

April 30, 1968

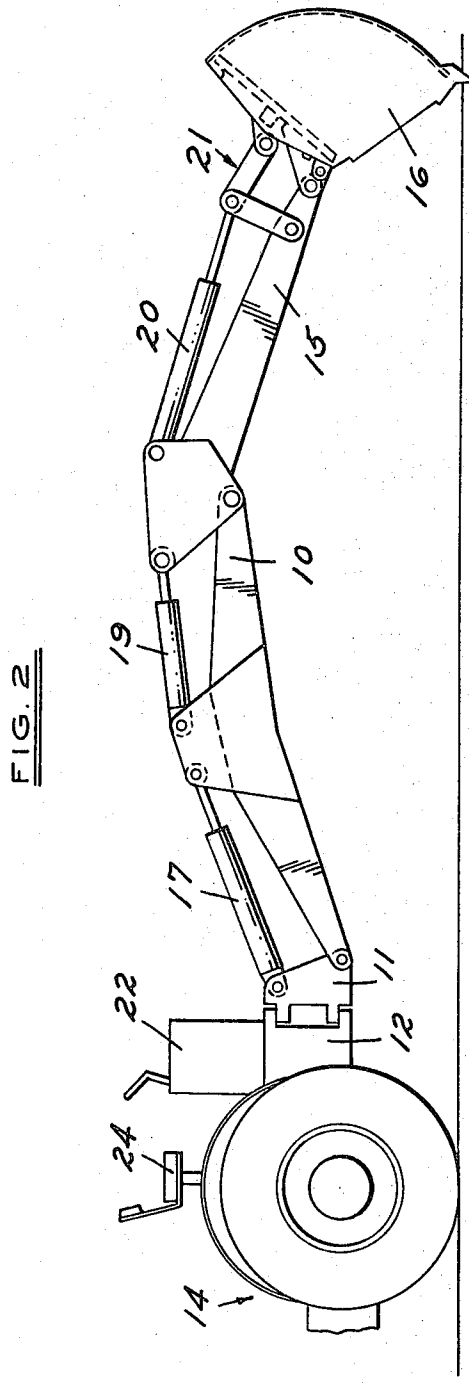
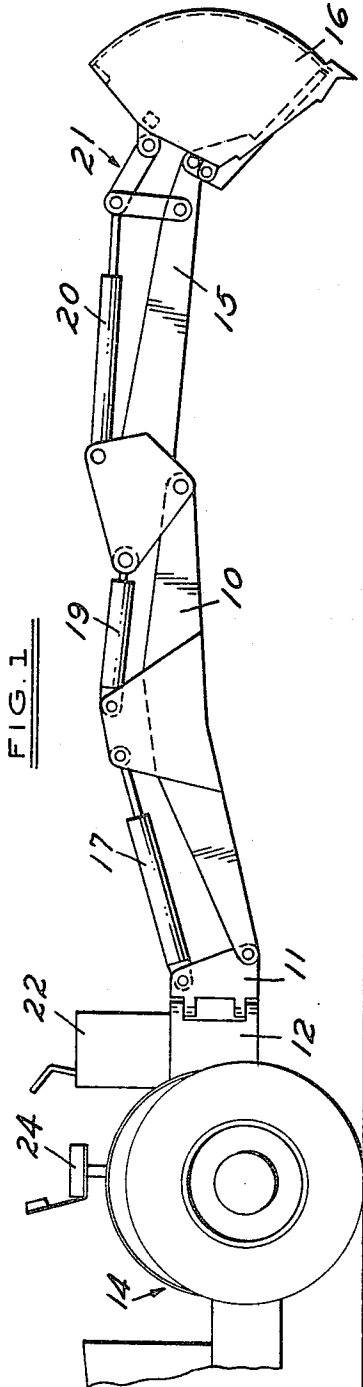
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3,380,604

BACKHOE BUCKET CONSTRUCTION

Filed July 28, 1966

3 Sheets-Sheet 1



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FIG. 3

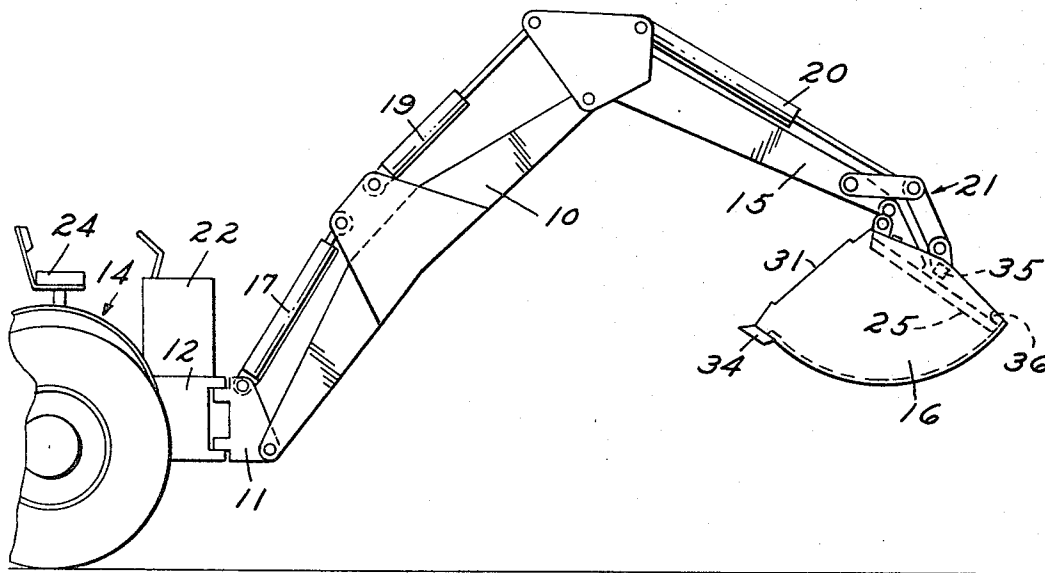
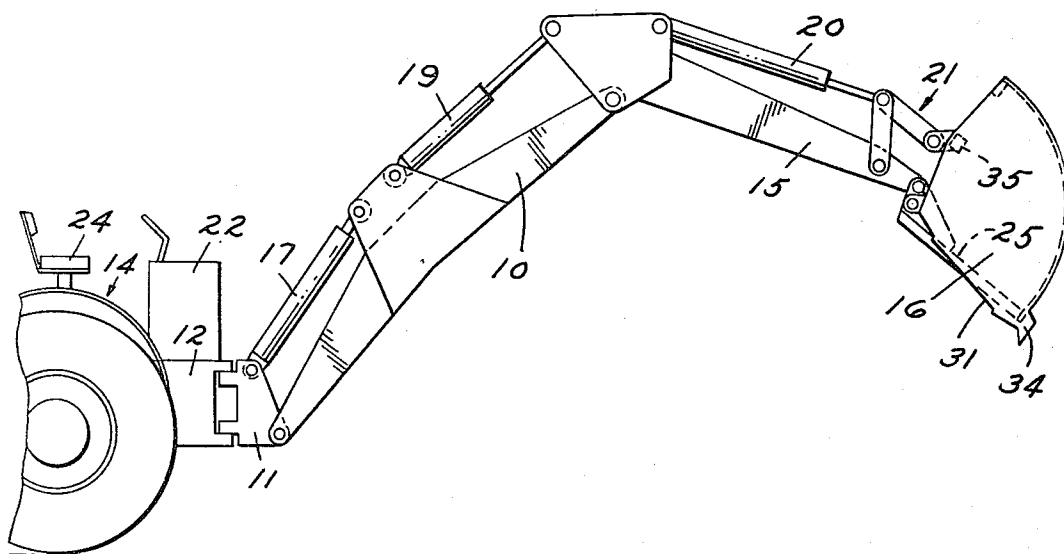


FIG. 4



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FIG. 5

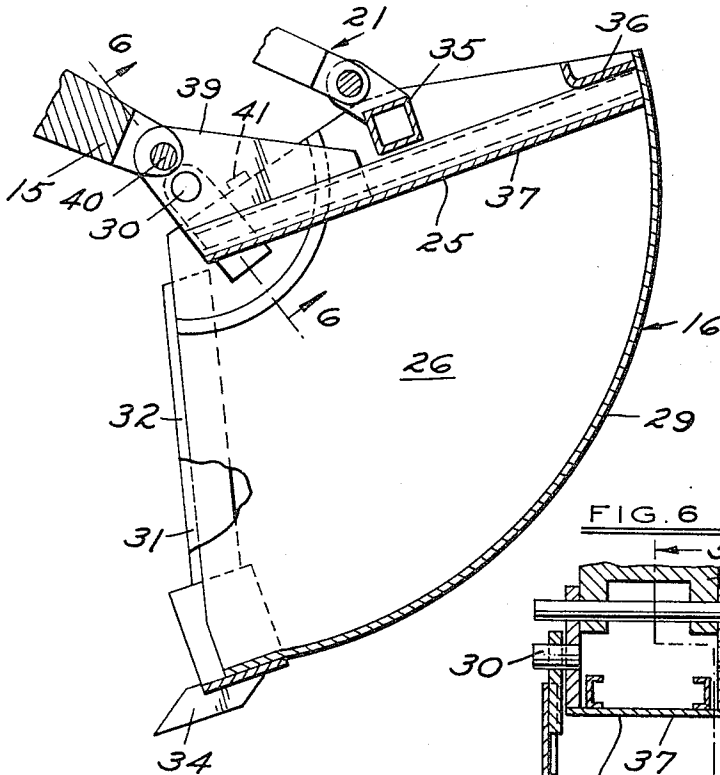


FIG. 6

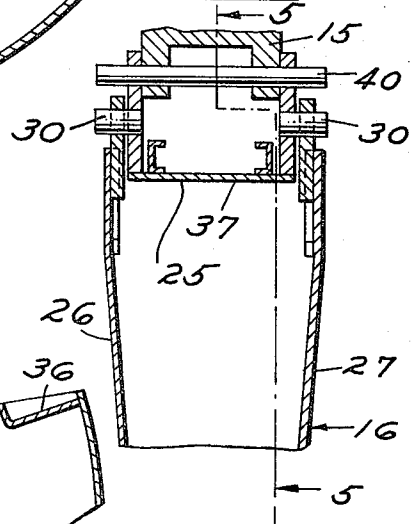
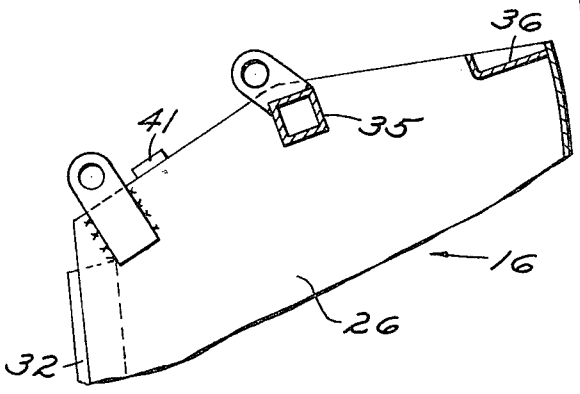


FIG. 7



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BACKHOE BUCKET CONSTRUCTION

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5 Claims. (Cl. 214-138)

ABSTRACT OF THE DISCLOSURE

A backhoe bucket is provided with an ejector which also serves to mount the bucket on the end of a dipstick for articulation about a pair of parallel axes. Upon moving the bucket to dump position, the weight of the bucket and contents causes the bucket to drop slightly, rotating the ejector to force material from the bucket.

This invention relates to backhoes and more particularly to ejector buckets for backhoes.

Backhoe buckets sometimes are provided with ejectors to aid in dumping the contents. Ejectors are of particular utility in digging clay and more sticky soils by use of relatively narrow buckets, in which the material tends to cling to the walls of the bucket instead of dumping when the bucket is inverted. Ejectors, which usually are power operated, comprise a member extending between the bucket sides and swingable about an axis at a corner of the bucket to sweep the bucket from rear to front upon dumping to dislodge any material tending to adhere to the bucket walls.

The ejector of the present invention is operated by the weight of the bucket and contents, which tend to force the ejector forwardly to sweep the interior of the bucket. This is accomplished by articulating the bucket on the end of the dipstick by a short link comprising an integral portion of the ejector. When the dipstick and bucket are positioned to dump the contents of the bucket, the weight of the bucket and contents serves to rotate the ejector about its connection to the end of the dipstick and thereby rotate it with respect to the dipstick and bucket and force it forwardly to sweep the volume of the bucket and dislodge any dirt tending to stick within the bucket.

Among the objects of the present invention are to provide an improved ejector for backhoe buckets which is operated by the weight of the bucket and its contents; to provide such a construction in which the ejector does not interfere with the digging cycle of the backhoe; to provide such a construction which is simple and durable; and generally to improve constructions of the type described.

Other objects, and objects relating to details and economies of construction will be more apparent from the detailed description to follow.

My invention is clearly defined in the appended claims. In the claims, as well as in the description, parts may at times be identified by specific names for clarity and convenience, but such nomenclature is to be understood as having the broadest meaning consistent with the context and with the concept of my invention as distinguished from the pertinent prior art. The best form in which I have contemplated applying my invention is illustrated in the accompanying drawings forming a part of this specification in which:

FIGURE 1 is a somewhat diagrammatic side elevation of a backhoe, showing the bucket and dipstick in position to commence the digging cycle. The rear portion of the tractor is shown.

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FIGURE 2 is a side elevation similar to FIGURE 1, the digging cycle having been commenced.

FIGURE 3 is a side elevation similar to FIGURE 1, the boom and dipstick being positioned for dumping and the bucket still being closed.

FIGURE 4 is a view similar to FIGURE 3, the bucket being shown in open, dump position.

FIGURE 5 is an enlarged vertical cross section of the bucket taken along the line 5-5 of FIGURE 6, the ejector and portions of the dipstick and bucket operating linkage being shown in side elevation.

FIGURE 6 is a transverse section of the bucket, ejector and dipstick, taken generally along the line 6-6 of FIGURE 5.

FIGURE 7 is a fragmentary vertical section of the bucket, showing details of construction.

Referring now to the drawings, the backhoe to which the ejector bucket construction of the present invention is applied is more or less conventional, comprising a boom 10 which is pivotally mounted for vertical swinging movement on a swing frame 11 mounted for horizontal swinging movement on a main frame 12 mounted on a tractor 14. A dipstick 15 is pivotally mounted for vertical swinging movement on the outer end portion of the boom 10 and a bucket 16 is mounted for vertical swinging movement on the outer end of the dipstick 15.

A boom lift cylinder 17 extends between the swing frame 11 and a portion of the boom 10 to raise and lower the boom. A crowd cylinder 19 extends between a portion of the boom and the dipstick 15 to swing the dipstick about its pivotal connection on the boom. A bucket cylinder 20 extends between a portion of the dipstick 15 and a linkage 21 consisting of a portion of a four-bar linkage 21 for swinging the bucket 16 about its pivotal connection on the dipstick. All of these cylinders are double-acting hydraulic cylinders and are controlled by a bank of hydraulic control valves contained within a control console 22 positioned adjacent an operator's seat 24 on the tractor 14.

In operation, the boom 10 and dipstick 15 are extended as indicated in FIGURE 1 to commence the digging stroke. Then by swinging the dipstick towards the operator (crowding), the bucket 16 is engaged with the ground for the digging stroke. As the digging stroke progresses, the bucket cylinder 20 may be operated to swing the bucket towards the operator (close the bucket) in order to relieve any overload in the hydraulic circuitry to the crowd cylinder 19. If curling the bucket does not relieve the overload, as evidenced by continued blowing of a pressure relief valve (not shown), the lift cylinder 17 may be actuated to lift the boom slightly and relieve the overload.

As the bucket 16 is being filled, it is rotated to closed position as indicated generally in FIGURE 3. When the bucket is filled, the lift cylinder 17 is actuated to lift the dipstick 15 and bucket from the excavation, the boom 10, dipstick and bucket being generally in the position indicated in FIGURE 3, after which the backhoe may be swung to one side or the other of the excavation and the bucket rotated away from the operator (opened) to dump the contents of the bucket, after which the digging stroke is again repeated. The backhoe construction and operation described immediately above are conventional.

When digging clay and other sticky soils, particularly when using a relatively narrow width bucket, difficulty often is encountered with dirt failing to drop from the bucket when the bucket is opened for dumping, as in FIGURE 4. According to the present invention, an ejector 25 is pivoted to sweep the volume of the bucket

as the bucket is opened and push before it any dirt tending to adhere to the inner surfaces of the bucket. The ejector and bucket will now be described in detail.

The bucket 16 comprises a pair of side walls 26 and 27 connected by an arcuate bottom wall 29. The bottom wall 29 preferably lies along an arc extending about a bucket axis 30 as a center. Cutting lips 31 and 32 are provided along the leading edge of the bucket side walls 26 and 27, and bucket teeth 34 are provided along the leading edge of the bottom wall 29. The side walls 26 and 27 of the bucket are connected by cross braces 35 and 36 at the rear of the bucket.

An ejector 37 is mounted for swinging movement on the bucket axis 30, which is located adjacent the upper front corner of the bucket 16. The ejector 37 extends between the side walls 26 and 27 of the bucket so as to sweep the volume of the bucket and may comprise a relatively flat plate spanning between the bucket walls or a V-shaped member lying adjacent the bucket walls, as is well known in the art. The braces 35 and 36 limit rearward swinging movement of the ejector 37 and the ejector when in rearward position forms the rear wall of the bucket (see FIGURE 5). When swung forwardly, the ejector 37 lies generally along the front edge of the bucket.

The ejector 37 is provided with a projecting portion 39 extending from the top of the bucket when the ejector is swung rearwardly (see FIGURE 5). The portion 39 is provided with a horizontal transverse axis 40 for mounting the ejector for pivotal movement on the end of the dipstick 15. The ejector axis 40 and the bucket axis 30 are relatively closely spaced and the projecting portion 39 of the ejector provides a short link whereby the bucket 16 is articulated for vertical swinging movement about the outer end of the dipstick 15. In the form shown, a plane passed through the axes 30 and 40 lies at an angle approaching the perpendicular to the general plane of the ejector 37. This angle and the distance between the axes 30 and 40 may be varied if desired to increase or decrease the force available for swinging the ejector 37 forwardly during the dumping operation.

The bucket cylinder 20 operating through the bucket operating linkage 21, which is pivoted to the outer portion of the dipstick and to the bucket 16, serves to swing the bucket in a vertical plane about the axes 30 and 40. The links 21, the portions of the bucket and dipstick between the attaching points of the linkage 21 and the axes 30 and 40, respectively, and the projecting portion 39 of the ejector between the axes form a five-bar bucket operating linkage for articulating the bucket on the end of the dipstick and swinging it vertically. This operating linkage is unstable, and when the bucket is positioned for digging as shown in FIGURE 1, the ejector 25 will be swing forwardly within the bucket, the ejector axle 40 resting against pads 41 on the upper edge of the bucket side wall 26 and 27. Upon engagement of the bucket with the ground as indicated in FIGURE 2, the reaction to the digging effort will tend to cause the bucket to rise relative to the dipstick, swinging the ejector 25 to the rear of the bucket where it will remain during the rest of the digging cycle and while the bucket is maintained in a closed position and the backhoe swung for dumping (see FIGURE 3). Upon the bucket being moved to open position by operation of the cylinder 20, the combined weight of the bucket 16, ejec-

tor 25 and bucket contents will tend to drop the bucket relative to the end of the dipstick 15, the bucket axis 30 moving to a position generally beneath the ejector axis 40 and swinging the ejector 25 forwardly to sweep the volume of the bucket and dislodge any dirt tending to adhere to the side walls of the bucket.

The bucket and ejector of the present invention permit the use of narrow buckets for digging in sticky soils and make it unnecessary to provide additional linkage or cylinders for swinging the ejector, except in unusual operating conditions. Further, the present invention is suitable for use with the conventional backhoe by substitution only of the ejector and the bucket. When the ejector is not required, it does not substantially interfere with operation of the backhoe in normal digging, although the ejector may easily be removed and the bucket mounted directly on the dipstick in the usual manner.

What is claimed is:

1. In a backhoe, a dipstick, a bucket articulated on the outer end of the dipstick for oscillation about first and second closely spaced, horizontal, transverse axes, a double-acting hydraulic cylinder connected with the bucket and the dipstick for rotating the bucket about its axes, the bucket having opposite sides and an arcuate bottom, and an ejector swingably mounted on the first transverse axis for swinging movement between the front and rear of the bucket and having a portion extending between the bucket sides so as to sweep the volume of the bucket, the ejector having a projecting portion linking the bucket to the end of the dipstick and provided with said second transverse horizontal axis parallel to and located a short distance from the axis mounting the ejector on the bucket and forming a common axis for rotation of the bucket and ejector about the end of the dipstick, the weight of the bucket and contents when in bucket dumping position tending to rotate the ejector about the second transverse axis in a direction to lower the bucket and cause the ejector to sweep the volume of the bucket due to downward arcuate movement of the first transverse axis about the second axis as a center.

2. In a backhoe construction as claimed in claim 1, the first transverse axis being located at the upper front corner of the bucket.

3. In a backhoe construction as claimed in claim 2, the arcuate bottom of the bucket being generally concentric with the first transverse axis.

4. In a backhoe construction as claimed in claim 1, the first and second transverse axes for mounting the bucket on the dipstick lying in a plane making an angle approaching 90° with the general plane of the ejector.

5. In a backhoe construction as claimed in claim 1, the hydraulic cylinder being connected with the bucket and dipstick by a pair of links extending from a common point at the connection of the links to the cylinder.

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