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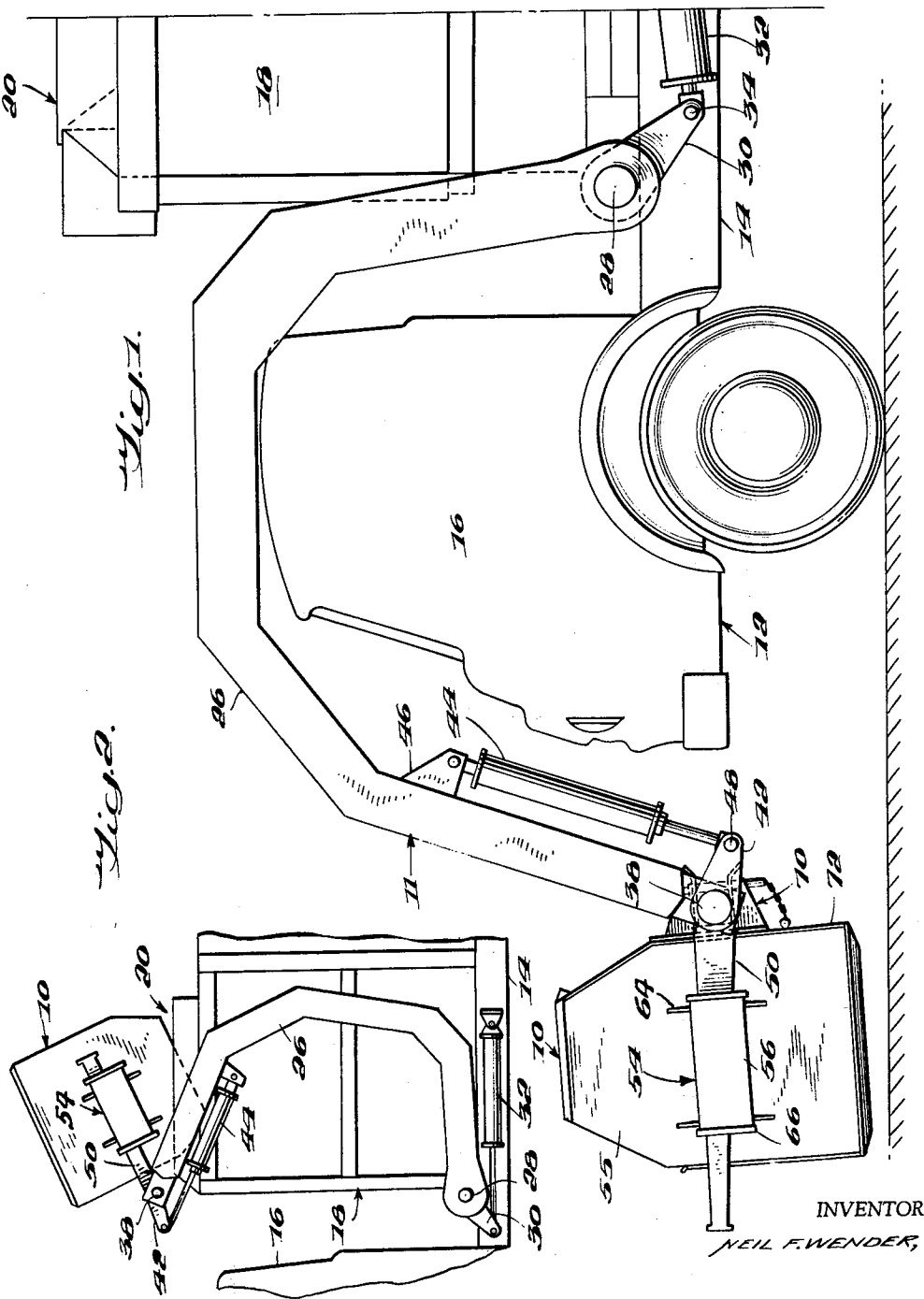
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FRONT END LOADER EQUIPMENT

Filed May 19, 1961

2 Sheets-Sheet 1



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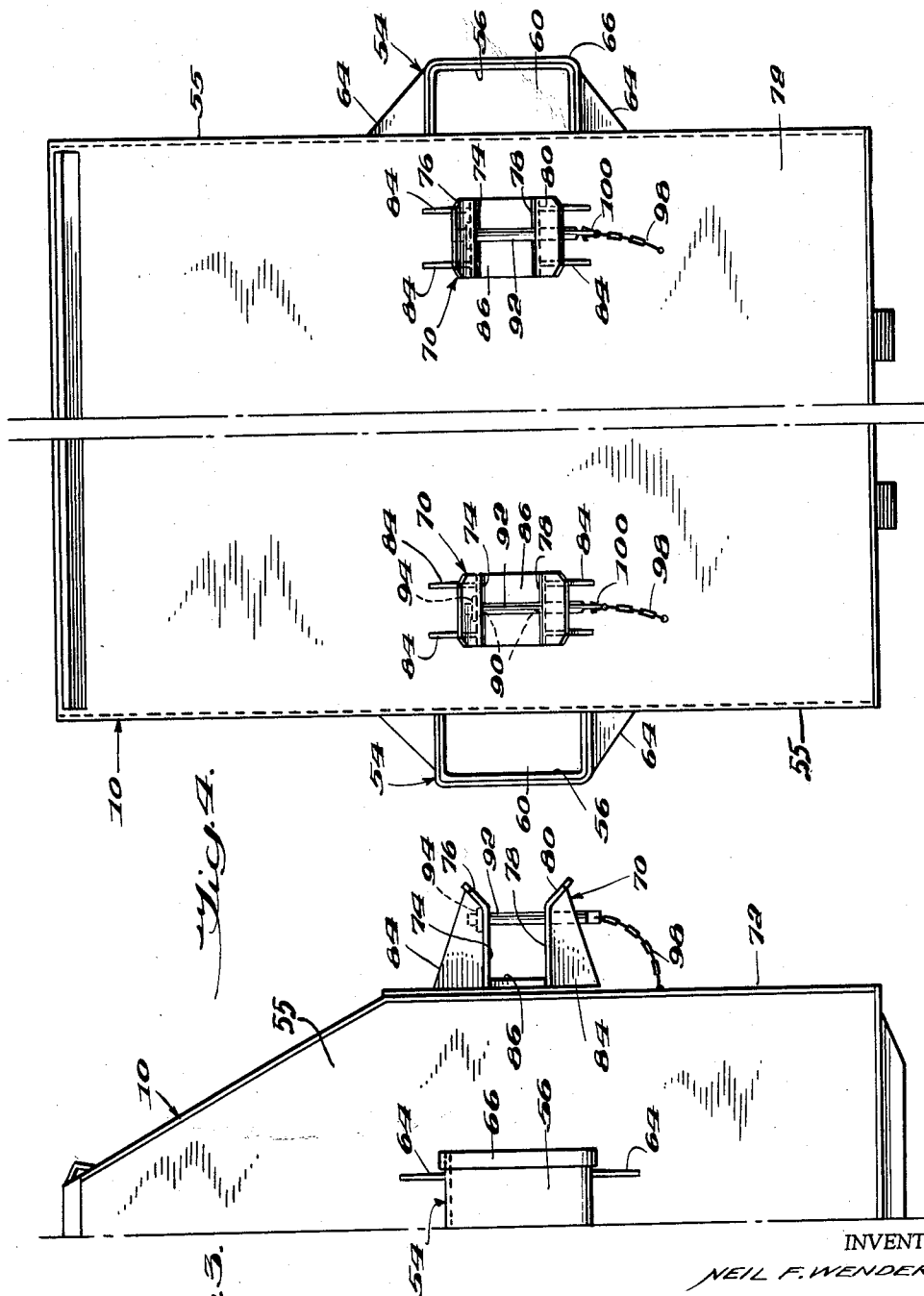
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FRONT END LOADER EQUIPMENT

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This invention relates to improvements in material handling containers of the type used with front end loaders.

An efficient and convenient method of handling loose materials in the past has been to provide containers of suitable size and shape into which the material can be deposited from time to time. Usually, these containers are relatively large, thereby requiring these containers to be handled by power actuated mechanism. In the collection of refuse, for example, numerous containers may be placed at convenient locations at apartment buildings, hotels, institutions of various types, restaurants, manufacturing establishments, etc., and then the containers may be emptied after they are filled.

The front end loader usually employed to handle these containers is mounted on a vehicle which has a body capable of receiving material from numerous containers. This hoisting apparatus generally includes a pair of lifting arms pivotally mounted at one end to the vehicle. At the other end of the lifting arms, a pair of fork arms are fixed on a front torque tube which extends between and connects the front portion of the lifting arms. Suitable power devices are employed for swinging the lifting arms and for adjusting the position of the fork arms relative to the lifting arms.

A detachable connection is effected between a container and the fork arms of the lifting apparatus by sleeve assemblies attached to the ends of the container. The sleeve assemblies present channels or passages along the sides of the container for receiving the fork arms. The top portion of the container is provided with suitable doors through which material can be deposited in the container. The top wall of the container has an opening through which material may be dumped out of the container when the container is inverted.

The dumping operation of a container is carried out by swinging the container above the body of the vehicle and then inverting the container so that the material falls through a hopper opening and into the body. The container, after it is empty, is returned to the ground, or other supporting surface, in front of the vehicle.

The sleeve assemblies which receive the fork arms must be suitably large to allow the fork arms to move easily into and out of sleeve assemblies. This results in considerable clearance between the sides of the sleeve assemblies and the fork arms. During the dumping operation of a container, the container and the sleeve assemblies shift relative to the fork arms. Because of the large clearance between the sleeve assemblies and the fork arms, the relative movement can be extensive at times. Ordinarily, as in conventional equipment of this type, the container is free to move lengthwise with respect to the fork arms during the dumping operation.

This relative movement between the sleeve assemblies and the fork arms may cause jarring and shocking to both the hoisting apparatus and the container. As a result, considerable noise is produced because the equipment normally is of metal, and in addition, the jarring may damage the hoisting apparatus and the container.

One object of this invention is to provide containers for use with front end loaders whereby a safe and relatively noiseless connection can be effected between the hoisting apparatus and the container.

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Another object of this invention is to provide devices for detachably fixing a container to a front end loader.

Another object of this invention is to provide latch brackets for detachably fixing a container to the front torque tube of a front end loader.

Another object of this invention is to provide connecting structure between a container and hoisting apparatus which structure reduces jarring and shocking to the container and to the hoisting apparatus.

These objects may be accomplished, according to one embodiment of this invention, by providing a pair of latch brackets on the wall of a container which normally faces the front end loading equipment. The front torque tube of the hoisting apparatus can be fitted into the latch brackets as the fork arms are received by the sleeve assemblies along the end walls of the container. Once the fork arms are within the sleeve assemblies, and once the front torque tube is received by the latch brackets, a retaining pin can be inserted through the latch brackets to hold the container in fixed relation with respect to the hoisting apparatus.

Throughout the lifting and dumping operation, the container will be held generally fixed with respect to the front torque tube and will not be free to move lengthwise of the fork arms. After the container has been returned to the ground in front of the vehicle, the retaining pins may be removed so that the front torque tube may be disconnected easily from the latch brackets.

This embodiment of the invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevation view of a vehicle equipped with a front end loader, and showing a container in connection therewith, which container embodies this invention;

FIG. 2 is a portion of the apparatus illustrated in FIG. 1, but shown in position wherein the container is swung upwardly by the lifting arms of the hoisting apparatus;

FIG. 3 is an enlarged side elevation view of a portion of a container equipped with the latch brackets of this invention; and

FIG. 4 is a rear elevation view corresponding with FIG. 3.

In FIGS. 1 and 2 there is illustrated a front end loader of the type which may be employed for servicing a container 10. The container 10 may be of any suitable size and shape necessary for receiving and holding the material to be handled. Normally, the container 10 is of closed box-type construction having suitable openings at the top through which material may be deposited from time to time. The top wall of the container 10 is provided with an opening through which material may be dumped when the container is inverted.

The front end loader is designated by reference numeral 11 and may be mounted on a vehicle 12 having a chassis 14. The vehicle 12 is self-propelled under the control of an operator located within a cab 16. A body 18 is mounted on the vehicle chassis 14 behind the cab 16 and may be of any suitable type for receiving the particular material to be handled. The body 18 is provided with a hopper opening 20 at the front and top thereof for receiving the material from the container 10. It is often desirable that the interior of the body 18 be provided with a packer mechanism for compressing the material within the body 18.

The hoisting apparatus 11 includes a pair of lifting arms 26 spaced apart a distance corresponding substantially with the width of the cab 16. The lifting arms 26 may be of gooseneck shape, or inverted U-shape for example, so as to extend over the top and downwardly in front and back of the cab 16, as illustrated in FIG. 1.

Behind the cab 16, the lower ends of the lifting arms

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26 are fixed on a horizontal rear torque tube or rod 28 which extends substantially from one side of the vehicle 12 to the other. The torque tube 28 is journaled in bearing boxes which are fixed on the vehicle chassis 14. In this manner, the lifting arms 26 are pivotally mounted to the vehicle 12 through the rear torque tube 28 and the bearing boxes fixed on the chassis 14.

A pair of lever arms 30 are attached to each end of the torque tube 28 and extend downwardly therefrom. Suitable power devices 32, for example conventional hydraulically actuated cylinder and piston assemblies, are pivotally mounted on the vehicle chassis 14 and have their piston rods pivotally connected at 34 to the free ends of corresponding lever arms 30.

At the front of the vehicle 12, the lifting arms 26 are connected by a horizontal front torque tube or rod 38 which is journaled in bearing boxes secured to the forward ends of the lifting arms 26. Lever arms 42 are fixed on opposite ends of the torque tube 38 adjacent the lifting arms 26. A power device 44, for example a conventional hydraulically actuated cylinder and piston assembly, is mounted on each of the lifting arms 26 and pivotally connected thereto by a bracket 46. Each power device 44 extends along its corresponding lifting arm 26 and the piston rod thereof is pivotally connected at 48 with a corresponding lever arm 42. A pair of fork arms 50 are rigidly mounted on the torque tube 38 adjacent respective lifting arms 26. These fork arms 50 extend forwardly of the vehicle 12 when the lifting apparatus 11 is in the position illustrated in FIG. 1.

A sleeve assembly 54 is mounted on each end wall 55 of the container 10. Each sleeve assembly 54 includes a channel-shaped member 56 fixed to the end wall 55 to present a longitudinally extending opening or passage 60 through which a fork arm 50 of the hoisting apparatus may be inserted. Gussets 64 strengthen and aid in attaching the channel member 56 to the end wall 55. The ends of the channel member 56 may be strengthened by C-shaped bars 66.

A pair of latch brackets 70 are mounted on the rear wall 72 of the container 10. The two latch brackets 70, which may be identical, are spaced apart on the rear wall 72 adjacent corresponding sleeve assemblies 54 and horizontally aligned therewith, as illustrated in FIGS. 3 and 4.

Each latch bracket 70 includes an upper plate 74 having a turned-up end portion 76, and a lower plate 78 having a turned-down end portion 80. The upper and lower plates 74 and 78 are spaced apart vertically a suitable distance to receive therebetween the front torque tube 38 of the hoisting apparatus 11. The turned-up portion 76 and the turned-down portion 80 of the plates 74 and 78 cooperate to guide the front torque tube 38 into the space between the two plates 74 and 78. The plates 74 and 78 are fixed to the rear wall of the container as by welding and are strengthened by gussets 84.

A block 86 of suitable resilient material, such as rubber for example, is fixed between the plates 74 and 78 to the rear wall 72 by an epoxy cement, or other suitable means. The block 86 may be engaged by the front torque tube 38. The material of which the block is made should be of such character as to absorb shocks applied thereto by the front torque tube 38. In addition, it is desirable that the block 86 should resist wear caused by engagement with the front torque tube 38.

The upper plate 74 and the lower plate 78 are provided with vertically aligned holes adjacent the turned portions 76 and 80. A retaining pin 92 having a head 94 may be inserted through or removed from the holes in the plates 74 and 78. The head 94 serves to prevent the pin 92 from sliding all the way through the holes.

A chain 98, or other suitable flexible member, has one end fixed to the wall 72 of the container 10 adjacent the latch bracket 70, and is of suitable length to engage the bottom of the retaining pin 92 when the pin is in the holes, as illustrated in FIGS. 3 and 4. The free end of the chain 98 has a hook 100 which may be inserted

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through a hole provided in a flattened portion at the end opposite the head 94 of the pin 92. The hook 100 should be easily attached or removed from the pin 92. The chain 98 serves to retain the pin 92 in the holes.

In operation of the hoisting apparatus 11 for emptying the contents of the container 10 into the body 18, the vehicle 12 is driven into position adjacent the container 10 and the fork arms 50 are inserted through the sleeve assemblies 54. Entrance of the fork arms into the sleeve assemblies 54 is completed by proper actuation of the power devices 44 which rotate the fork arms 50, and proper actuation of the power devices 32 which raise and lower the lifting arms 26. The power devices 32 swing the lifting arms 26 upwardly above the cab 16.

Prior to the engagement of the hoisting apparatus 11 with the container 10, the retaining pins 92 are removed from the latch brackets 70. As the vehicle 12 approaches the container 10, while it rests on the ground or other supporting surface, the power devices 32 are actuated to adjust the vertical position of the front torque tube 38 so the torque tube will enter the space between the upper plate 74 and lower plate 78 of the latch brackets 70. After the front torque tube 38 is received between the latch brackets 70, as illustrated in FIG. 1, the retaining pins 92 may be inserted through the holes in the upper and lower plates 74 and 78, and then the hooks 100 of the chains 98 may be fastened to the lower ends of the retaining pins 92.

The power devices 32 may be actuated to swing the lifting arms 26 upwardly to swing the container 10 into position above the hopper opening 20. Simultaneously, the power devices 44 may be actuated to rotate the fork arms 50 in a counterclockwise direction, with reference to FIG. 1, to keep the container 10 in a substantially upright position during its upward swinging movement. Once the container 10 is above the hopper opening 20, the power devices 44 can be actuated in a clockwise direction to invert the container 10 to dump the contents through the hopper opening 20 into the body 18, as illustrated in FIG. 2.

During the lifting and the inverting operation of the container 10, there will be a tendency for the container to slide longitudinally with respect to the fork arms 50. The container 10 may fall towards and away from the front torque tube 38. In this event, shock and jarring movements will be absorbed by the block members 86. The noise which would normally accompany such an operation is reduced greatly, and in addition, jarring effects which might damage the container 10 or the lifting apparatus 11 are substantially eliminated.

In addition, the extent of the longitudinal movement of the container 10 with respect to the fork arms 50 will be eliminated, in effect, by the latch brackets 70. The block members 86 and the retaining pins 92 cooperate to hold the container 10 in a relatively fixed position with respect to the front torque tube 38. Although the clearance between the upper and lower plates 74 and 78 of the latch brackets 70 must be suitably large to allow the torque tube 38 to enter the latch brackets easily, the total movement which may take place longitudinally is negligible compared to conventional devices, wherein no satisfactory means have been provided in the past for retaining the container on the hoisting apparatus.

As the container 10 is returned to its position on the ground in front of the vehicle 12 after the dumping operation, the latch brackets 70 again serve to prevent relative movement between the container 10 and the front torque tube 38. When the container 10 contacts the ground, the latch brackets 70 will prevent the container 10 from bouncing with respect to the hoisting apparatus 11. Again, jarring and shock effects between the container 10 and the hoisting apparatus 11 will be absorbed by the block members 86 and the noise which normally would be encountered will be lessened considerably.

After the container 10 is resting firmly on the ground, the hooks 100 may be unfastened from the retaining pins

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92, and the retaining pins removed from the holes in the upper and lower plates 74 and 78. The hoisting apparatus 11 then may be disconnected from the container 10 by proper actuation of the power devices 32 and 44 and proper manipulation of the vehicle 12 to extract the fork arms 50 from the sleeve assemblies 54, and the torque tube 38 from the latch brackets 70.

The reduction of the shocking and jarring forces between the container 10 and the hoisting apparatus 11 extends the useful life of the hoisting apparatus and the containers, and reduces maintenance costs. In addition, the undesirable noises which normally would annoy people nearby are lessened noticeably.

Sometimes the container employed with the hoisting apparatus is of a type called a hand loader or collection type. This type of container is carried on the hoisting apparatus from point to point where material is placed in the container by hand. After the container is full, the contents are dumped into the body. The same container is carried to different locations by the hoisting apparatus.

Another type of container which may be employed with the hoisting apparatus is a snow scoop container. This type of container may be used to push or scoop up snow or other similar loose material. Generally, it has an open front and top portion. Also, other types of containers may be used.

Whether a hand loader type container, a snow scoop type container, or the type of container illustrated and described is employed in connection with the hoisting apparatus, the sleeve assemblies 54 may be used with the same advantages.

While the invention has been illustrated and described in one preferred embodiment, it is recognized that other variations and changes may be made therein without departing from the invention as set forth in the claims.

I claim:

1. In a vehicle having loader means mounted thereon for raising and lowering movements relative to the vehicle, said loader means including lifting forks, the combination therewith, of a container having sleeves on opposite end portions thereof in positions for engagement by the forks upon forward movement of the vehicle relative to the container, and a bracket on a side of the container toward the loader, said bracket having upper and lower portions in positions for entry of a portion of the loader therebetween substantially simultaneously with said movement of the forks into the sleeves on the container to hold the container against substantial relative movement with respect to the loader.

2. In front end loader equipment including a vehicle having a body thereon, loader means including a pair of fork arms and mounted on the vehicle for raising and lowering movements relative thereto, the combination with the vehicle, of a container, sleeves on opposite end portions of the container slidably receiving the fork arms therein to raise the container during upward movement of the loader means, and latch means on a side of the container toward the loader and interconnecting said side with the loader.

3. In front end loader equipment including a vehicle having a body thereon, loader means including a pair of fork arms and mounted on the vehicle for raising and lowering movements relative thereto, the combination with the vehicle, of a container, sleeves on opposite end portions of the container slidably receiving the fork arms therein to raise the container during upward movement of the loader means, said loader means including a cross shaft in opposed relation to a side of the container, and latch means interconnecting the container side and cross shaft for holding the container against rotative movement with respect to the loader means.

4. In front end loader equipment including a vehicle

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having a body thereon, loader means comprising a pair of lifting arms mounted on the vehicle for raising and lowering movements relative thereto, a cross shaft at the front end portions of the lifting arms interconnecting said arms, and fork arms mounted on the front end portions of the lifting arms and movable relative thereto, the combination therewith, of a container having a side wall in opposed relation to the loader means and having end walls, sleeve means mounted on the end walls slidably receiving the fork arms therein to support the container thereon during upward movement of the loader means, said sleeve means being enlarged with respect to the fork arms for rotative movement of the container relative thereto during the lifting movement, and latch means interconnecting said side of the container with the shaft for holding the container against substantial relative rotation during the lifting operation.

5. In front end loader equipment including a vehicle having a body thereon, loader means comprising a pair of lifting arms mounted on the vehicle for raising and lowering movements relative thereto, a cross shaft at the front end portions of the lifting arms interconnecting said arms, and fork arms mounted on the front end portions of the lifting arms and movable relative thereto, the combination therewith, of a container having a side wall in opposed relation to the loader means and having end walls, sleeve means mounted on the end walls slidably receiving the fork arms therein to support the container thereon during upward movement of the loader means, said sleeve means being enlarged with respect to the fork arms for rotative movement of the container relative thereto during the lifting movement, said container side having upper and lower plates thereon spaced apart to form a yoke and slidably receiving therebetween the shaft for holding the container against substantial rotative movement during raising and lowering of the container.

6. In front end loader equipment including a vehicle having a body thereon, loader means comprising a pair of lifting arms mounted on the vehicle for raising and lowering movements relative thereto, a cross shaft at the front end portions of the lifting arms interconnecting said arms, and fork arms mounted on the front end portions of the lifting arms and movable relative thereto, the combination therewith, of a container having a side wall in opposed relation to the loader means and having end walls, sleeve means mounted on the end walls slidably receiving the fork arms therein to support the container thereon during upward movement of the loader means, said sleeve means being enlarged with respect to the fork arms for rotative movement of the container relative thereto during the lifting movement, said container side having upper and lower plates thereon spaced apart to form a yoke and slidably receiving therebetween the shaft for holding the container against substantial rotative movement during raising and lowering of the container, and a latch pin connected with the plates for confining the shaft in the yoke.

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