

[54] **FORK LIFT CONVERTER ATTACHMENT**

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[58] Field of Search..... 214/145, 138 C, 302, 670

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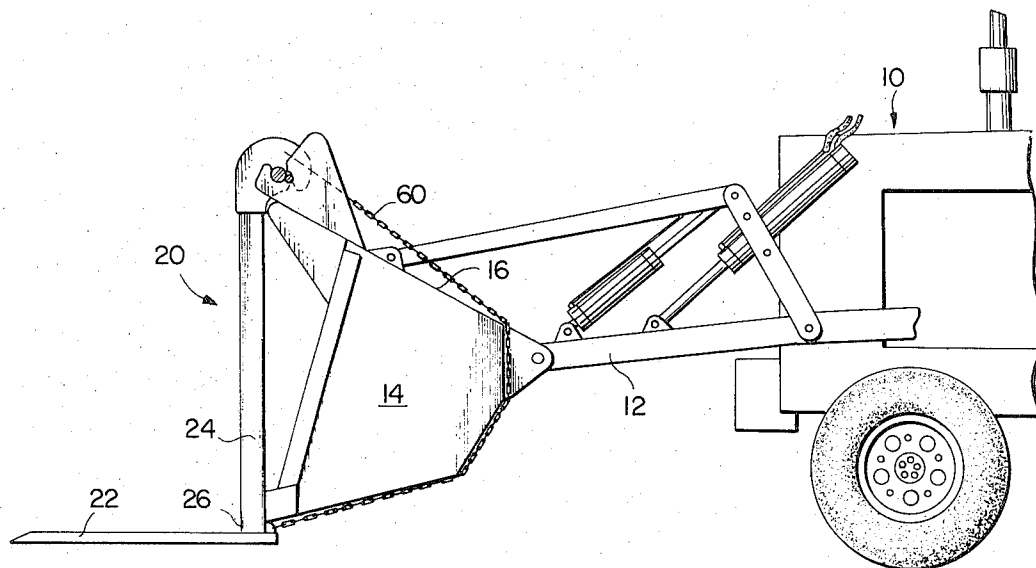
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[57]

ABSTRACT

A fork lift converter attachment for a front end loader bucket has a pair of forks with horizontal lifting elements and vertical extension elements, the latter having a cross rod at their upper ends which is generally triangular in transverse cross section: brackets secured to the bucket at the upper edge thereof have generally upwardly facing openings which can receive the cross rod only when the bucket is tilted downwardly, the bucket on reverse rotation causing the cross rod to be locked in the bracket openings. The cross rod may comprise two parallel rods or tubes of different diameters welded together. The vertical and horizontal elements meet at a true right angle, without gussets or fillets. A chain permits fork withdrawal even if the load is resting on the ground.

15 Claims, 5 Drawing Figures



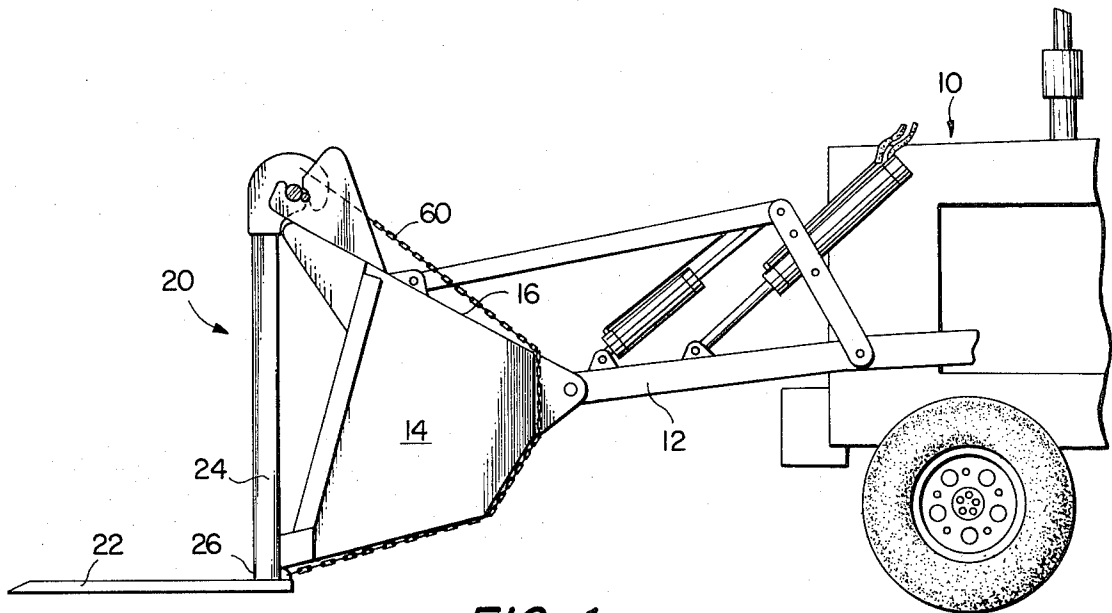


FIG. 1

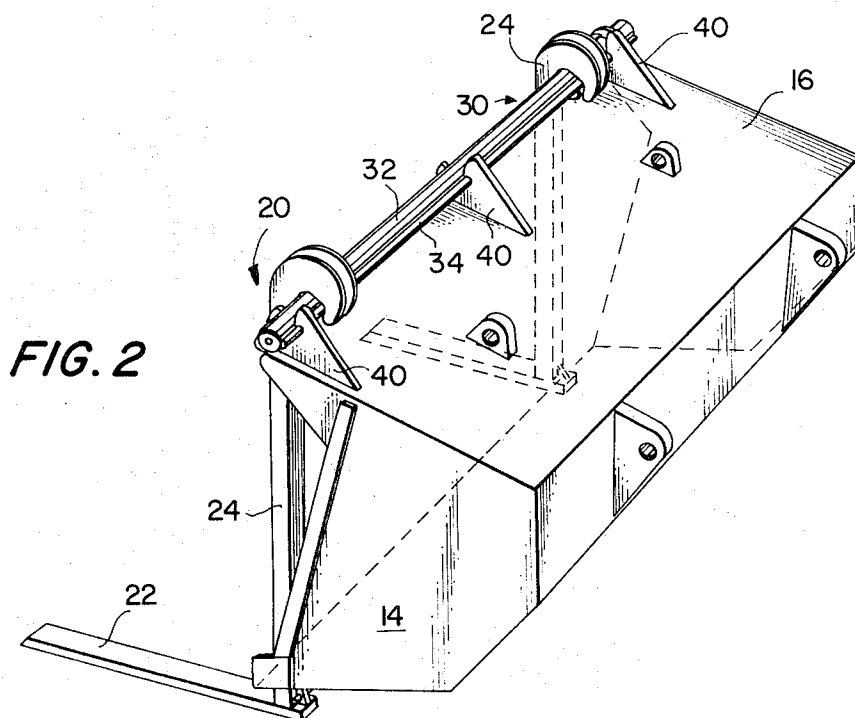


FIG. 2

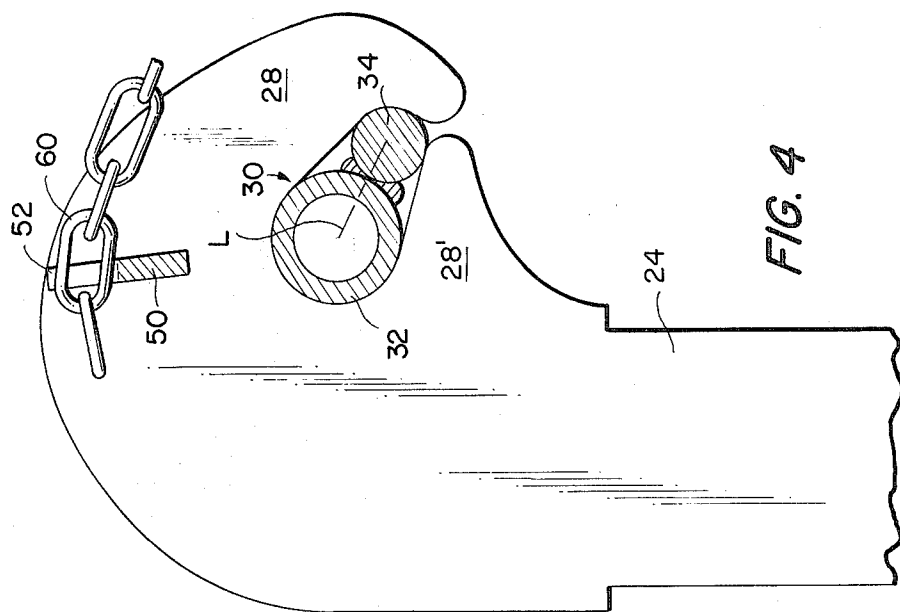


FIG. 4

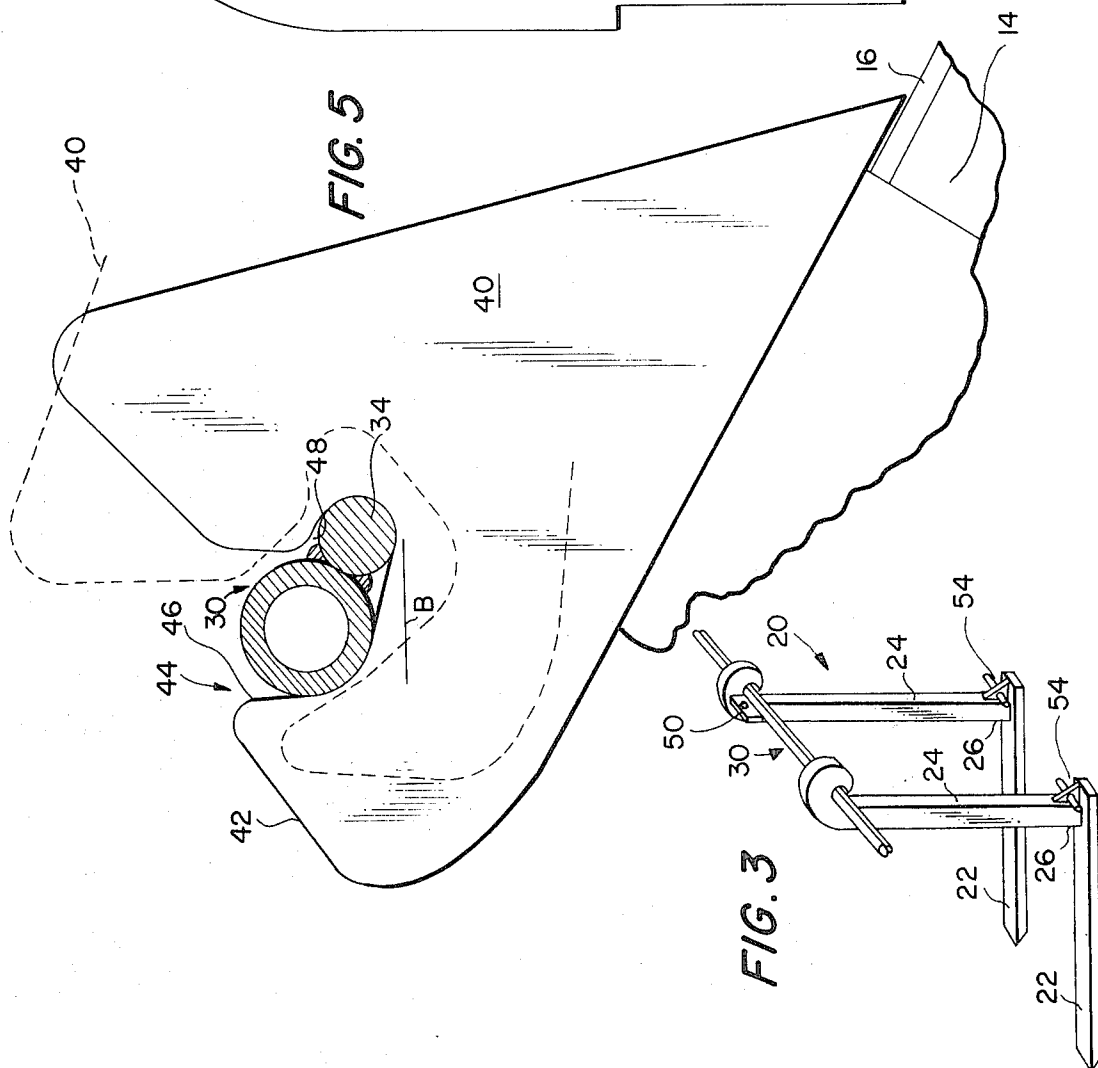


FIG. 3

FIG. 5

FORK LIFT CONVERTER ATTACHMENT

BACKGROUND OF THE INVENTION

The present invention relates to apparatus for converting a material handling implement from one type to another type, and more particularly, for converting the bucket of a front end loader to a fork lift.

It has been recognized that it is often desirable to provide a converter attachment for material handling equipment, such as front end loaders, so as to enable them to lift palletized loads by providing them with fork lift attachment. Further, and more generally, it has been recognized that various types of implements may be provided with brackets and the like in order to enable them to perform additional functions than those for which they were primarily constructed. In one general approach to this problem has been the provision of apparatus requiring the threading of a rod or pin axially through openings in various elements. Another approach has been to provide a transversely extending rod of circular cross section on the attachment, and to provide a bracket having a generally U-shaped opening engageable with the rod by rotative manipulation of the front of the lift arms. This latter approach thus makes use in the attachment operation of the ability of conventional lift arms of power operated vehicles such as front end loaders to have both a rotative motion about an axis transverse to the vehicle longitudinal axis, and a lifting motion relative to the surface of which the vehicle rests.

The devices which have utilized a threaded rod or pin are deficient because of the time consumed in assembling the attachment to the basic structure, this being required by the necessity for closely aligning holes or apertures in the elements of the basic structure and of the attachment, so that the rod or pin may be threaded axially therethrough. Further, disassembly is also undesirably time consuming, in some cases, because of the difficulty of unthreading the rod if there is any binding load or force on the rod. Hence, it is often necessary with this type of attachment to carefully manipulate the fork lift arms so as to insure against any binding force acting on the rod.

Prior art apparatus which has utilized the second noted approach have been found to be more readily attached than apparatus utilizing the first noted approach. These constructions have included, however, connecting rods or bars of cylindrical configuration, provided as a part of the attachment, and a bracket provided as part of the basic structure connected to the lift arms, which bracket was characterized by a generally U-shaped opening; manipulation of the lift arms in a manner so as to rotate the front ends thereof, as a unit, relative to the vehicle transverse axis was utilized to cause the brackets to engage the rod or bar by causing the rod or bar to enter into the U-shaped opening through the open mouth thereof. This construction, as noted, has not been found to be entirely satisfactory, due to the fact that there is some danger that upon manipulation of the lift arms, the attachment would become inadvertently separated from the basic structure. In one instance, for example, it was disclosed that even though the bracket with U-shaped opening was used, there was additionally provided pins which were inserted or threaded through openings in the several parts, so as to complete the mounting of the attachment to the basic lift arm structure.

Where fork lift attachments have been provided, they have been made of a single piece of longitudinally extending material which has been bent so as to provide two portions at right angles to each other, the bending necessarily occurring with a radius at a juncture of the two portions, thereby preventing a load, such as a box having surfaces at right angles and a sharp corner, from both resting on the horizontal portions and engaging the vertical portions. This has been a deficiency, also, of fork lift devices which have utilized two separate elements for the vertical and horizontal portions, connected by a gusset plate or re-enforcing plate, which latter would similarly prevent the noted two-surface engagement.

Among the objects of the present invention are to provide an attachment for the lift arms of a powered vehicle which may be quickly secured, and which will provide superior connection between the attachment and the basic structure. A further object of the present invention is to provide an attachment of the type noted which is not liable to be inadvertently separated from the basic structure during operation of the vehicle and/or lift arms.

Yet another object of the present invention is the provision of an attachment device for lift arm-equipped vehicles which requires no threading or insertion in an axial direction of rods or pins. Yet another object of the present invention is the provision of a fork lift attachment in which the vertical and horizontal portions of the fork lift meet at a true right angle so that a load such as a sharp-edged box may engage both vertical and horizontal surfaces of the fork lift attachment.

SUMMARY OF THE INVENTION

The present invention provides, specifically, a fork lift attachment for the bucket of a front end loader, which bucket is carried on conventional lift arms. The fork lift attachment comprises a pair of forks, each having a horizontal lifting element and a vertical extension element, these two elements being structurally connected and characterized by the absence of a gusset plate or fillet at their juncture. At their upper ends, the vertical extension elements are provided with transverse openings, which receive a cross bar of non-circular transverse cross section. The openings in the extensions have substantially the same cross section as that of the cross bar, so that the forks may be shifted along the cross bar, but may not rotate relative to it. The cross bar, which is of non-circular transverse cross section, is preferably formed of a relatively large diameter tube having a smaller-diameter bar welded to it in parallel relationship. A line connecting the axes of the two cylindrical elements, the tube and the bar, extends upwardly at an angle of approximately 30° to the horizontal. The basic structure, carried by the lift arms, is the bucket of a front end loader, which may be both raised and lowered, and rotated about an axis transverse to the vehicle longitudinal axis. On the bucket there are secured a plurality of brackets, each having an opening which is generally L-shaped, having an entry portion extending generally vertically, and a rearwardly extending portion. The bucket is tilted or rotated forwardly, and moved so that the smaller cylindrical element of the cross rod first enters the now-inclined opening, the bucket then rotating so that the noted opening in the brackets thereon rotate, also, thereby embracing the cross rod. A chain, attached to

the lower portion of the fork lift attachment, may then be drawn around the bucket and connected to the upper ends of the vertical extension of the attachment, to further secure the fork lift attachment against rotation relative to the bucket and to permit the withdrawal of the fork lift attachment when the load rests directly on the ground, without a pallet.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational view showing the attachment of the present invention, and a portion of a front end loader.

FIG. 2 is a rear perspective view showing the front end loader bucket and the present invention attachment.

FIG. 3 is a rear perspective view, on a reduced scale, of the fork lift attachment portion of the present invention.

FIG. 4 is an elevational view, on an enlarged scale, of a portion of the fork lift attachment shown in FIG. 3.

FIG. 5 is an elevational view of the bracket engaging the cross rod of the present invention attachment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like or corresponding reference numerals are used for like or corresponding parts throughout the several views, there is shown in FIG. 1 a motor vehicle generally designated 10, the rear end of which is not shown. Motor vehicle 10 is preferably a conventional tractor-like vehicle having lift arms 12, one on either side of the vehicle, and only one of which is visible in FIG. 1. Suitable power cylinders are provided for raising and lowering the lift arms, and for causing an implement carried by the lift arms to be rotated about an axis transverse to the vehicle longitudinal axis, all as is conventional. As particularly illustrated by the drawings, the vehicle 10 is a front end loader, being provided with a bucket 14 which is forwardly facing, with an opening towards the left, as viewed in FIG. 1. The bucket 14 includes an upper plate 16, as is shown in FIG. 2, and to the left of the bucket 14 is a fork lift attachment generally designated 20.

Referring now to FIG. 2, the fork lift attachment 20 may be seen to comprise a pair of transversely spaced forks, each comprising a horizontal lifting element 22 and a vertical extension element 24; these elements are at right angles to each other, and their juncture, at 26, may be seen to provide a right angle which is without fillet or gusset. Hence, a load such as a box of rectangular cross section, and having a sharp edge between its sides, may be carried by the attachment 20 with the vertical and horizontal sides of the load both engaging the horizontal element 22 and vertical extension element 24, respectively.

Connecting the two forks, and forming a portion of the fork lift attachment 20 is a cross rod generally designated 30, and comprising a forward tubular element 32 and a rearward cylindrical rod element 34. The cross rod 30 is carried by the upper ends of the vertical extensions 24, and engages brackets 40 which are secured to the upper plate 16 of bucket 14. There are preferably three of the brackets 40, each welded to the plate 16, being parallel to each other, and spaced trans-

versely across the plate 16, as clearly shown in FIG. 2.

Referring now to FIG. 3, there may be seen the attachment 20 including the pair of forks, each having a horizontal lifting element 22 and a vertical extension 24 extending at right angles thereto, and without fillet or gusset at the juncture 26 thereof. At their upper ends, the vertical extension elements 24 are curved generally rearwardly and downwardly, the cross rod 30 being seen to be carried by the upper ends of the extensions 24.

Referring now to FIG. 4, there is shown, to enlarged scale, the upper end of a vertical extension element 24, which may be seen to provide a generally rearwardly and downwardly facing socket structure, including an upper finger 28 and a lower finger 28' which are in spaced apart relationship, and which provide an opening of generally the same size and shape as that of the cross bar 30. The cross bar 30, as shown, comprises a forward tube 32 of relatively large cylindrical cross section, and a rearward rod 34 of smaller cylindrical cross section. The cross bar 30, may for example, have a cross sectional thickness of approximately two inches, this being the diameter of the tube 32, and a cross sectional length of approximately 3 inches, the rod 34 having a diameter of approximately nine-sixteenths inch. A line connecting the centers of the tube 32 and rod 34, when the axis of the extension element 34 is substantially vertical, lies in an upwardly inclined angle of approximately 30° to the horizontal: the noted line is designated L.

Secured to the upper or crown portion of the vertical extension element 24 is a locking plate 50 having a slot 52 therein in which there is positioned a like of a chain 60. A corresponding chain securing fixture 54, as shown in FIG. 3, is provided at the rear lower portion of each fork.

Referring now to FIG. 5, there may be seen a bracket 40, secured to the top plate 16 of the bucket 14, in enlarged view, and in solid lines. The bracket 40 is of generally triangular shape, having a side 42 inclined upwardly and to the right, and being provided with a generally L-shaped opening 44 including a vertical portion 46, and a rearwardly extending portion 48 joined to and communicating with it. The cross rod 30 is embracingly received within the opening 44, the horizontal portion 48 substantially engaging the rod 34 through some 180°, and lying on top of a portion of the rod 34. Otherside stated, that part of the bracket 40 which serves to define the top of horizontal portion 48 overlies the bar 34, and the entire cross bar 30 rests on the portion of the bracket 40 which defines the lower extent of the opening 44. This configuration serves to embracingly engage the cross bar 30, and to secure it in position so that detachment of the fork lift attachment 20 may not occur, through inadvertence, during manipulation of the lift arms 12, or of the entire vehicle 10.

To engage the brackets 40 with the attachment 20, the vehicle 10 is maneuvered so that the bucket 14 is close to the attachment 20, at the rear thereof, with the attachment 20 resting on a convenient surface, such as the ground. The bucket 14 is then rotated in a counter-clockwise direction as viewed in FIG. 1, about a transverse axis, so that the brackets 40 are approximately in the position as indicated in dotted lines in FIG. 5. Then the vehicle is moved slightly forward and the bucket 14

is rotated in a clockwise direction, thereby causing the cross bar 30 to enter into the opening 44, it being understood that the rod 34 first enters into the portion 46 and then into the portion 48, after which rotation as noted of the bucket 14 in a clockwise direction will cause the bracket 40 to be moved to the full line position as shown in FIG. 5, thereby embracingly engaging and securing the cross rod 30 in the position shown in FIG. 5. Thereafter, the chain 60 may be passed around the rear of bucket 14, as shown in FIG. 1, and secured to the locking plate 50. The chain 60 may be provided as an added precaution against any possibility of accidental disengagement of the attachment 20, even during the most severe service, and to enable the forks to be withdrawn from a load not on a pallet and engaging the ground. The lower portions of the vertical extension elements 24 engage and receive support from the lower lip of the bucket 14, as shown in FIG. 1.

There has been provided an attachment, particularly a fork lift attachment, which may be quickly and securely connected to a basic structure provided by the lift arms of a power vehicle, specifically a bucket of a front end loader. The attachment may be not only quickly secured to the basic structure, but may be securely held in place due to the provision of a non-circular cross rod and an engaging opening configuration in a plurality of brackets secured to the bucket. There has further been provided a chain connection for securement where severe service is contemplated to further insure against any rotation of the attachment relative to the basic structure, or bucket, and to permit fork withdrawal from a non-palletized load. Further, the fork configuration of the present fork lift attachment provides for a sharp internal angle between the horizontal and vertical elements of the fork lift, so as to provide for better engagement of a load having a sharp exterior angle between the walls thereof.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

I claim:

1. An apparatus including a motor vehicle having vertically swinging lift arm means for supporting, lifting and rotating an implement, support means comprising an implement carried by said lift arm means, a plurality of transversely spaced, parallel bracket means on said support means, and attachment means comprising load engaging means and a transversely extending cross rod of non-circular cross section, said attachment means being positionable on the ground with said cross rod in a

predetermined fixed position.

said bracket means comprising relatively fixed means defining an opening for receiving said cross rod only in one angular position of said bracket means and for embracing said cross rod in said predetermined fixed position upon rotation of said bracket means to a second position thereof.

2. The apparatus of claim 1, wherein said opening is a generally L-shaped opening having an entry portion extending vertically and a rearwardly extending portion.

3. The apparatus of claim 2, said cross rod having a generally triangular cross section.

4. The apparatus of claim 3, said cross rod being relatively thick at the front portion thereof and relatively thin at the rear portion thereof.

5. The apparatus of claim 4, said cross rod comprising a pair of cylindrical elements of circular cross section and different diameters secured together in parallel relationship.

6. The apparatus of claim 1, said cross rod comprising a forwardly positioned element of circular cross section and a rearwardly positioned element of smaller circular cross section secured parallel thereto.

7. The apparatus of claim 6, wherein a line connecting the centers of said elements being inclined upwardly at approximately 30°.

8. The apparatus of claim 1, said implement comprising a bucket.

9. The apparatus of claim 8, said attachment means comprising fork lift means.

10. The apparatus of claim 1, said attachment means comprising fork lift means.

11. The apparatus of claim 10, said fork lift means comprising plural forks each comprising a horizontal lifting element and a vertical extension element, said vertical extension elements each having an opening at the upper end thereof slidably and non-rotatably receiving said cross rod therein.

12. The apparatus of claim 1, and releasable means for preventing rotation of said attachment means relative to said support means.

13. The apparatus of claim 12, said releasable means comprising a chain.

14. The apparatus of claim 1, said attachment having means at the lower and upper portions thereof for securement of a chain.

15. The apparatus of claim 1, said attachment means comprising fork lift means comprising plural forks each including a horizontal lifting element and a vertical extension element, the forwardly facing juncture thereof being free of gussets and radius, whereby a load having right angled surfaces may engage both said elements of each said fork lift means.

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