United States Patent

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[54] **BUCKET ATTACHMENT FOR FRONT END LOADERS**
9 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **214/767,** 214/145, 37/117.5
[51] **Int. Cl.** **E02f 3/70**
[50] **Field of Search** 214/767, 145, 620, 740; 37/117.5

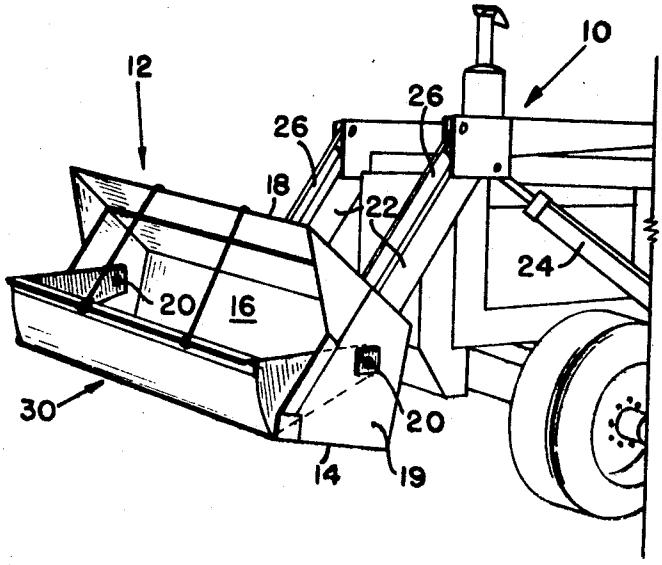
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ABSTRACT: A curved plate extending the width of the bucket is relatively fixed with respect to the boom so that as the bucket is rotated the size of the opening between the bucket and plate can be varied to control the rate of flow of material from the bucket. A funneling mechanism directs the material dispensed from the bucket to a restricted material discharge opening.



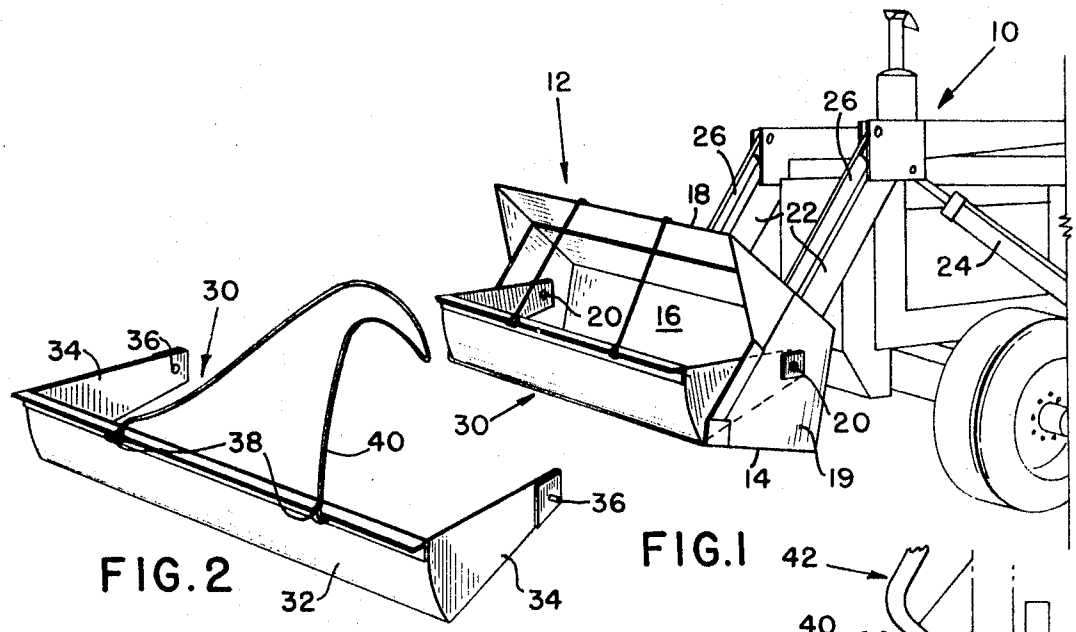


FIG. 2

FIG. 1

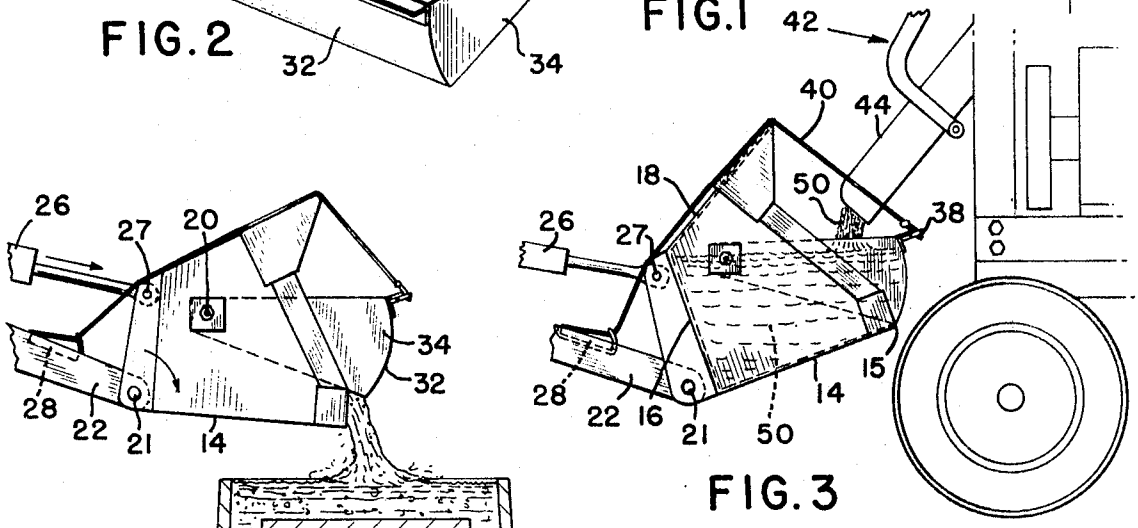


FIG. 3

FIG. 4

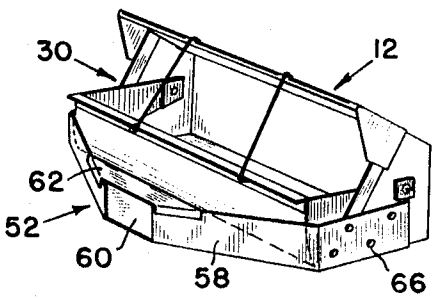


FIG. 6

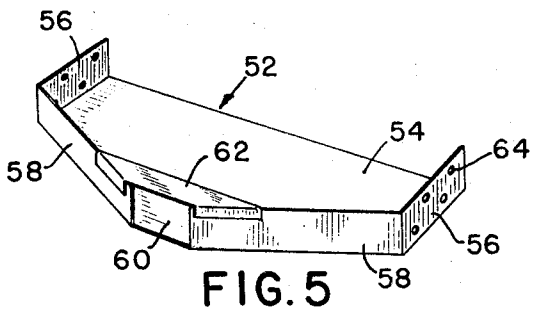


FIG. 5

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BUCKET ATTACHMENT FOR FRONT END LOADERS

BACKGROUND OF THE INVENTION

This invention relates generally to front end-type tractor loaders and more specifically to an improved multiple functioning bucket arrangement having means for controlling the flow of material as it is discharged from the bucket to a desired location.

It has become increasingly necessary to provide loader arrangements which will, in addition to the well-known digging and loading functions, perform other desirable functions to increase the versatility of the machines.

In the handling of concrete or other free flowing granulated materials with conventional front end loader buckets, such as are well known in the art, a serious problem is encountered in spillage of the material from the bucket. First, 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 bucket is generally considerably below the upper edge of the top wall of the bucket, so that during transport of a filled bucket to a remote location spillage occurs. Further, additional spillage occurs as the free flowing material is discharged from the bucket since the operator has very limited control over the direction or rate of flow of the material as it leaves the bucket. This results in a loss of material portion of the load and as a consequence results in an increase of cost of material moving operations.

SUMMARY OF THE INVENTION

The improved bucket is constructed to have sidewalls spaced apart by bottom, rear, and top walls. The bottom wall is provided with a conventional cutting edge. The bucket is pivotally mounted on a boom, and a conventional linkage arrangement is provided for pivoting the bucket relative to the boom. Means are also provided for raising and lowering the boom. A somewhat U-shaped attachment is pivotally mounted to the sidewalls of the bucket. The crossmember of the U-shaped attachment is arcuate and extends the full width of the bucket between the sidewalls thereof. The lower edge of the arcuate crossmember is relatively fixed with respect to the boom and normally rests upon the bottom wall of the bucket adjacent the cutting edge. The crossmember increases the capacity of the bucket when in the load-carrying position and controls the rate of flow of material discharged from the bucket. Material is discharged by rotating the bucket with respect to the U-shaped attachment thereby regulating the opening between the bottom wall of the bucket and the lower edge of the attachment and controlling the flow of material. Since the crossmember is arcuate, it cooperates with the bottom wall of the bucket in a manner similar to a clam-shell action such that any material remaining in the bucket acts on the curved crossmember to cut off the flow of material as the bucket bottom wall is rotated back into engagement with the crossmember.

A funnel attachment, fixed to the bucket sidewalls, extends forwardly of and encloses the arcuate crossmember to guide and restrict the controlled flow of material from the bucket to a designated or restricted area. The attachment consists of a plate, extending beneath the bucket, including upstanding front walls forming an outlet or opening therebetween for confining the flow of the material discharged from the bucket. This funnel attachment substantially confines the material discharged from the bucket such that material can be deposited in small or limited areas.

It is a primary object of the invention to provide a bucket arrangement for a tractor for discharging concrete or other free flowing material therefrom in a controlled manner.

Another object of the invention is to provide a means to cut off or vary the rate of flow of material from the bucket.

A further object of this invention is to provide a means for transporting material such as concrete, gravel, sand, and other free flowing materials to designated areas inaccessible by trucks or other vehicles.

Another feature of the invention is to increase the load capacity of a bucket by reducing the opening between the bottom wall and the top wall of a bucket.

Still another feature of the invention is to uniformly mix concrete as it is released from the bucket, by discharging the material from the bottom or lower portion of the load within the bucket.

Another feature of the invention is to provide a funnel to confine the material to a restricted opening as it is discharged from the bucket such that material can be dispensed to areas of a limited size.

A further object of the invention is to provide a means for providing precise cutoff control of the material due to the clam-shell action of the bucket arrangement.

Yet another object of the invention is the provision of a front end loader attachment that is inexpensive, easily installed and readily operable in conjunction with a conventional bucket.

These and other objects of the present invention will become apparent to those skilled in the art from a consideration of the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a perspective view of a tractor mounted front-end-type loader, illustrating portions of the tractor, and showing the flow control attachment mounted on the bucket of the loader.

FIG. 2 is a perspective view of the bucket flow control attachment illustrating the substantially U-shaped construction.

FIG. 3 is a side view of the bucket and flow control attachment being filled with concrete from a mixer, and illustrating the increased carrying capacity of the bucket due to the attachment provided thereon.

FIG. 4 is a side view of the bucket and flow control attachment cooperating to provide a controlled discharge of concrete into a form.

FIG. 5 is a perspective view of a mechanism adapted to be mounted on the front portion of a bucket for funneling the material to an opening as it is discharged from the bucket.

FIG. 6 is a perspective view of a funnel attachment mounted on a bucket provided with the flow control attachment.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, the tractor **10** of the present invention is of the rubber-tired type. However, it is to be understood that the tractor may also be of the crawler type. A boom comprising a pair of arms **22** is pivotally connected, by suitable means, at one end thereof to the tractor **10**. Fluid rams **24**, only one of which has been shown, are pivotally connected between the tractor and the boom arms **22** for raising and lowering the boom arms in a vertical plane to selected positions. The bucket **12** is of a conventional type consisting of a flat bottom wall **14** having a cutting edge **15** on the forward portion thereof, a back or rear wall **16**, a top wall **18**, an end or sidewalls **19**. The bucket **12** is pivotally mounted on pins **21** at the end of the boom arms **22** adjacent the junction of the rear and bottom walls thereof. Fluid rams **26** are pivotally connected by pins **27** at one end to the bucket **12** adjacent the juncture of the upper and rear walls, and are connected at the other end to the tractor **10** by conventional means, not shown. The fluid rams **26** control the attitude of the bucket **12** by rotating the bucket about pivot pins **21**. A fluid control system, not shown, of a type which is well known to those skilled in the art, is provided for operation of the fluid rams **24, 26**. Selective extension and retraction of the rams **24** will, respectively, raise and lower the boom arms **22**. Similarly, retraction and extension of the rams **26** will, respectively, roll back and roll forward the bucket **12** relative to the boom arms **22**. Secured to and extending between the boom arms **22** is a bar or plate **28** located adjacent the ends of the arms **22** pivotally supporting the bucket **12**.

An auxiliary section 30 for increasing the load carrying capacity of the bucket and for controlling the flow rate of material from the bucket 12, is pivotally mounted to sidewalls 19 of the bucket, and normally rests upon the forward edge portion 15 of bottom wall 14.

Referring now to FIG. 2, the auxiliary section 30 consists of an arcuate crossmember 32 of a length to extend between the sidewalls 19 of bucket 12. A pair of arms 34 are secured to the arcuate member 32 at the ends thereof and pivotally secured by pin 36 to the bucket sidewalls 19. Suitable fastener means 20 pivotally secures the section 30 to the bucket 12. A cable section 40 having each of its ends secured to fasteners 38, mounted on arcuate member 32, is looped around bar 28 fixed between the boom arms 22, as most clearly shown in FIG. 4. By attaching the arcuate member 32 to the boom in this manner, the position of the member 32 remains relatively fixed or stable with respect to the boom arms 22, and material can be discharged from the bucket by rotating the bucket relatively to the arcuate member 32 and the boom arms 22. The flow of material can be controlled by varying the longitudinal opening formed between the member 32 and the wall 14 of the bucket by rotating the bucket a selected degree. FIG. 4 illustrates material 50 being dispensed from the bucket into a form 46 having a core 48 therein, by rotating the bucket about pivot 21, in the direction of the arrow, by rams 26 relatively to boom arms 22 and the member 32. When it is desirable to stop the flow of material from the bucket, it is only necessary to rotate the bucket, as shown by FIG. 4, in a counterclockwise direction by rams 26 to close the opening between the lower edge of arcuate member 32 in the forward edge 15 of bottom wall 14. The weight of the material remaining in the bucket directs a force against the inner concave surface of the member 32 thereby holding the member 32 steady as the bucket rotates toward the member 32 thus obtaining a clam-shell action between the arcuate member 32 and the wall 14.

Referring to FIG. 3, a conventional concrete mixer 42, having a discharge chute 44, is shown dispensing concrete into the bucket 12. The boom arms 22 have been properly positioned by rams 24 to present bucket 12 at the proper height to receive concrete in the mixer. The bucket has been rotated in a counterclockwise direction about pin 21 by rams 26 to move the edge 15 of wall 14 against the lower edge of arcuate member 32 thus providing a container for receiving the concrete. After the bucket has been filled, the tractor transports the concrete to areas inaccessible to conventional concrete mixers and deposits the same in designated areas. The weight of the concrete in the bucket applies a force to the curved member 32 to maintain the bucket and member in a closed relationship. In transporting concrete, the water and cement therein normally tend to rise to the top thereby varying the consistency throughout the bucket. If the transported concrete is dispensed from a conventional bucket, without the section 30, the water would be poured off first and the heavier solids would be later discharged. This creates a problem where one bucket of concrete is used to fill several different receptacles or forms. However, by utilizing the section 30, the concrete 50 is discharged from the bottom portion of the bucket in a uniform manner, as shown by FIG. 4, since the water flows downwardly through the solid parts as the concrete is being discharged.

In many instances, it is necessary to dispense concrete into molds having small apertures for receiving the concrete or into other restricted or confined areas having a length less than the length of the bucket. FIG. 5 illustrates a device 52 for funneling the concrete released from bucket 12 so as to discharge the same from a central opening 60.

The unitary funneling device 52 includes a flat plate 54 having a portion thereof positioned underneath the bottom wall 14 and a tapered, forwardly extending portion. Side plates 56, having openings 64 therein, are secured by suitable fastening means 66 to the outer portion of bucket wall 19. As shown by FIG. 5, upstanding walls 58, each having one end secured to a respective sidewall 56, extend forwardly with respect to the tractor in converging paths, to define a narrow opening 60 between the other ends of the wall 58. A plate member 62 is secured to the top portions of the walls 58 defining the opening 60. By mounting the auxiliary section 30 and the funneling device 52 on the bucket 12, as shown by FIG. 6, it is possible to accurately control the flow of material dispensed from the bucket and to divert the dispensed material to a restricted opening for discharging the material into limited or restricted areas.

From the foregoing description, it can be seen that the present invention provides attachments that can be readily and easily mounted on the bucket of a conventional front end loader and conveniently operated without requiring additional loader control means or by requiring modifications to existing loader controls. The attachments are rugged, simple in structure, highly efficient, and comparatively low in cost.

The invention may be embodied in other specific forms without departing from the spirit of the essential characteristics thereof. The present embodiments are, therefore, considered in all respects to be illustrative and not restrictive.

I claim:

1. In a front-end-type tractor loader having a movable boom, a bucket construction having bottom, back, and sidewalls, means for tilting said bucket relative to said boom, and flow control means extending lengthwise of said bucket for controlling the rate of flow of material dispensed from said bucket upon tilting of the bucket relative thereto, and means mounted on said tractor loader and secured to the flow control means stationarily positioning said flow control means with respect to said boom during tilting of the bucket.

2. The loader of claim 1, wherein said flow control means is positioned normally to engage said bottom wall of said bucket.

3. The loader of claim 2, wherein the material flow is controlled by variably tilting said bucket bottom wall with respect to said boom and from engagement with said flow control means.

4. The loader of claim 3, wherein said flow control means includes an arcuate crossmember having a concave inner surface cooperating with said bottom wall for providing a clam-shell action to cut off the flow of material being dispensed from said bucket.

5. The loader of claim 4, said means stationarily positioning said flow control means including a flexible member secured to said crossmember and said boom.

6. The loader of claim 5, and further including means for receiving and funneling material from said bucket to a limited discharge outlet.

7. The loader of claim 6, wherein said receiving and funneling means is detachably secured to said bucket sidewalls and extends forwardly of said flow control means.

8. The loader of claim 1, and further including means for funneling material discharged from said bucket to a localized discharge opening.

9. The loader of claim 8, wherein said funneling means includes a receiving plate and upstanding sidewalls secured thereto for confining the flow of material dispensed from said bucket to a limited discharge opening.