United States Patent [19]

McCain

[11] **3,896,950**

[45] **July 29, 1975**

[54] **EXCAVATING MACHINE**

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[52] **U.S. Cl.** ..... **214/138 R;** 37/183 R; 214/145

[51] **Int. Cl.²** **E02F 3/30**

[58] **Field of Search** 214/138, 767, 768, 145; 37/183, 184

[56] **References Cited**

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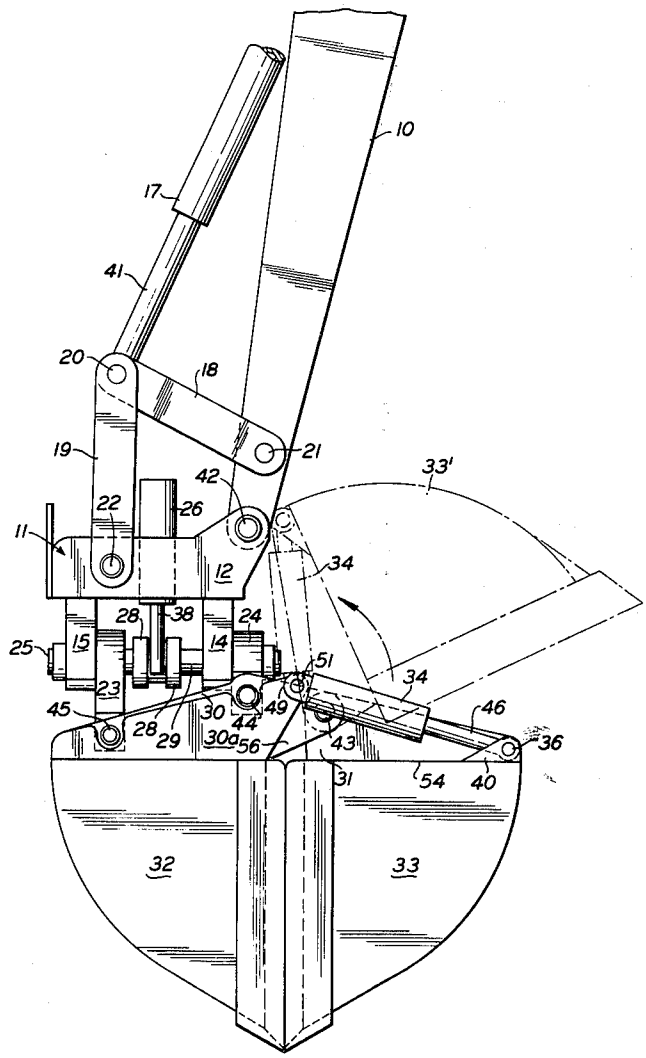
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Primary Examiner—Robert J. Spar
Assistant Examiner—Ross Weaver

[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 and bucket about laterally extending axis. The bucket support has downwardly extending lugs which pivotally receive a king pin. The king pin is also received in the 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 axially extending 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 buckets. 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.

10 Claims, 4 Drawing Figures



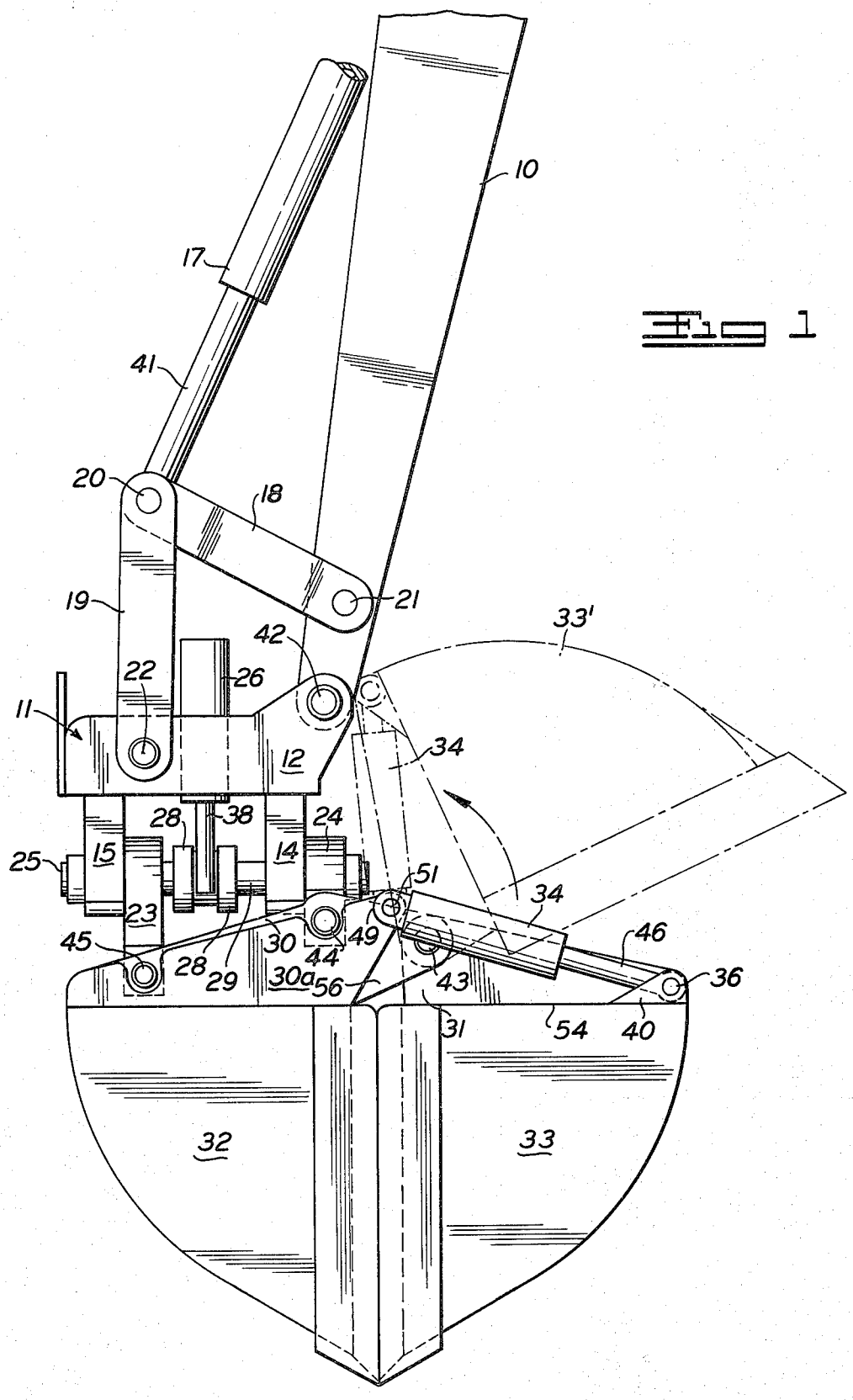

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Fig 1

Fig 2

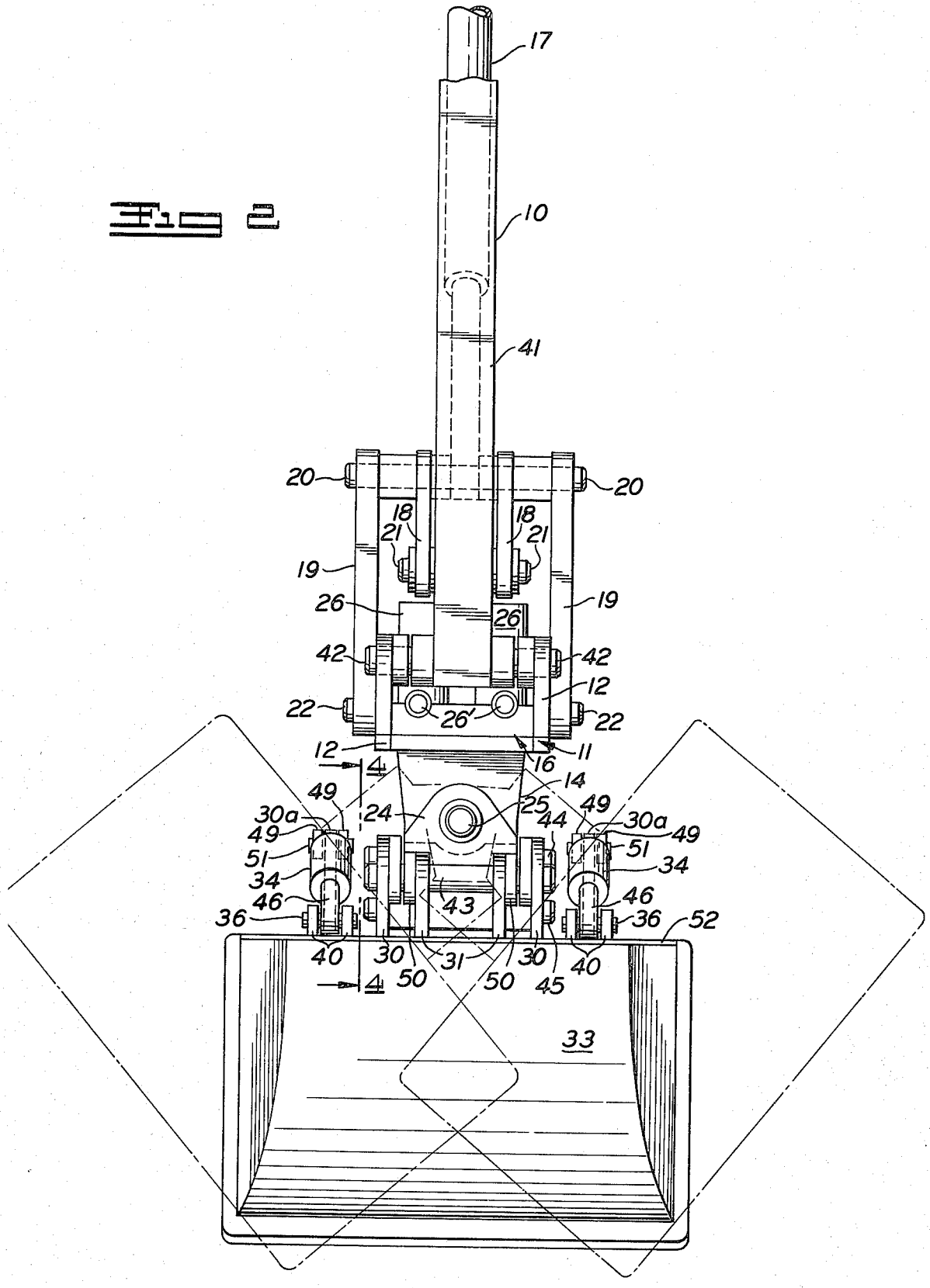

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Fig 3

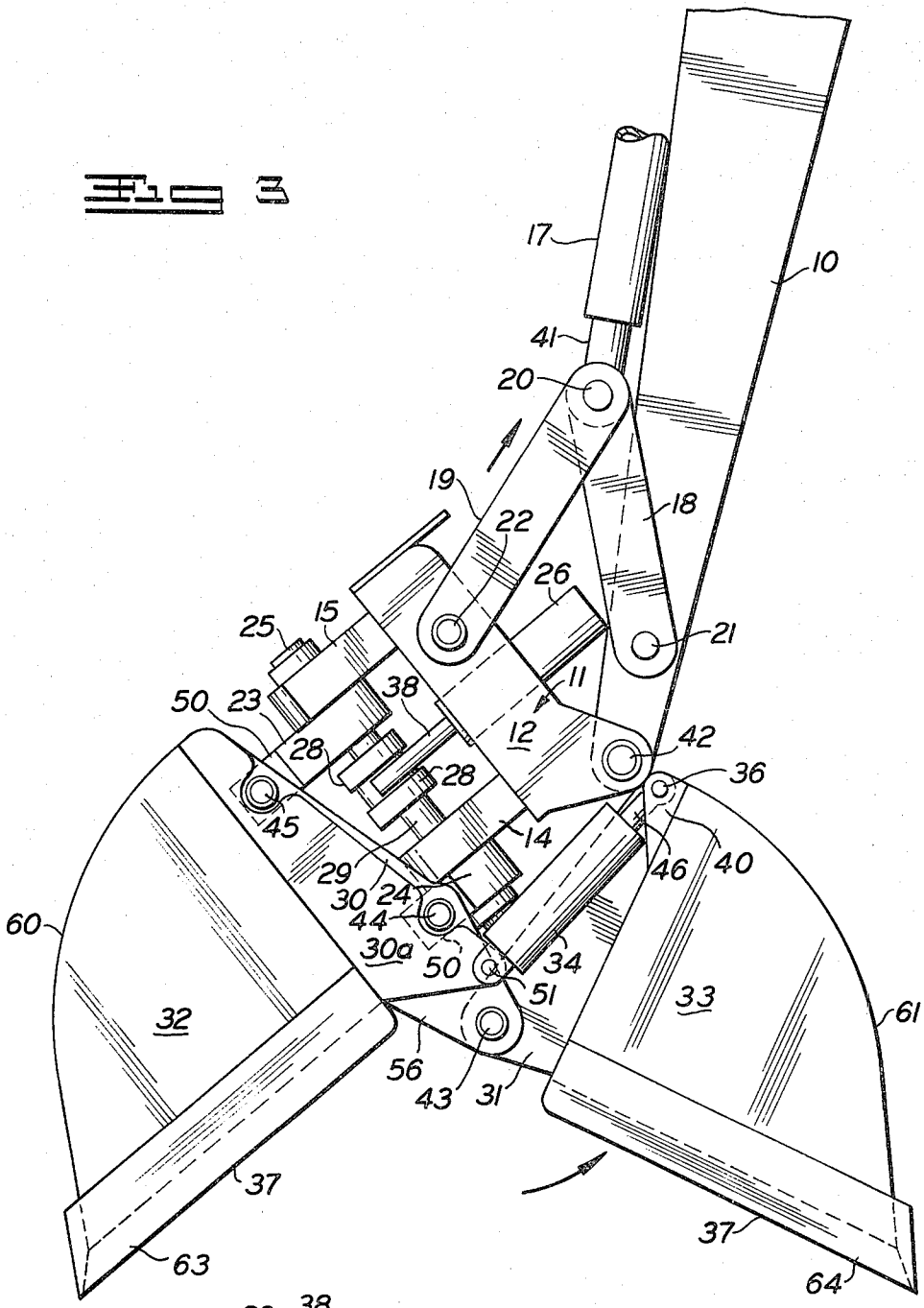
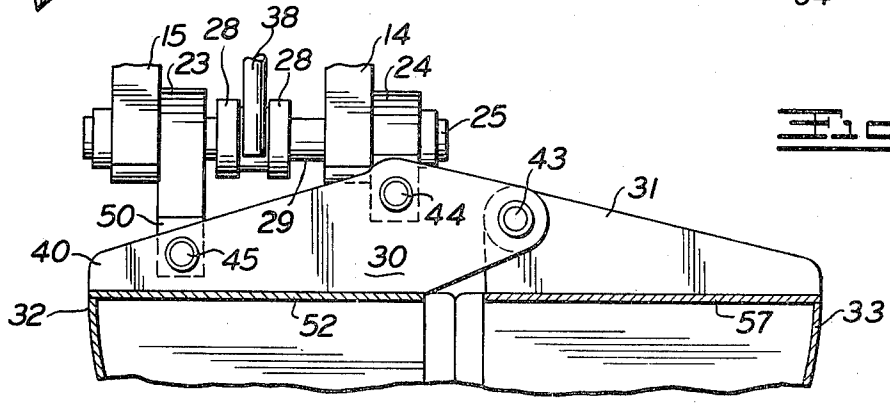

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Fig 4


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EXCAVATING MACHINE

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.

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.

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. 2.

DETAILED DESCRIPTION OF THE DRAWINGS

Now with more particular reference to the drawings, the machine disclosed is made up generally of a dipper stick **10**, buckets **32** and **33**, which may be swung relative to each other and be tilted relative to the dipper stick **10**. The dipper stick **10** 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 **10** and the first bucket **32** may be used like the bucket and the dipper stick of U.S. Pat. No. 3,231,116. In addition thereto the second bucket **33**, which is swingably connected to the first bucket **32** and controlled by cylinders **34**, can be opened and closed with the rear bucket thereby forming a clamshell bucket.

The bucket support **11** is made up of the spaced side plates **12** which have the lugs **14** and **15** disposed between them and fixed to the side plates **12**. The lugs **14** and **15** extend downwardly below side plates **12** and each have two spaced axially extending holes aligned with each other. These axially aligned holes receive the king pin **25**. The lugs **14** and **15** each have two laterally spaced axially extending holes that receive the members **50**. Members **50** are fixed to the cylinders **26**. The members **50** allow the cylinders to swing.

Lugs **14** and **15** are in the form of plates that are fixed to the spaced plates **12** of the bucket support and extend downwardly.

The first bucket **32** has a relatively heavy top plate **52** to which the two laterally spaced flanges **30** are fixed.

Brackets **56** are also fixed to plate **52**. Brackets **23** and **24** are generally triangular in shape. The lower edges of the brackets **23** and **24** are received between the spaced flanges **30** and pins **44** and **45** extend through holes in the flanges **30** and through the holes in the lower ends of the brackets **23** and **24**. The upper ends of the brackets **23** and **24** each have a hole which receives king pin **25** and brackets **23** and **24** are fixed to king pin **25**. The second bucket **33** has a top plate **57** and spaced flanges **31** fixed to top plate **57**. Pin **43** extends through flanges **31** on second bucket **33** and through flanges **30** on first bucket **32** thereby swingably connecting the second bucket **33** to the first bucket **32**. The cylinders **34** each have spaced lugs **49** fixed to the end of the cylinder opposite piston rod **46**. These lugs **49** receive the pins **51**. Spaced pairs of lugs **40** are welded to the front part of the plate **57**. Each pair of lugs **40** receives the piston rods **46** between them. Pins **36** extend through the lugs **40** and through the piston rods **46**. The second bucket **33** can be swung to the position shown in FIG. 3 by means of the cylinder **34** and swung backward to the position shown in FIG. 2. The entire bucket assembly including buckets **32** and **33** and brackets **23** and **24** can be swung laterally by means of cylinders **26** and piston rods **38** which are connected to lugs **28**.

The lower end of the dipper stick **10** is pivoted by pin **42** to the side plates **12**. Links **18** are pivoted to dipper stick **10** by pin **21** and to the common point of the piston rod **41** and the links **19** by means of pin **20**. Links **19** are pivoted to the side plates **12** by means of pivot **22**.

It will be seen that the crank arms **28** are fixed to the king pin **25** and king pin **25** is fixed to the brackets **23** and **24**. Thus by means of the cylinders **26**, the buckets **32** and **33** can be swung laterally from the central position shown in full lines in FIG. 2 to either of the dashed line positions. By means of the cylinder **17**, the two buckets **32** and **33** can be swung longitudinally and by means of the cylinders **34**, the bucket **33** 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.

The buckets **32** and **33** each have a flat top that are generally triangular in shape and have an arcuate outer edge **60** and **61** which extends between jaws **63** and **64** and sides **56** and **57** respectively. Lugs **40** are fixed to side **57** remote from pivot **43**.

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.

The teeth on the buckets are bolted on and can be removed for ditch cleaning and 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 un-

derstood 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 and a clamshell bucket,

said clamshell bucket being made up of a first bucket member and a second bucket member,

a bucket support,

said dipper stick being swingably connected to said bucket support,

means to swing said bucket support relative to said dipper stick,

axially spaced downwardly extending lugs fixed to said bucket support,

said first bucket member having two first spaced axially extending flanges fixed thereto and two second spaced axially extending flanges fixed thereto and disposed between said first axially extending flanges,

said second bucket member having two spaced lugs fixed thereto,

and two third spaced axially extending flanges fixed to said second bucket member and disposed between said lugs on said second bucket member and,

upwardly extending lugs fixed to said first bucket member and disposed between said second axially extending flanges,

means connecting said lugs on said second bucket member to said second flanges on said first bucket member,

king pin means extending through said downwardly extending lugs and through said upwardly extending lugs,

said king pin means being fixed to said upwardly extending lugs,

crank means fixed to said king pin means and

first hydraulic cylinder means connected to said bucket support and said crank means for swinging said bucket about said king pin means,

means swingably connecting said first flanges and said third flanges whereby said second bucket member is swingably connected to said first bucket member,

and second hydraulic cylinder means connected to said first flanges and to said lugs on said second bucket member for swinging said second bucket member relative to said first bucket member.

2. The combination recited in claim **1** wherein said means for swinging said 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 the dipper stick,

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

3. The combination recited in claim **2** wherein two said first hydraulic cylinder are supported on said bucket support and each said 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.

4. The combination recited in claim **3** wherein said first bucket member and said second bucket member each have a relatively flat top plate thereon,

said first lugs, first flanges and said second flanges are fixed to said top plate

said second lugs and said third flanges are fixed to said flat plate on said second bucket member.

5. The combination recited in claim **3** wherein said king pin has two spaced crank members,

and said piston rod of said first cylinder is received between said two cranks.

6. The combination recited in claim **5** wherein pivot means is provided on said bucket support generally parallel to said king pin pivotally supporting said first cylinders.

7. The combination recited in claim **5** 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.

8. The combination recited in claim **1** 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.

9. The combination recited in claim **1** 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.

10. The combination recited in claim **1** 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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