Oct. 4, 1955 C. GERST 2,719,639

POWER LIFT

Filed May 31, 1952 3 Sheets-Sheet 1

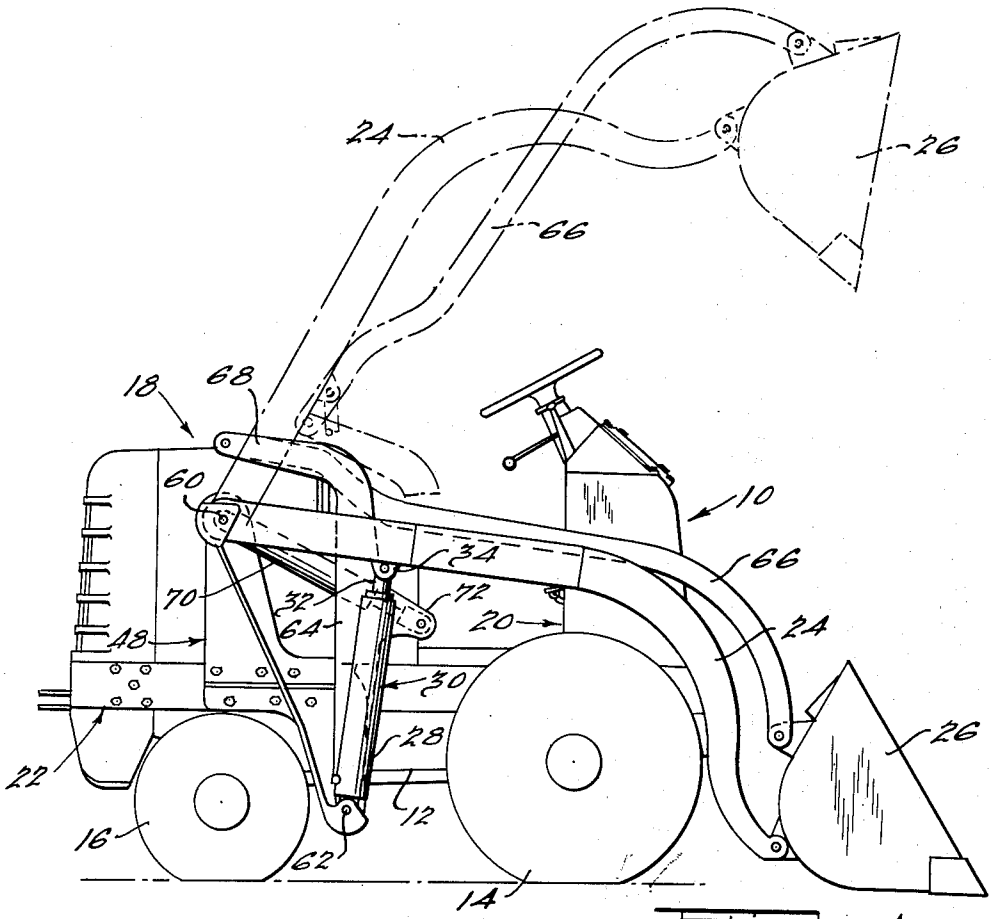


Fig. 1.

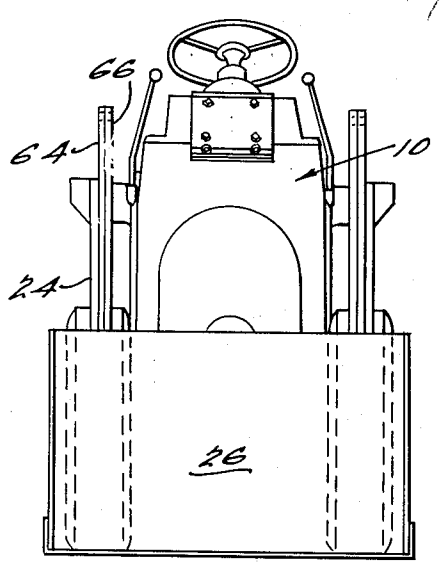


Fig. 2.

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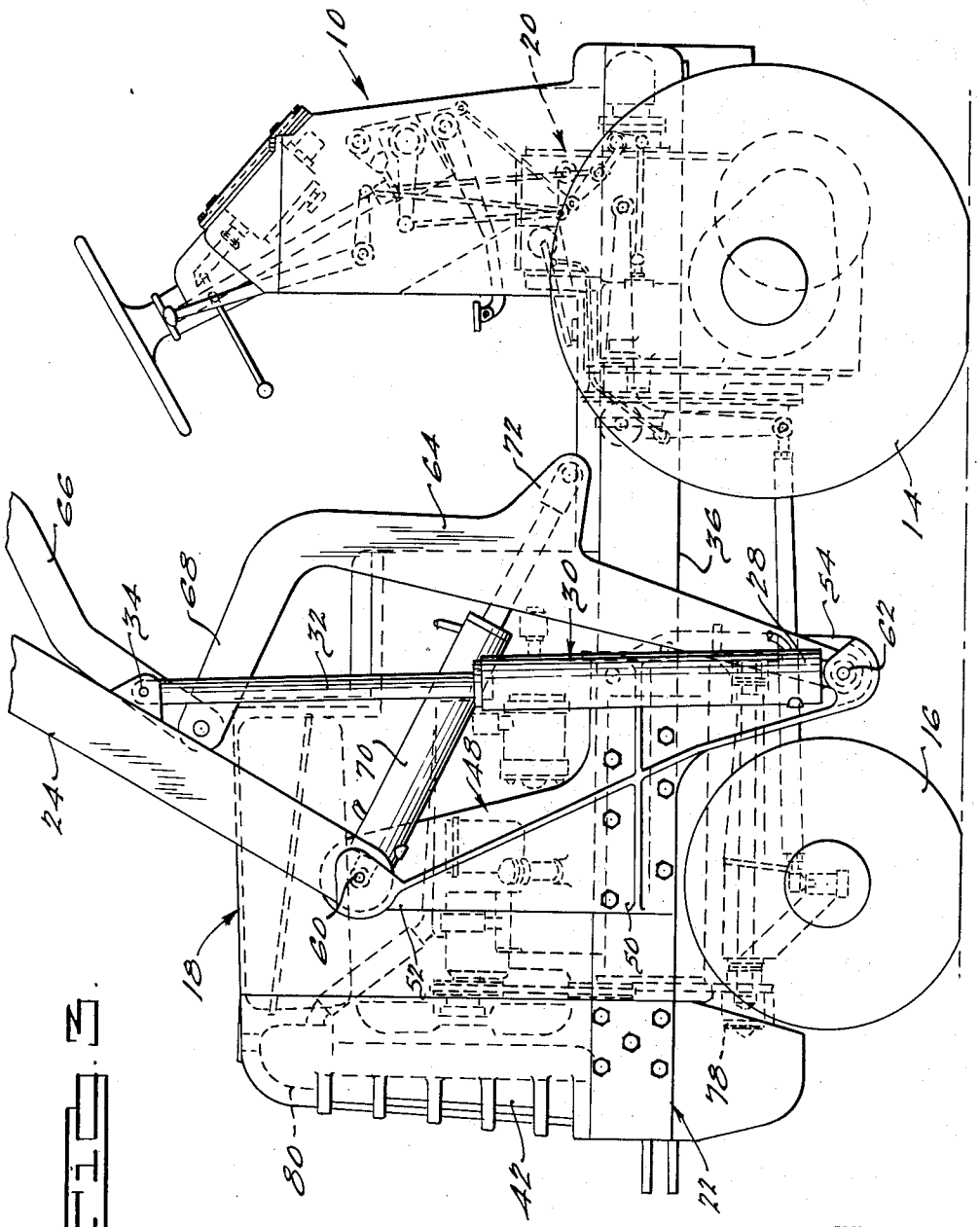


FIG. 2

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POWER LIFT

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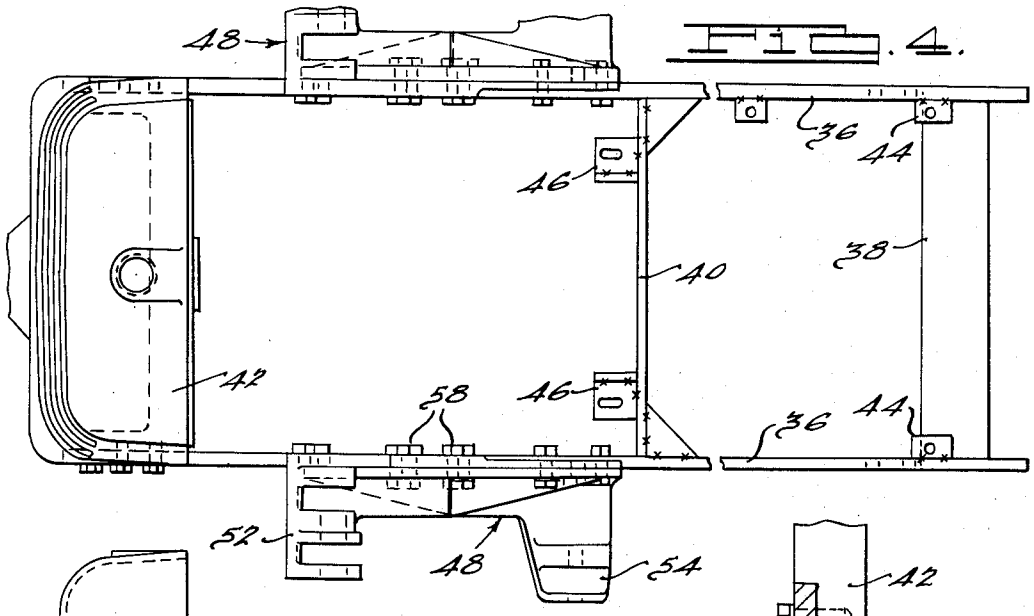


Fig. 4.

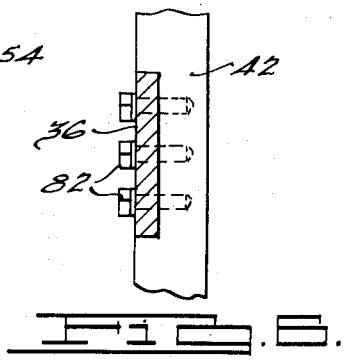


Fig. 8.

Fig. 5.

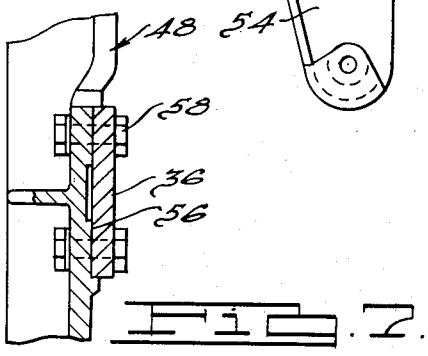


Fig. 7.

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POWER LIFT

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3 Claims. (Cl. 214—140)

This invention relates to power operated material handling apparatus in general and has particular reference to power operated lifting apparatus adapted for use with an engine driven vehicle, such as a tractor.

The lifting apparatus contemplated by this invention is of the type having a pair of lift arms pivotally mounted on a tractor and provided with a material handling device at their outer ends and hydraulic piston and cylinder means connected to the lift arms for raising and lowering the same. In my prior copending applications Serial No. 225,338, filed May 9, 1951, and now Patent No. 2,707,056, for "Tractor Shovel," and Serial No. 242,095, and now Patent No. 2,707,057, filed August 16, 1951, for "Tractor Shovel," there is disclosed power operated lifting apparatus of a type with which the present invention is particularly adapted for use. The present invention is directed particularly to a new and improved supporting structure for the lift arms and power operated means for raising and lowering the arms.

A principal object of the invention is to provide a new and improved power operated material handling apparatus.

Another object of the invention is to provide a new and improved supporting structure for a hydraulically actuated lifting apparatus.

Another object of the invention is to provide a supporting structure for a lifting apparatus which is relatively simple in construction and inexpensive to manufacture and which is especially adapted for use with an engine driven tractor.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are three sheets, which by way of illustration show a preferred embodiment of the invention and what I now consider to be the best mode in which I have contemplated applying the principles of my invention. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

Fig. 1 is a side elevational view of a power operated lifting apparatus embodying my present invention;

Fig. 2 is a front elevational view of the apparatus disclosed in Fig. 1;

Fig. 3 is a fragmentary side elevational view of the apparatus and showing the same in a different operative position thereof;

Fig. 4 is a top plan view of the supporting frame for the lifting apparatus;

Fig. 5 is a side elevational view of the frame shown in Fig. 4;

Fig. 6 is a fragmentary sectional view taken along lines 6—6 of Fig. 5; and

Fig. 7 is a fragmentary sectional view taken along lines 7—7 of Fig. 5.

In Fig. 1 there is disclosed an engine driven tractor 10 having the lifting apparatus of this invention mounted thereon. The tractor 10 may be of any suitable type, and as disclosed in Fig. 1 comprises a body 12, front and rear wheels 14 and 16, an engine indicated generally at 18 and mounted above the rear wheels 16, and a transmission indicated at 20 connected to the front drive wheels 14.

The lifting apparatus comprises in general a supporting frame 22 mounted on the tractor, having lifting arms 24 pivotally mounted on the frame 22 at their inner ends and having a material handling device, such as a shovel 26, pivotally connected to the outer ends thereof. The cylinders 28 of hydraulic piston and cylinder means 30 are pivotally mounted on the frame 22 at each side thereof, and pistons 32 of the hydraulic means 30 are pivotally connected to lift arms 24 by means of brackets 34 intermediate the ends of the lift arms 24. A suitable hydraulic pump (not shown) is provided for supplying fluid under pressure to cylinders 28 for operating the piston and cylinder means 30 for raising and lowering the lift arms 24 and the material handling means 26.

The frame 22 is generally rectangular in shape, as illustrated in Fig. 4, and comprises longitudinally extending side frame members 36, cross frame members 38 and 40 rigidly secured to the side frame members 36 as by welding, and an engine guard structure or shield 42 rigidly secured between the side frame members 36 at the rear end thereof. Suitable bracket means, such as brackets 44 and 46, may be secured to side frame members 36 and cross frame member 40. Such brackets are provided with openings therein comprising provisions for mounting the supporting frame 22 on the tractor. The structure and arrangement of the mounting brackets may be varied, and in any event would be such as to mount the frame on to the particular tractor to which the invention is to be applied.

Each of the side frame members 36 is provided with a bracket 48 mounted thereon intermediate the ends of such frame member. The brackets 48 comprise a central portion 50 mounted on the frame members 36 and an integral, upwardly extending portion 52 and a downwardly extending portion 54. The mounting of brackets 48 on frame members 36 is best shown in Fig. 7. The central portion 50 of each bracket 48 is provided with a groove or slot 56 adapted to receive a frame member 36 so that the bracket is keyed to the frame member as shown in Fig. 7. Suitable fastening means, such as bolts 58 or rivets, extend through brackets 48 and frame members 36 for securing the same together.

The inner ends of the lift arms 24 are pivotally mounted on the upwardly extending portions 52 of brackets 48 by mean of pins 60 secured within brackets 48 and about which the lift arms 24 freely pivot. The downwardly extending portions 54 of brackets 48 are similarly provided with pins 62 which pivotally mount cylinders 28 on brackets 48.

Tilting levers 64 are also pivotally mounted on pins 62 provided on the downwardly extending portions 54 of brackets 48, and lever arms 66 have their inner ends pivotally connected to the upper ends 68 of tilting levers 64. The outer ends of lever arms 66 are pivotally connected to the shovel 26. Hydraulic piston cylinder means 70 have one part thereof pivotally mounted on pins 60 provided in the upwardly extending portions 52 of brackets 48, and the other part of such piston and cylinder means is pivotally connected to a laterally extending arm 72 provided on the tilting lever 64. Thus, actuation of the piston and cylinder means 70 will cause pivotal movement of tilting levers 64 about their pivotal connections 62, which in turn will effect movement of lever arms 66 relative to lift arms 24 so that the angle at which the shovel 26 is supported at the outer ends

of lift arms 24 may be changed. In Fig. 1 the lifting apparatus is shown with the scoop 26 in its loading position, in which position the scoop is tilted forwardly so that when the tractor is moving forwardly the material to be handled may be picked up by the scoop. Actuation of hydraulic means 30 and hydraulic means 70 will effect raising of lift arms 24 and pivotal movement of tilting levers 64 in a counterclockwise direction (Fig. 1) respectively, thereby causing levers 66 to move the shovel 26 into its load carrying position in which it is supported in a substantially horizontal position. The dotted line position of the levers 66 and arms 24 and shovel 26 illustrated in Fig. 1 shows the unloading position of such elements, from which it can be seen that the shovel 26 is unloaded by actuation of hydraulic means 70 so as to pivot tilting levers 64 in a clockwise direction, thereby causing levers 66 to tilt the shovel into the position shown. The hydraulic piston and cylinder means 30 and the hydraulic means 70 may each be actuated independently of actuation of the other. While the material handling device is illustrated as comprising a shovel, it is apparent that any other suitable material handling means might be mounted on the ends of lift arms 24 and levers 66.

When a load is supported by lift arms 24 the turning moment of arms 24 under such load will be transmitted to brackets 48 and will tend to rotate the same in a clockwise direction about their connections with side frame members 36. The keyed connection between brackets 48 and frame members 36 previously described is operative to transmit the turning moment of lift arms 24 to side frame members 36 without exerting a shearing force on the fastening means 58 which secure the brackets 48 and frame members 36 together. The weight supported by lift arms 24 when in an elevated position thus provides a turning moment which is transmitted to side frame members 36. The engine shield 42 which is rigidly secured to frame members 36 serves the dual purpose of providing a guard or shield for the engine and also providing a counterweight positioned relative to the brackets 48 so as to counteract the turning moment imparted to the side frame members by the lift arms. The shield 42 may be made of cast iron and the lower portion 74 thereof may, if necessary, be a solid mass so as to provide the necessary weight for effecting the purpose of counterbalancing the weight supported by lift arms 24.

As will be seen in Figs. 3 and 5, the lower portion 74 of counterweight 42 may be provided with a bore 76 adapted to receive a pilot pin 78 provided on the engine for properly locating the supporting frame on the tractor. By the use of the combined shield and counterweight member 42 relatively large loads may be supported by the lifting apparatus and at the same time the conventional shield for the radiator 80 and other parts of the engine is provided without encumbering the tractor with additional structure. The shield 42 may be secured to the frame members 36 by means of bolts 82.

The connection between brackets 48 and frame members 36 is such that the brackets may be secured to the frame members at a desired position along the length of the frame members. To this end the frame members may be provided with a plurality of holes adapted to receive bolts or rivets 58 so that the corresponding holes in brackets 48 can be aligned with the desired set of holes in the frame members. The foregoing would be advantageous in the event that it was found desirable to locate the material handling device either closer to or farther from the front end of the tractor.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a load lifting assemblage applicable to an engine driven vehicle, a vehicle frame having a rigidly interconnected opposite side members, a bracket mounted medially of each of said frame members, each of said brackets having integral portions extending upwardly and downwardly relative to said frame and the corresponding ends of said bracket portions being provided respectively with upper and lower pivots, lifting arms swingably suspended from said upper pivots, hydraulic power devices connecting said lower pivots with medial portions of said arms, tilting levers having their lower ends swingably suspended from said lower pivots, other hydraulic power devices connecting said upper pivots with the medial portions of said levers, lever arms pivotally attached to the upper swinging ends of said tilting levers, a material handling element pivotally attached to the upper swinging ends of said lifting and lever arms, both of said hydraulic power devices being operable to move said material handling element and tending when in action to rotate said brackets relative to said frame, and weight means mounted on said frame in opposition to said material handling means for counteracting said rotative tendency.

2. In a load lifting assemblage applicable to an engine driven vehicle, a vehicle frame having rigidly interconnected opposite side members, a bracket mounted medially of each of said frame members, each of said brackets having an integral rear portion extending upwardly and an integral front portion extending downwardly relative to said frame and the corresponding ends of said bracket portions being provided respectively with upper and lower pivots, lifting arms swingably suspended from said upper pivots, hydraulic rams each having a cylinder and a plunger connecting said lower pivots with medial portions of said arms, tilting levers having their lower ends swingably suspended from said lower pivots, other hydraulic rams each having a cylinder and a plunger connecting said upper pivots with the medial portions of said levers, lever arms pivotally attached to the upper swinging ends of said tilting levers, a material handling element pivotally attached to the upper swinging ends of said lifting and lever arms at one side of said brackets, both of said hydraulic rams being operable to swing said material handling element and tending when in action to rotate said brackets relative to said frame, and weight means mounted on said frame at the opposite side of said brackets for counteracting said rotative tendency.

3. In a load lifting assemblage applicable to an engine driven vehicle, a vehicle frame having rigidly interconnected opposite side members, a bracket mounted medially of each of said frame members, each of said brackets having an integral rear portion extending upwardly and an integral front portion extending downwardly relative to said frame and the corresponding ends of said bracket portions being provided respectively with upper and lower pivots, a lifting arm swingably suspended from each of said upper pivots, a hydraulic ram connecting each of said lower pivots with the medial portion of the corresponding lifting arm, a tilting lever having its lower end swingably suspended from each of said lower pivots, another hydraulic ram connecting each of said upper pivots with the medial portion of the corresponding tilting lever, a lever arm pivotally attached to the upper swinging end of each of said tilting levers, a material handling bucket pivotally attached to the upper swinging ends of all of said lifting and lever arms and being movable forwardly of said brackets, both of said hydraulic rams being operable to move said material handling element and tending when in action to rotate said brackets relative to said frame, and weight means mounted on said frame rearwardly of said brackets for counteracting said rotative tendency.

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