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LOADER FOR TRACTOR MOUNTING

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2 Sheets-Sheet 1

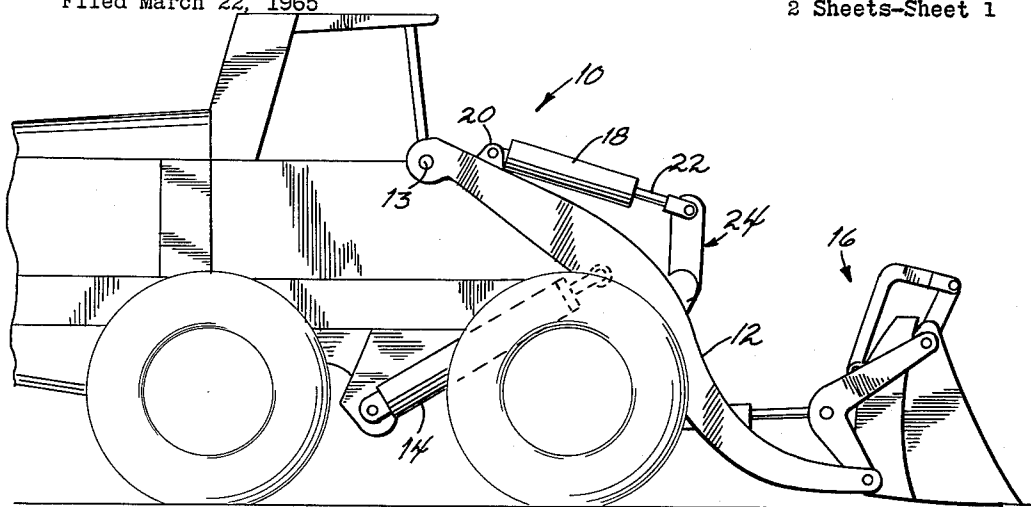


FIG. 1

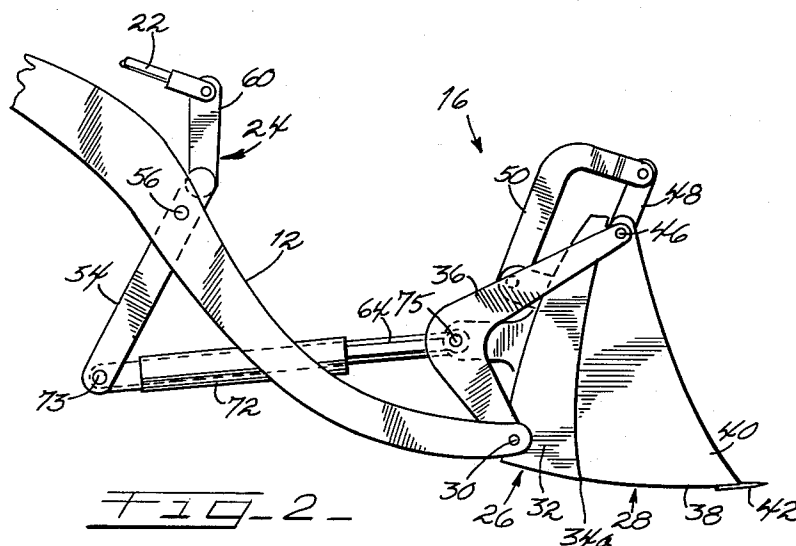


FIG. 2

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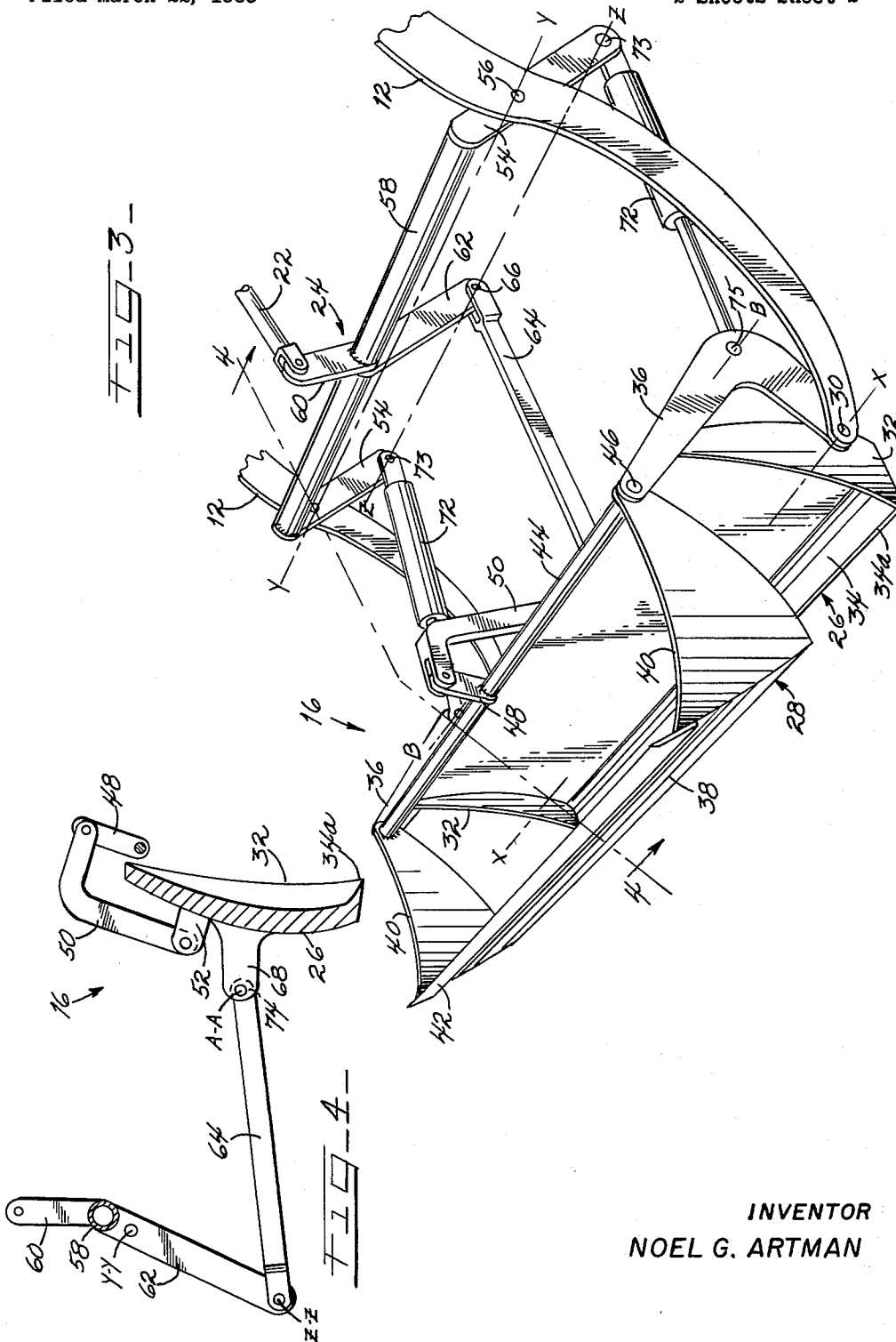
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LOADER FOR TRACTOR MOUNTING

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7 Claims. (Cl. 214—140)

This invention relates to a load-handling bucket for a tractor mounting and more particularly relates to a multi-purpose load-handling bucket with front and rear portions constructed so that multiple operations may be performed therewith.

Another object of this invention is to provide a multi-purpose bucket for a material-handling vehicle in which the front portion of the bucket pivots relative to the back portion of the bucket through a lever connected with the boom of the vehicle so that bulldozing, skid-shoveling, back-hoeing, and clam-shell operations may be performed by selectively positioning the front and back portions relative to the boom.

Another object of this invention is to provide a multi-purpose two-piece bucket for a vehicle in which the front portion pivots away from the back portion through a linkage arrangement on the boom to encompass a larger amount of material during the loading operation.

The invention, both as to its organization and method of operation, taken with further objects and advantages thereof, will best be understood by reference to the following description, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a side elevation view of a material-handling vehicle incorporating a loader mechanism embodying features of the present invention;

FIGURE 2 is an enlarged side elevation view of the two-piece loader bucket and linkage arrangement of the loader mechanism of FIGURE 1;

FIGURE 3 is a perspective view of the loader mechanism of FIGURES 1 and 2 in which the front portion of the bucket is pivoted away from the rear portion;

FIGURE 4 is a side elevation view, partially in cross-section, of the loader mechanism of the present invention taken along the line 4—4 of FIGURE 3.

The material-handling vehicle is indicated generally in FIGURE 1 by the numeral 10. A pair of boom arms 12 are pivotally mounted about pins 13 on either side of the vehicle 10 for pivotal movement in a vertical plane through operation of a pair of extensible hydraulic motors or rams 14. The multi-purpose bucket 16 of the present invention is pivotally mounted at the end of booms 12 in a manner to be presently described. The extensible hydraulic ram 18 is pivotally mounted to the bracket 20 which in turn is rigidly connected to the frame of vehicle 10. The rod 22 of ram 18 is pivotally connected to lever assembly 24 and operates to control the attitude of multi-purpose bucket 16. A hydraulic control system (not shown) of the type which is well-known to those skilled in the art is provided for operation of hydraulic rams 14 and 18. Selective extension and retraction of rams 14 will respectively raise and lower the boom arms 12. Similarly, extension or retraction of hydraulic ram 18 will respectively roll back or roll forward the bucket 16 relative to boom arms 12.

Referring now to FIGURES 2 and 3 the construction and operation of the multi-purpose bucket 16 is shown in greater detail. The bucket 16 consists of a back portion 26 and a front portion 28. The back portion 26 is mounted on pins 30 carried at the forward end of boom arms 12 for pivotal movement about transversely disposed horizontal axis X—X. Skirts 32 and bottom portion 34 de-

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fine the side walls of the back portion of the bucket. Bottom wall portion 34 has a cutting edge 34a.

A pair of L-shaped links 36 are provided to support the front portion 28. Links 36 are pivotally mounted on pins 30 about axis X—X. The front portion 28 comprises a bottom member 38 which is rigidly supported between the lower ends of a pair of side members 40. A cutting blade 42 is provided along the forward edge of bottom member 38 and a tubular cross-member 44 is rigidly secured between the upper ends of the side members 40. The front portion is pivotally mounted at the upper ends of links 36 about pin members 46. A lever arm 48 is rigidly secured to the cross-member 44 intermediate the side members 40. An L-shaped link 50 is pivotally mounted at one end to link 48 and at its other end to bracket 52, which in turn is rigidly secured to the rearward side of back portion 26 (FIGURE 4).

Selective operation of the multi-purpose bucket 16 is achieved through pivotal movement of the lever assembly 24 by the hydraulic ram 18. The lever assembly 24 comprises a pair of arms 54 which are mounted on pins 56 carried on boom arms 12 for pivotal movement about horizontal axis Y—Y. A tubular cross-support member 58 is rigidly secured between the arms 54 at a position spaced upwardly from the axis Y—Y. Arm 60 projects upwardly from cross-member 58 and is pivotally connected to rod 22 of hydraulic motor 18. An intermediate arm 62 projects downwardly from the cross-member 58 and is in parallel relationship with the arms 54. A rigid link 64 is pivotally connected at one end to the lowermost portion of arms 62 on pins 66 about axis Z—Z. Axis Z—Z is in a parallel relationship with axes X—X and Y—Y. The other end of link 64 is pivotally mounted about pin 74 on bracket 68 which in turn is rigidly secured to the rearward side of back portion 26. With reference to FIGURE 4 it may be seen that the pivotal connection of link 64 to bracket 68 is about axis A—A which is in parallel relationship with axes X—X and Z—Z.

A pair of hydraulic motors or rams 72 are provided to operate links 36 and front portion 28. The head end of each of the hydraulic motors 72 is pivotally mounted on pins 73 at the lower end of arms 54 for pivotal movement about axis Z—Z. The rod end of each of the hydraulic motors 72 is pivotally secured to pins 75 intermediate the ends of the levers 36 for pivotal movement about axis B—B. Conventional hydraulic conduits and controls (not shown) are provided to afford selective extension and retraction of hydraulic motors 72.

With the hydraulic rams 72 in a fully retracted position the levers 36 will rotate backward relative to boom arm 12 until the pivot axis B—B is coincident with the pivot axis A—A of the connection of the link 64 to the bracket 68. The levers 36 in this position will align the front portion 28 in a closed position against the back portion 26, as shown in FIGURE 2. Selective extension and retraction of hydraulic motor 18 will now produce roll-back or dumping operations of multi-purpose bucket 16. The force of motor 18 operating through rod 22 will be transmitted by means of lever assembly 24 through rigid link 64 to effect pivotal movement of back portion 26 relative to boom arms 12. The hydraulic motors 72 will be hydraulically locked and will transmit force from lever assembly 24 to pivot levers 36 and front portion 28 relative to boom arms 12. Because the pivotal connections of the link 64 and the motors 72 to the back portion 26 and levers 36, respectively, are coincident about axes A—A and B—B the closed front and back portions 26 and 28 will pivot as a unit about axis X—X. The multi-purpose bucket can now be used in the manner of a conventional loader bucket.

A clam-shell action is obtained when hydraulic motors 72 are extended so that levers 36 will rotate forwardly about axis X—X. This movement will carry cross-member 44 forwardly relative to the back portion 26. Lever arm 48 will react against link 50 and back portion 26 to produce an upward and forward movement of front portion 28 relative to back portion 26. This dual movement of the front portion 28 will achieve a much larger "bite" of the material being handled as compared to conventional buckets.

With the front portion 28 rotated to its uppermost position and with the back portion 26 substantially vertical, the multi-purpose bucket 16 may be used for a bulldozing operation. Other variations of loading operations with the multi-purpose bucket of this invention will readily be apparent to those skilled in the art.

It is understood that various changes in the details, steps, and arrangements of parts, which have been described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

What is claimed is:

1. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a transverse horizontal axis; first lever means pivotally mounted on the boom rearwardly from the axis; second lever means pivotally mounted on the boom; the front portion of the bucket being pivotally connected to the second lever means for movement of the front portion to and from the back portion; a link pivotally interconnecting the first lever means with the back portion; means pivotally interconnecting the back portion with the front portion; first motor means connected with the first lever means for pivotal movement thereof relative to the boom; and second motor means connected with the first lever means to pivot the second lever means and the front portion relative to the back portion.

2. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a transverse horizontal axis; first lever means pivotally mounted on the boom rearwardly from the axis; second lever means pivotally mounted on the boom about the axis; the front portion of the bucket being pivotally connected to the second lever means for movement of the front portion to and from the back portion; a first link pivotally interconnecting the first lever means with the back portion; a second link pivotally interconnecting the back portion with the front portion; motor means connected with the first lever means to pivot the second lever means and the front portion relative to the back portion; and a hydraulic ram connected with the first lever means for pivotal movement thereof relative to the boom.

3. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a first transverse horizontal axis; a first lever pivotally mounted on the boom rearwardly from the first axis and having a pair of depending arms disposed in parallel relationship; a pair of second levers pivotally mounted on the boom about the first axis and having respective ends extending upwardly; a pair of hydraulic motors each having two ends, one end of each motor being pivotally connected to the arms about a second axis parallel to the first axis, the other end of each motor being pivotally connected to a respective second lever about a third axis parallel to the first axis; a link having two ends, one end of the link being pivotally connected to the first lever about the second axis, the other end of the link being pivotally connected to the back portion about the third axis when the

back portion is adjacent the front portion; linkage means to pivotally interconnect the back portion with the uppermost end of the front portion; and motor means connected with the first lever means for pivotal movement thereof relative to the boom.

4. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a first transverse horizontal axis; a first lever pivotally mounted on the boom rearwardly from the first axis and having a pair of depending arms disposed in parallel relationship; second lever means pivotally mounted on the boom and extending upwardly therefrom; hydraulic motor means having two ends, one end being pivotally connected to the arms about a second axis parallel to the first axis, the other end being pivotally connected to the second lever means about a third axis parallel to the first axis; a link, one end of the link being pivotally connected to the first lever, the other end of the link being pivotally connected to the back portion about the third axis when the back portion is adjacent the front portion; means to pivotally interconnect the back portion with the uppermost end of the front portion; and means to pivot the first lever relative to the boom.

5. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a first transverse horizontal axis; first lever means pivotally mounted on the boom rearwardly from the first axis; second lever means pivotally mounted on the boom about the first axis; a pair of hydraulic motors, one end of each motor being pivotally connected to the first lever means about a second axis parallel to the first axis, the other end of each motor being pivotally connected to the second lever means at a point spaced from the first axis; a link, one end of the link being pivotally connected to the first lever means about the second axis, the other end of the link being pivotally connected to the back portion about the third axis when the back portion is adjacent the front portion; and motor means connected with the first lever means for pivotal movement thereof relative to the boom.

6. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a transverse horizontal axis; first lever means pivotally mounted on the boom rearwardly from the axis; second lever means pivotally mounted on the boom; the front portion of the bucket being pivotally connected to the second lever means for movement of the front portion to and from the back portion; a lever arm rigidly connected to the front portion and projecting upwardly therefrom; a first link pivotally interconnecting the first lever means with the back portion; a second link pivotally interconnecting the lever arm with the front portion; first motor means connected with the first lever means to pivot the second lever means and the front portion relative to the back portion; and second motor means to pivot the first lever means relative to the boom.

7. In a material-handling vehicle having a moveable boom, the combination including: a bucket having a back portion and a front portion, the back portion being mounted on the forward end of the boom about a transverse horizontal axis; first lever means pivotally mounted on the boom rearwardly from the axis; second lever means pivotally mounted on the boom about the axis; the front portion of the bucket being pivotally connected to the second lever means for movement of the front portion to and from the back portion; a first link pivotally interconnecting the first lever means with the back portion; a lever arm rigidly connected to the front portion and projecting upwardly therefrom; a second link pivotally interconnecting the back portion with the lever arm; a

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pair of hydraulic motors, one end of each motor being pivotally connected to the first lever means, the other end of each hydraulic motor being pivotally connected to the second lever means at a position between the axis and the pivotal connection of the front portion to the second lever means; and motor means to pivot the first lever means relative to the boom.

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