Sept. 22, 1970 L. H. CHANT 3,529,740

TRACTOR LOADER

Filed June 17, 1968 3 Sheets-Sheet 1

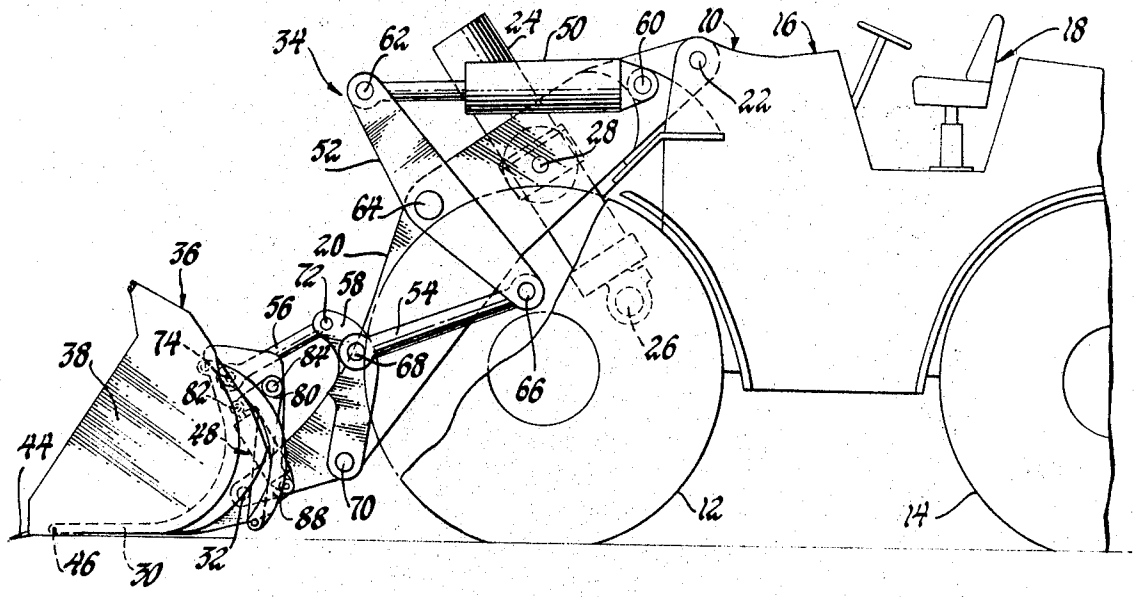


Fig. 1

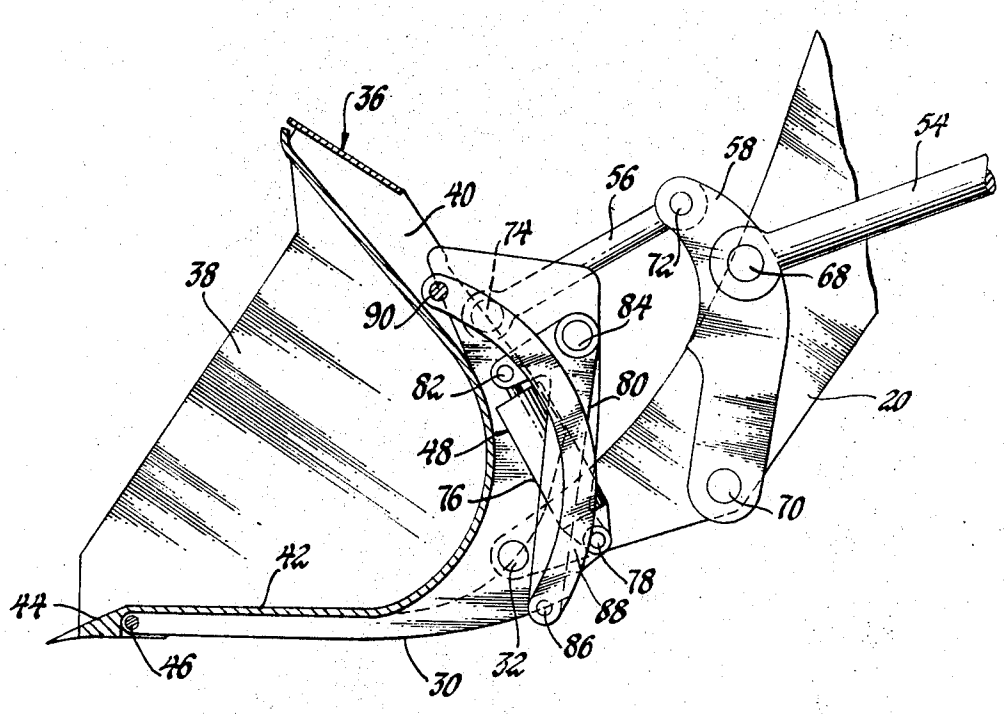


Fig. 2

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TRACTOR LOADER

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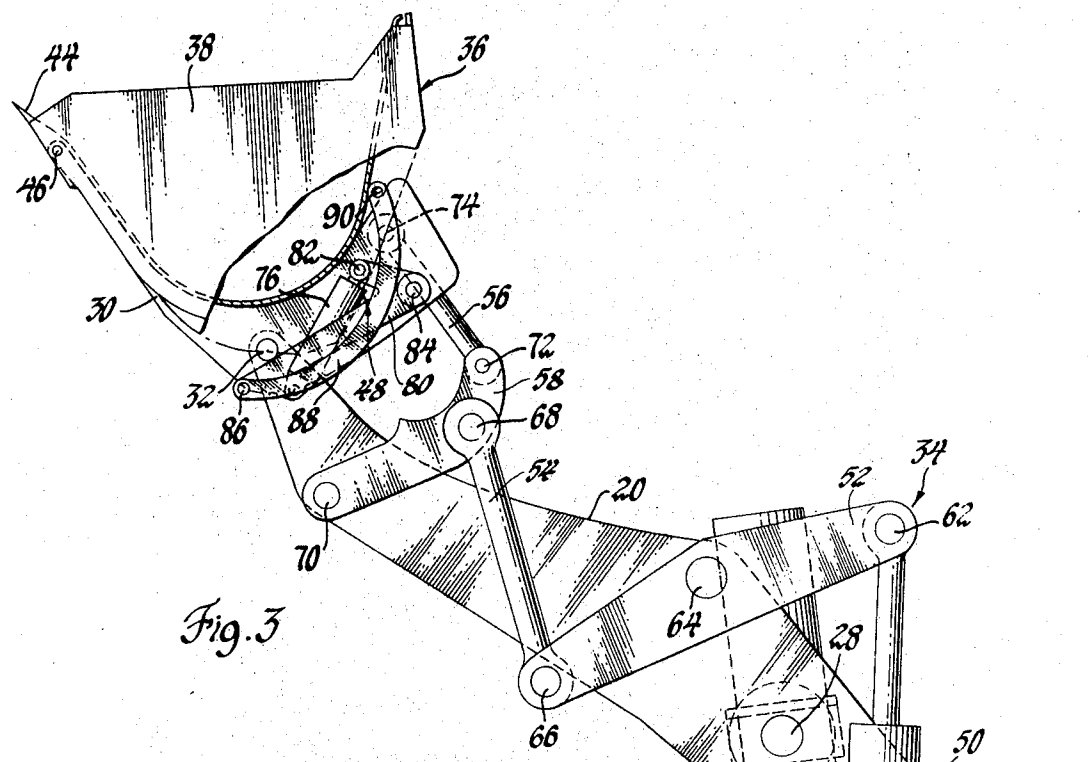


Fig. 3

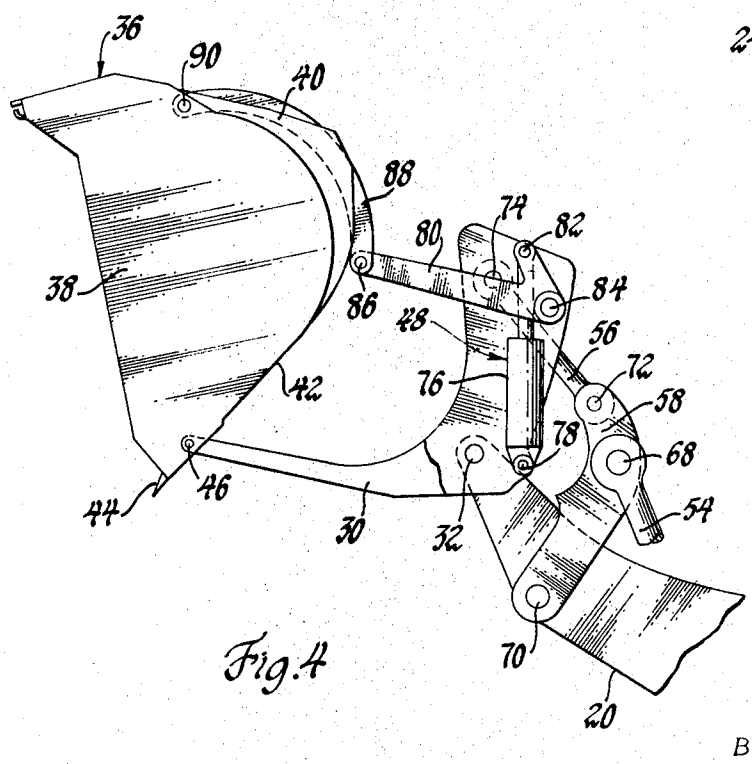


Fig. 4

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TRACTOR LOADER

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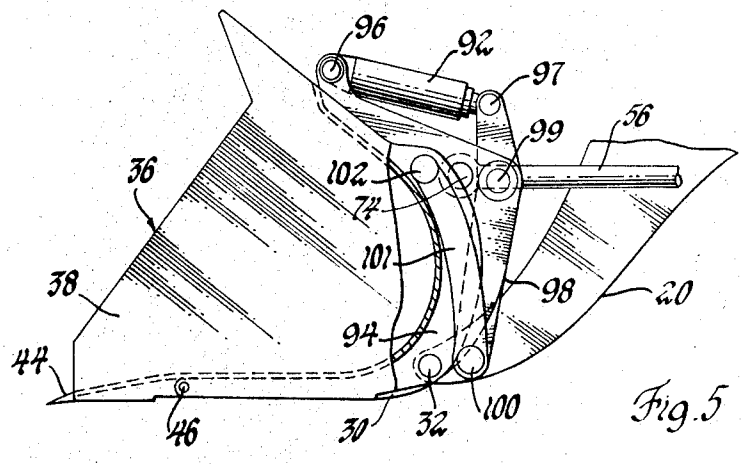


Fig. 5

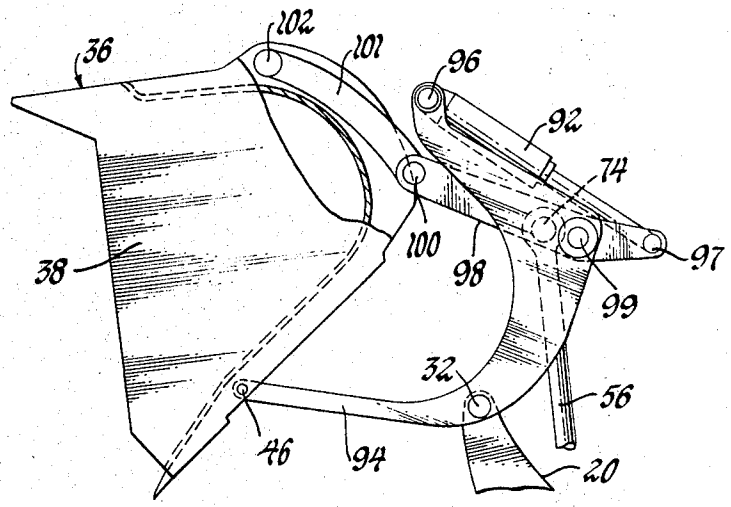


Fig. 6

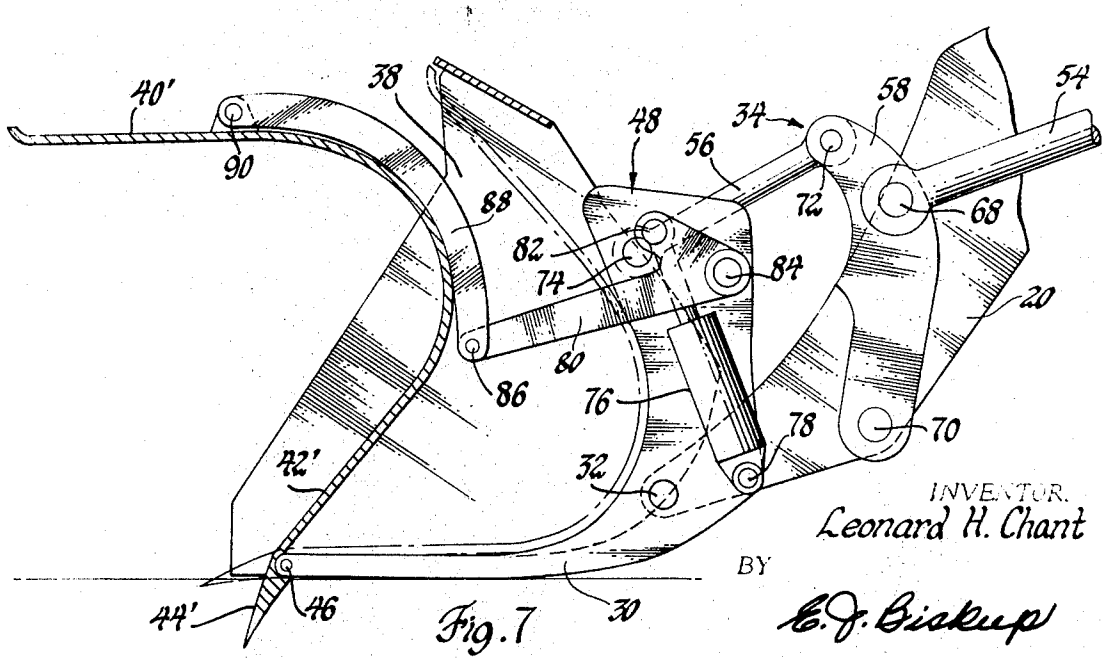


Fig. 7

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3,529,740

TRACTOR LOADER

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Int. Cl. E02f 3/28
U.S. Cl. 214—774 10 Claims

ABSTRACT OF THE DISCLOSURE

A tractor loader having a material handling bucket pivotally supported at its lower forward end by a bucket carrier. Lift arm means extend between the tractor frame and the bucket carrier and support a primary tilt linkage for tilting the bucket and carrier as a unit relative to the boom. The carrier is provided with a secondary tilt linkage which serves to move the bucket relative to the carrier about a second pivot connection so that selective pivotal movement of the bucket can be obtained about two pivotal connections to thereby provide an increase in dumping height when required.

The conventional front end loader has a lift arm, the extreme forward end of which supports a material handling bucket. A tilt linkage is usually mounted on the lift arm and connected to the rear of the bucket for pivoting the latter about its pivotal support with the lift arm so as to position the bucket during loading and pumping operations or while material is being hauled from one area to another.

In loaders of the above-described type, the dumping height of the bucket is determined in part by the stroke of the lift cylinders and the length of the lift arm and is represented by the maximum clearance under the bucket cutting edge when the bucket is in the fully raised dump position. In addition, most loaders are designed to have a dumping height equal to the average truck body loading height, however, there are times when it may be necessary to have the loader working at a level lower than the truck or the truck may be equipped with sideboards to increase its payload. In such cases, a loader having capabilities for increased dumping height is desirable in order to compensate for the increase in the effective elevation of the truck body.

Accordingly, the objects of the present invention are to provide a tractor loader having a bucket supported for selective pivotal movement about two pivotal connections, one of which provides an increase in dump height; to provide a tractor mounted material handling bucket that is supported at its lower forward end by a bucket carrier and is selectively movable relative to the carrier in cases where increased dumping height is required and may be pivoted with the carrier as a unit during a normal digging operation; to provide a bucket carrier that is supported by the usual lift arm of a tractor loader and has a bucket pivotally mounted thereto, the movement of which can be controlled by tilt linkage carried by the carrier; to provide a tractor loader having a lift arm which supports a bucket carrier and incorporates two independently operable tilt linkages which control movement of a bucket supported at its lower forward end by the bucket carrier; and to provide a bucket carrier which is pivotally supported by the forward end of the usual lift arm of a tractor loader and has an independently operable tilt linkage including a bellcrank and link supported by the carrier for moving the bucket relative thereto so as to provide forward pivotal movement of the bucket about a point located forwardly of the usual pivotal connection between the lift arm and bucket.

Other objects and advantages of the present invention will be apparent from the following detailed description when taken with the drawings in which:

FIG. 1 shows a tractor loader having a bucket carrier and bucket connected with a lift arm and tilt linkage in accordance with the invention;

FIG. 2 is an enlarged view with one side wall of the bucket removed so as to show in detail the bucket carrier and associated tilt linkage for moving the bucket relative to the carrier;

FIG. 3 shows the loader lift arm of FIG. 1 in a raised position and illustrates the relative positions assumed by the various members of the tilt linkage controlling movement of the bucket;

FIG. 4 is a view similar to FIG. 3 but shows the bucket in the dump position under control of the tilt linkage carried by the bucket carrier;

FIG. 5 shows a modified form of the bucket tilt linkage carried by the carrier;

FIG. 6 shows the relative positions of the members of the tilt linkage of FIG. 5 when the bucket is in the dump position; and

FIG. 7 shows the bucket tilt linkage of FIGS. 1 through 4 operating an ejector incorporated with the bucket.

Referring to the drawings and particularly FIGS. 1 and 2 thereof, a rubber-tired tractor loader **10** is shown supported by axially spaced front and rear wheels **12** and **14**, and including a body frame **16** having an operator's station **18**. The forward end of the body frame **16** supports a boom or lift arm **20** at a pivotal connection **22** for movement about a transverse horizontal axis under the control of a double-acting hydraulic lift cylinder **24** pivotally mounted between the body frame **16** and lift arm **20** at pivot connections **26** and **28**. The forward extreme end of the lift arm **20** supports a generally L-shaped bucket carrier **30** for pivotal movement about a transverse horizontal axis passing through the pivot connection **32**. Primary tilt linkage **34** carried by the lift arm **20** serves to control movement of the bucket carrier **30** about the pivot connection **32** during the normal work cycle of the tractor loader. A material handling bucket **36** having the usual laterally spaced side walls **38**, a back wall portion **40**, floor portion **42** and cutting edge **44** is pivotally supported by the bucket carrier **30** and adapted to move relative to the latter about a transverse horizontal axis passing through the pivotal connection **46**. Control of the latter-described movement is provided by a secondary tilt linkage **48** mounted on the bucket carrier **30**.

The primary tilt linkage **34** includes a double-acting hydraulic cylinder **50**, a reversing lever **52**, a pair of links **54** and **56**, and a lever **58** which are pivotally interconnected in a manner so as to provide movement of the bucket carrier **30** upon expansion or contraction of the cylinder **50**. More specifically, the hydraulic cylinder **50** has the cylinder end thereof pivotally connected to the body frame **16** at a point **60** and the rod end pivotally connected to the upper end of the reversing lever **52** at a point **62**. The reversing lever **52** has an intermediate part thereof pivotally connected to the lift arm **20** at a point **64** and the lower end pivotally connected to one end of the link **54** at a point **66**. The link **54** extends forwardly for pivotal connection at point **68** with the lever **58** which in turn has the lower end pivotally connected to the lift arm **20** at a point **70** and the upper end pivotally connected at point **72** to the rear end of the link **56**, while the forward end of the latter is pivotally connected to the carrier **30** at a point **74**.

Thus, it should be apparent from the above that by expanding the hydraulic cylinder **50**, the carrier **30** and associated bucket **36** can be rotated rearwardly or clock-

wise about the pivotal connection **32**. Conversely, by contracting the hydraulic cylinder **50** the bucket carrier **30** can be rotated forwardly or in a counterclockwise direction about the pivotal connection **32**. It will also be understood that the geometry of the primary tilt linkage **34** is such that when the lift cylinder **24** is expanded so as to raise the lift arm **20** to the dump position, the bucket carrier **30** and the various members of the linkage automatically assume the positions as shown in FIG. 3 at which point contraction of the hydraulic cylinder **50** causes the carrier **30** to rotate counterclockwise about the pivotal connection **32** and dump the load in the bucket **36**. As alluded to hereinbefore, however, there are instances when an increased dumping height is required and, to this end, the bucket carrier **30** is provided with the secondary tilt linkage **48** which permits the bucket **36** to move about the pivotal connection **46** relative to the carrier **30** in a counterclockwise direction as shown in FIG. 4. In this regard, and as best seen in FIGS. 2, 3 and 4, it will be noted that the secondary tilt linkage **48** includes a double-acting hydraulic cylinder **76** which has its cylinder end pivotally connected to the carrier **30** at a point **78**. The rod end of the cylinder **76** is pivotally connected to one arm of a lever or bellcrank **80** at a point **82**. The bellcrank **80** in turn is pivotally mounted on the carrier **30** at a point **84** and has the other arm pivotally connected at a point **86** to an arcuate link **88**, the upper end of which is pivotally connected to the bucket back wall portion **40** at a point **90**. Thus, as seen in FIG. 4, by expanding the hydraulic cylinder **76**, the bellcrank **80** is rotated about its pivotal support point **84** with the carrier **30** in a clockwise direction causing the lower end of the link **88** to move upwardly from its position in FIG. 2 and cause rotation of the bucket **36** about its pivotal connection **46** with the carrier **30**.

At this juncture, it should be mentioned that the drawings show only one side of the vehicle and therefore it will be understood that the linkage described above has corresponding and identical parts located on the other side of the vehicle.

FIG. 5 shows a modified form of the secondary linkage **48** disclosed in FIGS. 1 through 4 and except for the carrier and associated linkage, the parts and components corresponding to those shown in the latter-mentioned figures are identified by the same reference numerals. In this case, a double-acting hydraulic cylinder **92** has the cylinder end pivotally connected to the upper end of a generally C-shaped bucket carrier **94** at a point **96**. The rod end of the cylinder **92** extends rearwardly for pivotal connection at a point **97** with the upper end of a lever **98** having an intermediate portion thereof pivotally connected at a point **99** to the carrier **94**. The lower end of the lever **98** is pivotally connected at a point **100** to one end of a link **101**, the other end of which extends forwardly and upwardly for pivotal connection at a point **102** with the rear of the bucket **36**. As shown in FIG. 6, when the hydraulic cylinder **92** is expanded, the lever **98** rotates in a clockwise direction about its pivotal point **99** with the carrier **94** and causes the link **101** to move upwardly and forwardly so as to pivot the bucket **36** about its forward pivotal connection **46** with the carrier **94** in a manner similar to the arrangement as disclosed in FIGS. 1 through 4.

The bucket and carrier combination of FIG. 7 differs from the arrangement shown in FIGS. 1 through 4 only in that the side walls **38** of the bucket are rigidly fixed to the carrier **30** and intended to remain stationary therewith while the back wall portion **40'**, floor portion **42'**, and cutting edge **44'** are formed as a unit pivotally supported at the forward end of the carrier **30** at pivotal connection **46** and serve as an ejector for discharging material when moved from the phantom line position to the full line position. In all respects, the primary and secondary linkages **34** and **48** are the same as those incorporated with the loader shown in FIG. 1 and operate in a similar fashion.

Various changes and modifications can be made in this construction without departing from the spirit of the invention. Such changes and modifications are contemplated by the inventor and he does not wish to be limited except by the scope of the appended claims.

I claim:

1. In combination with a tractor mounted material handling bucket including an integrally formed back wall and floor portion pivotally supported adjacent its lower forward end by a bucket carrier and having a boom for raising the bucket carrier from the ground and first tilt linkage and second tilt linkage for respectively tilting the bucket and carrier as a unit relative to the boom and tilting the back wall and floor portion relative to the carrier, said second tilt linkage supported by said carrier and comprising a lever member having an intermediate portion thereof pivotally mounted on the carrier by a pivotal connection, a link having one end pivotally connected to the lever member at a first pivot point spaced below said pivotal connection and having the other end pivotally connected to an upper portion of the bucket, and a double-acting hydraulic cylinder pivotally connected between said carrier and a second pivot point on said lever member spaced from said pivotal connection and said first pivot point for rotating the lever member about said pivotal connection whereby said back wall and floor portion is tilted forwardly relative to the carrier to a dump position.

2. The combination of claim **1** wherein said bucket includes a pair of laterally spaced side walls rigidly connected to said back wall and floor portion.

3. The combination of claim **1** wherein said bucket includes a pair of laterally spaced side walls rigidly connected with said carrier.

4. In combination with a tractor mounted material handling bucket pivotally supported adjacent its lower forward end by a bucket carrier and having a boom for raising the bucket carrier from the ground and first tilt linkage and second tilt linkage for respectively tilting the bucket and carrier as a unit relative to the boom and tilting the bucket relative to the carrier, said bucket carrier having a forwardly extending portion which serves to pivotally support the bucket, an upwardly extending portion rigid with said forwardly extending portion, said second tilt linkage carried by said upwardly extending portion and comprising a lever member having an intermediate portion thereof pivotally mounted on the carrier by a pivotal connection, a link having one end pivotally connected to the lever member at a first pivot point spaced below said pivotal connection and having the other end pivotally connected to an upper portion of the bucket, and a hydraulic cylinder pivotally connected between said carrier and a second pivot point on said lever member spaced from said pivotal connection and said first pivot point for rotating the lever member about said pivotal connection whereby said link is raised to cause the bucket to tilt forwardly relative to the carrier to a dump position.

5. In combination with a tractor mounted material handling bucket pivotally supported adjacent its lower forward end by a bucket carrier and having a boom for raising the bucket carrier from the ground and first tilt means and second tilt means for respectively tilting the bucket and carrier as a unit relative to the boom and tilting the bucket relative to the carrier, the improvement wherein said carrier is generally C-shaped in configuration and said second tilt means comprising a lever member having an intermediate portion thereof pivotally mounted on the carrier by a pivotal connection, a link having one end pivotally connected to the lever member at a first pivot point spaced below said pivotal connection and having the other end pivotally connected to an upper portion of the bucket, and a hydraulic cylinder pivotally connected between said carrier and a second pivot point on said lever member located above said pivotal connection for rotating the lever member about said pivotal connection whereby said link is raised to cause the bucket to tilt forwardly relative to the carrier to a dump position.

6. In combination with a tractor mounted material handling bucket pivotally supported adjacent its lower forward end by a bucket carrier and having a boom for raising the bucket carrier from the ground, said bucket carrier having a forwardly extending portion which serves to pivotally support the bucket, an upwardly extending portion rigid with the forwardly extending portion, first tilt linkage mounted on the boom for tilting the bucket and carrier as a unit relative to the boom, second tilt linkage mounted on the carrier for tilting the bucket relative to the carrier, said second tilt linkage comprising a lever member having an intermediate portion thereof pivotally mounted on said upwardly extending portion of the carrier by a pivotal connection, a link having one end pivotally connected to the lever member at a first pivot point spaced below said pivotal connection and having the other end pivotally connected to an upper portion of the bucket, and a hydraulic cylinder pivotally connected between said carrier and a second pivot point on said lever member spaced to one side of a line passing through the centers of said pivotal connection and said first pivot point, said hydraulic cylinder adapted to rotate the lever member about said pivotal connection whereby said link is raised to cause the bucket to tilt forwardly relative to the carrier to a dump position.

7. The combination of claims 6 wherein the longitudinal center axis of said hydraulic cylinder is substantially normal to the line passing through the centers of said pivotal connection and the first pivot point between the

lever member and the link when the bucket is in the carry position.

8. The combination of claim 6 wherein the longitudinal center axis of said hydraulic cylinder is substantially normal to the line passing through the centers of said pivotal connection and the first pivot point between the lever member and the link when the bucket is in the dump position.

9. The combination of claim 6 wherein said second pivot point is located at a level below the level of the pivotal connection supporting the lever member when the bucket is in a carry position.

10. The combination of claim 6 wherein the bucket carrier is generally L-shaped.

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U.S. Cl. X.R.

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