Nov. 5, 1963 H. J. VOS 3,109,248

BUCKET GRADER ATTACHMENT

Filed Nov. 15, 1961

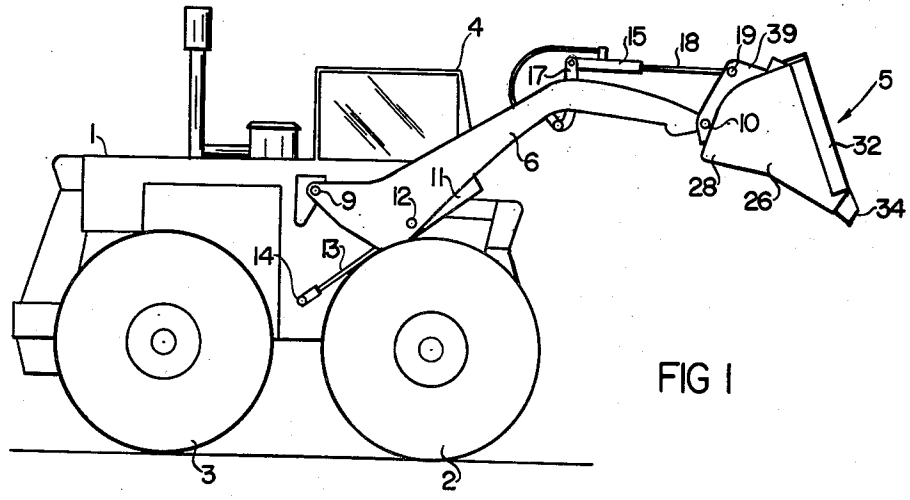


FIG 1

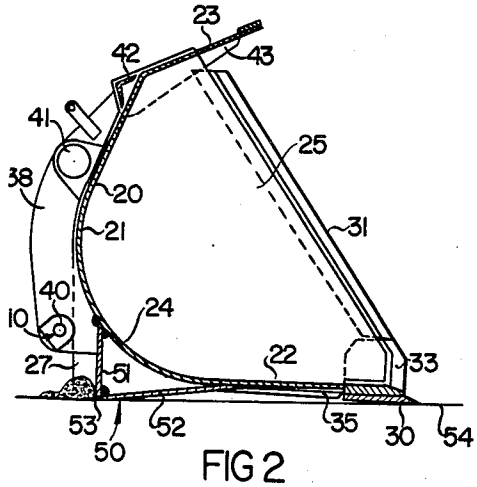


FIG 2

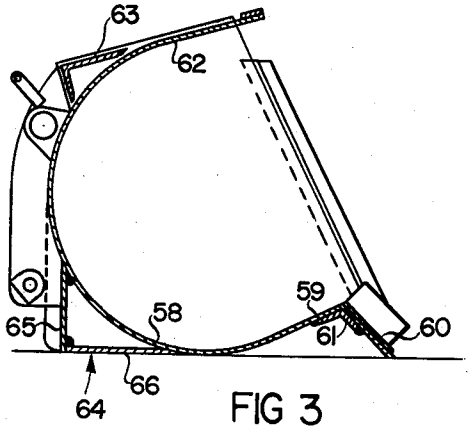


FIG 3

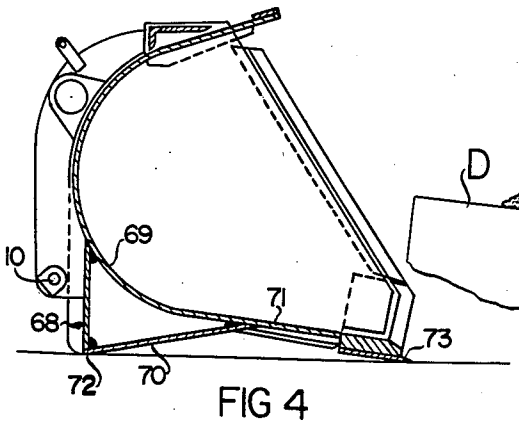


FIG 4

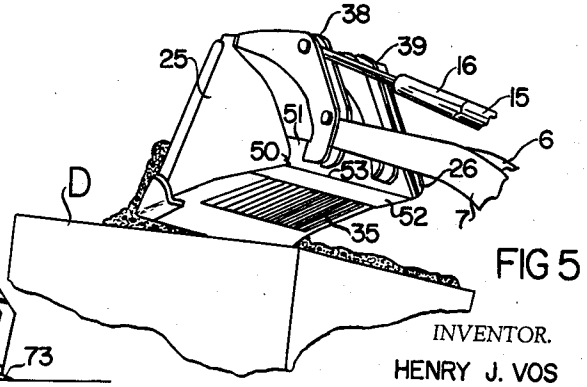


FIG 5

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BUCKET GRADER ATTACHMENT

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This invention relates generally, as indicated, to a bucket grader attachment and more particularly to a front end loader type bucket provided with a specially constructed heel which will facilitate the use of the bucket as a grading tool.

Earth moving and lifting buckets on front end loaders conventionally comprise a curved back wall which joins a substantially straight bottom wall, with the bottom wall terminating in a cutting blade or teeth along the bottom edge of the bucket. The side walls, of course, close the ends of the bucket to form a substantially V-shape trough-like container. The bucket is pivotally mounted on a tractor and as the tractor is driven forward, the cutting blade is caused to engage the material and fill the bucket. It is, however, difficult to employ the bucket as a grader to smooth or level a surface in that the rounded back portion of the bucket will not move earth ahead of it as the tractor is moved rearwardly and if the tractor is moved forwardly the cutting blade will be caused to engage the surface biting into the earth and removing material from the desired grade.

It is accordingly a principal object of the present invention to provide an earth moving bucket which can be employed as a grader in either direction of movement of the tractor.

A further important object is the provision of a bucket heel for a front end loader bucket which acts as a shoe to help control the cutting edge for forward grading.

It is another object to provide a strengthened front end loader bucket which will have a double thickness bottom portion thus helping to keep the bucket from freezing.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:

FIG. 1 is a side elevation of a front end loader employing a bucket in accordance with the present invention;

FIG. 2 is a transverse section of such bucket on an enlarged scale;

FIG. 3 is a similar transverse section of a modified form of bucket;

FIG. 4 is a transverse section of a still further modification of the present invention; and

FIG. 5 is a fragmentary perspective view of such bucket in operation.

Referring now to the annexed drawing and more particularly to FIG. 1, the bucket of the present invention may be employed with a front end loader which may comprise a tractor 1 having pairs of front and rear wheels 2 and 3, all of which are engine-driven and of which the rear wheels 3 may be the steering wheels actuated by the steering wheel provided in the operator's cab 4. The scoop or bucket 5 is mounted on a pair of generally S-shape arms 6 and 7, these arms or booms 6 and 7 have their proximal ends pivotally connected to the sides of the tractor as shown at 9 and their distal ends pivotally connected to the back of the scoop 5 as shown at 10. Piston-cylinder assemblies 11 for each of the booms are pivoted thereto as shown at 12 and the rods 13 thereof are pivoted to the sides of the tractor as shown at 14. In this manner, the piston-cylinder assemblies may be employed to raise and lower the booms about the pivots 9 thus to raise and lower the bucket or scoop 5.

In order to tilt or pivot the bucket or scoop about the pivots 10 on the ends of the booms 6 and 7, there are provided piston-cylinder assemblies 15 and 16 which have their blind ends pivoted to links 17 mounted in the boom arms. The rods 18 of such piston-cylinder assemblies are also pivoted to the scoop as shown at 19 whereby extension or retraction of such piston-cylinder assemblies will pivot the scoop about the pivot 10. Reference may be had to the copending application of Bernard A. Kuhl, Serial No. 24,062, filed April 22, 1960, now Patent No. 3,076,571, entitled "Front End Loader," assigned to The Thew Shovel Company, of Lorain, Ohio, for a more complete disclosure of a tractor and front end loader arm assembly with which the present invention may be employed.

Referring now additionally to FIG. 2, it will be seen that the bucket or scoop 5 is comprised of a longitudinally extending plate 20 which forms the back wall 21 and the bottom wall 22. The back wall terminates in a forwardly inclined portion 23 which extends beyond the opening of the bucket to act as a shield to prevent material therein from tumbling back over the top edge of the bucket. The back wall and the bottom wall are joined by a uniformly curved portion 24 and the ends of the bucket are closed by end walls 25 and 26. Such end walls extend beyond the curved back wall portion 24 as shown at 27 and 28.

The bottom wall 22 terminates in a cutting blade 30 and the side walls 25 and 26 are also provided with cutting blades shown at 31 and 32. Additional cutting blades may be provided adjacent the horizontally extending cutting blade 30 as shown at 33 and 34. The bottom wall 22 may be provided with a series of wear plates 35 extending rearwardly of the cutting blade 30. There may, for example, be eight such wear plates. These serve not only to reinforce the bottom wall 22, but to protect the same from the constant abrasive action thereon resulting from the digging action of the bucket.

The back wall 21 of the bucket is provided with pairs of flanges 38 and 39 which receive the booms 6 and 7 as well as the piston rods 18 of the piston-cylinder assemblies 15 and 16. Aligned apertures 40 and 41 may be provided in such flanges to receive the pins providing the connections to the boom tips and the piston rods. Suitable reinforcing members may also be provided. The top of the wall 21 may be provided with a reinforcing angle iron as shown at 42 and suitable gusset plates 43 may also be provided.

The improvement of the present invention comprises a downwardly projecting heel shown at 50 extending along the curved wall portion 24 between the end plates 25 and 26 and more particularly between the extensions 27 and 28 thereof. The curved wall portion 24 which forms the apex between the back wall 21 and the bottom wall 22 may have welded to the back portion thereof a downwardly extending plate 51 which is secured to a substantially horizontally extending plate 52. The plates may be joined as by welding to form an apex or rather sharp point 53 which will contact the ground when the bucket is placed on a grade 54 in the position of FIG. 2. The substantially horizontally extending plate 52 may extend forwardly to the wear plates 35. Thus the plate 52 extends between the marginal bottom edges of the end plates 25 and 26 on a slightly inclined plane, whereas the rear vertically extending wall 51 will be slightly

inwardly spaced from the rear marginal edges of the end wall extensions 27 and 28. Heel 50 is then in the form of a hollow chamber of the substantially triangular sectional configuration shown which extends along the entire bottom surface 24 of the bucket presenting a downwardly extending ground engaging portion 53 which, together with the cutting blade 30, will support the bottom wall 22 and the wear plates 35 secured thereto above the grade 54. When the bucket is thus positioned on the grade 54, the heel 50 will maintain the cutting blade 30 extending inclined downwardly and as the tractor is moved forwardly, the cutting blade 30 will be caused to dig into the grade 54 much more readily. It will also be seen that the hollow chamber provides an air insulation for the curved wall 24 of the bucket and in this manner, the bucket will be kept from freezing. Frictional contact of the bottom plate 52 with the grade will cause the air within the chamber to heat thus maintaining the temperature of the air within the chamber sufficiently high to avoid freezing. The heel 50 can also serve as a rear grader with the front blade 30 serving as a shoe or heel for the rear grading. Thus when the tractor is moved rearwardly, the edge 53 and the wall 51 will engage the grade and serve as a grading tool. The heel 50 can also be used as a fine grading tool in a forward direction by lowering the heel a couple of inches below the cutting edge 30 by means of the piston-cylinder assemblies 15, 16. The heel also raises the normal position of the pivot 10 from the grade 54 and in this manner, the present bucket construction allows the use of larger tires 2 and 3 than would normally be required without changing the arm structures 6 and 7. The larger tires, of course, give more dump height.

Referring now to FIG. 3, there is shown an embodiment of the present invention wherein the heel is applied to a front end loader bucket of the type having a curved bottom wall 58, the leading edge of which is planar as shown at 59 and which terminates in a downwardly extending cutting edge 60. An angle iron 61 may be positioned between the cutting blade 60 and the wall 58 for reinforcing purposes. The top of the wall 58 curves upwardly over the top of the bucket as shown at 62 and a reinforcing angle iron 63 may be provided. The heel 64 comprised of the vertically extending wall 65 and the substantially horizontally extending wall 66 forms a hollow reinforcing chamber at the back of the bucket. Such heel extending between the end walls of the bucket may serve as a back grader attachment wherein the wall 65 would be employed to grade the earth as the tractor is moved rearwardly. Moreover, the horizontal wall 66 will tend to maintain the bucket in its position shown to resist pivoting in a counterclockwise direction as the material contacts the leading edge of the downwardly extending blade 60. Again, by raising the blade, the heel may serve as a forward grading tool.

FIG. 4 illustrates a further modification of the present invention quite similar to that shown in FIG. 2, wherein a larger size heel attachment is provided. Here the vertically extending plate 68 is welded or otherwise suitably secured to the curved rear wall 69 of the bucket and the bottom wall 70 is similarly secured to the bottom wall 71 of the bucket. The apex 72 of the triangular chamber between the end walls of the bucket extends substantially below the bottom wall 71 and, of course, substantially below the pivot 10. An attachment of this type may be employed wherein it is desired to have a substantial downward inclination to the cutting blade 73 when forward grading or digging.

It can now be seen that the attachment of the present invention can readily be applied to the rear wall of the conventional bucket to provide a downwardly projecting heel which will serve as a grade contacting supporting shoe for the bucket properly to incline and position the forward or leading cutting blade. The heel also serves as a grading attachment for fine rear and forward grading. In addition, the attachment reinforces the bucket wall and provides a hollow insulating chamber to prevent freezing of contents within the bucket. Also, it is noted that in all of the embodiments illustrated, the bottom of the bucket is provided with a downwardly opening relatively shallow inverted V-shape trough which can be employed to shape and compact the load once it has been positioned on the dump truck D as seen in FIG. 5. Spillage from dump trucks on city streets is a constant problem and with the front end loader bucket of the present invention, it is possible for the operator more correctly to place and compact the load in the dump truck body.

It can now be seen that there is provided a bucket grader attachment which greatly enlarges the use of a front end loader and improves the operation thereof.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. An earth moving bucket for a tractor loader comprising a curved back wall constituting a continuation of a substantially straight bottom wall which terminates in a digging blade along the bottom edge of the bucket, end walls closing the ends of said bucket forming a V-shape trough-like container; a V-shape hollow heel secured to the back of said bucket at the juncture between said back wall and said bottom wall and extending the length of said bucket between said end walls, said V-shape hollow heel comprising a substantially vertically extending back plate secured along its top edge to said back wall, and a slightly upwardly inclined bottom plate secured along its bottom edge to the bottom edge of said back plate to form the apex of said heel and secured along its top edge to said bottom wall, the apex of said heel thus extending beneath said bottom wall to provide a heel support for said bucket, said end walls of said bucket extending beyond said back and bottom walls to close the ends of said heel to provide an enclosed chamber beneath said bucket.

2. A bucket as set forth in claim 1 including wear plates mounted on said bottom wall between said bottom plate and said cutting edge cooperating with said bottom plate to form a shallow inverted V-shape bottom surface on said bucket adapted to shape and compact loads.

3. An earth moving bucket for a tractor loader comprising a back wall and a bottom wall, said bottom wall terminating in a digging edge, end walls closing the ends of said bucket to form a V-shape trough-like container; a V-shape hollow heel secured to the back of said bucket at the juncture between said back wall and said bottom wall and extending the length of said bucket between said end walls, said V-shape hollow heel comprising a substantially vertically extending back plate secured along its top edge to said back wall, and a slightly upwardly inclined bottom plate secured along its bottom edge to the bottom edge of said back plate to form the apex of said heel and secured along its top edge to said bottom wall, said back plate thus extending downwardly at the rear of said bucket to serve as a back grading blade, and said inclined bottom plate serving as a front grading blade when said bucket is tilted backwardly, the apex of said heel extending beneath said bottom wall to provide a heel support for said bucket, said end walls of said bucket extending beyond said back and bottom walls to close the ends of said heel to provide an enclosed chamber beneath said bucket.

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