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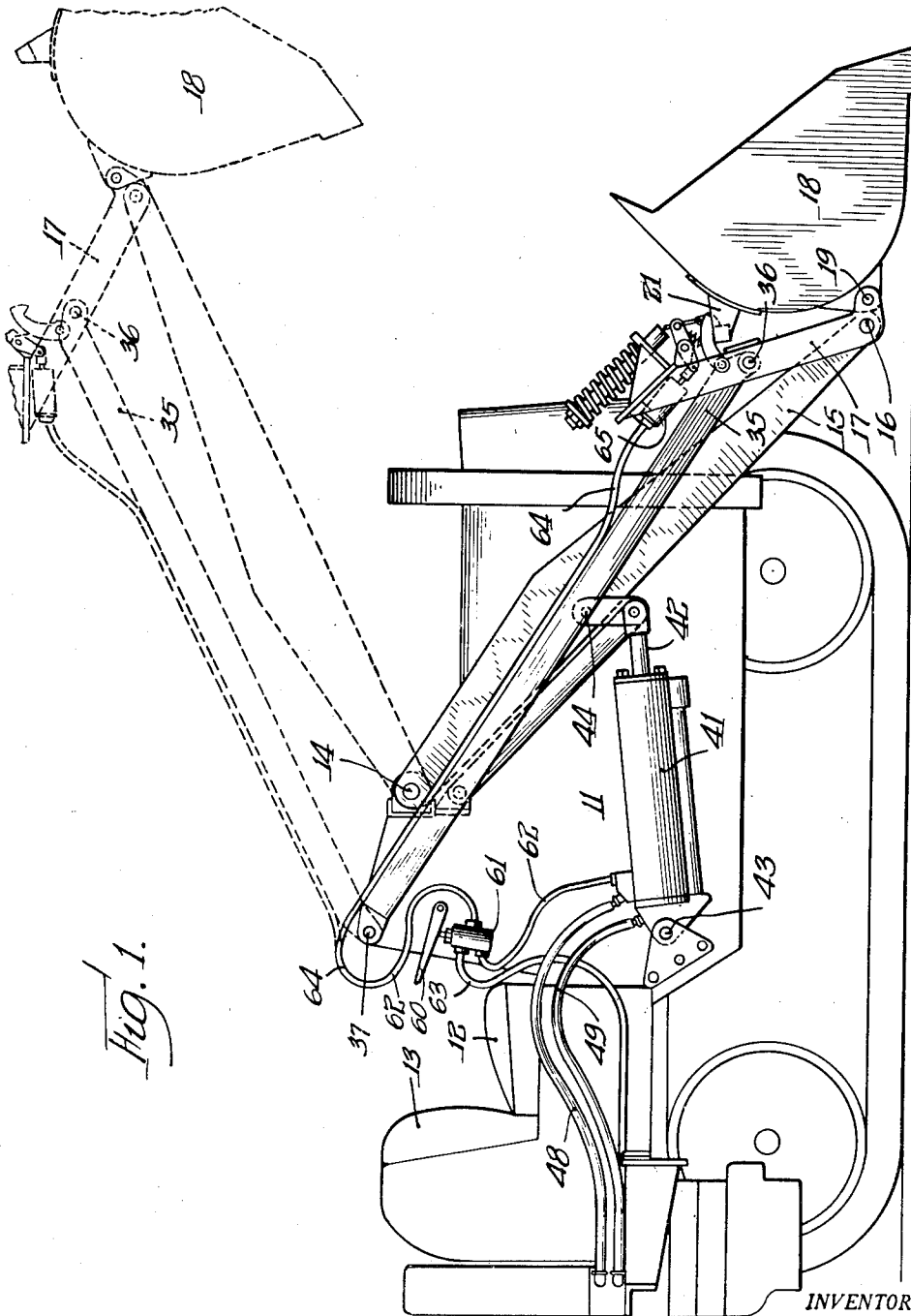
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TRACTOR SHOVEL HYDRAULIC DUMPING CONTROL

Filed Jan. 18, 1947

3 Sheets-Sheet 1



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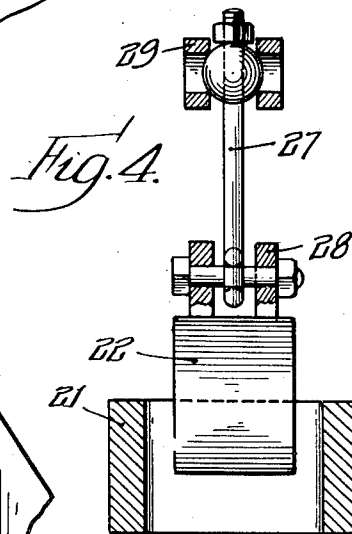
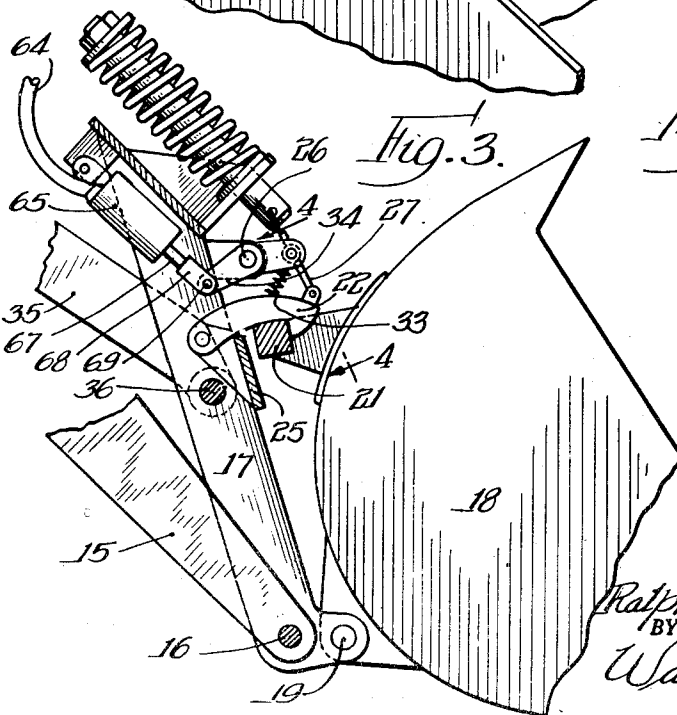
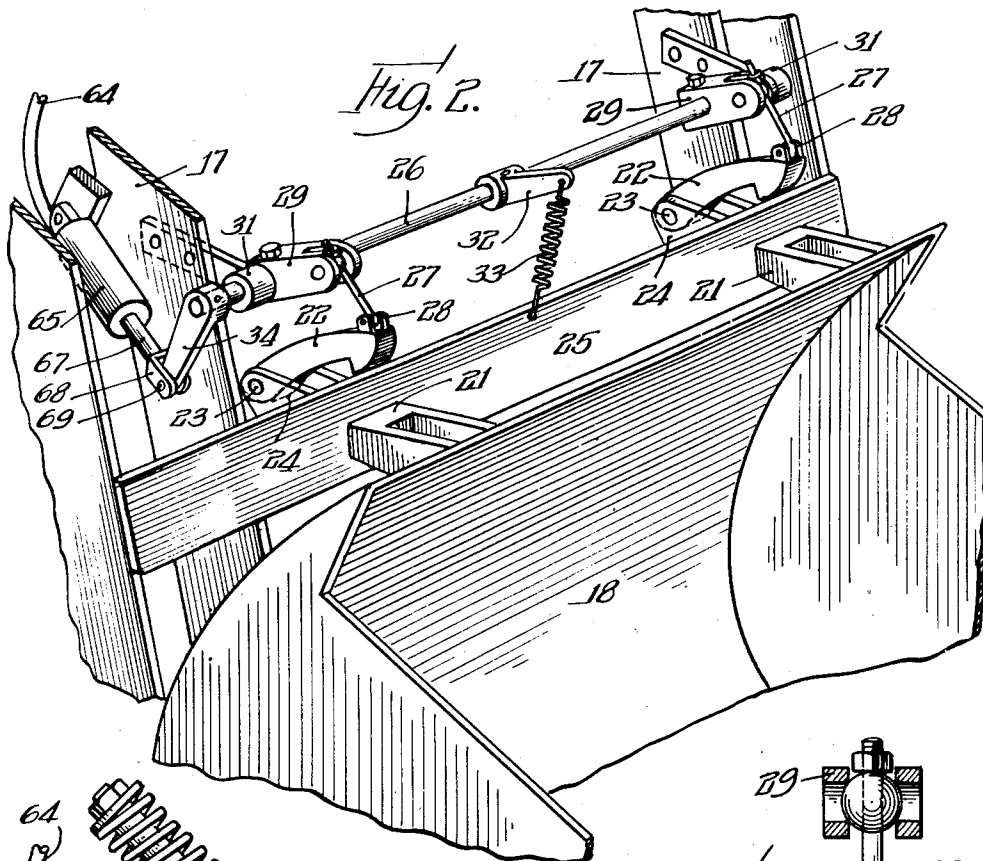
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TRACTOR SHOVEL HYDRAULIC DUMPING CONTROL

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3 Sheets-Sheet 2



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TRACTOR-SHOVEL HYDRAULIC DUMPING
CONTROL

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1 Claim. (Cl. 214-140)

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In tractor-shovels and analogous or comparable appliances the shovel or bucket is frequently mounted on the level on the end portion of a boom horizontally hinged or fulcrumed at its other end on the tractor and supplied with appropriate hydraulic-means for raising and lowering the boom and shovel and its load, the shovel being equipped with releasable locking or latching means to hold it from turning on its hinge into load-discharging or dumping position until it has been elevated to the desired relation.

One outstanding aim or purpose of the current invention is to provide new and efficient means to unlatch or unlock the bucket for delivery of its load at any desired position thereof during the raising and lowering cycle with the least amount of manual effort on the part of the operator of the appliance.

In the past, the conventional or usual method has been to operate the cam and lever or other arrangement provided for this purpose with a rod or rope hook-up through the necessary linkage to afford the operator the production of the desired effect.

In order to enable such operator to unlatch or release the bucket or shovel, it has been necessary for him to pull the rope or the rod manually through a distance determined by the leverage necessary to bring the effort within the limit of the operator's physical ability or capacity.

This, however, usually has had to be a relatively long pull resulting in drawing or displacing the operator out of his normal position, and, therefore, necessarily creating an inefficient condition.

One of the paramount objects of the present invention is, therefore, to overcome these difficulties by a comparatively simple yet satisfactory and effective means and method.

In order that those trained in this art may readily understand the invention and the various advantages and benefits accruing from its employment, a present preferred embodiment of the invention in physical form has been fully illustrated in the accompanying drawings, forming a part of this specification, and is fully explained in detail hereinafter.

In these drawings:

Figure 1 is a general side elevation of the structure portraying the current invention;

Figure 2 is a fragmentary perspective view of the new apparatus in unlatched condition;

Figure 3 is a partial, longitudinal, vertical section through the appliance showing it in hooked or locked relation;

Figure 4 is an enlarged, small cross-section on line 4-4 of Figure 3;

Figure 5 presents a diagrammatic view of the fluid control system;

Figure 6 illustrates the valve shown in Figure 5 controlled by the operator; and

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Figure 7 depicts in section the hydraulic cylinder and piston means employed to perform the unlatching operation.

As illustrated in these drawings, the tractor-shovel includes a suitable tractor 11 (Figure 1) driven by the usual internal-combustion engine, not shown, such appliance having an appropriate seat 12 and its back 13 for the operator of the vehicle.

At 14 on such tractor, the rear end of an appropriate boom 15 is fulcrumed, the forward end of such boom being hinged at 16 to a duplex frame member 17 on which the bucket or shovel 18 is hinged at 19 (Figs. 1 and 3).

Fixedly mounted on, as by welding or differently, and projecting rearwardly from the back wall of the shovel is a pair of spaced-apart loops 21, 21 (Figs. 2 and 3) cooperating with a pair of companion or complementary, forwardly extending hooks 22, 22 rockingly mounted at 23, 23 in brackets 24, 24 welded on, or otherwise fixedly secured on, a transverse bar 25 forming part of the dual member 17 hinged on the boom 15 at 16.

Each such hook at its end is joined to a cross-shaft 26 by its own link 27 (Figure 2) rockingly mounted on the hook at 28 and connected to the shaft by a bifurcated arm 29 fixed on the shaft so that turning of the latter on its axis in its suitably supported bearings 31, 31 on the member 17 actuates the hooks simultaneously.

Near, or at, its center-point shaft 26 has fixed thereon an outstanding arm 32 connected at its free end to a terminal portion of a coiled-spring 33 attached at its opposite end to the bar 25, such spring obviously tending to lower the two hooks 22, 22 simultaneously into their operative engagement position with the pair of shovel or bucket loops 21, 21 through the action of shaft 26 and the links 27, 27.

As indicated in Figures 2 and 3, one end of shaft 26 has rigidly mounted thereon an operating arm 34 by means of which the shaft may be turned to release or lift the two hooks from the shovel to allow the latter under the action of its own weight and that of its load to swing downwardly automatically on its hinge 19 and thus discharge or dump its load.

Frame 17 carrying several of the various elements referred to above and which is hinged on the boom 15 at 16, and which has the shovel hinged on itself, is maintained at all times in suitable and proper position by a pair of parallel links 35, 35 hinged to the part 17 in registration at 36, and hinged at their other ends in alignment on the tractor at 37 (Figure 1).

Boom 15, its shovel 18, the frame 17, and the parts associated with the latter (Figure 1) are raised and lowered by a combined main hydraulic-cylinder 41, its piston (not shown) and its piston-rod 42 hinged on the tractor at 43,

or by two such hydraulic-means if a dual or duplex boom is employed, such piston-rod or piston-rods, if two are used, being operatively connected to its boom at 44 through a novel link-means constituting the subject matter of my co-pending patent application Serial No. 715,871, filed December 12, 1946, now Patent No. 2,444,692 granted July 6, 1948.

This main hydraulic-means is double-acting and the oil for operating it comes from a supply-tank 45 (Figure 5) by a pump 46, a manually operated valve 47 and conduit connections 48 and 49 (Figs. 1 and 5) to the two ends of the cylinder 41, the pump being connected to the tank and valve by conduits 51 and 52 and the tank being directly connected to valve 47 by another conduit 53.

As is customary in constructions of this character, the pump is always working as long as the tractor-engine is in operation, and when the hydraulic-means is not doing any work the pump merely idles and circulates the oil from the tank back through the connection 53 to the tank, this general arrangement being well known in the art and hence needing no further description.

A supplemental manually operated valve 61, as shown in Figures 1, 5 and 6, is connected by a flexible conduit 62 to the interior of one end of a main cylinder 41 out beyond its piston and is also joined by another tube 63 to the oil supply-tank 45.

In addition, the valve has a flexible conduit 64 (Figs. 5 and 7) connected to an auxiliary cylinder 65 housing an ordinary piston 66, the piston-rod 67 of which has a bifurcated end 68 rockingly connected at 69 to the end of arm 34 on shaft 26, such cylinder 65 being rockingly mounted at 71 on member 17.

The operation of this novel shovel releasing mechanism is as follows:

Whenever it is necessary or desirable to dump the load in the shovel the latter is off the ground having been elevated therefrom by the oil-pressure in cylinder 41 which has been built up by the operator's control of valve 47.

This oil under suitable pressure is utilized to release the bucket hooks by tapping some of the oil off from the lower portion of cylinder 41 through the conduit 62 and this is performed by the operator pushing down on handle 60 of valve 61, which slides its plunger 72 down against the action of its coiled spring 73 to cause its circular cavity 74 on valve stem 72 to register with the ports connecting with the conduits 62 and 64, thus supplying oil through the latter conduit 64 to the interior of auxiliary cylinder 65 forcing its piston 66 along the cylinder and causing a rocking of arm 34 producing an upward movement of arms 29 on shaft 26 and through their links 27 elevating and releasing the hooks 22, 22 from their loops 21, 21 thus freeing the shovel and allowing it to automatically rock down and deliver its load from a suitable position, as shown in dotted lines in Figure 1.

As soon as this has been accomplished, the operator releases handle 60 and the valve 72 automatically rises under the expanding action of spring 73 so that the annular chamber 74 closes its connection with conduit 62 and establishes its connection with conduits 64 and 63 back to the supply-tank.

Promptly upon the oil-pressure in cylinder 65

being thus released, spring 33 gradually rocks shaft 26 back to its original position bringing the hooks into such place that they will automatically engage their loops 21 as soon as the shovel is rocked back on its hinge to load-retaining position, as for instance, when the shovel engages the ground.

This action of spring 33 in rocking shaft 26 automatically through arm 34 pushes piston 66 back to its initial position and in so doing forces the oil, or at least a substantial portion of it, back through conduit 64, valve 61, and connection 63 to the supply-tank but readily returning again, when needed, by the depression of handle 60 by the operator.

The advantages of this particular system are quite obvious and produce more efficient action through accessibility and reduction of effort on the part of the operator.

In this connection, it may be noted that the amount of oil tapped off from the main-cylinder 41 to unlatch the hooks is so small in comparison with the displacement of the main-cylinder that the slight descent of the mechanism or reduced speed of elevation caused by this is practically negligible.

Whereas this construction has been described in detail, it should be understood that the invention is not necessarily limited and restricted to the precise details of the appliance and that various modifications may be availed of without departure from the heart and essence of the invention, as defined by the dependent claim, and without the loss or sacrifice of any of its material benefits and advantages.

I claim:

In a tractor-shovel having a lifting and lowering mechanism on which the shovel is rockingly mounted, a main hydraulic-means to operate said lifting and lowering mechanism including a fluid supply-tank, a pump, piping and a main power-cylinder and its piston, a latch releasably locking said shovel against dumping its load, and means to restore said latch automatically to locking position after having been released, the novel improvement of a latch-operating hydraulic-means to release said shovel-latch, means to feed fluid under pressure from said cylinder of said main hydraulic-means to said latch-operating auxiliary hydraulic-means and to convey it therefrom, and a manually controlled valve to govern the feed of said fluid to and from said latch auxiliary hydraulic-means and its return to said supply-tank, whereby upon reverse of said valve to its discharge condition said latch-restoration means forces the fluid from said latch auxiliary hydraulic-means.

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