Sept. 3, 1940. A. C. LINDGREN ET AL 2,213,401

LIFT MECHANISM FOR TRACTORS

Filed Dec. 27, 1937 5 Sheets-Sheet 1

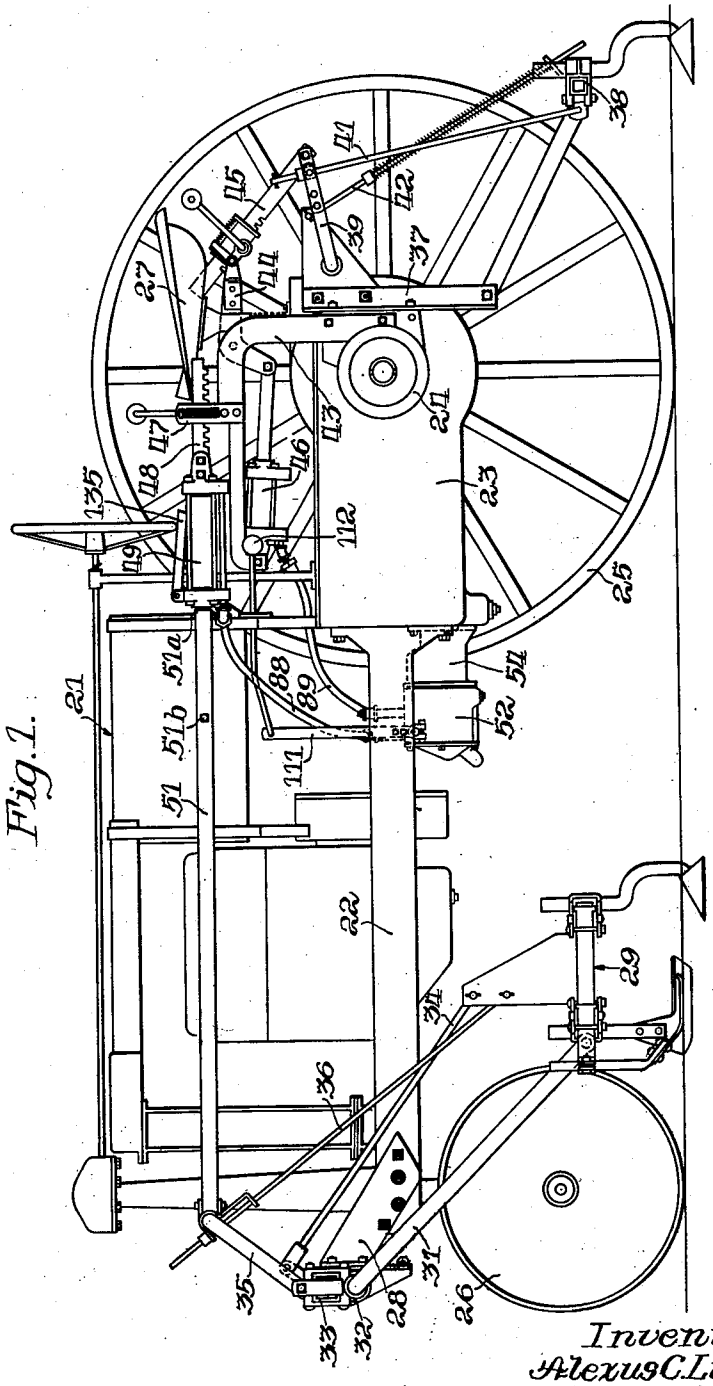

Fig. 1.

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Filed Dec. 27, 1937 5 Sheets-Sheet 2

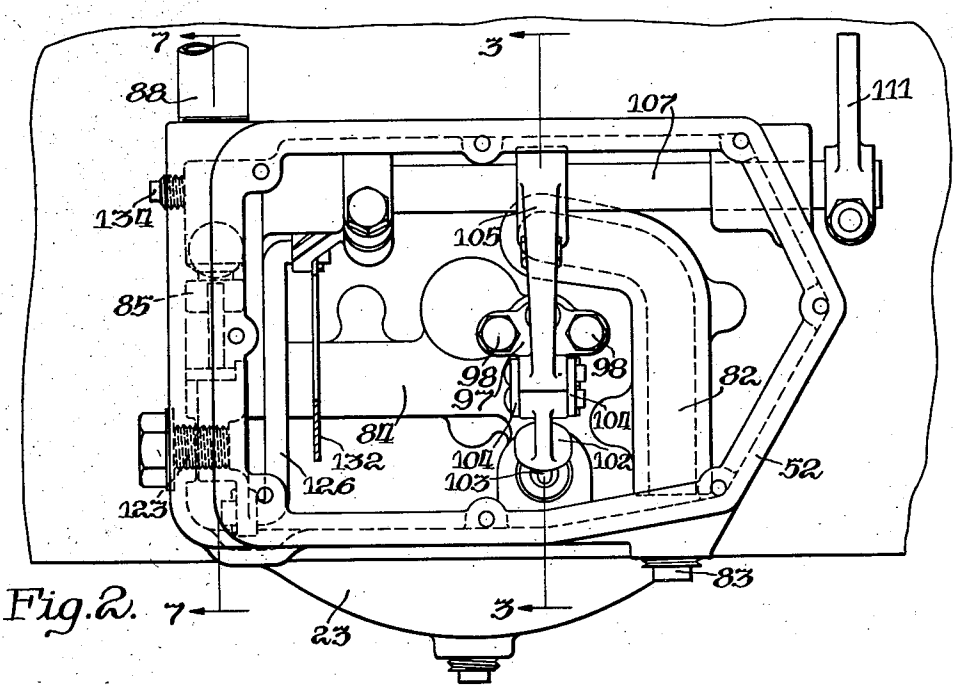

Fig. 2.

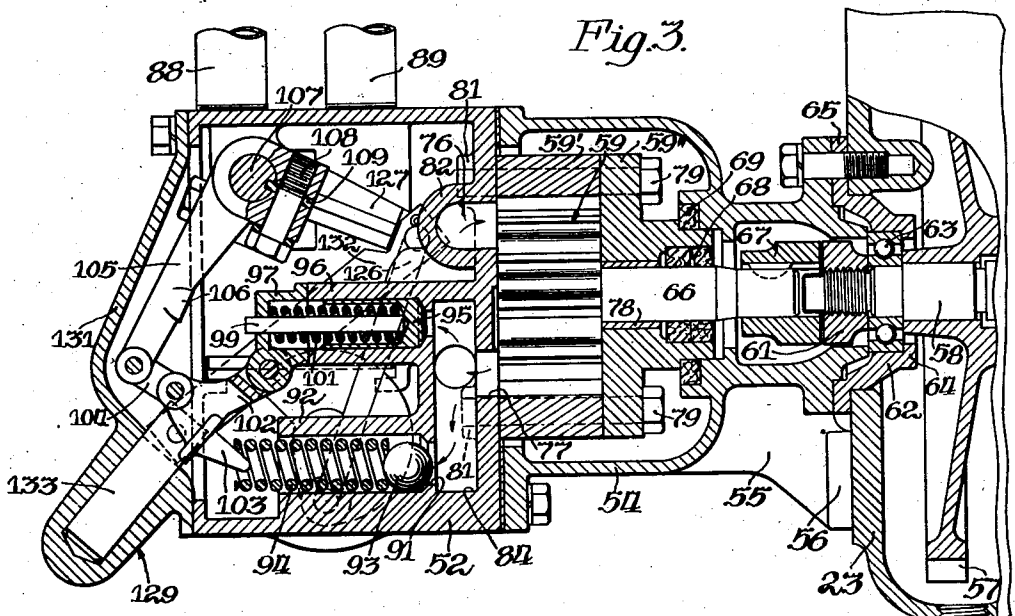

Fig. 3.

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LIFT MECHANISM FOR TRACTORS

Filed Dec. 27, 1937 5 Sheets-Sheet 3

Fig. 4.

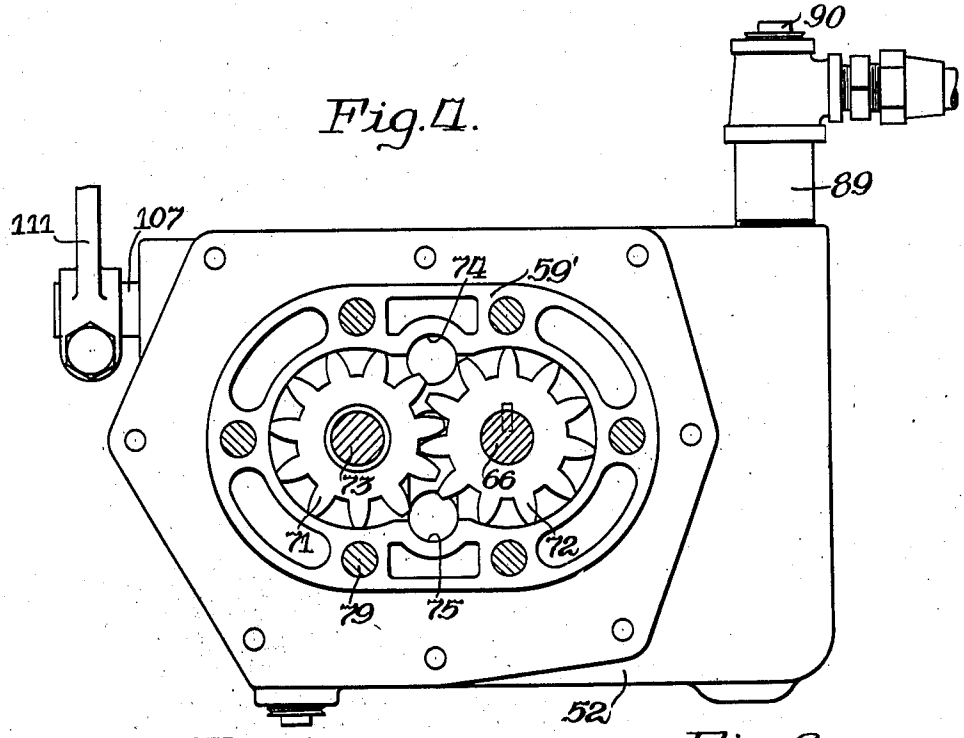


Fig. 5.

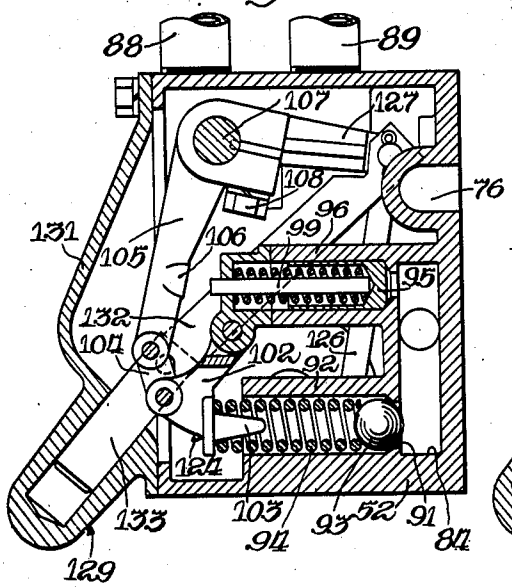
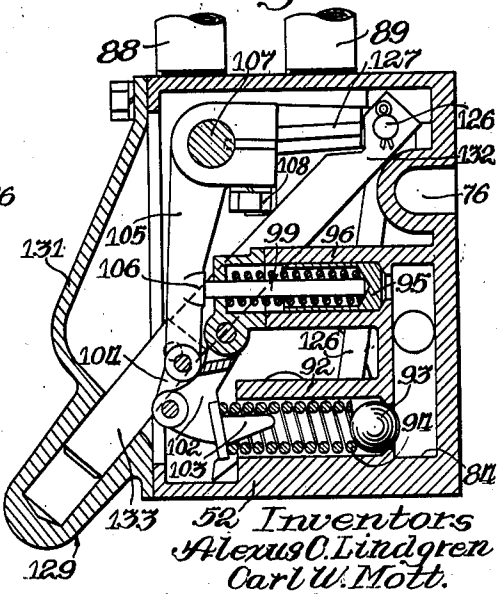


Fig. 6.



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LIFT MECHANISM FOR TRACTORS
Filed Dec. 27, 1937 5 Sheets-Sheet 4

Fig. 7.

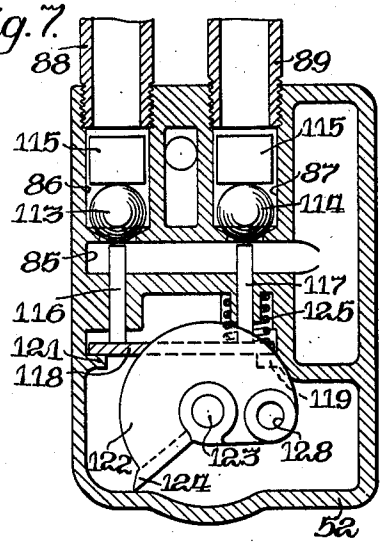


Fig. 8.

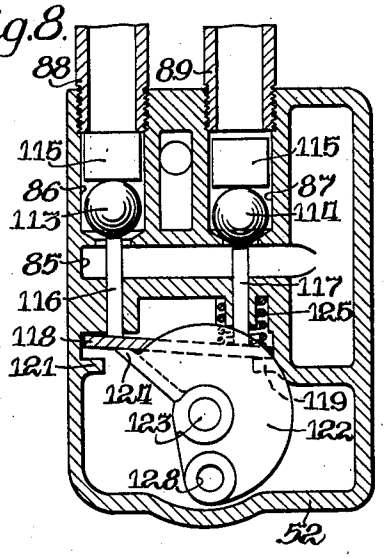


Fig. 9.

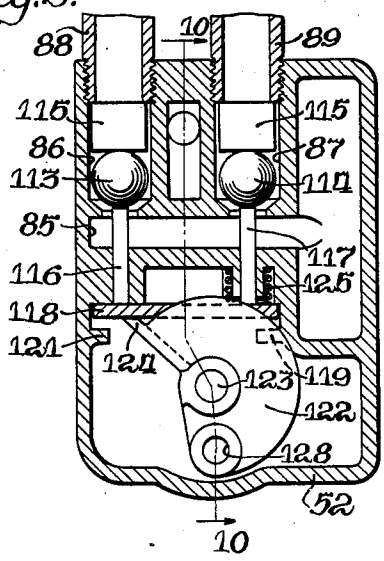
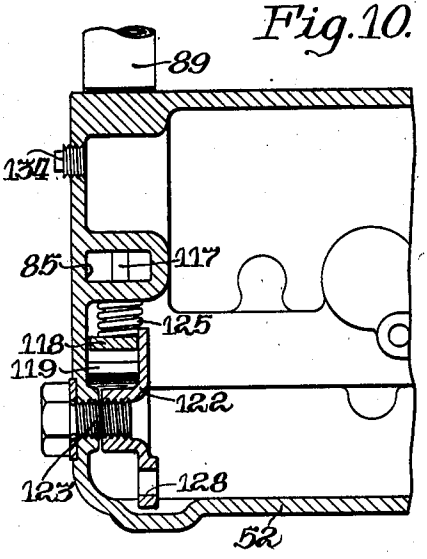


Fig. 10.



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LIFT MECHANISM FOR TRACTORS

Filed Dec. 27, 1937 5 Sheets-Sheet 5

Fig. 11.

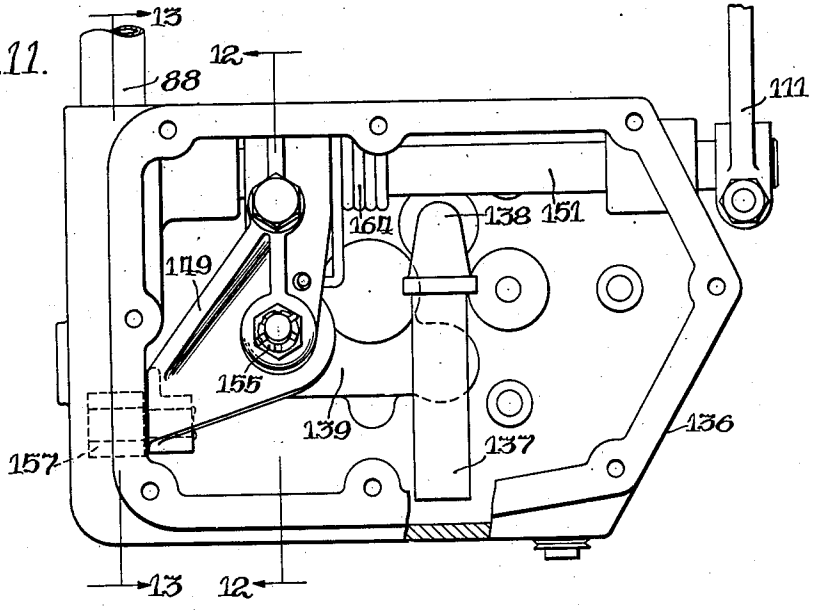


Fig. 12.

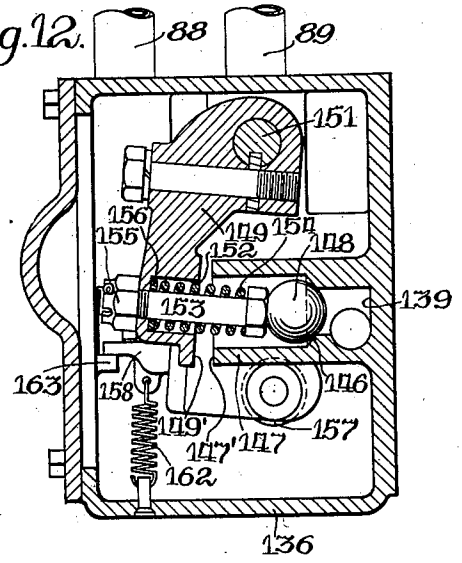
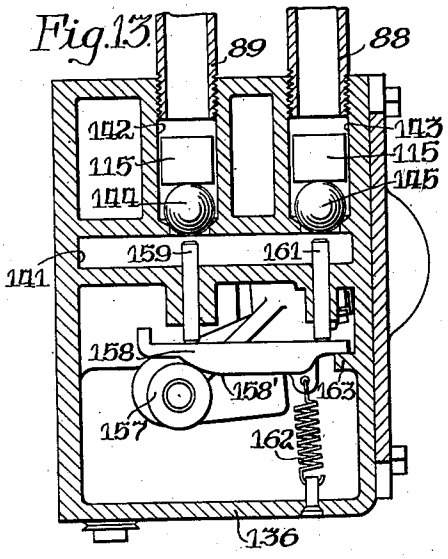


Fig. 13.



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2,213,401

UNITED STATES PATENT OFFICE

2,213,401

LIFT MECHANISM FOR TRACTORS

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Application December 27, 1937, Serial No. 181,778

45 Claims. (Cl. 97—50)

This invention relates to hydraulic lift mechanism for lifting and lowering implements directly connected to tractors.

An object of the invention is to provide an improved and simplified form of lift mechanism, which is easily controlled by the operator of the tractor by a single control means.

Another object of the invention is to provide an improved lifting mechanism for tractors having independently mounted implements where it is desired to lift and lower the same in consecutive order.

In general, the invention comprises a tractor or motor propelled vehicle, on which two implements are mounted at different locations with separate fluid expansible means for each of the implements to lift the same out of its ground engaging position, a pump driven by the motor of the vehicle for delivering a fluid to and from a fluid supply casing, and a valve arranged to interrupt this flow of fluid between the pump and casing, to divert the fluid and deliver the same to the fluid expansible means to lift the implements. At the time this valve is closed, liquid is delivered simultaneously to each of the fluid expansible means and the entire arrangement is so designed that the unit resistance in one of the fluid expansible means is less than that in the other. As a result, one of the implements is lifted prior to lifting of the other implement. When the implements have reached their lifted position, the valve will open automatically and thereby continue the interchange of fluid between the pump and the casing, and means will come into play automatically to hold the implements in their lifted positions. To lower the implements, means is provided, which is associated with the control means for operating the valve, whereby the retaining means may be affected in such manner as to lower the implements in consecutive order.

For other features and a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a side view of a tractor, showing implements and the lifting mechanism of the present invention connected thereto;

Figure 2 is a view of the interior of the fluid supply casing containing the valve arrangements, with the cover removed and looking toward the rear of the tractor;

Figure 3 is a cross-section of a portion of the transmission casing of the tractor and showing the fluid pump and fluid casing in section, looking in the direction of line 3—3 of Figure 2;

Figure 4 is an elevational view of the rear face of the fluid casing and of the fluid gear pump, which is mounted on the rear of the casing;

Figure 5 is a sectional view of the casing taken on the line 3—3 of Figure 2, but with the valve in an open position;

Figure 6 is a similar elevational view taken on the line 3—3 of Figure 2, showing the position of the parts when the valve is closed;

Figures 7, 8 and 9 are sectional elevational views taken on the line 7—7 of Figure 2, showing the trap valve means for retaining the implements in their lifted positions at different positions, and the means for affecting the retaining means to lower the implements;

Figure 10 is a cross-section, also in elevation, of the fluid casing in part, taken on the line 10—10 of Figure 9;

Figure 11 is a modified form of valve arrangement with the cover of its casing removed;

Figure 12 is a sectional view of the modified valve and mechanism for operating the same, taken along the line 12—12 of Figure 11; and,

Figure 13 is a sectional view of the trap valve retaining means and its means for affecting the same to lower the implements, taken along the line 13—13 of Figure 11.

In general, the invention is shown applied to a tractor or motor propelled implement carrying frame, generally indicated at 21, having side beams or sills 22, a transmission and final drive housing 23, a rear axle housing 24, rear wheels 25, and a front steering wheel 26 operated from an operator's station 27. At the front of the tractor there are forwardly extending bracket members 28 connected to the forward ends of the side sills 22, to which the usual cultivating implements 29 may be attached to extend rearwardly thereof and adapted for vertical movement by pivoting of the usual drag link 31 in a bracket clamp 32 fixed to a transversely extending tool supporting member 33, which in turn is carried by the bracket members 28. In order to give parallel lifting movement to the cultivator implement 29, there is provided a second link 34 pivoted to the upper end of the bracket clamp 32 and to the implement 29. Pivotally mounted on the transverse tool support is a lifting arm 35, the upper end of which has connected thereto a lifting link 36 connected at its lower end with the implement 29. The lifting arm 35 may thus be pivoted to effect an upward move-

ment of the link 36 for lifting and lowering the implement 29.

Rigidly mounted on the rear axle 24 is a bracket 37, to which a rear implement 38 is pivotally mounted for movement to and from its ground position and adapted to be lifted by means of a rockable crank arm 39 having the usual lifting link 41. A usual pressure link 42, having a pressure spring, may also be attached at one end to the bracket 37 for the purpose of supplying downward pressure to the implement 38.

Mounted on the bracket 37 is an inverted L-bracket 43, extending upwardly and forwardly of the tractor, on which is pivotally mounted a rockable bell-crank member 44, which is connected with the crank member 39 by means of an adjustable link 45, adjustable for the purpose of regulating the working depth of the rear implement 38. Connected to the forward end of the inverted L-shaped bracket member 43, there is a fluid expansible chamber means 46 having its piston connected to the bell-crank 44 and, in turn, through the above mentioned linkage, to raise and lower the rear implement 38.

Mounted at the upper part of the bracket 43 there is an upstanding crank-operated pinion means 47 having for operation a rack member 48, that is, in turn, connected to a second expansible chamber means 49, which has its piston connected to a longitudinally movable push-pipe 51 for the operation of the lift arm 35, to lift and lower the front implement 29. It should now appear that there are two independently mounted implements at different locations on the tractor, each of which has a separately mounted fluid expansible chamber means for respectively lifting the same. While only one fluid expansible chamber for lifting the forward implement is shown, it should be understood that a second fluid expansible chamber means can be used on the opposite side of the tractor for lifting and lowering the front implement on that side. This second expansible chamber means may be preferably in fluid communication with the same source of fluid supply as the expansible chamber means 49. For the rear implement only one fluid expansible means 46 is necessary, as implements transversely of the tractor may be connected to the crank 39, that may have other crank arm portions laterally spaced across the rear of the tractor. Each of the fluid expansible means are of the single-acting type.

The entire assemblage is so designed, due to the weight of the implements, the length of the various lever arms, and the size of the piston within the expansible chamber means—that less unit resistance to the lifting of the implements is presented to the fluid expansible means 49 for the front implement than in the fluid expansible means 46 for the rear implement. All of this is purposely arranged and designed to give this effect, so that, when the different fluid chamber means are presented with fluid from the same fluid source, the front implements will be lifted prior to the lifting of the rear implements. The presentation of fluid pressure to these elements will be hereinafter described more in detail.

Mounted forwardly of the transmission final drive housing 23 and supported thereon, there is a fluid supply casing 52, which is shown more in detail in Figures 2 and 3. The casing 52 is connected at its rear face to a bracket 54, preferably in the form of a housing, which is, in turn, connected to the transmission final drive housing 23 and has a depending rib portion 55 with a foot portion 56 to engage the transmission final drive housing 23, to give strength to the bracket housing 54, as shown in Figure 3.

The relationship of gearing within the transmission final drive housing is preferably that shown in the Patent No. 1,982,436 to E. A. Johnston, which has an auxiliary gear 57 adapted to be operated by the motor of the motor propelled vehicle. This gear, as described in the patent, is ordinarily used for driving a power take-off shaft 58, that extends substantially the length of the housing 23 and normally adapted for taking off power at the rear of the housing. This same shaft is used in the present invention for driving a gear pump 59 located within the bracket housing 54. The outlet of this shaft 58 through the forward end of the housing 23 has been modified substantially to provide the shaft 58 with a male coupling member 61 threadedly connected thereto and also to have an inwardly extending cup member 62 for containing a ball bearing assembly 63, which, in cooperation with a ledge portion 64 of the cup member 62, keeps the shaft 58 from sliding rearwardly. The cup-shaped member 62 also has a flange portion 65, which is disposed between the housing 23 and the bracket 54 when the latter is attached to the tractor.

The bracket housing 54, in addition to having a pump contained therein with its casing portions 59' and 59'', has also a centrally disposed drive shaft 66 for driving the pump, which, in turn, has a female coupling member 67 fixed thereon for engagement with the male coupling 61 on the shaft 58 when the bracket 54 and casing 52 are mounted on the transmission housing 23. In order to prevent excess leakage of oil between the transmission housing 23 and bracket housing 54, there are provided sufficient gaskets 68 around the pump drive shaft 66, and the gaskets 69 between the pump body portion 59'' and the bracket housing 54.

The gear pump comprises the usual two gears 71 and 72, the former of which is rotatably mounted on a spindle stud 73 mounted on the rear face of the fluid casing 52, and the latter of which is fixed to the drive shaft 66 to be driven thereby. Surrounding both of these gears is the pump body portion 59' (Figure 4), shaped to contain an inlet passage means 74 and an outlet passage means 75 adapted to cooperate respectively with holes 76 and 77 in the rear face of the fluid supply casing 52. The body portion 59'' of the pump has a bushing 78 adapted to fit over the drive shaft 66, serving as a cover for one side of the pump when fixed to the body portion 59' and both secured to the rear face of the housing 52 by means of relatively long bolts 79 adapted to be screwed into threaded pockets 81 in the rear face of the casing 52.

Communicating with the intake passage 74 of the pump and with the hole portion 76 in the face of the casing 52, there is a passage portion 82 within the casing 52 (Figure 2), which extends downwardly and opens into the bottom of the fluid casing for the purpose of supplying fluid to the inlet side of the pump. Means 82, taken with the opening 76, thus provides the fluid communication with the inlet side of the pump. Just below the bottom end of this passage 82, there is a stop-cock 83, which may be opened for draining of the casing at various times.

Communicating with the hole 77 in the rear face of the casing 52 and with the outlet side of the pump, there is a horizontally extending passage means 84 (Figure 3) to a chamber or fur-

ther passage means 85 at the side of the housing 52. From this passage means 85, there extends vertically (Figure 7) two passage-ways 86 and 87. Fluid is thus delivered to the passage-way 85 and thence divided and delivered to the respective passage-ways 86 and 87. The passage-way 86 is connected through a fluid connection 88 to the fluid expansible means 49 for lifting the front implement. In communication with the passage means 87, there is a fluid connection 89 for delivering fluid to the expansible chamber means 46 for lifting the rear implement. It should thus be seen that a fluid communication is provided for delivering fluid from the outlet side of the pump to the fluid expansible lifting chambers 46 and 49.

Also in communication with the passage means 84 there is a port 91, which is normally open to permit the outward flow of fluid from the gear pump back into the supply chamber within the fluid casing 52. This passage 85 and port 91 and the intake passage 82 to the pump thus will normally permit interchange of fluid between the pump 59 and the supply casing 52. The fluid, in passing through the port 91, also passes through an enlarged passage means 92, in which may be located a ball valve 93 for closing the port 91, and a spring 94 (Figure 3) for maintaining a predetermined pressure for providing a spring bias to the valve 93 upon closing the same by compression of the spring.

When it is desired to raise the implements, this valve 93 is closed by means to be hereinafter described. The flow of fluid from the outlet side of the pump will thus be diverted to the passage means 85 outwardly to the fluid expansible means 46 and 49 to lift the implements. Fluid is supplied at a constant rate, filling up the passage connections and the fluid expansible chambers, or, in other words, the fluid expansible chambers are thus in direct communication with the outlet side of the pump 59. Due to the fact that the unit resistance on the fluid expansible means 49 for the front implement is less than the unit of resistance for the fluid expansible means 46 for the rear implement, the expensible chamber will first be actuated to lift the front implement; and, when filled with fluid, the fluid expansible means 46 will next be filled with fluid to effect lifting of the rear implement. The front implement is thus lifted prior to lifting of the rear implement. This effect is desirable upon reaching the end of a field which is being cultivated, so that the benefit of cultivating with the rear implements exactly to the edge of the field will be accomplished. In order to provide a safety or by-pass, the valve 93 has been purposely arranged to be spring biased. As soon as the rear implement is lifted, the valve 93 will tend to by-pass or continue the interchange of fluid between the pump 59 and the casing 52.

To insure positive opening of the valve 93, although the pressure bias of the spring 94 would appear sufficient, there has been provided, as shown particularly in Figures 2, 3, 5 and 6, means for automatically opening the pressure valve 93 when the implements have reached their lifted position. This means takes the form of a piston 95 in a chamber means 96, which has communication with the passage means 84. By having the means for opening the valve 93 as one which is responsive to pressure in the fluid communications, this means will have the function of positively opening the valve 93 upon any overload which might occur due to clogging in the fluid communications. Thus, the valve 93 will open upon clogging just the same as at the completion of the lifting of the implements. The automatic opening means, however, does insure a positive release of the spring 94 from against the valve 93, taking the bias from the valve and permitting a greater flow of fluid through the port 91.

The means for closing and opening the valve 93 and its association with the automatic means 95 for opening the same upon overload will now be explained. The chamber means 96 extends forwardly from the rear of the casing 52 with an opening at its forward end, which is adapted to be closed by a cap or cover member 97, which is bolted to the chamber means 96 by means of bolts 98 and has a centrally disposed hole therein through which a stem or pin 99, in engagement with the piston 95, may slide. This pin will thus slide and protrude behind the face of the cover member 97, depending upon the pressure exerted on the piston 95. Surrounding the pin 99 and pressing against the piston 95, there is a spring 101 having a predetermined resiliency. This spring 101 tends to hold the piston seated against the opening with the passage means 84 until pressure in the passage 84 becomes sufficient to overcome the same to push the pin 99 forwardly through the cover 97.

The chamber means 96 is in vertical alinement with the enlarged passage-way 92. The cover member 97 on the chamber means 96 has a pivoted arm member 102 pivoted thereon, and having a projecting portion 103 adapted to centralize within the spring 94 as the same is pivoted toward the ball valve 93 to close the same. This arm member 102 is never permitted to be out of connection with the more or less loose spring 94 in the passage means 92. When the projected portion 103 is farthest away from the ball valve 93, the spring 94 is released and there will be a free flow of fluid from the passage means 84 over the spring 94, through the passage means 92, and into the fluid supply chamber within the casing 52. Pivoted on the forward part of the arm member 102 is a toggle link 104, which, in turn, is pivoted to an operating arm member 105 having a portion 106 adapted to be engaged by the piston operated pin 99 and rigidly connected to a transverse rock-shaft 107 rockably pivoted within the casing and protruding through the casing at one side. The operating arm member 105 is fixed to the transverse rock-shaft 107 by a bolt 108 extending through bifurcated portions on the operating arm member 105 and through a washer and key member 109, which extends into a keyway in the shaft to insure a fixed and rigid connection therewith. The transverse shaft 107 is operated by a manual arm member 111 fixed to the same, outside of the casing and having a handle portion 112 connected thereto and extending longitudinally rearwardly to a location near the operator's station 27 on the vehicle.

The operator, on pushing the handle means 112 forwardly to its fullest extent, will cause the operating arm 105 to rotate counter-clockwise, and, in turn, cause the arm member 102 to rotate in the same direction about its pivot through its toggle link 104, until the ball valve 93 is placed under the full bias of the spring 94 and the toggle link 104 is locked over center, as shown in Figure 6. In this position, the implements will start to lift and, if the operator does not break the toggle by pulling the operating handle

112 rearwardly, the implements will lift to their full height and then the toggle will be broken by pressure of the pin 99 on the portion 106 of the operating arm 105. Due to the force with which the toggle mechanism is kicked out, there is a tendency for the arm member 105 to return to the position shown in Figure 3, but this is undesirable for reasons to be explained later.

Now that the implements have been raised, some sort of means must be employed to retain the implements in their raised position. Such a device might take the form of a mechanical contrivance, but may also take a form utilizing the return pressure of the fluid caused by the weight of the implements tending to return to their ground engaging position. In each of the passage chambers 86 and 87 are disposed, respectively, one-way trap valves 113 and 114 (Figures 7 to 10). In order to prevent these ball valves from sticking in the ends of the passage pipes 88 and 89 in their vertical movement as fluid is being passed by them to lift the implements, there is provided above them a loose piece of metal 115.

When the implements are lifted and the valve 93 has opened, the tendency of the fluid in the fluid expansible means is to return to the fluid supply casing 52. This action is prevented by the trap valves 113 and 114. The implements are thus held in their lifted position by a column of fluid pressing against the valves 113 and 114. These ball or trap valves may thus be termed means for retaining implements in their lifted positions.

In order to lower the implements, some sort of means must be used to effect the opening of valves 113 and 114 and, in accordance with the spirit of this invention, to effect lowering of one implement prior to lowering of the other implement. A separate means for opening each valve is used. Under each ball valve is located a respective pin 116 and 117 slidable in a portion of the casing 52 to contact the ball valves 113 to raise the same against pressure due to the weight of the implements on the column of the fluid and to permit return of the fluid first from the pipe 88 of the front implement, and then from the pipe 89 of the rear implement. For accomplishing this effect there is provided a plate member 118 located underneath the pins 116 and 117 and supported in the casing by portions 119 and 121 of the wall of the casing, yet permitting movement thereof upwardly to lift the pins 116 and 117 for opening their respective ball valves. To cause the plate 118 to first lift the pin 116 and then the pin 117, there is a cam member 122 pivoted to the inside of the casing by a screw bolt 123, and adapted to rotate either on the threads or with the threads of the bolt, (Figure 10), and having thereon a radially extending portion 124 adapted to engage the plate 118, upon the cam member 122 being rotated in a clockwise direction, near to the pin 116 (Figure 8). Associated with the plate 118 at a point near to engagement of the pin 117 therewith is a spring member 125 that tends to hold that end of the plate 118 down while the cam is operating to lift the opposite side of the plate 118. After the cam member and portion 124 have been rotated to the position shown in Figure 8, there can still be further rotation of the same to overcome the spring pressure of the spring 125 to effect a final lifting of the plate 118 to lift the pin 117 and effect lowering of the rear implement, as in the position shown in Figure 9.

To operate the cam 122 about its pivot bolt 123, there is a connecting link 126 that pivotally connects with a second arm member 127 fixed to the transverse shaft 107. This connecting link is pivotally connected to the cam member at 128. By having this cam member or means for effecting lowering of the implements connected to the same transverse shaft 107, to which is also connected the operating means for the valve 93, simplicity of construction and singularity of control is accomplished. The means for effecting the implement retaining means may thus be controlled by the same handle means 112. To effect lowering of the implements, the handle means 112 is pulled rearwardly by the operator, and in the opposite direction when the valve 93 is to be closed to lift the implements. Due to the pressure on the ball valves, a noticeable amount of resistance is felt by the operator in the handle means 112 when attempting to pull the handle means rearwardly to effect first the lowering of the front implement. After the front implement is lowered, a second resistance is felt in the handle means 112, which must be overcome to lower the rear implement. This is in effect an indication to the operator as to the position of this implement as the mechanism is being operated. This is a positive effect, much the equivalent of the effect obtained by an operator of an automobile in shifting transmission gears. The position of the operating arm member 105 is that shown in Figure 3, when the last implement has been lowered and the handle means 112 has been pulled rearwardly as far as it can go.

The operating mechanism for the valve 93, as stated above, kicks over its center position with considerable force, and, if it were not delayed or retarded, that force would be sufficient to cause the arm member 105 to return to the position shown in Figure 3, and thus cause immediate lowering of the implements. This movement would cause the shaft 107 to move just as though the operator were pulling on the handle means 112 to effect the retaining trap valves for lowering the implements. To overcome this tendency, there is provided a dash-pot 129 located in the cover 131 for the forward part of the casing 52. This dash-pot is connected with arm 127 by a link 132, so that force imparted to the shaft 107 will be transmitted to a piston 133 in the dash-pot 129 and connected to the lower end of the connecting link 132. This dash-pot will permit the arm member 105 to move only to the position shown in Figure 5. When the control handle 112 is pulled rearwardly, the arm member 105 will first take a position somewhere between that position shown in Figure 5 and that shown in Figure 3 to lower the front implement, and then it will be finally moved to the position shown in Figure 3. The pull of the control handle 112 rearwardly would also be opposed by the dash-pot as well as by the column pressure on the trap valves. The dash-pot will get its medium of operation from the supply casing, the fluid used in the casing being preferably oil, or some light liquid.

The casing 52 may be filled from time to time as necessary, by removing a plug 90 from one of the discharge pipes 88 or 89, Figure 4. To provide a vent while the casing is being replenished with liquid, there is a stop-cock 134 communicating with the interior of the casing.

If it is desired to operate the front implement

on only one side of the tractor at a time, the front implement may be held in its lifted position by a flop-over latch 135 mounted on the fluid expansible chamber means 49, so that it will engage the end 51a of the push pipe 51 when the same is pushed forward by the fluid expansible means 49. This will in no way affect the fluid system, and the front implement on the other side of the tractor can be operated the same as before. The stem of the piston in the fluid expansible means 49 extends into the pipe and abuts a plug and bolt indicated at 51b.

The form of the invention shown in Figures 11, 12 and 13 functions generally the same as the form shown in Figures 1 to 10. It has a casing 136, which is very similar to the casing 52 of the other form, but more simple in construction. The pump, similar to that shown in Figure 3, is arranged on a rear face the same as in the other form. For communication to the intake of the pump from the bottom of the casing there is a passage pipe 137 connected with the inlet side of the pump at 138. The fluid from the outlet side of the pump passes in through the rear face of the casing 136 to a passage means 139 extending transversely within the wall of the rear face of the casing to the side thereof in communication with a longitudinally extending passage 141 (Figure 13), and thence upwardly to vertically extending passageways 142 and 143 for delivering fluid to the respective fluid expansible means for the front and rear implements. These vertical passages contain, respectively, trap valves 144 and 145.

Leading from the passage 139, there is a port 146 and a forwardly extending passage chamber 147, through which the fluid may flow when a valve 148, which may engage the port 146, is out of engagement with the same. When the pump is operating, there will thus be an interchange of fluid between the pump and the fluid casing 136. The fluid will leave the fluid casing 136 through the passage means 137, into the pump through the port 138, and return from the pump through the passage 139 and port 146. When it is desired to lift the front and rear implements, the valve 148 will be made to close the port 146, whereby fluid will be diverted and caused to flow vertically through the vertical chambers 142 and 143 to their respective fluid expansible means. For the same reasons stated in connection with the other form of the invention, the front implement will be lifted prior to lifting of the rear implement. The entire assembly is so designed that the unit resistance on the fluid expansible means 49 for the front implement is less than the unit resistance presented to the fluid expansible means 46 for the rear implement.

For operating the valve 148, there is provided an operating arm member 149, that is fixed to a transverse shaft 151 extending through the casing 136 at one side thereof, where the manual control means 111 and its handle 112 is attached. The arm member 149 has a recess 152 arranged with its opening coinciding with the passage chamber 147. This recess is for the reception of a bolt member 153 and a spring 154. This spring 154 is preloaded by tightening of a nut 155 on the front side of the operating arm 149.

When the hand control 112 is pushed forwardly by the operator, the head of the bolt 153 will engage the valve 148 and the spring 154 will be compressed until a face 149' surrounding the recess 152 engages with the end of the passage means 147. The valve 148 is thus closed, but free to open automatically when the pressure becomes too great in the fluid passages, as when the final implement has been lifted. When this overload is reached, the valve 148, in permitting passage of fluid, will vibrate quite considerably, giving indication to the operator that he should release pressure from the control means. Thus, the function of the spring 154 is very similar to the function of the spring 94 described above in connection with the other form of the invention. They both serve to place their respective valves under a pressure bias.

When it is desired to preload the spring 154 to a greater amount, a washer 156 is disposed in the recess 152, and the nut 155 is tightened, so that the clearance between the face 149' and the end 147' of the passage means 147 is the same as before. In this way, the spring 154 is shortened and its resistance to force, due to the shortening of the same, will be greater than before. Thus, when the operator moves the operating arm 149 toward the ball valve 148 to engage the faces 149' and 147', a greater pressure will be presented to the ball valve 148. Thus, there has been provided a means of adjusting for the pressure of the fluid required to automatically open the ball valve 148. The use of the washer 156 is the only way that this adjustment may be made, since it is desired to maintain the same clearance between the face 149' and the face 147'. Instead of a washer 156, the adjustment might be effected by a threaded collar.

The operating arm member 149 has a laterally extending portion 149'' (Figure 11), on which is mounted a roller 157 extending to a point in vertical alinement with the ball valves 144 and 145. This roller 157 will take a path of movement under the ball valve in the form of an arc when the transverse shaft 151 and operating member 149 are rocked. Cooperating with this roller is a cam plate member 158 having a cam surface 158' thereon for engagement with the roller and on which are supported valve opening pins 159 and 161 adapted to cooperate respectively with the ball valves 144 and 145.

After the implements have been raised, there will be pressure on the ball valves 144 and 145, so that the implements will be retained in their lifted position. As the roller 157 is moved in a counter-clockwise direction as viewed in Figure 12, the ball valve 144 will first be lifted to effect lowering of the front implement, the plate member 58 being maintained at its portion underneath the ball valve 145 by a spring 162 against a ledge portion 163 on the wall of the casing 136. A further movement of the roller on the cam surface 158' will thus be required to overcome the spring 162 to effect opening of the ball valve 145.

It should now be apparent that a very similar control means is used for closing the ball valve to effect lifting of the implements and also for effecting opening of the ball valves 144 and 145, to that disclosed in the previous form of the invention. Both means are fixed to a single hand and foot control located near the operator's station 27.

Instead of there being a toggle mechanism for opening the valve in addition to its biasing spring 94, the arrangements as to the principal operation are practically identical. The toggle mechanism of the prior form can be opened by hand, if desired, the same as the valve closing means of

the present form may be opened upon release of pressure from its control handle.

Sometimes the operator desires to have the implements lowered immediately after lifting them to their lifted position, or only partially. This can be done automatically in the present form by the use of a coil spring **164** surrounding the transverse operating shaft **151** connected to the operating member **149** and to the casing **136**, and so coiled that, when the operator applies pressure to close the ball valve **148**, a spring pressure is built up in the same, so that, upon a quick release of the control handle by the operator, the force will cause the operating member **149** and cam **157** to return sufficiently to engage the cam plate **158** and thereby effect immediate lowering of the implements.

It should now be seen that the foregoing description provides an efficient fluid operated lifting and lowering mechanism for tractor mounted implements in which a consecutive lifting and lowering of the implements may be effected, and one in which this lifting and lowering may be done by a single control means located near the operator's station on the tractor.

While various other forms of construction may be used, such changes in form would be deemed to be included within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. In combination, an implement-carrying frame, implements independently mounted for movement on said frame, a fluid expansible means for each implement to respectively move the same, means for simultaneously supplying fluid to the expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, whereby consecutive movement of the respective implements will be effected.

2. In combination, a motor propelled vehicle, implements independently mounted for movement on the vehicle, a fluid expansible means for each implement to respectively move the same, means for simultaneously supplying fluid to the expansible means operated by the motor, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement whereby consecutive movement of the respective implements will be effected.

3. In combination, a motor propelled vehicle having auxiliary gearing operated by the motor, an implement mounted for movement at one location on the vehicle, a second implement independently mounted for movement at another location on the vehicle, a fluid expansible means for each implement to respectively move the same, means for simultaneously supplying fluid to the expansible means adapted to be operated by the auxiliary gearing, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of the second implement, whereby consecutive movement of the respective implements will be effected.

4. In combination, an implement carrying frame, implements independently mounted to be lifted and lowered on the frame, a fluid expansible means for each implement to lift the same, means for simultaneously supplying fluid to the different expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, and means for separately discharging the fluid of the different expansible means at different times to lower the implements, whereby consecutive lifting and lowering of the implements will be consequently effected.

5. In combination, a motor propelled vehicle having auxiliary gearing operated by the motor, implements independently mounted on the vehicle to be lifted and lowered, a fluid expansible means for each implement to lift the respective implements, a fluid pump connected to said gearing, passage means from said pump to the different expansible means for delivering fluid thereto, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, to effect consecutive lift of implements, and valve means in the different passage means to retain the fluid in the expansible means when the implements have been lifted, and means for opening the different valve means to lower the implements.

6. In combination, an implement-carrying frame, implements mounted on the frame to be lifted and lowered, a fluid expansible means for each implement to lift the respective implements, means for simultaneously supplying fluid to the different expansible means, valve means associated with the supply means to the separate expansible means for automatically retaining the fluid in said expansible means when the implements have been lifted, and a single manual control means for opening said valve means in consecutive order to effect subsequent lowering of the respective implements.

7. In combination, a motor propelled vehicle having auxiliary gearing operated by the motor, an implement mounted on the vehicle to be lifted and lowered, a fluid pump adapted to be connected for operation to said gearing having a fluid inlet passage means and a fluid outlet passage means, a fluid supply casing having separate passage means connecting respectively the inlet and outlet of the pump to permit normal interchange of fluid therebetween, a pressure biased valve in the passage connecting the outlet passage of the pump, a fluid expansible means to lift the implement, passage means for connecting the expansible means with the outlet passage of the pump, and means operable at the will of the operator of the vehicle for closing said pressure biased valve to divert the flow of fluid from the pump to the passage means of the expansible means connecting with the outlet of the pump to lift the implement, said pressure biased valve being adapted to open automatically due to fluid pressure at the completion of the lift of the implement to continue the interchange of fluid between the pump and the casing.

8. In combination, a motor propelled vehicle having auxiliary gearing operated by the motor, an implement mounted on the vehicle to be lifted and lowered, a fluid pump adapted to be connected for operation to said gearing having a fluid inlet passage means and a fluid outlet passage means, a fluid supply casing having separate passage means connecting respectively the inlet and outlet of the pump to permit normal interchange of fluid therebetween a pressure biased valve in the passage connecting the outlet passage of the pump, a fluid expansible means to lift the implement, passage means for connecting the expansible means with the outlet

passage of the pump, and means operable at the will of the operator of the vehicle for closing said pressure biased valve to divert the flow of fluid from the pump to the passage means of the expansible means connecting with the outlet of the pump to lift the implement, said pressure biased valve being adapted to open automatically due to fluid pressure at the completion of the lift of the implement to continue the interchange of fluid between the pump and the casing, means for retaining the implement in its lifted position, and means for operating said retaining means to permit lowering of the implement.

9. In combination, a motor propelled vehicle having auxiliary gearing operated by the motor, an implement mounted on the vehicle to be lifted and lowered, a fluid pump adapted to be connected for operation to said gearing having a fluid inlet passage means and a fluid outlet passage means, a fluid supply casing having separate passage means connecting respectively the inlet and outlet of the pump to permit normal interchange of fluid therebetween, a pressure biased valve in the passage connecting the outlet passage of the pump, a fluid expansible means to lift the implement, passage means for connecting the expansible means with the outlet passage of the pump, and means operable at the will of the operator of the vehicle for closing said pressure biased valve to divert the flow of fluid from the pump to the passage means of the expansible means connecting the outlet of the pump to lift the implement, said pressure biased valve being adapted to open automatically due to fluid pressure at the completion of the lift of the implement to continue the interchange of liquid between the pump and the casing, means for retaining the implement in its lifted position, means for operating said retaining means to permit lowering of the implement, and a single control means common to both of said valve closing means and said last mentioned means.

10. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having an inlet side and an outlet side, a fluid supply casing, separate fluid communications between the casing and the respective inlet and outlet sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in communication with the outlet side of the pump, a valve in the communication between the casing and the outlet side of the pump, toggle mechanism for operating said valve, means for operating said toggle mechanism to operate the valve, and means for automatically upsetting the toggle mechanism to open the valve at the end of the lifting of the implement resulting from the closing of said valve and of the diverting of fluid to the fluid expansible means.

11. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having an inlet side and an outlet side, a fluid supply casing, separate fluid communications between the casing and the respective inlet and outlet sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in communication with the outlet side of the pump, a valve in the communication between the casing and the outlet side of the pump, toggle mechanism for operating said valve, means for operating said toggle mechanism to operate the valve, means for automatically upsetting the toggle mechanism to open the valve at the end of the lifting of the implement resulting from the closing of said valve and of the diverting of fluid to the fluid expansible means, means for retaining the implement in its lifted position, and means for operating said retaining means to lower the implement.

12. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having an inlet side and an outlet side, a fluid supply casing, separate fluid communications between the casing and the respective inlet and outlet sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in communication with the outlet side of the pump, a valve in the communication between the casing and the outlet side of the pump, toggle mechanism for operating said valve, means for operating said toggle mechanism to operate the valve, means for automatically upsetting the toggle mechanism to open the valve at the end of the lifting of the implement resulting from the closing of said valve and of the diverting of fluid to the fluid expansible means, means for retaining the implement in its lifted position, means for operating said retaining means to lower the implement, control means common to both of said means for operating the toggle mechanism and the means for operating said retaining means in which movement in one direction thereof operates to set the toggle mechanism and close said valve without actuation of the operating means, and means for prohibiting actuation of the operating means by virtue of the upsetting force of the toggle mechanism upon opening of the valve and return movement of the control means.

13. In combination, a motor propelled vehicle, implements independently mounted for movement on said vehicle, a fluid pump adapted to be operated by said motor, a fluid supply casing, fluid passage means between said pump and casing to normally permit interchange of fluid therebetween, a fluid expansible means for each implement to lift the same in communication with one of the fluid passages between the pump and casing, a valve in one of said passages, the closing of which causes fluid to be diverted to the expansible means for lifting the implements, means for operating said valve, separate means for retaining each of the implements in their lifted position, and means for operating the retaining means to lower the implements at different times, the same being operable manually in separate steps to lower first one implement and then another.

14. In combination, a motor propelled vehicle, implements independently mounted for movement on said vehicle, a fluid pump adapted to be operated by said motor, a fluid supply casing, fluid passage means between said pump and casing to normally permit interchange of fluid therebetween, a fluid expansible means for each implement to lift the same in communication with one of the fluid passages between the pump and casing, a valve in one of said passages, the closing of which causes fluid to be diverted to the expansible means for lifting the implements, means for operating said valve, separate means for retaining each of the implements in its lifted position, means for operating the retaining means to lower the implements at different times, and

said operating means adapted to be operated by the means for operating the valve.

15. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having an inlet side and an outlet side, a fluid supplying casing, fluid communication between the casing and the sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in fluid communication with the outlet side of the pump, a valve adapted to close one of the fluid communications to divert the fluid to the fluid expansible means, operating means for closing said valve comprising a pre-loaded spring means adapted to place the valve under spring pressure, but being so loaded as to permit the valve to automatically open to continue the interchange of fluid between the pump and the casing at the completion of the lifting of the implement.

16. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having an inlet side and an outlet side, a fluid supply casing, fluid communication between the casing and the sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in fluid communication with the outlet side of the pump, a valve adapted to close one of the fluid communications to divert the fluid to the fluid expansible means, operating means for closing said valve comprising a pre-loaded spring means adapted to place the valve under spring pressure, but being so loaded as to permit the valve to automatically open to continue the interchange of fluid between the pump and the casing at the completion of the lifting of the implement, and means whereby the loading of said spring may be adjusted.

17. In combination, a motor propelled vehicle, an implement mounted on the vehicle to be lifted and lowered, a fluid pump operated by said motor and having a inlet side and an outlet side, a fluid supply casing, fluid communications between the casing and the sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in fluid communication with the outlet side of the pump, a valve adapted to close one of the fluid communications to divert the fluid to the fluid expansible means, manual means for closing said valve to lift the implement, means for retaining said implement in its lifted position, means associated with said manual means for operating the retaining means to lower the implement, and spring means associated with said manual means tending to resist the closing movement thereof to effect quick return movement of said manual means upon release of the same to automatically operate said operating means of the retaining means.

18. In combination, a tractor having forward and rear portions, an implement mounted for vertical movement on the forward portion of the tractor, another implement mounted for vertical movement on the rear portion of the tractor; a fluid expansible means for each implement to respectively move the same, means for simultaneously supplying fluid to the fluid expansible means, the fluid expansible means for the implement mounted on the forward portion being presented with less unit resistance than the fluid expansible means for the implement mounted on the rear portion, whereby consecutive movement of the implements on the front and rear portions will be respectively effected.

19. In combination, a tractor having forward and rear portions, an implement mounted on the forward portion of the tractor to be lifted and lowered, another implement mounted on the rear portion of the tractor to be lifted and lowered, a fluid expansible means for each implement to lift the same, means for supplying fluid to the fluid expansible means, the fluid expansible means for the implement mounted on the forward portion being presented with less unit resistance than the fluid expansible means for the implement mounted on the rear portion, means for discharging the fluid from the different fluid expansible means in consecutive order to effect lowering of the implement on the forward portion prior to lowering of the implement on the rear portion, whereby consecutive lifting and lowering of the implements of the respective forward and rear portion will be effected.

20. In combination, an implement-carrying frame, an implement mounted for movement on said frame, pump means for supplying fluid under pressure having a fluid inlet passage means and a fluid outlet passage means, a fluid supply casing having separate passage means connecting respectively the inlet and outlet passage means to permit normal interchange of fluid therebetween, a pressure biased valve in the outlet passage means, a fluid expansible means to lift the implement, passage means for connecting the expansible means with the outlet passage means, and means for closing the pressure biased valve to divert the flow of fluid from the pump means to the passage means of the expansible means to lift the implement, said pressure biased valve being adapted to open automatically due to excess fluid pressure to continue the interchange of fluid between the pump means and the casing.

21. In combination, an implement-carrying frame, an implement mounted for movement on said frame, a fluid pressure pump having an inlet side and an outlet side, a fluid supply casing, fluid communication between the casing and the sides of the pump to permit interchange of fluid therebetween, a fluid expansible means to lift the implement in communication with the outlet side of the pump, a valve adapted to close one of the fluid communications to divert the fluid to the fluid expansible means, means for closing said valve including a pre-loaded spring means adapted to place the valve under spring pressure but being so loaded as to permit the valve to automatically open upon being subjected to excess pressure to continue the interchange of fluid between the pump and the casing.

22. In combination, a frame, a source of fluid supply, a means including an implement and a fluid expansible means for connecting the same to the source of fluid supply, a second means including an implement and a fluid expansible means for connecting the same to the same source of fluid supply, both of said means carried by the frame and adapted so that they may have movement relative thereto, and both of said mean being constructed so that movement of its implement is effected prior to movement of the implement of the other means upon operation of the source of fluid supply.

23. In combination, a tractor having a forward portion and a rear portion, means for supplying fluid on the tractor, means including an implement adapted to be mounted for movement on the forward portion of the tractor and a fluid

expansible means for connecting the same to the fluid supply, a second means including an implement adapted to be mountetd for movement on the rear portion of the tractor and having a fluid expansible means for connecting the same to the fluid supply, and both of the means being constructed so that movement of the implement thereof is effected prior to any movement of the other means with the implement frame on the rear portion upon the operation of the fluid supply means.

24. In combination, a plurality of implements, a fluid expansible means for each implement to effect operation of the same, means for simultaneously supplying fluid to the expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, whereby consecutive operation of the respective implements will be effected.

25. In combination, a motor propelled vehicle, a plurality of implements connected to the vehicle, a fluid expansive means for each implement to effect operation of the same, means for simultaneously supplying fluid to the expansible means operated by the motor, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, whereby consecutive operation of the respective implements will be effected.

26. In combination, a plurality of implements, a fluid expansible means for each implement to effect operation of the same, means for simultaneously supplying fluid to the different expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement, and means for separately discharging the fluid of the different expansible means at different times, whereby consecutive operation and discharging of the fluid expansible means will be effected.

27. In combination, a plurality of implements, a fluid expansible means for each implement to effect the operation of the same, means for simultaneously supplying fluid to the different expansible means, a valve means associated with each of the separate expansible means for effecting discharge of the fluid therefrom, and a single manual control means for operating the respective valve means in consecutive order to effect consecutive discharging of the respective fluid expansible means.

28. In combination, a plurality of implements, a single-acting fluid expansible means for each implement to effect operation of the same, means for effecting consecutive operation of the respective fluid expansible means from one position to another position, means for effecting consecutive discharge of the fluid from the respective expansible means to operate the implement to return the same to the one position, and a single manual control means for operating both of said effecting means, the said control means being operable in separate steps to return first the one implement and then the other implement.

29. In combination, a motor propelled vehicle, implements mounted on the vehicle to be lifted and lowered, a single-acting fluid expansible means for each implement to lift the same, means for effecting consecutive operation of the respective fluid expansible means and consequent lifting of the respective implements, and means for effecting consecutive discharge of the fluid from the respective expansible means to thereby effect consecutive lowering of the respective implements, the said last mentioned effecting means being operable manually in separate steps to lower first one implement and then the other implement.

30. In combination, a motor propelled vehicle, implements mounted on the vehicle to be lifted and lowered, a single-acting fluid expansible means for each implement to lift the same, means for effecting consecutive operation of the respective fluid expansible means and consequent lifting of the respective implements, means for effecting consecutive discharge of the fluid from the respective expansible means to thereby effect consecutive lowering of the respective implements, and a single manual control means for operating both of said effecting means, the said control means being operable in separate steps to lower first one implement and then the other implement.

31. In combination, an implement carrying frame, a plurality of implements mounted on said frame to be lifted and lowered, a single-acting fluid expansible means for each implement to effect operation of the same, means for simultaneously supplying fluid to the respective expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement to thereby effect consecutive lifting of the implements, and means for effecting consecutive discharge of the fluid from the respective expansible means to thereby effect consecutive lowering of the respective implements.

32. In combination, an implement carrying frame, a plurality of implements mounted on said frame to be lifted and lowered, a single-acting fluid expansible means for each implement to effect operation of the same, means for simultaneously supplying fluid to the respective expansible means, the fluid expansible means for one of the implements being presented with less unit resistance than the fluid expansible means of another implement to thereby effect consecutive lifting of the implements, means for effecting consecutive discharge of the fluid from the respective expansible means to thereby effect consecutive lowering of the respective implements, and a single manual control means for operating both the supplying means and the discharge effective means.

33. In combination, a frame, a plurality of implements connected to the frame, a single-acting fluid expansible means for each implement to effect operation of the same, a fluid supply means delivering fluid to the respective fluid expansible means, a one-way trap valve for each fluid expansible means for normally permitting flow of fluid to the same, and a single control means for opening the respective trap valves in consecutive order to effect consecutive operation of the implements.

34. In combination, an implement-carrying frame, a plurality of implements mounted on the frame to be lifted and lowered, a single-acting fluid expansible means for each implement to lift the same, a fluid-supply means for delivering fluid to the respective fluid expansible means, a one-way trap valve for each fluid expansible means for normally permitting flow of fluid to the same, and a single control means for opening the respective trap valves in consecutive order to effect

consecutive lowering of the respective implements.

35. In combination, an inmplement-carrying frame, a plurality of implements mounted on said frame to be lifted and lowered, a single-acting fluid expansible means for each implement to lift the same, a fluid supply means for delivering fluid to the respective fluid expansible means, a one-way trap valve for each expansible means for normally permitting flow of fluid to the same, and a single control means for opening the trap valves in consecutive and delayed order while moving the same through definite intervals of space in one direction to thereby effect delayed lowering of the respective implements.

36. In combination, a frame, an implement connected to the frame, a fluid expansible means for operating the implement with respect to the frame, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, and said valve being adapted to open automatically due to fluid pressure set up in the supply means at the completion of the operation of the expansible means.

37. In combination, a frame, an implement connected to the frame, a fluid expansible means for operating the implement with respect to the frame, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, said valve being adapted to open automatically due to fluid pressure set up in the supply means at the completion of the operation of the expansible means, means for retaining the implement in its new position after the valve has been opened, and means for operating said retaining means to permit further operation of the implement.

38. In combination, a frame, an implement connected to the same, a fluid expansible means for operating the implement with respect to the frame, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, said valve being adapted to open automatically due to fluid pressure set up in the supply means at the completion of the operation of the expansible means, means for retaining the implement in its new position after the valve has been opened, means for operating said retaining means to permit further operation of the implement, and a single manual control means common to both said pressure biased valve and said last mentioned operating means.

39. In combination, an implement adapted for operation from one position to another, a fluid expansible means for operating the implement, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, toggle mechanism for operating said valve, manual control means for setting said toggle means and to close said valve, and means for automatically upsetting the toggle mechanism at the end of the operation of the implement.

40. In combination, an implement adapted for operation from one position to another, a fluid expansible means for operating the implement, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, toggle mechanism for operating said valve, manual control means for setting said toggle means and to close said valve, means for automatically upsetting the toggle mechanism at the end of the operation of the implement, means for retaining the implement in its new position, and means for operating the retaining means to effect return of the implement to its original position.

41. In combination, an implement adapted for operation from one position to another, a fluid expansible means for operating the implement, a fluid supply means for delivering fluid to the expansible means including a valve adapted to be closed by manual means to divert delivery of fluid to the fluid expansible means, toggle mechanism for operating said valve, manual control means for setting said toggle mechanism and to close said valve, means for automatically upsetting said toggle mechanism at the end of the operation of the implement, means for retaining the implement in its new position, means for operating the retaining means to effect return of the implement to its original position associated with said manual control means for setting the toggle mechanism, and means for prohibiting actuation of this operating means due to the upsetting force of the toggle mechanism.

42. In combination, a plurality of implements, each of which is adapted for operation from one position to another, a separate fluid expansible means for operating each implement, fluid supply means for delivering fluid to the respective fluid expansible means including a valve for controlling the flow of fluid to the expansible means, means for operating said valve to effect operation of the respective expansible means, separate means for each implement to retain the same in the new position, and manual means for operating each of the retaining means at different times and in separate steps to effect consecutive return of the implements to their original positions.

43. In combination, an implement adapted for operation, a fluid expansible means for operating the implement, a fluid supply means for delivering fluid to the fluid expansible means including a valve means for controlling the flow of fluid to the fluid expansible means and adapted to be closed to effect operation of the same, said valve means including a pre-loaded spring means adapted to place the valve under predetermined spring pressure but being loaded so as to permit the valve to automatically open at a predetermined fluid pressure within the fluid supply means to thereby cause cessation of the operation of the fluid expansible means.

44. In combination, an implement adapted for operation, a fluid expansible means for operating the implement, a fluid supply means for delivering fluid to the fluid expansible means including a valve means for controlling the flow of fluid to the fluid expansible means and adapted to be closed to effect operation of the same, said valve means including a pre-loaded spring means adapted to place the valve under predetermined spring pressure but being loaded so as to permit the valve automatically to open at a predetermined fluid pressure within the fluid supply means to thereby cause cessation of the operation of the fluid expansible means, and means whereby the loading of said spring means may be adjusted.

45. In combination, an implement adapted for operation, a fluid expansible means for operating the implement, a fluid supply means for deliver-

ing fluid to the fluid expansible means including a valve means for controlling the flow of fluid to the fluid expansible means and adapted to be closed to effect operation of the same, manual means for closing the valve to operate the implement, means for retaining the implement in its operated position, means associated with the manual means for operating the retaining means to permit return of the implement to its original position, and spring means associated with the manual means tending to resist the closing movement thereof to optionally effect quick return movement of said manual means upon release of the same to automatically operate said operating means of the retaining means.

ALEXUS C. LINDGREN.
CARL W. MOTT.