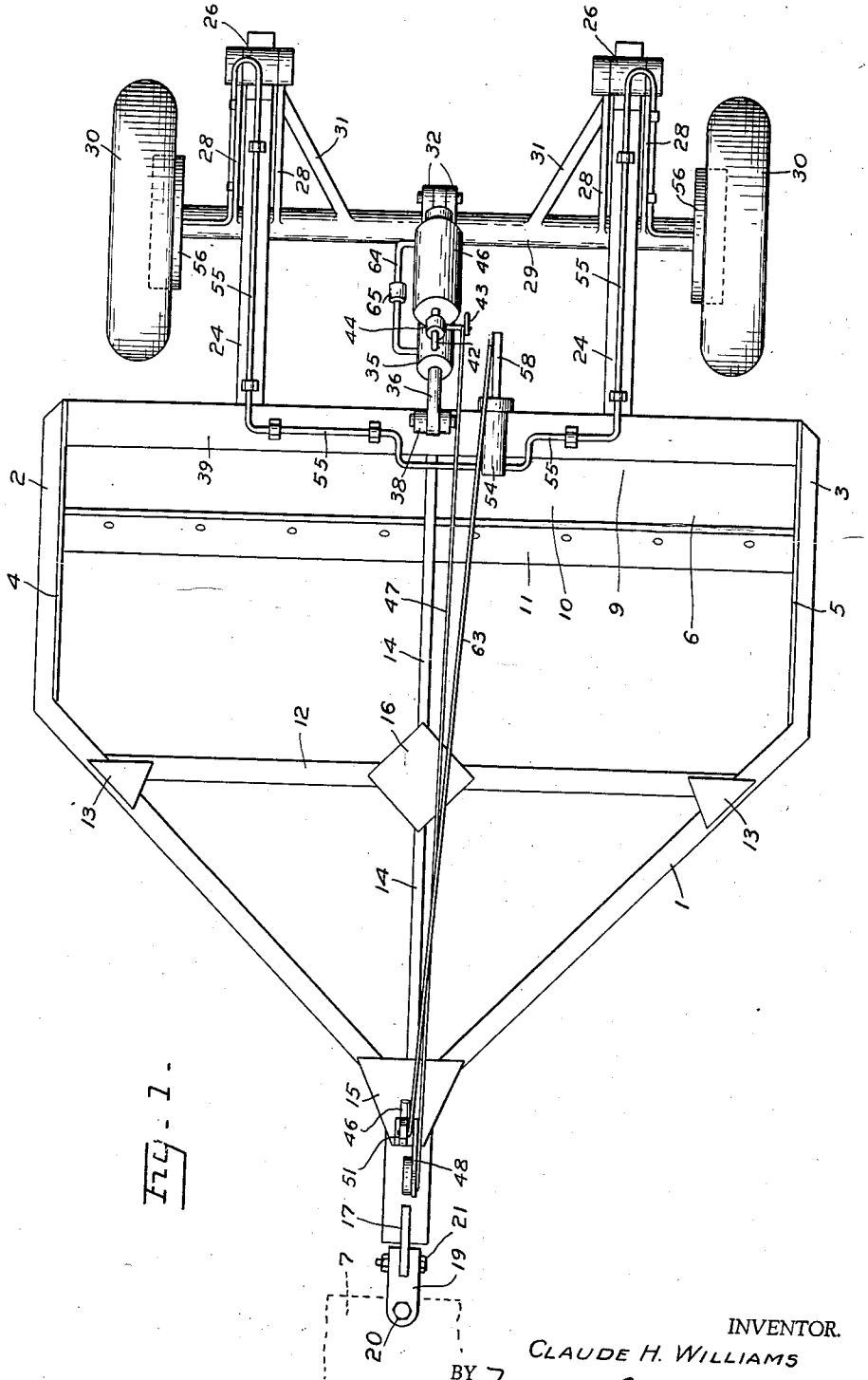


Fig. 1.

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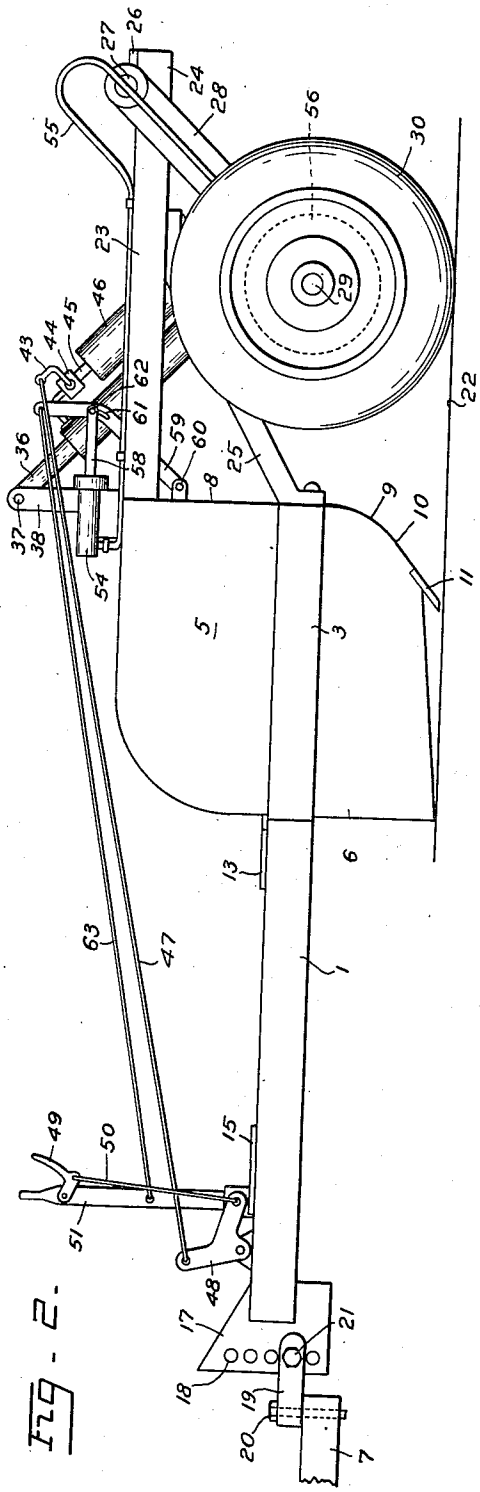


Fig. 2.

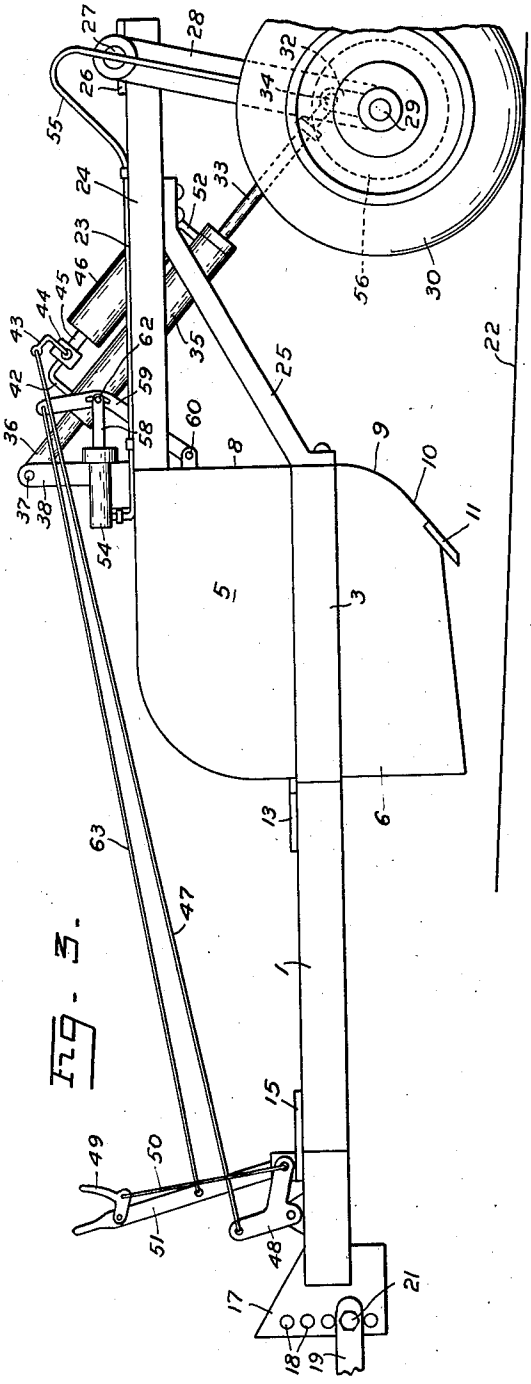


Fig. 3.

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Fig. 4.

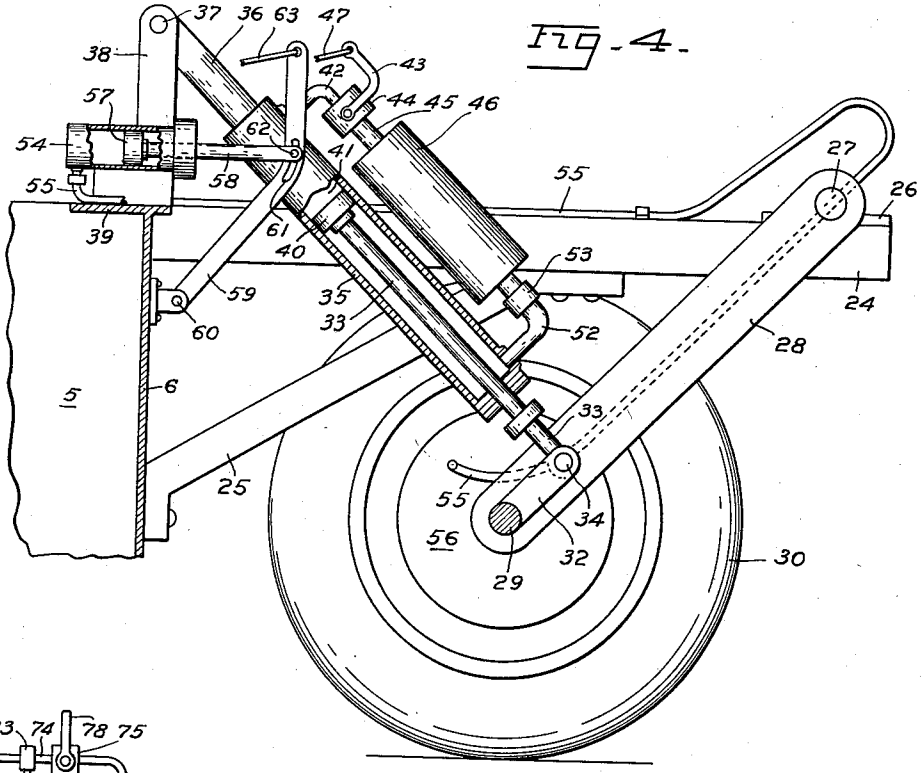
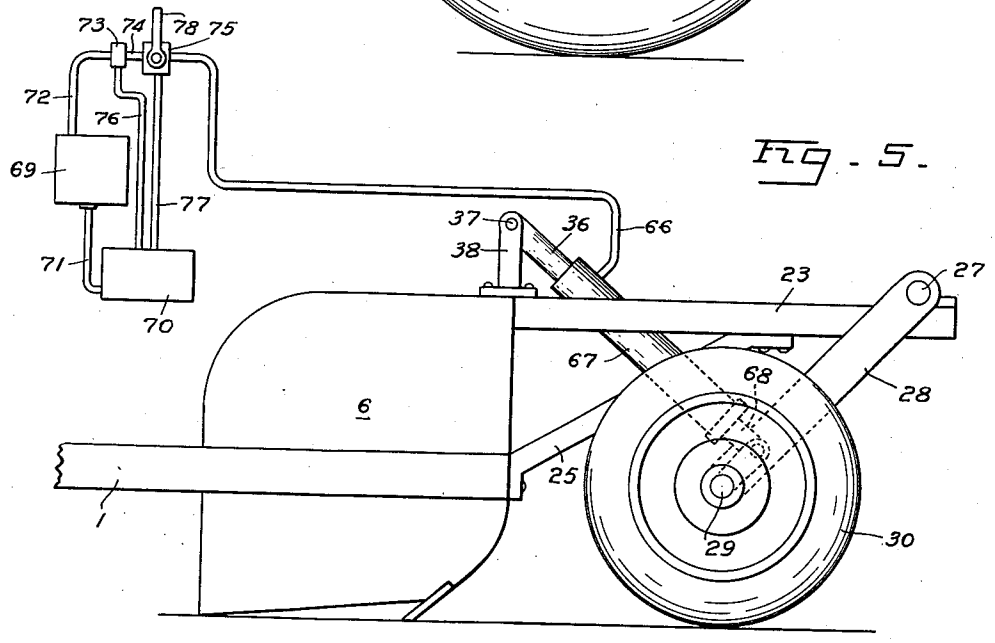


Fig. 5.



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Fig. 6.

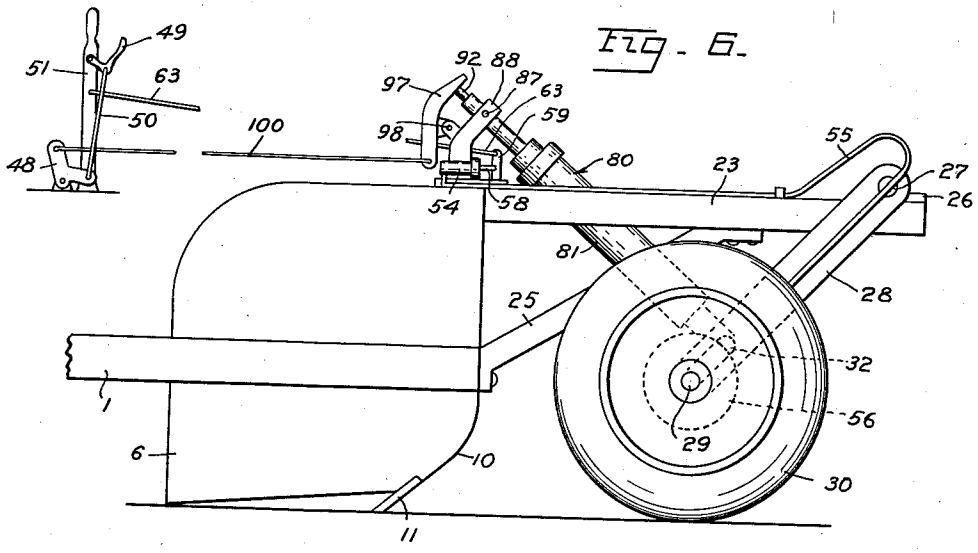
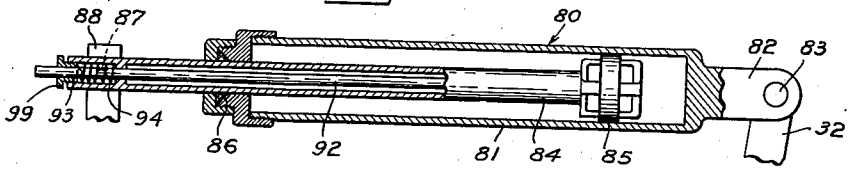


Fig. 7.



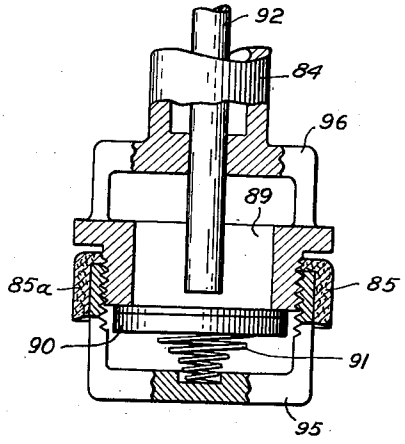


Fig. 8.

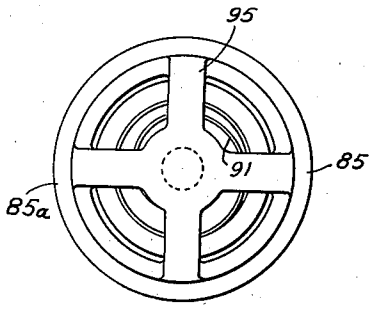


Fig. 9.

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Patented June 25, 1940 2,205,508

UNITED STATES PATENT OFFICE

2,205,508

SCRAPER

Claud H. Williams, Modesto, Calif.

Application September 18, 1937, Serial No. 164,518

3 Claims. (Cl. 74—527)

My invention relates to improvements in a scraper, and it consists of the combinations, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide an improvement over the scraper shown in my co-pending application, Serial No. 136,679, filed April 13, 1937. In the co-pending case, I show the scraper pulled by angle irons that extend over the top of the scraper. I have found that the scraper operates more efficiently when the frame is connected to the sides of the scraper instead of to the top. The present invention therefore shows the frame constructed in this manner.

In the co-pending case I also show a U-shaped axle extending between two wheels, the bight portion of the axle being mounted in bearings carried by the portion of the frame that extends behind the scraper. In the present case I show a straight axle instead of a U-shaped one, and this axle carries radially extending arms that have their free ends pivotally mounted in bearings which in turn are disposed at the free ends of an auxiliary frame connected to the top rear wall of the scraper. I make use of hydraulic braking mechanism for locking the wheels against rotation and thus causing the scraper to be raised by a means hereinafter described. In my co-pending case, mechanical brakes are shown.

Novel means is used for permitting the operator to control the means and to cause the hydraulic braking mechanism to lift the scraper. This same means may be actuated for controlling the release mechanism for permitting the scraper to lower. This means includes a single control lever and handle that may be actuated by the operator from a position on the tractor.

The scraper itself, in the present case, is designed differently from the design shown in the co-pending application. In the co-pending case, the rear wall of the scraper is curved so that the upper portion of the wall will curve inwardly beyond a line that is tangent to the curvature of the wall and is perpendicular to the bottom of the scraper. I have found that with this curved scraper construction, the scraper will pile up dirt until the dirt reaches approximately the middle of the scraper. The force necessary for moving this pile of dirt will cause the dirt to exert a lifting force on the scraper for lifting the scraper with respect to the ground and causing it to move along at a higher level. This periodic lifting of the scraper will form ridges and steps in the ground.

In the present invention, I have overcome this disadvantage by curving only the lower portion of the scraper that connects with the scraper blade. The rear scraper wall does not curve inwardly from the mid-portion of the scraper and upwardly, but flattens out into a wall that is perpendicular to the bottom of the scraper. This type of scraper will not form steps in the ground being scraped.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming a part of this application, in which

Figure 1 is a top plan view of the device;

Figure 2 is a side elevation;

Figure 3 is a view similar to Figure 2, but shows the scraper in a raised position;

Figure 4 is an enlarged detail of the scraper lowering mechanism;

Figure 5 is a diagrammatic showing of a modified form of the device;

Figure 6 shows another modified form of the device;

Figure 7 is a longitudinal section through a cylinder and plunger;

Figure 8 is a section through a plunger valve; and

Figure 9 is an end view of the valve.

In carrying out my invention I provide a frame indicated generally at 1 and Figure 1 shows this frame as being triangular in shape, with the ends 2 and 3 connected to the sides 4 and 5 of a scraper indicated generally at 6. Figures 2 and 3 show the ends of the frame connected to the sides of the scraper approximately mid-way between the top and bottom of the scraper. The purpose of this is to cause the frame 1 to pull in a substantially horizontal direction when the frame is connected to a tractor indicated generally at 7.

The rear wall of the scraper has a vertical flat portion 8 and a curved portion 9 that connects with an inclined lower portion 10. A scraper blade 11 is connected to the inclined portion 10. The frame 1 is reinforced by a cross piece 12 and this cross piece is secured to the triangular sides of the frame by gusset plates 13. A central reinforcing member 14 extends from a gusset plate 15 disposed at the apex of the frame to a gusset plate 16. The member 14 is connected to the middle of the rear wall 8 of the scraper and constitutes an additional member for moving the scraper. It is obvious that two or more members

14 may be used, or the members may be dispensed with should the construction of the scraper be strong enough.

Figures 2 and 3 also show the front end of the frame connected to a plate 17 and this plate has a plurality of openings 18 provided therein for receiving a clevis 19. The clevis 19 is in turn connected to a tractor by means of a bolt 20 or other suitable fastening means. The clevis is adjustably connected to the plate 17 by a bolt 21 and this bolt is inserted in one of the openings 18 that will cause the frame 1 to extend substantially in a horizontal direction to the ground 22.

The scraper is supported by an auxiliary frame 23 that consists of two arms 24 connected to the top of the scraper and extending rearwardly therefrom. The arms are reinforced by braces 25. At the outer ends of the arms I mount bearings 26 and these bearings carry stub shafts 27, see Figures 2 and 3, to which arms 28 are secured. Figure 1 shows two pairs of arms 28 and each pair straddles the stationary arms 24.

The swinging arms 28 are rigidly connected to a straight shaft 29 that extends between and is supported by wheels 30. If desired the arms 28 may be reinforced by struts 31.

I will now describe the means for holding the swinging arms 28 in the desired position. This means comprises stub arms 32 that are integral with the axle 29 and preferably lie in the same plane as the arms 28. A piston rod 33 is pivotally connected at 34 to the arms 32 and this rod is slidably mounted in a cylinder 35. The cylinder is carried by a projection 36 that is pivoted at 37 to an upright 38. The upright in turn is secured to the top flange 39 of the scraper 6. A piston 40 is disposed at the top of the piston rod 33 and traps a fluid in the upper end 41 of the piston. This fluid may be slowly released from the cylinder 35 through a by-pass 42, see Figure 4, when a valve handle 43 is actuated for opening a valve 44 and placing the by-pass 42 in communication with a pipe 45 that leads to a storage tank 46.

Figures 2 and 3 show the valve handle 43 connected by a rod 47 to a bell-crank lever 48 and the lever in turn is operatively connected to a handle 49 by a link 50. When the handle 49 is moved from the position shown in Figure 2 into that shown in Figure 3, the valve 44 will be opened and the fluid in the compartment 41 will bleed into the storage tank 46 and will permit the arms 28 to swing about the pivots 27 in a clockwise direction. This will permit the scraper 6 to lower into the desired position. It should be noted that although the handle 49 is mounted on a lever 51, the handle may be swung into a position against the lever without the need of swinging the lever from the position shown in Figure 2. The pivoting of the link 50 with the bell-crank lever 48 permits this operation and the valve handle 43 may be actuated in the manner indicated. As the fluid bleeds from the compartment 41 into the storage tank 46, additional fluid will flow through a by-pass 52 from the storage tank, see Figure 4, and back into the lower end of the cylinder. This will prevent a vacuum from forming in the lower end of the cylinder. A check valve indicated at 53 is placed in the by-pass 52 and permits the fluid to flow from the storage tank 46 into the bottom of the cylinder 35, but prevents a return flow through the by-pass

The mechanism for moving the arms 28 in a counter-clockwise direction, consists of a cylinder 54, see Figure 4. Two conduits 55—55 lead from the cylinder to the pivot points of the arms 28, see Figure 1, and extend along the arms to a hydraulic braking means indicated generally at 56. Any hydraulic brake may be used and when a piston 57 in the cylinder 54 is moved to the left in Figure 4, fluid will be forced from the cylinder through the conduits 55 and into the braking mechanisms for applying the brakes. This will rigidly connect the shaft 29 to the wheels 30 and therefore a further movement of the scraper over the ground will cause the locked wheels 30 to rotate and to swing the arms 28 about their pivots 27 in a counter-clockwise direction. This will cause the arms 28 to lift the auxiliary frame 24 and to raise the scraper as shown in Figure 3.

Means for moving the piston 57 to the left in Figure 4 consists of a piston rod 58 connected to the position and actuated by a lever 59 that is pivoted to the scraper at 60 and is provided with a slot 61 that receives a pin 62 carried by the piston rod 58. The lever 59 is moved by a link 63, see Figure 2, and this link is connected to the lever 51. Figure 3 shows the lever 51 swung into operative position and this will apply the brakes in the braking mechanism 56 and will lock the wheels to the shaft 29. As already stated this movement will cause the arms 28 to lift the scraper as the scraper is moved over the ground, and the piston rod 33 will be extended from the cylinder 35 in the manner shown.

During this movement of the piston rod 33, the piston 40 will be moved toward the bottom of the cylinder 35 and will force the fluid from this portion of the cylinder through a by-pass 64 that places the bottom of the cylinder in communication with the top. The fluid in flowing from the bottom of the cylinder to the top, passes a check valve 65, see Figure 1, and this check valve prevents the return flow of the fluid in the by-pass. As soon as the scraper has been raised to the desired elevation, the lever 51 is released and will swing from the position shown in Figure 3 back into that shown in Figure 2. The fluid will flow from the braking mechanisms 56 back through the conduits 55 and into the cylinder 54. The arms 28 will be held in the position into which they have been swung, because the check valve 65 will prevent the escape of fluid from the top of the cylinder 35. When it is again desired to lower the scraper, the handle 49 is used to open the valve 44, and this will permit the scraper to lower in the manner already described.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

The scraper is drawn by the tractor in the manner described and the level of the blade 11 with respect to the ground 22 can be adjusted by means of actuating the handle 49 or the lever 51. Both the up and down movements of the scraper are controlled by the operator who controls the tractor. The full force of the pull of the tractor will be exerted substantially mid-way between the top and bottom of the scraper. In this way the maximum force of the tractor is utilized. The device is readily operated and is durable and efficient for the purpose intended.

In Figure 5, I show a modified form of the device. In this form, corresponding parts will be given like reference numerals. The axle 29 is moved and the arms 28 will swing in a counter-clockwise direction about the pivots 27 by means of feeding a fluid from a conduit 66 into the top of a cylinder 67 that corresponds with the cylinder 35. The piston within the cylinder 67

will be moved toward the lower end of the cylinder and will extend a piston rod 68 corresponding to the rod 33 for swinging the arms 28 and raising the scraper. It will be noted that this is accomplished by injecting fluid under pressure into the top of the cylinder 67 without the necessity of applying brakes to the wheels 30. In other words, the braking mechanism may be dispensed with in the modified form.

I further show novel means for forcing a fluid into the top of the cylinder 67 for raising the scraper 6 and this means will permit the fluid to flow out of the top of the cylinder 67 when it is desired to lower the scraper. I have shown this means diagrammatically in Figure 5, and it consists of a pump 69 connected to a storage tank 70 by means of a pipe 71. The pump and storage tank are preferably applied to a tractor, not shown, and the pump is driven by the tractor engine. A pipe 72 leads from the pump 69 to an over-load valve 73 and from this valve a pipe 74 communicates with a three-way valve 75. The conduit 66 leads from the three-way valve 75 to the cylinder 67. The over-load valve 73 has a pipe 76 that leads back to the storage tank 70 and the three-way valve 75 has a fluid return pipe 77 that leads from the valve back to the storage tank.

The operation of this form of the device is as follows: The pump 69 is continuously actuated by the tractor engine and will draw a liquid from the storage tank 70 through the pipe 71 and will force this liquid, under pressure, through the pipe 72. The over-load valve 73 is so adjusted that sufficient pressure on the liquid in the pipe 72 will be exerted to swing the arms 28 before the over-load valve will by-pass the liquid through the pipe 76 and back to the storage tank 70. So long as the handle 78 of the three-way valve 75 remains in closed position, communication between the pipes 74 and 66 is cut off and the liquid will return to the storage tank. The overload valve 73 maintains the liquid at a sufficient pressure to immediately move the piston in the cylinder 67 when the valve 75 is opened.

When it is desired to raise the scraper 6, the handle 78 is swung for placing the conduit 66 in communication with the conduit 74. Liquid under the desired pressure will be fed into the conduit 66 and cylinder 67, and the piston within the cylinder will be moved for swinging the arms 28 and raising the scraper. When the scraper has been raised to the desired height, the handle 78 is again swung back into closed position and this will trap the fluid in the conduit 66 and the cylinder 67 for maintaining the arms in the position into which they have been swung. In the meantime the pump continues to operate and will force liquid through the over-load valve 73 and back into the storage tank 70 by means of the pipe 76.

When it is desired to lower the scraper, the handle 78 is moved into a position to place the conduit 66 in communication with the return pipe 77. The fluid will flow from the cylinder 67 through the pipes 66 and 77 and back into the storage tank 70. This will permit the arms 28 to move in a clockwise direction about the pivots 27 and to lower the scraper.

It will be noted that the auxiliary frame 23, the arms 28, and the cylinder 67, form the three sides of a triangle and that the side formed by the cylinder 67 and the connecting rod 68 can be extended or contracted to swing the side 28. This movement is positive and will function efficiently.

In Figures 6 to 9 inclusive, I show another modified form of my invention. This form makes use of certain parts shown in Figures 1 to 4 inclusive, and therefore corresponding parts will be given like reference numerals. In the modified form, the frame 1 supports the scraper 6 and the scraper in turn carries the auxiliary frame 23. The arms 28 are pivoted at 27 to the frame 23 and are rigidly connected to the straight shaft 29. The scraper 6 and auxiliary frame 23 are raised in the same manner as that provided in the form of the device shown in Figures 1 to 4 inclusive. The fluid-containing-reservoir 54, is connected with the braking mechanism 56 by the conduit 55. A movement of the piston rod 58 will force fluid from the reservoir 54 into the braking mechanism 56 and will cause this mechanism to lock the wheels 30 to the shaft 29. Further forward movement of the frame 1 will cause the wheels 30 to swing the arms 28 about the pivots 27 to raise the frame 23 and the scraper 6. The piston rod 58 is actuated by the lever 59 and the lever in turn is moved by the rod 63.

As the auxiliary frame 23 and the scraper 6 are raised by the wheels 30 and the arms 28, a telescoping connection indicated generally at 80 will be extended and this connection will hold the parts in raised position when the braking mechanism is released. I show the telescoping connection 80 in detail in Figure 7 and it comprises a cylinder 81 carrying a projection 82 that is pivoted at 83 to the stub arms 32. The arms are rigidly connected to the axle 29 and the cylinder 81 is free to pivot at 83 about the stub arms 32.

Within the cylinder 81 I slidably mount a hollow piston rod 84. The rod 84 carries a piston 85 at its inner end and is slidable in a packing gland 86 that closes the open end of the cylinder 81. The rod 84 carries trunnions 87 that are rotatably mounted in a support 88 that takes the place of the support 38 in the other form of my invention. The support 88 is carried by the scraper 6.

Figure 8 shows the hollow rod 84 connected to the piston 85 and illustrates how the piston is provided with a by-pass 89 that is normally closed by a spring pressed valve 90. As the frame 23 and the scraper 6 are raised by locking the wheels 30 to the axle 29, the cylinder 81 will be moved with respect to the rod 84 and piston 85 with the result that the piston will move toward the packing gland 86. The fluid in passing through the piston will open the valve 90 against the compression of a valve spring 91. As soon as the lifting of the auxiliary frame 23 and scraper 6 comes to an end, the tendency of the frame and scraper to lower will cause the fluid to tend to flow from the lower end of the cylinder 81, past the piston 85, and into the upper portion of the cylinder with the result that the valve 90 will be closed by means of the spring 91 and by the pressure of the fluid. The scraper 6 will therefore be held in the raised position into which it has been moved.

I provide novel means for lowering the scraper into any position desired and this means comprises a release rod 92 that is slidably mounted in the hollow piston rod 84. The rod 92 carries a pin 93 against which a spring 94 bears for holding the rod above the valve 90, as shown in Figures 7 and 8. This will permit the valve 90 to remain closed by means of the spring 91. When, however, it is desired to lower the scraper, the rod 92 is moved, by a means hereinafter described, against the valve 90 and it will open the valve to permit the fluid to drain by the piston 85 from

the lower end of the cylinder to the upper end. The scraper will therefore move downwardly. The fluid in flowing through the by-pass 89 passes through a cage 95 that carries the spring 91 and valve 90. After the fluid has passed through the by-pass 89 it will flow through a second cage 96 that connects the piston 85 with the hollow piston rod 84. The piston 85 carries a flexible flange 85*a* preferably made of rubber or leather for sealing the piston to the cylinder wall.

A lever 97 is pivoted at 98 to the support 88 and bears against the outer end of the release rod 92. Figure 7 shows the rod passing through a packing gland 99. A link 100 connects the lever 97 with the bell crank lever 48. The bell crank lever in turn is connected to the handle 49 by means of the link 50. The handle 49 is mounted on the lever 51 and the lever also has the links 62 connected thereto.

The operation of this form of the device is therefore similar to the preferred form shown in Figures 1 to 4 inclusive, except that the by-pass 64 and the check valve 65 are dispensed with. The storage tank 46, the by-pass 52, the check valve 53, the pipe 45, the valve 44, and the by-pass 42 are also dispensed with. All of the fluid for controlling the operation of the piston is contained within the cylinder 81. The raising of the scraper effected by the braking mechanism 56 will merely cause the fluid to force open the valve 90 and flow to a position beneath the valve. The lowering of the scraper 6 is accomplished by actuating the release rod 92 in the manner just described. The raising operation of the scraper 6 is therefore controlled by the lever 51 and the lowering of the scraper is controlled by the handle 49.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. In a scraper, a cylinder pivotally connected to a moving part, a piston slidable therein and having a fluid by-pass extending therethrough, a spring valve normally closing the by-pass, but opening to permit fluid in the cylinder to pass through the by-pass when the piston is moved in one direction, a hollow piston rod connected to the piston and projecting beyond the cylinder the projecting portion being pivotally connected to another moving part, and a release rod slidable in the piston rod and being movable against the valve for opening it when it is desired to move the piston in the opposite direction.

2. A device of the type described comprising a cylinder having one end pivotally connected to a moving part, a piston slidable in the cylinder, a piston rod connected to the piston and pivotally connected to another moving part, said piston being moved toward the top of the cylinder when the two moving parts are moved away from each other, said piston having a by-pass therein, a spring-pressed valve normally closing the by-pass, whereby a positive movement of the piston toward the cylinder top will automatically open the valve and permit fluid to pass to the cylinder bottom, and a manually actuated rod slidable in the piston rod for opening the valve for permitting the moving parts to move toward each other.

3. In a device of the type described, a cylinder having a closed end and adapted to contain a fluid the closed end of the cylinder being pivotally connected to a moving part, a piston mounted in the cylinder and having a hollow piston rod extending through the open end of the cylinder the free end of the rod being pivotally connected to another moving part, a cover for the open cylinder end and having a packing gland through which the rod slides, said piston having a fluid by-pass, a spring-pressed valve on the piston for closing the by-pass when the piston stands still or when the rod tends to move the piston toward the closed end of the cylinder, a valve opening rod slidable in the piston rod, and a spring means normally preventing the valve opening rod from contacting with the valve, said valve opening rod adapted to be moved to open the valve for permitting the piston to move toward the cylinder bottom.

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