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BUCKET CONSTRUCTION FOR TRACTOR LOADERS

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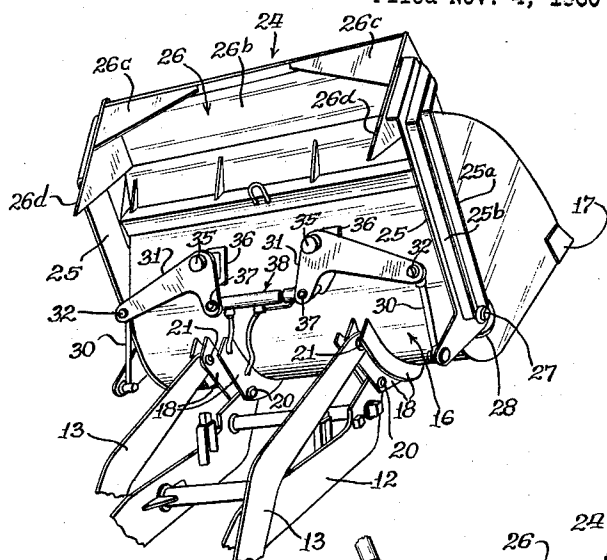


Fig. 1.

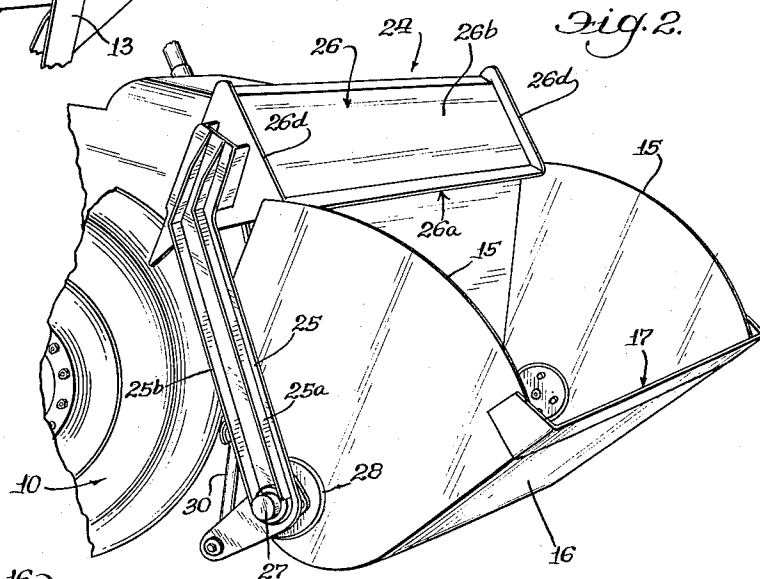


Fig. 2.

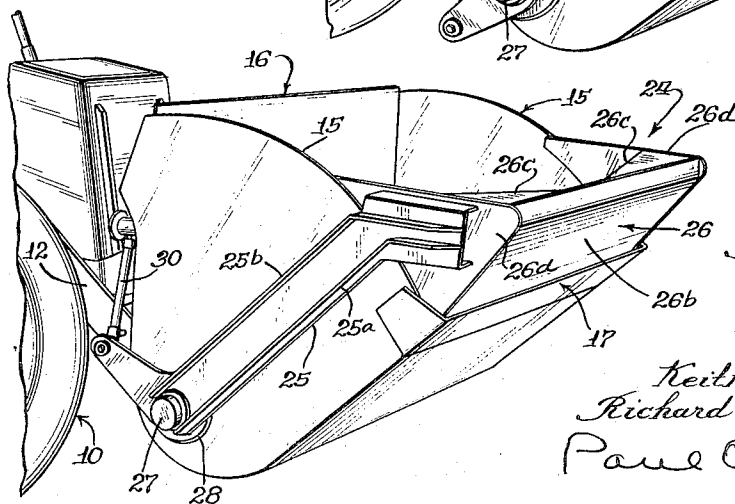


Fig. 3

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1

3,014,606

BUCKET CONSTRUCTION FOR TRACTOR
LOADERS

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This invention relates generally to bucket constructions for tractor loaders, and more specifically to an improved load striker and carrying arrangement for the bucket of a front-end-type tractor loader, which arrangement is uniquely adapted for the handling of free-flowing granulated material.

In the handling of free-flowing granulated material with front-end-type tractor loaders such as are known in the art, a serious problem is encountered in spillage of the granulated material from the bucket. This spillage occurs in a number of ways; firstly, because of the relative ease with which the bucket may be heaped with the material from a pile, the initial, somewhat cone-shaped, heaped load on the bucket is reduced by spillage as the bucket and machine are withdrawn from the pile. Further, in the carrying position of the bucket, the bucket is usually tipped rearwardly through an angle of approximately 40°, and in this position the forward edge of the cutting edge is generally considerably below the upper edges of the side walls and back wall of the bucket so that in the transport of the load to a remote location, additional spillage occurs until under some conditions only about one-half of the material originally dug is retained within the confines of the bucket.

It is the object of the present invention to provide a bucket arrangement for a tractor loader, such as disclosed in U.S. Patent No. 2,822,098, issued February 4, 1958, to R. L. Beyerstedt, which will greatly aid in digging and carrying a free-flowing granulated type of material with a minimum of spillage.

It is a further object of the present invention to provide a load striker and load maintainer arrangement for the bucket of a front-end-type tractor loader, wherein the striker bar is operated by a hydraulic ram carried on the rearward side of the bucket.

It is a feature of the present invention that operating means for a load striker and maintainer arrangement is provided wherein the hydraulic ram for operating the arrangement is relatively protected from damage in the normal operation of the loader.

Other objects and features of the present invention will be apparent upon a perusal of the following specification and drawing of which:

FIGURE 1 is a partial rear perspective view of a bucket constructed according to the present invention with the bucket positioned in a high lift position;

FIGURE 2 is a partial front perspective view of the bucket construction of FIGURE 1 with the striker bar in one operated position; and

FIGURE 3 is a view similar to FIGURE 2 but with the striker bar operated to another position.

The present embodiment is the preferred embodiment, but it is to be understood that changes can be made in the present embodiment by one skilled in the art without departing from the spirit and scope of the present invention.

For a general description of the present invention, reference is made to the drawing and the aforementioned patent. The bucket is constructed to have a pair of side walls spaced apart by a curved bottom and rear wall. The forward marginal edge of the bottom wall is provided with a cutting edge. The bucket is pivotally

2

mounted on a boom, and a linkage arrangement is provided for pivoting the bucket relative to the boom. Means are also provided for raising and lowering the boom. In the digging position, the bucket is lowered to ground level, and the linkage means is operated to position the bottom wall of the bucket in a substantially horizontal plane. This position is a lowered position from that shown in FIGURES 2 and 3. The forward marginal edges of the side walls of the bucket are curved as a portion of a circle with its origin point located near the lower rear portion of the bucket. The back wall of the bucket is disposed substantially vertically in the load carrying position of FIGURES 2 and 3. A somewhat U-shaped load striker and load retainer or maintainer blade or element is pivotally mounted, at the ends thereof on the lower rear side walls of the bucket. The crossmember of the U-shaped blade or striker element will, in pivoting from the position shown in FIGURE 2 to that shown in FIGURE 3, strike off the heaped load along a curved plane disposed a short distance inwardly of the marginal edges of the side walls of the bucket. The crossmember which itself is somewhat V-shaped in cross section has a lower forward portion which acts as the striker blade, and the striker blade with the remainder of the striker element further acts as load retaining or maintaining walls when the machine is operated in traveling to a remote location for dumping. Thus, when the bucket is in the carrying position, the striker and load retainer element substantially increases the carrying capacity of the bucket. During travel, the free-flowing material will flow approximately from the curved plane formed by the striker bar to a somewhat flat plane or water level configuration. The lower end legs of the U-shaped load striker element are formed somewhat as bellcranks and the outer ends of the bellcranks are pivotally connected to links which are angled from the side walls along the rear side of the bucket toward the center thereof. The links in turn are pivotally connected to bellcranks which are pivotally carried on the rear side of the bucket, and the other ends of each of those bellcranks are pivotally connected at the opposite ends of a hydraulic cylinder. The hydraulic cylinder is disposed somewhat parallel to and spaced a short distance away from the rear surface of the bucket. When the hydraulic ram cylinder is completely retracted, the striker element is positioned adjacent the rear wall of the bucket, such as shown in FIGURES 1 and 2. When the ram is completely extended, the striker element is moved across the open side of the bucket to engage the cutting edge of the bucket. The crossmember of the striker element must have a size correlated to the dimensions of the bucket walls so that the volume of material in the struck configuration approximately equals the volume defined by the bucket, the striker element, and a horizontal plane through the upper surface of the crossmember of the striker element, when the bucket has been tilted rearwardly to the breakout or carrying position such as shown in FIGURES 2 and 3. In FIGURE 1, the boom of the loader is shown in the raised or high lift position to aid in showing the important elements of the subject invention carried on the rearward side of the bucket.

For a detailed description of the present invention, continued reference is made to the drawing and the noted patent. A four-wheel rubber-tired tractor having wheels 10 is provided with a boom 12, one end of which is carried on the tractor and the other end of which is disposed forwardly thereof. Some means, such as the rams 25 of the noted patent, are provided for raising and lowering of the forward end of the boom 12. A link 13 is also provided and is formed in duplicate portions, one on each side of the tractor, as is the boom 12.

The link 13 is operatively carried at one end thereof on the tractor and the other end thereof is positioned forwardly of the tractor. The bucket comprises a pair of spaced-apart side walls 15 and a curved plate 16 which defines the bottom and rear wall of the bucket. The forward marginal edge of the bottom wall portion of the plate 16 is provided with a cutting edge 17. A pair of flanges 18 are secured to the rear side of the bucket in a spaced-apart relationship to each other transversely of the bucket for mounting of the bucket on the boom and for connecting of the bucket to the links 13. Pins 20 mounted through the flanges 18 and the end of the boom 12 pivotally carry the bucket on the forward end of the boom 12. The forward marginal edges of the side walls 15 are curved, and that curvature is traced by a portion of a circle having its center at the axis of the pins 27 which are secured to the side walls 15 of the bucket in the lower rearward portion thereof and extend outwardly therefrom. The links 13 are pivotally connected at their forward ends to the flanges 18 by pins 21. Pins 21 are disposed substantially vertically above the pins 20 when the bucket is in the ground-level digging position. With the above-described arrangement, the links 13 may be moved to pivot the bucket rearwardly toward the tractor about the axis of pins 20 through an angle of approximately 40°, which position is shown in FIGURES 2 and 3. The angle between the bottom wall and rear wall of the bucket is approximately 40° so that when the bucket is tilted from the ground level digging position to the breakout or carrying position as shown in FIGURES 2 and 3, the rear wall of the bucket is substantially vertically positioned, the open side of the bucket is disposed upwardly, and the marginal edge of the cutting edge 17 is disposed below the upper marginal edge of the back wall of the bucket. In digging a free-flowing granulated material, the bucket is positioned in the ground level digging position, and the tractor is then moved forwardly, causing the cutting edge 17 and the side walls 15 of the bucket to be forced into the material. As the bucket is forced into the material, the links 13 are operated to pivot the bucket rearwardly to the position shown in FIGURE 2. This scooping action of the bucket as it is moved forwardly and tilted rearwardly results in a substantially heaped bucket.

The load striking and maintaining element 24 comprises a pair of lever arms 25 and a crossmember 26. The crossmember 26 includes a striker blade 26a, forward retaining and upward retaining walls 26b and 26c, and side retaining members 26d. The members 26a, 26b, and 26c may be formed as a single plate which is somewhat U- or V-shaped as shown in the drawing, with the side members 26d secured one at each end of the members 26a, 26b, and 26c by some means such as welding.

The levers 25 are secured one at each end of the crossmember 26 by any means such as bolts or welding, and the levers 25 are spaced apart a distance slightly more than the width of the bucket. The levers 25 are provided with webs 25a and 25b which serve to reinforce and strengthen the levers. The levers 25 are formed at their lower ends somewhat as bellcranks, with the junction of the legs of the bellcranks being journaled on pins 27. The pins 27 are securely carried on the side walls 15 of the bucket by brackets 28. The lower ends of the legs of levers 25 extend rearwardly of the rearward side of the bucket and at their ends are each pivotally connected to one end of a link 30. The other end of each link 30 is pivotally connected to one end of a bellcrank 31 by pivotal mounting means 32. The junctions of the legs of the bellcranks 31 are each journaled on pins 35. Pins 35 are secured to the rear wall of the bucket to extend outwardly therefrom by brackets 36. The pins 35 and brackets 36 are positioned in a spaced-apart relationship to each other transversely of the rear wall of the bucket. The other end of each

bellcrank 31 is pivotally connected by pin means 37 to one end of a hydraulic ram 38. The head end of the hydraulic cam 38 is connected to one of the levers 31, with the rod end thereof connected to the end of the other of the levers 31. With this arrangement, the ram 38 is carried in a somewhat floating position between the levers 31.

Suitable hydraulic fluid pump, reservoir, valve and conduit means (not shown) are provided for the operation of the hydraulic ram 38.

In the operation of the subject invention, it may be seen that when the hydraulic ram 38 is completely retracted, the ends of the levers 31 connected thereto are at a position of minimum spacing therebetween and the other ends of the levers 31 are in their downwardmost position. With the levers 31 in this position, the links 30 are disposed in their downwardmost position with the result that the striker element 25 is positioned with the crossmember 26 thereof adjacent the upper end of the rear wall of the bucket. Extension of the hydraulic ram 38 will cause levers 31 to be pivoted so that the links 30 are drawn upwardly and the striker element 25 will be pivoted about pins 27 over the open side of the bucket to the cutting edge thereof such as shown in FIGURE 3. Thus it may be seen that by appropriate selective operations of the hydraulic ram 38, excess loads of a free-flowing material may be swept from the bucket while in the pile of material. The load may then be transported to a remote location with the increased volume of the bucket in the carrying position preventing substantially no loss of the load during transport. It may further be seen that during all of the various operations of the subject invention, the hydraulic ram 38 is protected from any accidental damage.

Having described the invention what is considered new and desired to be protected by Letters Patent is:

1. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and a rear wall, pivotal mounting means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom, a load striking and maintaining member comprising a crossmember having one end of each of a pair of levers secured to each end thereof, said crossmember having a length substantially equal to the distance between said side walls of said bucket, the other end of each of said levers being formed as a bellcrank, means mounting each of said levers at the junction of the legs thereof on the side walls of said bucket adjacent the lower rear portion thereof for pivotal movement of said levers to sweep said crossmember over the open side of said bucket, said crossmember having a shape such that the lower edge thereof will strike off the upper surface of a load in said bucket below the marginal edges of said side walls when said levers are pivoted and will maintain substantially the remaining load of a free-flowing material within said bucket when said bucket is carried and shaken in the load carrying position, linkage and leverage means carried on the rear wall of said bucket and operatively connected to the outer end of each of said other legs of said pair of levers, said linkage and leverage means including a hydraulic ram operable to operate said linkage and leverage means to pivot said pair of levers to move said crossmember over the open side of said bucket.

2. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and rear wall, means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom so that said bucket is movable from a horizontal digging position to a certain carrying position wherein the open side of the bucket is disposed substantially upwardly, a load striking and maintaining member comprising a pair of levers interconnected by a crossmember, said crossmember having

5

a length substantially equal to the distance between said side walls of said bucket, each of said levers pivotally mounted intermediate the ends thereof on said bucket for pivotal movement of said levers to carry said crossmember over the open side of said bucket, said crossmember having a shape such that the lower edge thereof will strike off the upper surface of a load immediately below the marginal edges of said side walls when said levers are pivoted and further having a shape which in cooperation with the walls of the bucket will retain substantially the remaining load of a free-flowing material within said bucket when said bucket is carried and shaken in said certain carrying position, means for pivoting said levers comprising a pair of bellcranks pivotally carried on the rear wall of said bucket in a spaced-apart relationship to each other, a hydraulic ram, means pivotally connecting each end of said hydraulic ram to one end of one leg of each of said bellcranks, a pair of links, means pivotally connecting each of said links between the outer end of the other leg of each of said bellcranks and the ends of said pair of levers.

3. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and a rear wall, a cutting edge carried on the forward marginal edge of said bottom wall, means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom so that said bucket is movable from a horizontal digging position to a certain load carrying position whereby the open side of the bucket is disposed substantially upwardly, a load striking and maintaining member comprising a pair of levers interconnected by a crossmember, said crossmember having a length substantially equal to the distance between said side walls of said bucket, each of said levers pivotally mounted intermediate the ends thereof on said bucket for pivotal movement of said levers to carry said crossmember over the open side of said bucket from the upper marginal edge of said rear wall to and in engagement with said cutting edge, said crossmember having a shape such that the lower edge thereof will strike off the upper surface of a heaped load in said bucket immediately below the marginal edges of said side walls when said levers are pivoted and further having a shape which in cooperation with said cutting edge will increase the volume of said bucket to retain substantially the remaining load of a free-flowing material within said bucket when said bucket is carried and shaken in said certain carrying position, lever and linkage means carried on the rear wall of said bucket and pivotally connected to the lower end of each of said levers, said lever and linkage means including a hydraulic ram for pivoting said pair of levers to carry said crossmember over the open side of said bucket.

4. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and rear wall, means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom so that said bucket is movable from a horizontal digging position to a certain load carrying position wherein the open side of the bucket is disposed substantially upwardly, a load striking and maintaining member comprising a pair of levers interconnected by a crossmember, said crossmember having a length substantially equal to the distance between said side walls of said bucket, each of said levers pivotally mounted intermediate the ends thereof on said bucket for pivotal movement of said levers to carry said crossmember over the open side of said bucket, the forward marginal edges of said side walls being formed to have a curvature substantially equal to that of a portion of a circle traced therethrough and having its center at the pivotal axis of said levers on said side walls, said crossmember having a shape such that the lower end thereof will strike off the upper surface of a heaped load in said bucket immediately below the curved marginal edges of

6

said side walls when said levers are pivoted and further having a shape which in cooperation with the walls of the bucket will retain substantially the remaining load of a free-flowing material within said bucket when said bucket is carried and shaken in said certain load carrying position, a pair of linkage and leverage arrangements, each linkage and leverage arrangement of said pair of linkage and leverage arrangements carried on the rear wall of said bucket and connected to the lower end of one of said levers of said pair of levers, power means connected between said pair of linkage and leverage arrangements for simultaneously operating each of said linkage and leverage arrangements to pivot said pair of levers to move said crossmember over the open side of said bucket.

5. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and a rear wall, a cutting edge carried on the forward marginal edge of said bottom wall, means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom so that said bucket is movable from a horizontal digging position to a certain load carrying position whereby the open side of the bucket is disposed substantially upwardly, a load striking and maintaining member comprising a pair of levers interconnected by a crossmember, said crossmember having a length substantially equal to the distance between said side walls of said bucket, each of said levers being formed as a bellcrank with one end of each of said levers connected to said crossmember, means pivotally carrying each of said levers at the junction of the legs thereof on the side walls of said bucket adjacent the lower rearward portion thereof for pivotal movement of said levers to carry said crossmember over the open side of said bucket between the upper marginal edge of said rear wall and said cutting edge, the forward marginal edges of said side walls being formed to have a curvature substantially equal to that of a portion of a circle traced therethrough and having its center at the pivotal axis of said levers on said side walls of said bucket, said crossmember having a shape such that the lower edge thereof will strike off the upper surface of a heaped load in said bucket immediately below the curved marginal edges of said side walls when said levers are pivoted and further having a shape which in cooperation with said cutting edge will increase the volume of said bucket to retain substantially the remaining load of a free-flowing material within said bucket when said bucket is carried and shaken in said certain load carrying position, a pair of linkage and leverage arrangements, each of said linkage and leverage arrangements pivotally carried on the rear wall of said bucket and connected at one end thereof to the outer end of the other leg of one of said levers, a hydraulic ram, means pivotally connecting the head end of said hydraulic ram to the other end of one of said linkage and leverage arrangements, means pivotally connecting the rod end of said hydraulic ram to the other end of the other of said linkage and leverage arrangements so that said pair of levers are pivoted responsive to extensions and retractions of said hydraulic ram.

6. In a bucket construction for a tractor loader having a boom, comprising a pair of spaced-apart side walls interconnected by a bottom and a rear wall, a cutting edge carried on the forward marginal edge of said bottom wall, means formed on the rear wall of said bucket for pivotally carrying said bucket on the forward end of the boom so that said bucket is movable from a horizontal digging position to a certain load carrying position wherein the open side of the bucket is disposed substantially upwardly, a load striking and maintaining member comprising a pair of levers interconnected by a crossmember, said crossmember having a length substantially equal to the distance between said side walls of said bucket, each of said levers being formed as a bellcrank with one leg thereof of substantially longer than the other leg thereof, the

outer end of said one leg of each of said levers being connected to said crossmember, means pivotally mounting each of said levers at the junction of the legs thereof on the side walls of said bucket adjacent the lower rearward portion thereof for pivotal movement of said levers to carry said crossmember over the open side of said bucket, the forward marginal edges of said sidewalls being formed to have a curvature substantially equal to that of a portion of a circle traced therethrough and having its center at the pivotal axis of said levers on said bucket, said crossmember being V-shaped having one portion thereof extending below the marginal edges of said side walls so that said one portion will strike off the upper surface of a heaped load in said bucket immediately below the marginal edges of said side walls when said levers are pivoted, the remaining portions of said V-shaped crossmember being such that when said one portion engages said cutting edge of said bucket the volume of said bucket is increased to retain substantially the remaining load of a free-flowing material within said bucket and said crossmember when said bucket is carried and shaken in said certain load carrying position, a pair of links, means pivot-

ally connecting one end of each of said links to the outer end of the other of said legs of each of said pair of levers, a pair of bellcrank levers, means pivotally mounting each lever of said pair of bellcrank levers at the junction of the legs thereof on the rear wall of said bucket in a horizontally spaced-apart relationship to each other, means pivotally connecting the outer end of one leg of each of said pair of bellcrank levers to the other end of one of said links, a hydraulic ram, means pivotally connecting the head end of said hydraulic ram to the other leg of one lever of said pair of bellcrank levers, means pivotally connecting the rod end of said hydraulic ram to the outer end of the other leg of the other lever of said bellcrank levers, so that said crossmember is movable over the open side of said bucket responsive to the operation of said hydraulic ram.

References Cited in the file of this patent

UNITED STATES PATENTS

20	2,307,933	Le Bleu	Jan. 12, 1943
	2,322,458	Le Bleu	June 22, 1943
	2,864,183	Ryan	Dec. 26, 1958