United States Patent [19]

McCain

[11] **3,920,137**

[45] **Nov. 18, 1975**

[54] **EXCAVATING MACHINE WITH CLAMSHELL BUCKET**

[76] Inventor: **Willard E. McCain,** 6431 W. Heidler Road, Fairview, Pa. 16415

[22] Filed: **Apr. 8, 1974**

[21] Appl. No.: **458,682**

[52] **U.S. Cl.** **214/140;** 294/70; 294/88

[51] **Int. Cl.²** **B66F 9/12**

[58] **Field of Search**..... 214/140, 147 G, 145; 294/70, 88, 106

[56] **References Cited**

UNITED STATES PATENTS

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2,840,254	6/1958	Bevan	214/147 G
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Primary Examiner—Friaglia
Assistant Examiner—R. Schrecengost

[57] **ABSTRACT**

The application discloses a backhoe dipper stick and clamshell bucket combination. A bucket support is pivoted to the dipper stick and a cylinder is connected to the dipper stick to swing the bucket about a laterally extending axis. The bucket support has downwardly extending lugs which pivotally receive a king pin. The king pin is also received in upwardly extending lugs connected to a tilt support and fixed to them. The king pin has crank arms fixed to an intermediate part of it and the crank arms are connected to the piston rod of a tilting cylinder which is supported on the bucket support. The tilting cylinder will tilt the bucket about the king pin. The tilt support has a pivot member connected to it and the pivot member is connected to a bucket bracket. The bucket bracket pivotally supports links that are fixed to each of the two buckets of the clamshell. The bucket cylinder is connected to each side of the bucket bracket and the bucket cylinders each have a piston rod connected to one of the buckets so that the buckets can be swung toward each other and away from each other providing a full clamshell bucket action. The buckets can be rotated relative to the bucket bracket.

16 Claims, 4 Drawing Figures

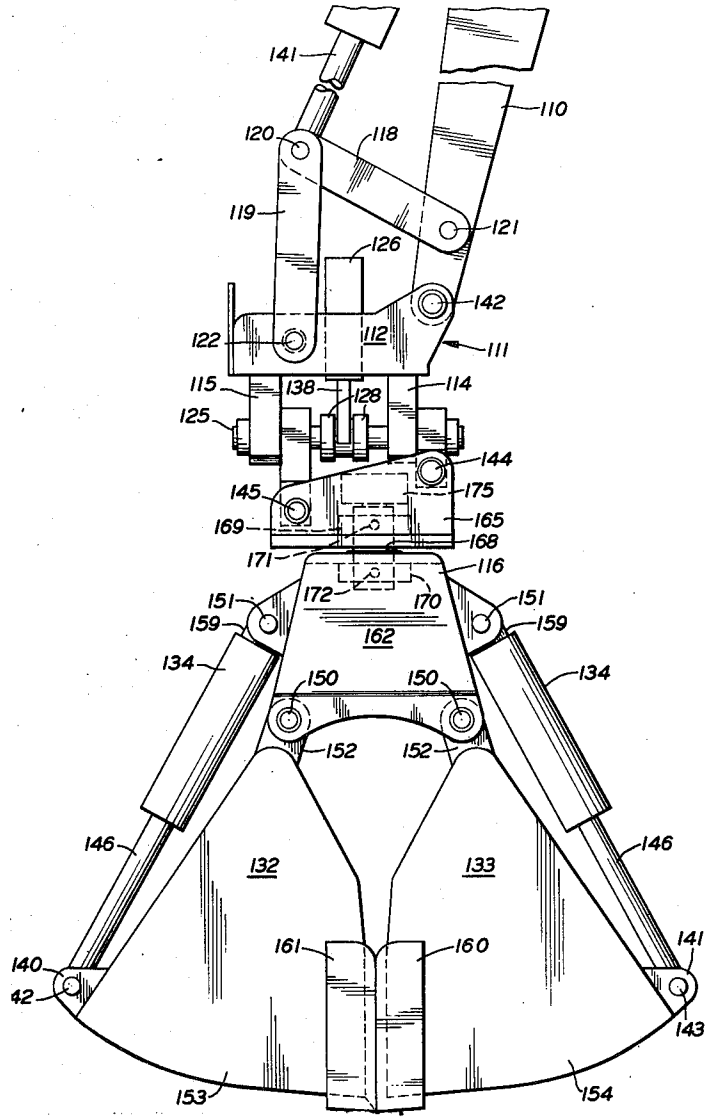


Fig 1

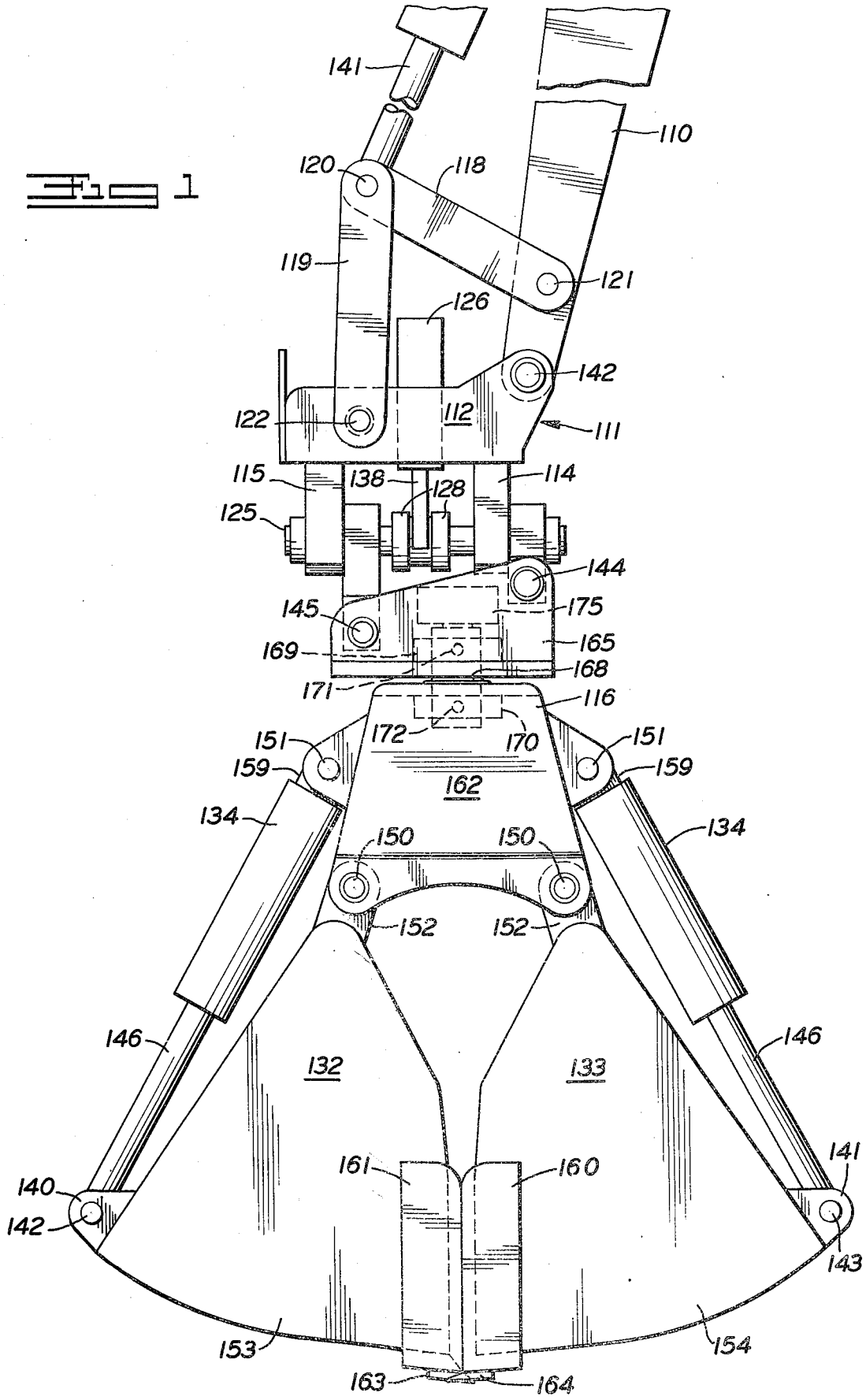

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FIG 2

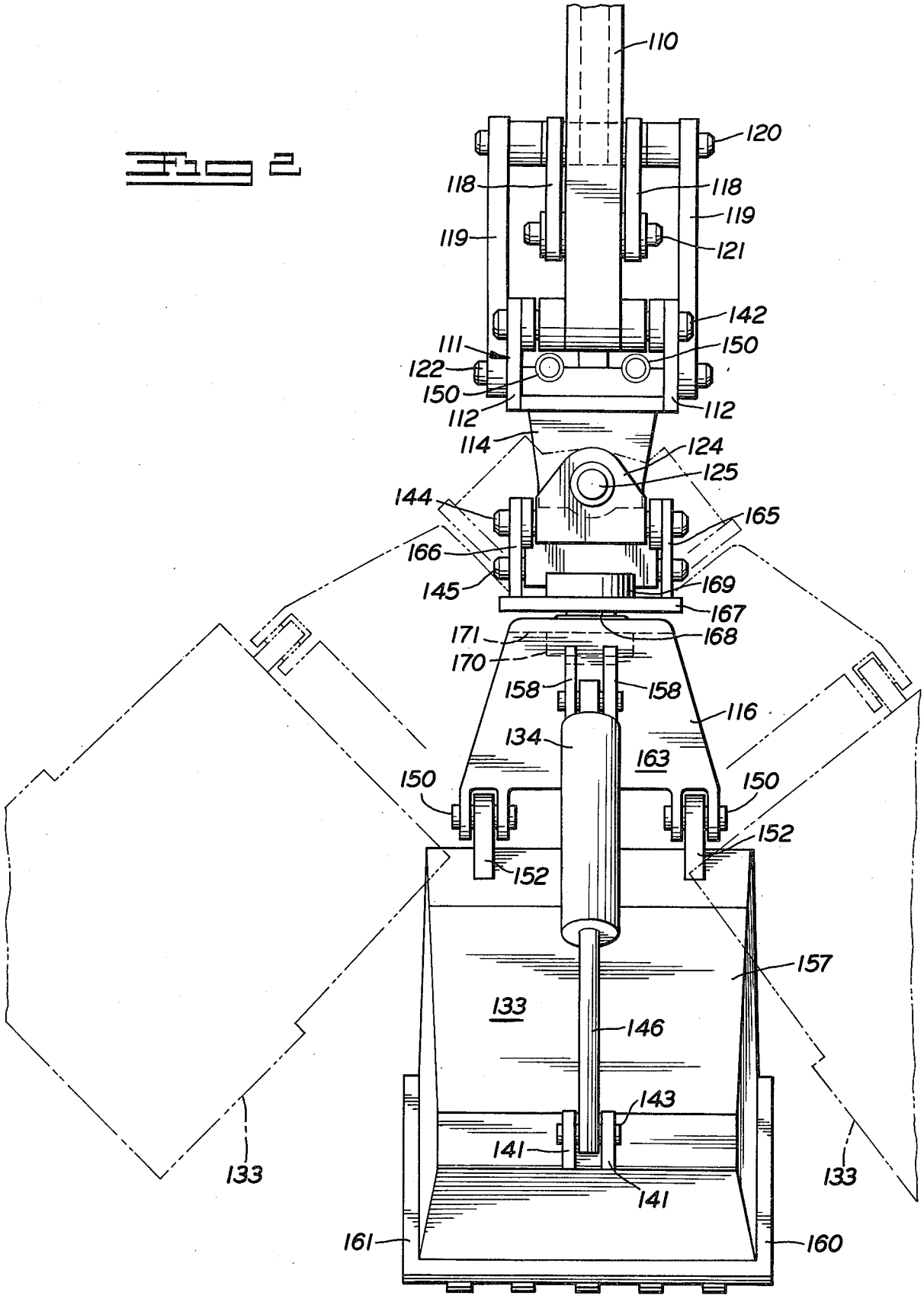
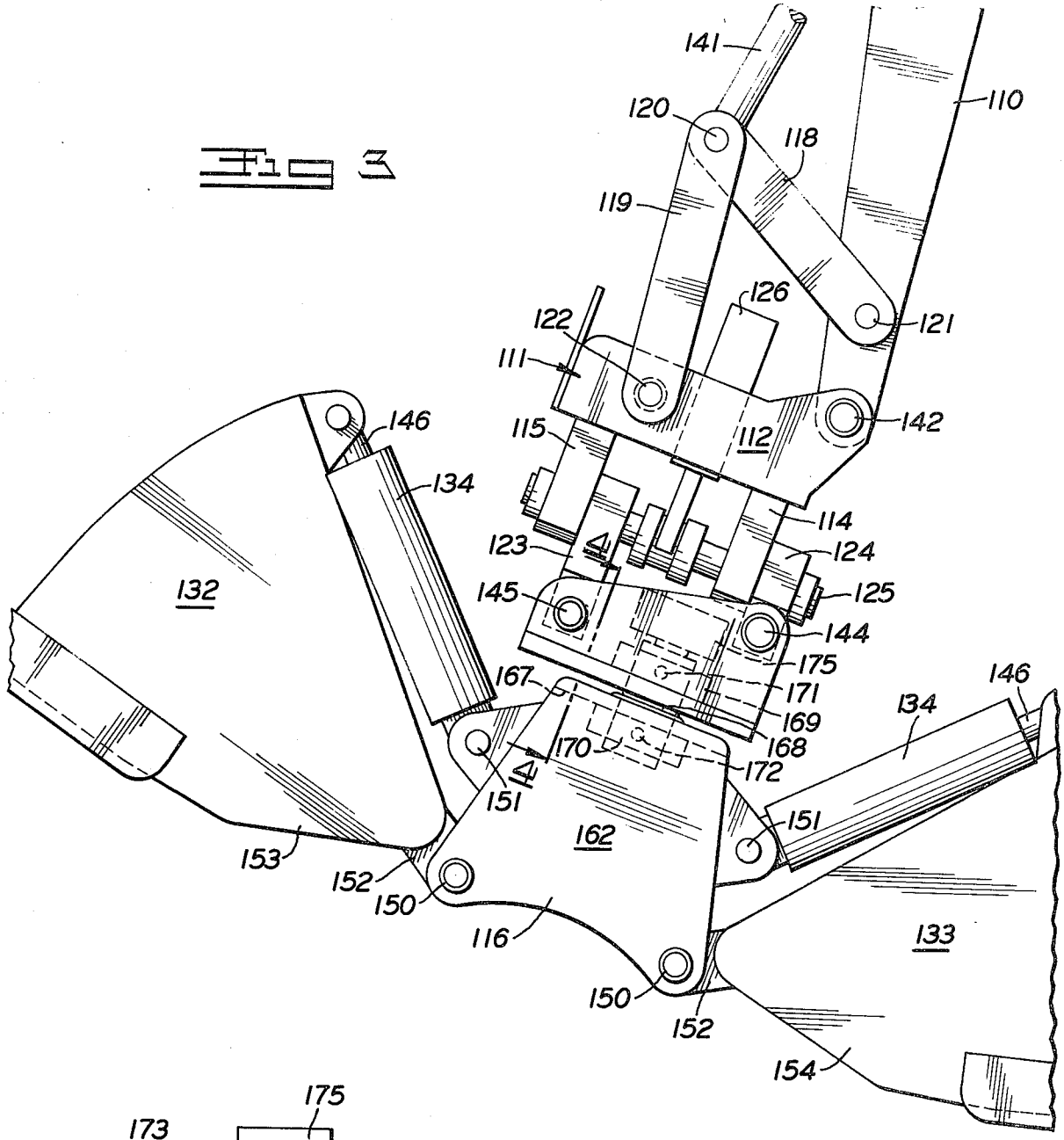

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Fig 3


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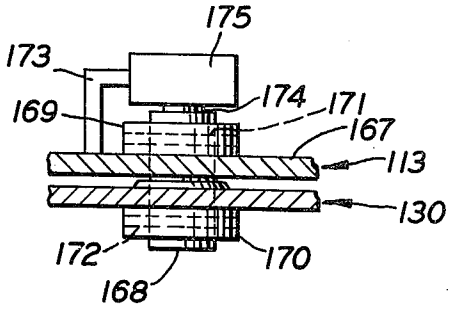

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Fig 4

EXCAVATING MACHINE WITH CLAMSHELL BUCKET

REFERENCE TO PRIOR ART

This disclosure constitutes an improvement over U.S. Pat. No. 3,252,606.

OBJECTS OF THE INVENTION

It is, accordingly, an object of the invention to provide an improved dipper stick and clamshell bucket.

Another object of the invention is to provide the dipper stick and clamshell bucket and means to swing the bucket pivotally about two separate axes perpendicular to each other and to swing each of the buckets relative to the other, and another cylinder to rotate the buckets.

Another object of the invention is to provide an improved support for a clamshell bucket in combination with a dipper stick.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

GENERAL DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the combination according to the invention, showing the buckets in closed position.

FIG. 2 is a front view of the combination shown in FIG. 1, showing the bucket parts swung laterally in phantom lines.

FIG. 3 is a view similar to FIG. 1, showing the buckets in open position.

FIG. 4 is a cross sectional view taken on line 4—4 of FIG. 3.

DETAILED DESCRIPTION OF THE DRAWINGS

Now with more particular reference to the drawings, the machine disclosed is made up generally of a dipper stick **110**, buckets **132** and **133**, which may be swung relative to each other and be tilted relative to the dipper stick **110**. The dipper stick **110** may be supported on a backhoe dipper stick or the like by suitable supporting arrangement familiar to those skilled in the art. The dipper stick **110** and the first bucket **132** may be used like the bucket and the dipper stick of U.S. Pat. No. 3,231,116. In addition thereto the second bucket **133**, which is swingably connected to the first bucket **132** and controlled by cylinders **134**, can be opened and closed with the rear bucket thereby forming a clamshell bucket.

The bucket support **111** is made up of the spaced side plates **112** which have the lugs **114** and **115** disposed between them and fixed to the side plates **112**. The lugs **114** and **115** extend downwardly below side plates **112** and each have two spaced axially extending holes aligned with each other. These axially aligned holes receive the king pin **125**. The lugs **114** and **115** each have two laterally spaced axially extending holes that receive the members **150'**. Members **150** are fixed to the cylinders **126** by suitable attaching means. The members **150'** allow the cylinders **126** to swing. (See FIG. **2**).

Lugs **114** and **115** are in the form of plates that are fixed to the spaced plates **112** of the bucket support and extend downwardly.

The first bucket **132** has a relatively heavy top lug **152** to which the two laterally spaced flanges **130** are fixed. Brackets **123** and **124** are generally triangular in shape. The lower edges of the brackets **123** and **124** are received between the spaced flanges **165** and **166** of tilt support and pins **144** and **145** extend through holes in the flanges **165** and **166** of tilt support **175** and through the holes in the lower ends of the brackets **123** and **124**. The upper ends of the brackets **123** and **124** each have a hole which receives king pin **125** and brackets **123** and **124** are fixed to king pin **125**. The second bucket **133** has a top plate **157** and spaced flanges **141** fixed to top plate **157**. Pin **143** extends through flanges **141** on second bucket **133** and pin **142** extends through flanges **140** on first bucket **132**. The cylinders **134** each have lugs **159** fixed to the end of the cylinder opposite piston rod **146**. These lugs **159** receive the pins **151**. Spaced lugs **140** and **141** are welded to the front part of the plate **157**. Each pair of lugs **140** and **141** receives the piston rods **146** between them. Pins **142** extend through the lugs **140** and through the piston rods **146**. The second bucket **133** can be swung to the position shown in FIG. **3** by means of the cylinder **134** and swung backward to the position shown in FIG. **2**. The entire bucket assembly including buckets **132** and **133** and bucket brackets **123** and **124** and tilt support **113** can be swung laterally by means of cylinders **126** and piston rods **138** which are connected to lugs **128**.

The lower end of the dipper stick **110** is pivoted by pin **142** to the side plates **112**. Links **118** are pivoted to dipper stick **110** by pin **121** and to the common point of the piston rod **141** and the links **119** by means of pin **120**. Links **119** are pivoted to the side plates **112** by means of pivot pin **122**.

It will be seen that the crank arms **128** are fixed to the king pin **125** and king pin **125** is fixed to the brackets **123** and **124**. Thus by means of the cylinders **126**, the buckets **132** and **133** can be swung laterally from the central position shown in full lines in FIG. **2** to either of the dashed line positions shown in FIG. **2**. By means of the cylinder **117**, the two buckets **132** and **133** can be swung longitudinally and by means of the cylinders **134**, the bucket **133** can be swung from open position shown in FIG. **3** to the closed position shown in FIG. **1**. Thus, the machine can be used as a regular backhoe or as a clamshell bucket.

The buckets **132** and **133** each have flat sides that are generally triangular in shape and have outer edges **160** and **161** which extend between jaws **163** and **164**.

The bucket bracket **116** is generally in the shape of the frustum of a pyramid, square in cross section, and made up of side plates **162** and end plates **163** and the top plate. The side plates **162** have holes and lugs on the lower ends that receive the pins **150** that pass through the lugs **152** on the buckets **132** and **133**.

Tilt support **165** has side plates **165** and **166** and bottom plate **167**. Bucket pivot pin **168** extends through plate **167** and through top plate **171'** of bucket bracket **116** and through top collar **169** and bottom collar **170**. The collars **169** and **170** are held to pin **168** by pins **171** and **172** respectively. The buckets can be swung about pin **168** by motor **175'** which is supported on plate **167** by bracket **173**.

The bucket disclosed herein can be controlled in all of its functions from the cab of the vehicle on which it

is mounted. The bucket has wrist action that is rotatable about an axis parallel to the longitudinal axis of the vehicle as well as about the ordinary lateral action. It is made so that one-half of the bucket can be removed and the other half can be used for ordinary backhoe operation. The half that has been removed can be reinstalled when it is desired to use the clam type operation.

Bucket bracket **116** is pivoted to tilt support **175** by pin **168** which extends through plate **167** and through plate **130** on the bucket bracket. Pin **168** has collar **170** on its lower end and collar **169** on its upper end. Collars **169** and **170** are held in place by pins **171** and **172.** Motor **175** is fixed to plate **167** by bracket **173.** The bucket can be rotated by motor **175.**

The teeth on the buckets are bolted on and can be removed for ditch cleaning, clean up, and other job applications where teeth are not required. Grapple tongs could be substituted for the bucket parts when this is desired.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination, a dipper stick, a first bucket and a second bucket,

a bucket support means having laterally spaced upwardly extending side members,

the end of said dipper stick being disposed between said side members and pivotably connected thereto,

means supporting said buckets about a first axis comprising a transverse pin extending through said side members and through said dipper stick and swingably connecting said bucket support means to said dipper stick,

tilting means connected to said bucket support means and to said dipper stick for tilting said bucket support means about said transverse pin,

a tilt support,

upwardly extending brackets connected to said tilt support,

downwardly extending brackets on said bucket support means,

and a king pin extending through said downwardly extending brackets and through said upwardly extending brackets,

a bucket bracket pivotally connected to said tilt support,

a first link fixed to said first bucket,

a second link fixed to said second bucket,

first pivot means connecting said first link to said bucket bracket,

second pivot means pivotally connecting said second link to said bucket bracket,

and means for swinging said first bucket relative to said bucket bracket,

and means for swinging said second bucket relative to said bucket bracket whereby said buckets can be swung toward and away from each other.

2. The combination recited in claim **1** wherein a pivot means is provided, pivotally connceting said bucket support means to said tilt support,

and means to rotate said bucket bracket relative to said tilt support.

3. The combination recited in claim **1** wherein said bucket support means has side plates, a top plate and a pivot means connecting said top plate to the bottom plate of said tilt support,

and said pivot means extends through said top plate of said bucket bracket and through said bottom plate of said tilt support.

4. The combination recited in claim **1** wherein said tilt support has side plates and end plates and is generally rectangular in cross section,

a first bucket cylinder swingably connected to one said side plate,

and a second bucket cylinder swingably connected to the other said side plate of said bucket bracket.

5. The combination recited in claim **1** wherein motor means is connected between said bucket bracket and said tilt support for rotating said bucket bracket and said tilt support relative to each other.

6. The combination recited in claim **1** wherein said means for swinging a bucket about said laterally extending axis comprises a first link and a second link, each having a first end and a second end,

and a third hydraulic cylinder having a piston rod,

pivot means connecting said first end of said first link, said first end of said second link, and the distal end of said piston rod together,

said second end of said first link being pivotally connected to said dipper stick,

said second end of said second link being pivotally connected to said bucket support.

7. The combination recited in claim **6** wherein two said first hydraulic cylinders are supported on said bucket support and each a first hydraulic cylinder having a piston rod, two cranks fixed to said king pin, each said piston rod of said first hydraulic cylinder being fixed to a said crank.

8. The combination recited in claim **7** wherein said first bucket has a relatively flat top plate thereon,

said spaced axially extending flanges are fixed to said top plate,

said spaced lugs comprise said upwardly extending axially spaced means.

9. The combination recited in claim **7** wherein said upwardly extending axially spaced means attached to said first bucket comprise,

second flanges fixed to said bucket,

and pin means extending through said flange means connecting said second bucket to said first bucket.

10. The combination recited in claim **9** wherein said king pin has spaced crank members fixed to the intermediate part thereof,

and said piston rod of said second cylinder is received between said crank means whereby said buckets are swung relative to each other to operate as a clamshell bucket.

11. The combination recited in claim **10** wherein pivot means is provided on said bucket support generally parallel to said king pin pivotally supporting said first cylinders.

12. The combination recited in claim **10** wherein two said first links are provided disposed one on each side of said dipper stick,

and two said second links are provided disposed one on each side of said first links and said bucket support.

13. The combination recited in claim 7 wherein said bucket support has spaced side plates fixed thereto and extending upwardly therefrom,

said dipper stick is connected to said bucket support by means connected to said upwardly extending side plates.

14. In combination, a dipper stick and a clamshell bucket,

bucket support means swingably connected to said dipper stick to swing about a laterally extending axis,

means to swing said bucket support about said laterally extending axis,

said clamshell bucket comprising a first bucket part and a second bucket part,

means swingably connecting said first bucket part to said bucket support to swing about an axially extending axis,

and means to swing said first bucket part about said laterally extending axis,

said first bucket part having laterally spaced flanges supported thereon,

laterally spaced flanges on said second bucket part,

and means pivotally connecting said second bucket part to said first bucket part,

laterally spaced cylinders connected to said first bucket part and to said second bucket part for swinging said second bucket part relative to said first bucket part.

15. The combination recited in claim 14 wherein said first bucket part has a flat top,

said means connecting said first bucket part to said bucket support comprises spaced flanges pivotally connected to said bucket support.

16. The combination recited in claim 15 wherein said second bucket part is removable from said first bucket part whereby said first bucket part is useable as an earth working device.

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