March 1, 1966 T. M. BOEHMER 3,237,792

FRONT END HIGH LIFT LOADING DEVICE

Filed May 22, 1964 2 Sheets-Sheet 1

FIG. 1

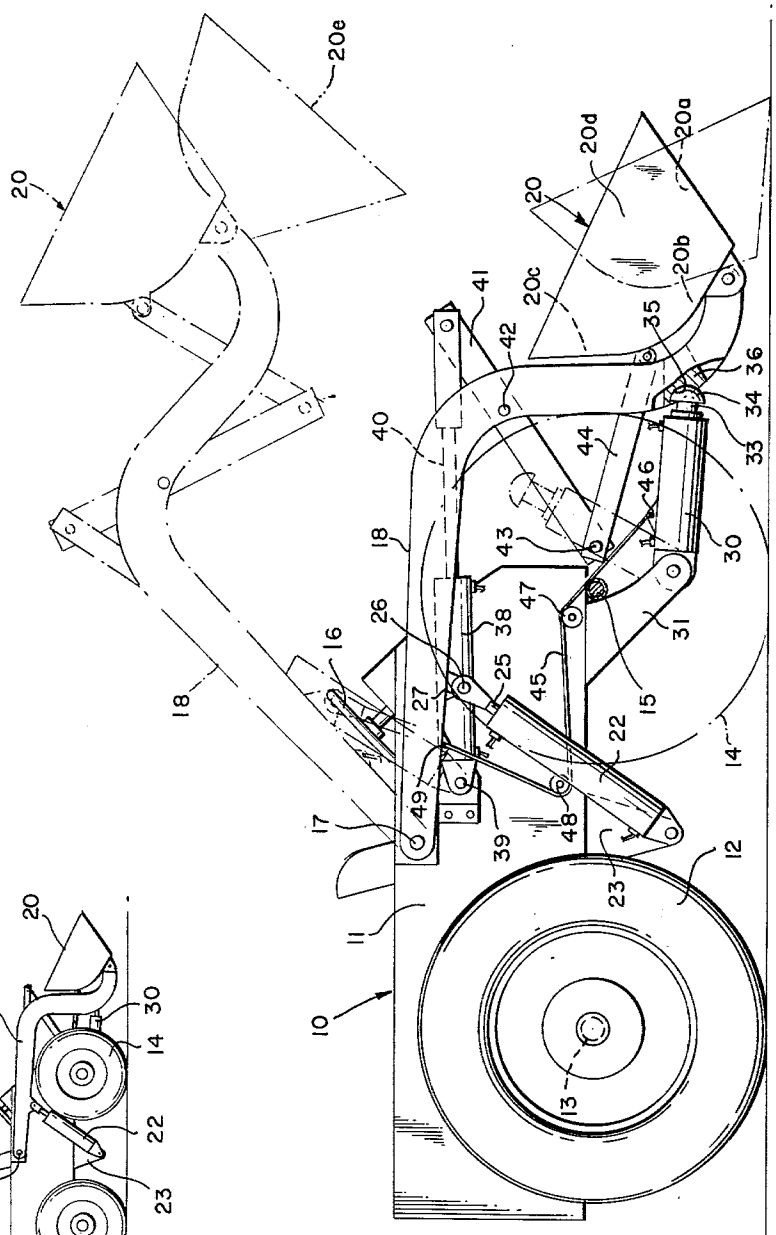

FIG. 4

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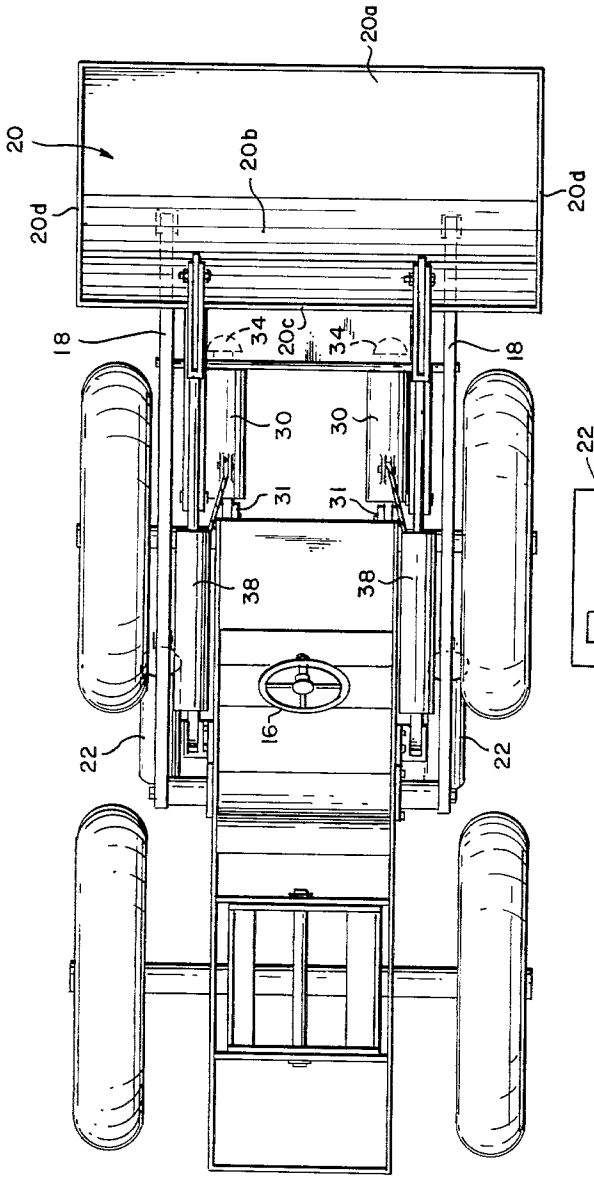

FIG. 2

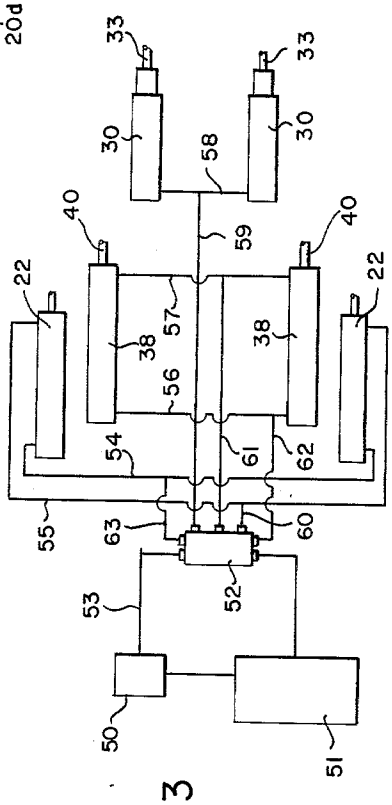

FIG. 3

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FRONT END HIGH LIFT LOADING DEVICE

Theodore M. Boehmer, Box 223, Darrington, Wash.

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4 Claims. (Cl. 214—140)

This invention relates to an improved material loading and handling mechanism as associated with a powered mobile vehicle such as for example, a wheel equipped, steerable truck or a tractor. More specifically, this invention relates to the provision of what I have herein designated to be a "high lift front end loader," especially designed for the excavating, moving and loading of earth or other materials.

It is the principal object of this invention to provide a machine of the above stated kind wherein an excavating and loading scoop or bucket is supported at the forward end of the mobile vehicle upon the forward end portion of a pair of scoop lifting and crowding arms that are pivotally fixed at their rear ends to the frame or body of the vehicle and are adapted to be swung upwardly from a lowered, scoop loading position, to a raised or high lift position, for load transportation or for dumping the load from the scoop; the main feature of this invention residing in the provision of means movable from and into position for bracing the scoop mounting arms so that they will better withstand the resistance of the scoop being crowded thereby into the material that is to be excavated or loaded, thereby to make possible the use of arms of lighter weight; to eliminate or reduce the tendency of twisting the arms and to overcome the tendency of raising the front wheels of the carrying vehicle off the ground during leveling operations or when lifting low level stock piles.

It is also an object of this invention to accomplish the above mentioned feature of the invention, that is, the arm bracing, by the installation and use of a pair of hydraulic crowding cylinders on the frame structure in such position as to be automatically engaged by the scoop mounting arm to sustain and exert the desired bracing force against the scoop during its crowding and loading.

Further objects of the present invention reside in the arrangement, formation and mounting of the scoop supporting and crowding arms; the means for effecting their movement; during loading and lifting the scoop from loading position to high level conveying position for travel or for dumping and in the means for moving the scoop crowding cylinders, after any upward swinging travel with the crowding arms, back to their arm bracing positions upon the return of the scoop by said arms to a loading position.

In accomplishing the above mentioned and other objects of the invention that will be disclosed as this specification progresses, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIG. 1 is a side elevation of the present vehicle, showing the scoop and its supporting arms in lowered loading position, and showing, in dash lines, the arms and scoop as lifted for load dumping.

FIG. 2 is a plan or top view of the vehicle of FIG. 1.

FIG. 3 is a schematic layout of the hydraulic system for the control of cylinders employed in the operation of the scoop lifting arms and scoop.

FIG. 4 is a view similar to that of FIG. 1 but showing the push beams supported at a level best suited for vehicles with four wheel steering means.

Referring more in detail to the drawings:

The vehicle of this invention is designated in its entirety by reference numeral **10**. As herein shown, it

comprises a body or frame structure **11** supported for travel by a pair of rear wheels **12—12** mounted at opposite ends of a driving cross-axle **13**, and a pair of front wheels **13—14** mounted on the opposite end portions of a supporting cross-axle **15**. It is to be understood that the vehicle **10** would be suitably powered by an engine, not shown, for its travel either in a forward or in a rearward direction. Also, it is to be understood that the vehicle may be equipped with means for two wheel or four wheel steering under control of a steering wheel, as designated by numeral **16**.

Pivotally fixed to opposite sides of the frame or body **11** by pivot members **17—17**, located in alignment transversely of the body **11**, are the paired scoop mounting arms **18—18**, which arms, in their lowered positions, extend horizontally and forwardly from the pivots **17** and at the front end of the body are curved downwardly, and at near ground level, are curved forwardly, as shown. At their forward ends, the arms **18—18** pivotally mount the scoop **20** thereon for forward and rearward tilting. It is shown in FIG. 2 that the scoop extends to the full width of the vehicle and comprises a front wall **20** and a bottom wall **20*b*** that curves upwardly and rearwardly to provide a back wall **20*c***. The bucket is closed at opposite ends by walls **20*d*—20*d***.

The means for arcurately swinging the scoop mounting arms from their lowered scoop loading position to a lifted position, such as shown in dash lines in FIG. 1, comprises a pair of hydraulic cylinders **22—22** which are pivoted at their lower ends on brackets **23—23** extended downwardly from opposite side portions of the body frame **11** and are normally inclined upwardly and forwardly as shown in FIG. 1. Piston rods **25** extend from the cylinders and are connected by pivots **26** to ears **27** formed on the arms **18**. When the piston rods are caused to be extended, the arms **18—18** are moved upwardly in unison to lift and carry the scoop to a high level position at which it may be dumped, as presently explained.

The main feature of the present structure resides in the use of a pair of crowding cylinders for backing up the scoop mounting arms **18—18** as will now be described.

Fixed to the main frame of housing **11** at opposite sides of its forward end portion is a pair of downwardly and forwardly directed brackets **31—31**, to which the rear end portions of paired hydraulic cylinders **30—30** are pivotally fixed. Each cylinder is forwardly directed and is equipped with a piston and piston rod **33** with a rounded bearing head **34** at its outer end that is pivotally seated in a socket **35** formed in a cross bar **36** that is fixed to and extended between the downturned forward end portions of the arms **18—18**, as has been shown in FIG. 1. For the filling of the scoop **20**, it may be tilted to any position between that shown in full lines in FIG. 1 to a position bringing the front wall **20*a*–20*a*** to a horizontal or somewhat below horizontal position. With the scoop in a load receiving position, it may be pushed forwardly into a bank or stock pile by the arms **18—18** with forward travel of the vehicle and during its loading or thereafter, it may be tilted to the full line position in FIG. 1 and then lifted to dumping level by arms **18** under power of cylinders **22**.

For dumping its load, the scoop may be tilted to position **20*e*** in FIG. 1; this being accomplished through that linkage and powered means shown in FIG. 1 and FIG. 2 to comprise a pair of hydraulic cylinders **38—38** that are pivotally mounted at their rear ends by pivot means **39—39** on the opposite side walls of the vehicle body **11**. Each of these cylinders has a piston rod **40** extended forwardly therefrom and pivotally connected at its forward end to one of a pair of levers **41** that are rearwardly and downwardly directed from that connection. Between its

ends, each lever 41 is pivoted, as at 42, to the downwardly directed portion of the corresponding lever arm 18 and at its lower end is pivoted as at 43, to the rear end of a link 44 which is pivotally joined at its forward end to the back wall 20c of the scoop 20. Thus, when the piston rods 40 of cylinders 38 are retracted, the scoop will be tilted forwardly for dumping and when extended, the scoop will be returned to position for loading.

When the arms 18—18 swing the scoop upwardly from position to FIG. 1, for transportation or/and dumping, the cylinders 30—30 are swung to any upwardly inclined position, as shown in dash lines in FIG. 1; this being effected by paired pull cables 45—45 that are attached as at 46 to the cylinders, and are extended rearwardly therefrom over cable guide sheaves 47 and 48 for connection as at 49 with the lever arms 18 near their pivotal mountings 17. These cable connections 45—45 are such that with the lowering of the scoop from high lift position to loading position, the cylinders 30—30 will be allowed to swing downwardly and the ball ends 34 of their piston rods positioned for seating in the sockets 35 as provided in the arm connecting bar 36 with lowering of the paired arms 18—18.

In FIG. 4, I have illustrated the vehicle of FIG. 1 as modified to adapt it for four wheel steering, by elevating the positions of the two scoop supporting arms 18—18 to a level sufficient to clear the front end wheels so that they, in being angled for lateral travel of the vehicle in turning, will in no way interfere with the arms either in their lowered or lifted positions. This permits turns to be made in shorter turning radii. While I have not shown or claimed any specific wheel steering means, it is to be understood that any satisfactory mechanism under control of the steering wheel may be employed.

The schematic hydraulic control system as shown in FIG. 3 shows a pump 50 to be connected to draw hydraulic pressure medium from a storage tank 51 and deliver it under pressure to a valve housing 52 through a pipe connection 53. The paired cylinders 22—22 at opposite sides of the vehicle, are joined at their inner ends by a pipe 54 and at their outer ends by a pipe line 55. Likewise, the paired cylinders 38—38 are joined at inner and outer ends respectively, by pipes 56 and 57. The cylinders 30—30 are joined across their inner ends by a pipe line 58 and this has a pipe connection 59 with control valve 52. Also, it is shown that the control valve 52 has a pipe line connection 60 and 61, respectively, with lines 55 and 57. Likewise, pipe connections 62 and 63 lead from pipes 56 and 54 to the valve 52. These valve connections provide for application of pressure medium from the valve 52 to and from the various cylinders as required for scoop lifting and dumping. It also provides for delivery of pressure medium through pipe 59 to the cylinders 30—30 to add and sustain the crowding pressure applied to the scoop supporting arms 18—18 and give upward lift to the arms in an upward lift for the scoop by said arms.

By reason of the use of the paired crowding cylinders 30—30 as described and shown in FIG. 1, the scoop mounting arms 18—18 may be made lighter and without any detriment to their required and intended uses and the tendency of lifting the front wheels under loading faces is avoided.

What I claim as new is:

1. A front end scoop loader comprising a powered mobile vehicle, a pair of lift arms extending along opposite sides of the vehicle and pivotally attached at their rear ends to the vehicle frame, the forward end of said lift arms extending beyond the front end of the vehicle, a load pick-up scoop pivotally supported on the forward ends of said lift arms, a first powered means secured to said vehicle and to each of said lift arms for raising and lowering the lift arms, a second powered means secured to said scoop for imparting pivotal action thereto, paired power cylinders secured to said vehicle frame on the forward end thereof, piston rods forwardly extendable from said cylinders and engageable with said arms when the scoop is positioned for loading whereby pressure is exertable on said arms and scoop to crowd the scoop into material to be loaded without requiring forward movement of the vehicle.

2. A front end scoop loader comprising a powered, mobile vehicle, a pair of lift arms extending along opposite sides of the vehicle, and pivotally attached at their rear ends to the vehicle frame, the forward end of said lift arms extending beyond the front end of the vehicle, a cross bar secured to and extending between said lift arms adjacent the forward ends thereof, a load pick-up scoop pivotally supported on the forward ends of said lift arms, a first powered means secured to said vehicle and to each of said lift arms for raising and lowering the lift arms, a second powered means secured to said scoop for imparting pivotal action thereto, paired power cylinders secured to said vehicle frame on the forward end thereof, piston rods forwardly extendable from said cylinders and engagable with said cross-bar when the scoop is positioned for loading whereby pressure is exertable on said arms and scoop to crowd the scoop into material to be loaded without requiring forward movement of the vehicle, said cylinders being pivotably mounted for upward and downward swinging at their forward ends with the lifting and lowering of the scoop and cables attached to the lifting arms and to said cylinders for causing the cylinders to swing upwardly with the lifting of the scoop while maintaining crowding pressure against said cross bar during scoop filling.

3. The device according to claim 2 wherein said cables lower the crowding cylinders with lowering of the scoop to positions for seating the outer ends of their piston rods against the cross bar upon return of the scoop.

4. The combination according to claim 3 wherein the piston rods of said crowding cylinder have spherically rounded outer end surfaces, and said lift arm connecting cross bar is socketed to seat said rounded ends of the piston rods therein.

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