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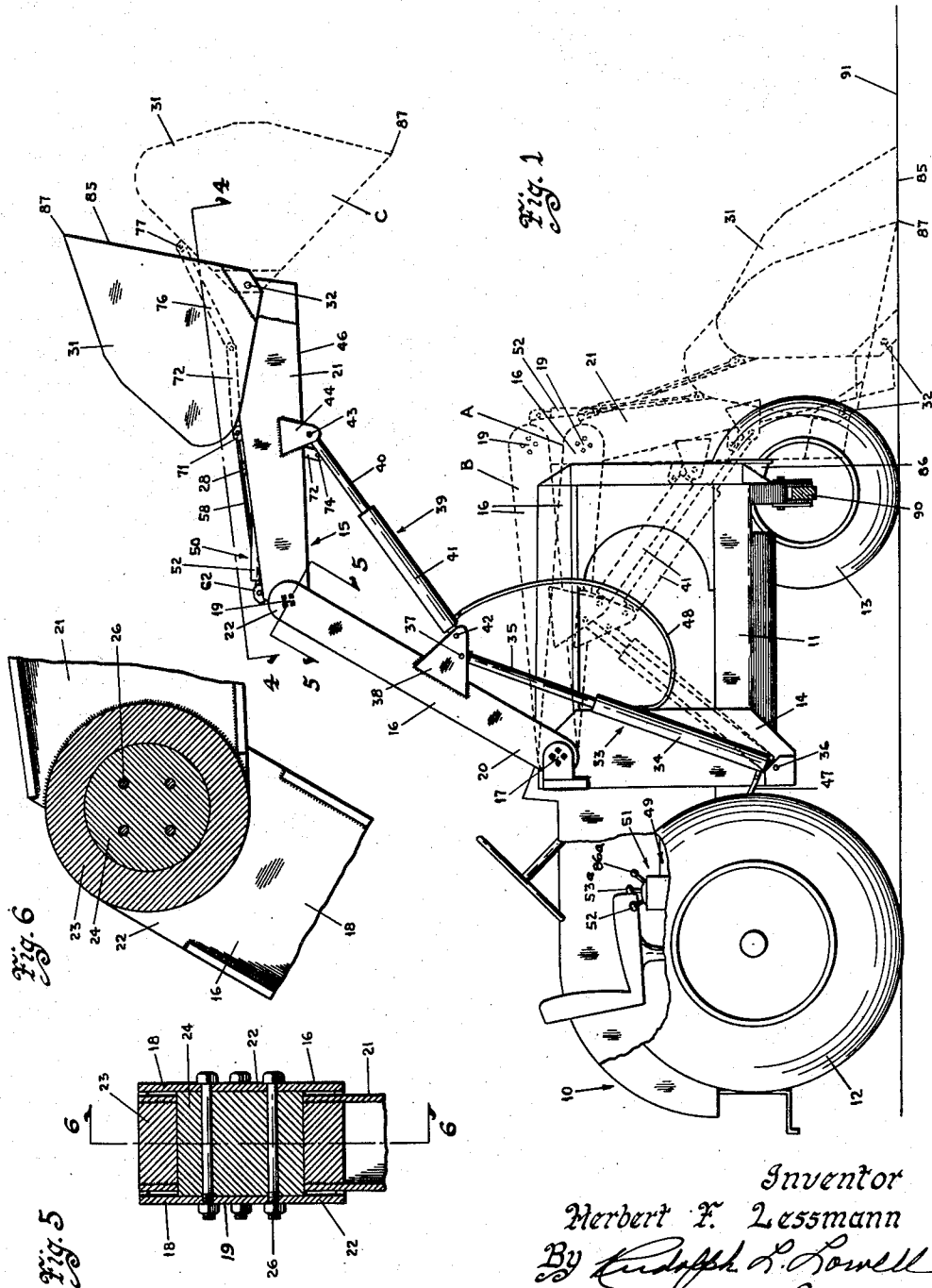
H. F. LESSMANN

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LOADER MACHINE

Filed March 9, 1951

2 Sheets-Sheet 1



Inventor
Herbert F. Lessmann
By *Rudolph P. Lowell*
Attorney

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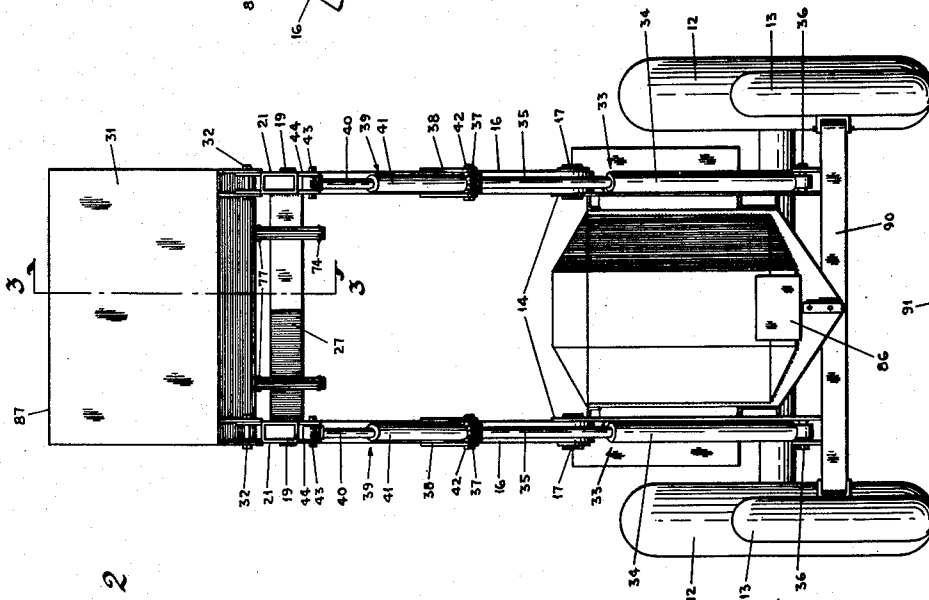
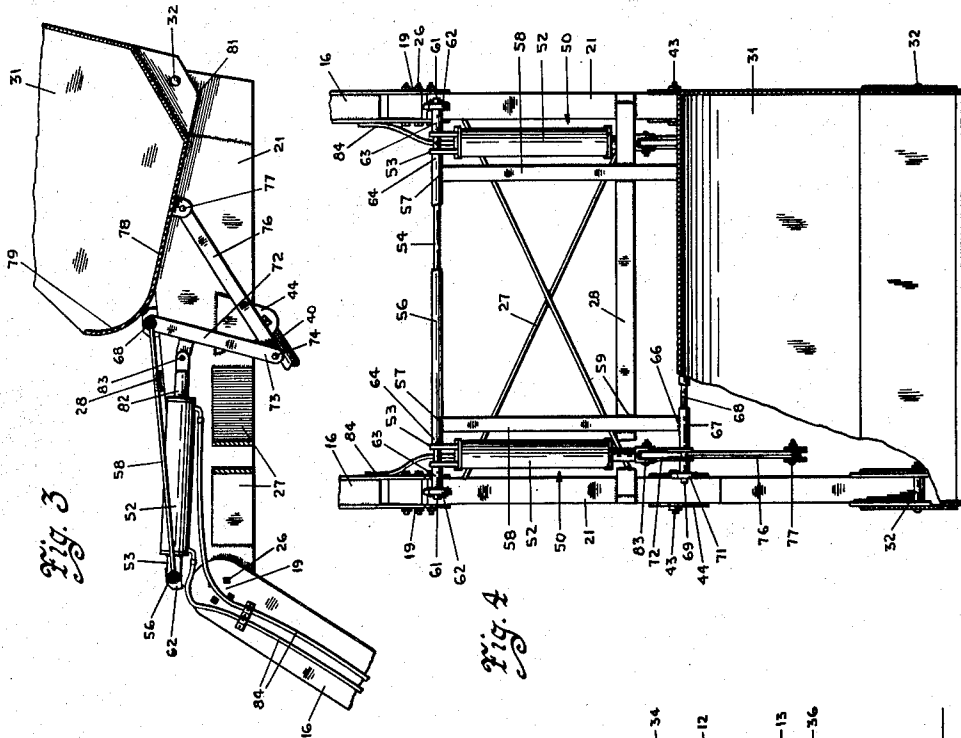
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Inventor
Herbert F. Lessmann
By *Ludolph L. Lowell*
Attorney

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LOADER MACHINE

Herbert F. Lessmann, Des Moines, Iowa, assignor, by
mesne assignments, to A. C. Anderson, Inc.

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2 Claims. (Cl. 214—140)

This invention relates generally to loading machines and in particular to a tractor type loading machine of a heavy duty construction having a power operated shovel for handling dirt, manure and similar materials.

An object of this invention is to provide an improved loading machine.

A further object of this invention is to provide a loading machine in which a pivoted scoop or shovel support is movable independently of the scoop lift arms so that the scoop can be loaded without any ground advance or travel of the machine.

Another object of this invention is to provide a loading machine in which the lift arms are equipped with front pivoted shovel supporting extensions that are pivotally movable independently of the lift arms, at any moved position of the lift arms, and capable of being extended forwardly of the lift arms to give adequate elevation to the shovel for clearance with a dump truck, during a dump truck loading operation.

A still further object of this invention is to provide a loading machine in which a pair of oppositely arranged booms, are each comprised of a pair of pivoted sections, pivotally movable independently of each other for locating a scoop carried on the forward sections in positions for scraping the ground surface in advance of the machine, or for digging into the ground surface in advance of the machine, all while the machine is at a standstill.

Still another object of this invention is to provide a shovel loading machine of a portable type which is of a simple and compact construction, easily maneuverable with full vision to the machine operator, efficient in operation to load the shovel either when the machine is being advanced or maintained at a standstill, capable of readily locating the shovel for convenient dumping into a usual dump truck, and of a construction to support a loaded shovel for transport of the load from a loading location to a dumping location with a complete elimination of any shovel sideway or tipping movement.

Further objects, features and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevational view of a loading machine of this invention with certain parts broken away for the purpose of clarity.

Fig. 2 is a front view of the machine shown in Fig. 1;

Fig. 3 is an enlarged sectional view as seen along the line 3—3 in Fig. 2;

Fig. 4 is an enlarged sectional view along the line 4—4 in Fig. 1, with certain parts broken away;

Fig. 5 is an enlarged sectional detail view as seen along the line 5—5 in Fig. 1; and

Fig. 6 is a sectional view taken on the line 6—6 in Fig. 5.

With reference to the drawing the loading machine of this invention is illustrated in Figs. 1 and 2 as including a tractor 10 having a main frame 11, rear traction wheels 12 and front steering wheels 13. The tractor is

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of a heavy duty construction and the main frame 11, forwardly of the rear wheels 12, carries a pair of transversely spaced oppositely arranged upright plate members 14, suitably braced across their upper ends so as to constitute upright side members for a rigid upright transverse frame structure integral with the main frame 11.

Disposed along the sides of the main frame 11, and to the outside of corresponding upright plate members 14, are a pair of sectional booms 15 each of which includes a lift arm 16 and a front extension or scoop supporting arm 21. Each lift arm 16 and scoop supporting arm (Figs. 5 and 6) are of what might be termed a box construction, with side members 18 of the lift arms 16 being provided with forward extensions 22. The lift arms 16 have their rear ends 20 pivotally connected at 17 adjacent the upper ends of the plate members 14, and the scoop supporting arms 21 have their rear ends pivotally connected at 19 to the forward extensions 22 on the lift arms 16. It is seen, therefore, that each boom 15 is of a two section construction, comprised of a lift arm 16, and a forward scoop supporting arm pivotally connected together at 19 for a hinged or jack-knife movement.

The pivotal connection 19 includes the forward extensions 22 on a lift arm 16, which receive in a straddled relation a journal bearing 23 formed as a part of, and carried at the rear end of a scoop supporting arm 21. A cylindrical bearing block 24, received within the journal 23, is retained in position within the journal 23 by bolt members 26 extended through the bearing block 24 and the forward extensions 22 of the side sections 18 of the lift arms 16. It is seen, therefore, that the scoop supporting arms 21 are pivotally movable in supported positions about the bearing blocks 24 for pivotal movement relative to the lift arms 16.

The scoop supporting arms 21 are connected together to form a rigid scoop supporting frame structure by means including a transversely extended criss-cross brace structure 27 (Figs. 3 and 4) and a transverse brace member 28 extended between, and secured as by welding, to the top sides of the scoop supporting arms 21. A scoop or shovel 31 is pivotally connected at 32 between the forward ends of the scoop supporting arms 21 for up and down movement relative to the scoop arms 21. It is seen, therefore, that the scoop arms 21, brace structure 27 and brace member 28 constitute an integral frame supporting structure for the scoop 31, and with this frame structure being pivotally connected at 19 for up and down movement independently of, and relative to, the lift arms 16.

The lift arms 16 are raised by and lowered under the control of means including a pair of hydraulic cylinder assemblies 33 (Figs. 1 and 2) disposed at opposite sides of the tractor 10. Cylinders 34, for the assemblies 33, are pivotally supported at 36 adjacent the lower ends of the upright supporting plates 14 whereby the pivots 36 are at spaced positions below the pivots 17 for the lift arms 16. The pistons 35, which are in operative association with the cylinders 34, have their free or outer ends pivotally connected at 37 to supporting plates 38 welded to the lift arms 16, intermediate the ends thereof, and projected laterally downwardly from the lift arms 16.

The scoop arms 21 (Figs. 1 and 2) are concurrently moved independently of and relative to the lift arms 16 by the provision of a pair of hydraulic cylinder assemblies 39, with each cylinder 41 in an assembly 39 being pivotally connected at 42 to a corresponding brace or supporting plate 38. A piston 40, operatively associated with a cylinder 41, has its outer end pivotally connected at 43 to supporting plates 44 welded to a scoop arm 21,

intermediate the ends thereof, and projected laterally outwardly from the rear side 46 of a corresponding scoop arm 21.

Each of the cylinders 34 and 41 is of a single acting type, and these cylinders are equipped with oil supply lines 47 and 48, respectively, which are connected to a common oil pump unit, indicated generally at 49, for supplying oil under pressure to the cylinders (Fig. 1). The oil pump unit 49 is equipped with a suitable valve mechanism, designated at 51, and provided with valve control levers 52a and 53a for independently supplying oil under pressure to the cylinders 34 and 41, respectively.

It is seen, therefore, that the lift arms 16 and scoop arms 21 are concurrently movable relative to each other, by a concurrent manipulation of the valve levers 52a and 53a, and are independently movable relative to each other, by a manipulation of one or the other of the valve levers 52a and 53a.

In addition to this concurrent or independent relative movement between the lift arms 16 and the scoop arms 21, the scoop 31 is pivotally movable independently of the scoop arms 21 by the provision of what might be termed a combination dumping and pitch control mechanism, and including a pair of hydraulic cylinder assemblies 50 (Figs. 3 and 4). The cylinder assemblies 50 are oppositely arranged in a transversely spaced relation between the scoop arms 21 at positions rearwardly of and above the scoop 31.

The cylinders 52, for the assemblies 50, have their upper ends 53 mounted on a rock shaft 54 (Figs. 3 and 4) extended transversely across the top or forward sides of the scoop arms 21, and rotatably supported in a tubular bearing 56. The bearing 56 is rigidly secured at 57, as by welding, to the rear or upper ends of a pair of brace members 58 extended longitudinally of the scoop arms 21, in a transversely spaced relation between the cylinder assemblies 50. Adjacent their lower ends the brace members 58 are secured by welding at 59 to the brace member 28. The opposite ends 61 of the rock shaft 54 are rotatably carried in bracket bearings 62 projected upwardly from the top sides of the scoop arms 21. Spacer members 63, mounted on the rock shaft 54, are located between each bearing 62 and a corresponding upper end 53 of a cylinder 52, for holding such upper cylinder ends against an adjacent end 64 of the tubular bearing 56, whereby to maintain the cylinders 52 against movement transversely of the scoop arms 21.

Secured as by welding at 66, to the lower ends of the longitudinal brace members 58 is a tubular bearing 67 for supporting a rock shaft 68 the opposite ends 69 of which are received within bearing brackets 71 carried on the scoop arms 21 and projected upwardly from the top or forward sides of the scoop arms 21.

Mounted in a transversely spaced relation on the rock shaft 68 are a pair of rearwardly extended rock arms 72 (Figs. 3 and 4) the rear or free ends 73 of which are pivotally connected at 74 with the rear ends of a pair of pivoted levers 76. The forward ends of the levers 76 are pivotally connected at 77 to the back wall 78 of the scoop 31. With the scoop 31 in a loading position therefor the rock arms 72 extend rearwardly and upwardly relative to the rock shaft 68, the levers 76 extend downwardly and forwardly relative to the rear ends 73 of the rock arms 72, the rock shaft 68 is substantially at the level of the upper end 79 of the scoop back wall 78, and the pivoted connections 77 of the levers 76 are intermediate the upper end 79 and the lower end 81 of the scoop back wall 78.

The pistons 82, for the cylinders 52, (Figs. 3 and 4) have their outer ends pivotally connected at 83 to the rock arms 72 at positions spaced rearwardly from the rock shaft 68. The cylinders 52 are of double acting type and each thereof has a pair of oil supply lines 84 connected to the oil pump unit 49, and with the supply of oil under pressure to the cylinders 52 being controlled

by a lever member 86a on the valve mechanism 51. The lever 86a is actuated independently of the valve control levers 52a and 53a so that the scoop 31 is pivotally movable independently of and relative to, the scoop arms 21. Further, by virtue of the cylinders 52 being of double acting type, it is apparent that the scoop 31 can be moved, and then maintained at any moved position relative to the scoop arms 21.

In the operation of the loading machine of this invention, and with reference to Fig. 1, let it be assumed that the scoop 31 is to be loaded. For loading the scoop 31 by a usual bucking operation the lift arms 16 may be moved to their dotted line positions shown at A, in which they extend downwardly and forwardly from their pivots 17, and the scoop arms 21 to a corresponding position extended downwardly and forwardly from their pivots 19 whereby the scoop 31 has its bottom side 85 riding along the ground surface 91. The scoop 31 is then loaded by merely advancing the tractor 10 toward the material to be handled.

When it is desired to load the scoop 31 without advancing the tractor 10, as in a bucking operation, the lift arms 16 may be moved to their dotted line positions shown at B in Fig. 1, with the scoop arms 21 moved to rearward positions by the action of gravity and limited by movement of cylinder assemblies 39 to fully retracted positions. At this rearward position of the scoop arms 21, the bottom side 85 of the scoop 31 is inclined forwardly and downwardly. The scoop arms 21 are rotated forwardly while the lift arms 16 are permitted to fall thereby to bring the bottom side 85 of the scoop 31 to a horizontal position adjacent the ground. This rotation of the scoop arms 21 and lift arms 16 is accomplished by the manipulation of the valve levers 52a and 53a respectively, which control the operation of the hydraulic cylinder assemblies 34 and 39. By a further manipulation of valve lever 53a, the scoop arms 21 are further rotated forwardly to move the bottom side 85 of scoop 31 to a position inclined forwardly and upwardly to complete the scooping operation. Thus by manipulation of the valve levers 52a and 53a the scoop arms 21 are permitted to swing like a pendulum whereby the scoop 31 moves through an arc about the pivotal supports 19.

It is seen, therefore, that the scoop 31 can be loaded with a minimum of what might be termed tearing up of the ground surface 91 around the material to be handled or loaded. This tearing up of the ground surface usually results because of the ground being soft so that in a usual bucking operation the ground is dug up by the weight of the tractor and the digging in of the traction wheels 12 during such operation. This tearing up of the ground of course, also impairs the maneuvering ability of the tractor 10.

Where it is desired to scrape the floor surface 91 in the loading of the scoop 31 the lift arms 16 can be moved to their dotted line positions indicated at B, also with reference to Fig. 1, with corresponding moved positions of the scoop arms 21 to rearward positions limited by movement of the cylinder assemblies 39 to fully retracted positions. The scoop 31 is then moved to a position at which its leading edge 87 is in contact engagement with the ground.

It is apparent also that where it is desirable to dig into the ground surface 91 at a level below the tractor wheels 12 and 13, such digging is readily accomplished by moving the lift arms 16 and scoop arms 21 to their relative positions indicated at either A or B in Fig. 1, and then by merely manipulating the hydraulic assemblies 50 to tilt or pivot the scoop 31 downwardly and forwardly, the leading edge 87 of the scoop 31 can be located below the level of the wheels 12 and 13. By progressively lowering the lift arms 16, a digging below the levels of the wheels 12 and 13 can be accomplished to an appreciable extent. It is apparent also that this operation can be aided by a rocking of the scoop arms 21.

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For carrying the loaded scoop 31 from a loading location to a dumping location, the lift arms 16 and scoop arms 21 can be relatively moved to position the scoop 31 above the front wheel axle 90 and against the bumper 86. The scoop 31 is thus cradled against the tractor with a substantial elimination of any side sway of the loaded scoop, that would interfere with a normal control of the tractor 10.

In the unloading of the scoop 31, the lift arms 16 are moved upwardly to their full line positions as shown in Fig. 1 concurrently with a movement of the scoop arms 21 outwardly and forwardly relative to the pivot connections 19. By virtue of this extension of the booms 15, relative to what might be termed a folded position of the booms 15 during a loading operation, the scoop 31 is not only elevated to an appreciable extent, but is located forwardly of the tractor 10 so as to give sufficient clearance between the tractor and a dump truck or the like being loaded. At this elevated position of the booms 15 the cylinder assemblies 50 are operated to move the scoop 31 to its dumping position indicated at C in Fig. 1.

During the loading operation of a dump truck or the like, the tractor 10 often approaches the dump truck from an angle so that the front wheels 13 may be in a straddling relation with the rear wheels of the truck. A bumper 86 is therefore provided on the front of the tractor 10 for abutting the truck.

With reference to Fig. 3, for dumping the scoop 31, the pistons 82 are extended from their associated cylinders 52, whereby the rock arms 72 and levers 76 are moved forwardly and downwardly to positions in substantially an end to end relation as shown in dotted lines in Fig. 1. By virtue of the cylinders 52 being of double acting type it is seen that by a successive retraction and extension of the pistons 82 the scoop 31 can be shaken, after being initially moved to a dumping position, so as to completely remove any material adhering thereto.

From the above description it is seen that this invention provides a loading machine which is of a simple and compact construction, capable of handling materials for loading purposes by merely a rocking back and forth action of the scoop arms 21, adapted to remove and load dirt from a position below the level of the tractor wheels, readily operated, in a loaded position, to cradle the scoop adjacent the front end of the tractor for transport purposes, and having extensible booms for elevating the loaded scoop to a position for easy dumping into trucks and the like. Stated otherwise, during a loading operation or in the transport of a load, the scoop 31 is maintained close to the tractor, and is then moved away from the tractor only during a dumping operation. The valve control levers 52, 53a and 86a are located for convenient

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access to the tractor operator to facilitate an easy and quick control over the independent or concurrent relative movement of the lift arms 16, scoop arms 21 and scoop 31.

Although the invention has been described with respect to a preferred embodiment thereof it is to be understood that it is not to be so limited since changes can be made therein which are within the full intended scope of this invention as defined by the appended claims.

I claim:

1. A front-end-loading portable power shovel including a power-propellable frame, a pair of lift-arms arranged on opposite sides of said frame and having their rear ends pivoted to said frame for up and down movement, a pair of hydraulic cylinder-assemblies operatively interposed between said frame and said lift-arms, one end of each such assembly being pivotally connected to the frame, on opposite sides thereof, at points below the point of pivotation between said frame and said lift-arms and the other end of said assembly being pivotally connected between said lift-arms at a point intermediate the ends thereof, forward extension-arms pivotally connected to said lift-arms for up and down movement, a pair of hydraulic cylinder-assemblies operatively interposed between said lift-arms and said extension-arms, with the rearward ends of said assemblies pivotally connected to said lift-arms at points intermediate the ends thereof and with the forward ends of said assemblies pivotally connected to said extension-arms at points intermediate the ends thereof, a shovel having its rearward portion pivotally connected to the forward ends of said extension-arms, and a hydraulic cylinder-assembly operatively interposed between said shovel and said extension-arms; said first pair of hydraulic cylinder-assemblies and said second pair of hydraulic cylinder-assemblies being operable independently of each other and said hydraulic cylinder-assembly intermediate the shovel and the extension-arms being operable independently of the first two pairs of hydraulic cylinder assemblies.

2. A power shovel according to claim 1, in which pivoted linkages are interposed between the shovel and the hydraulic cylinder-assembly therefor.

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