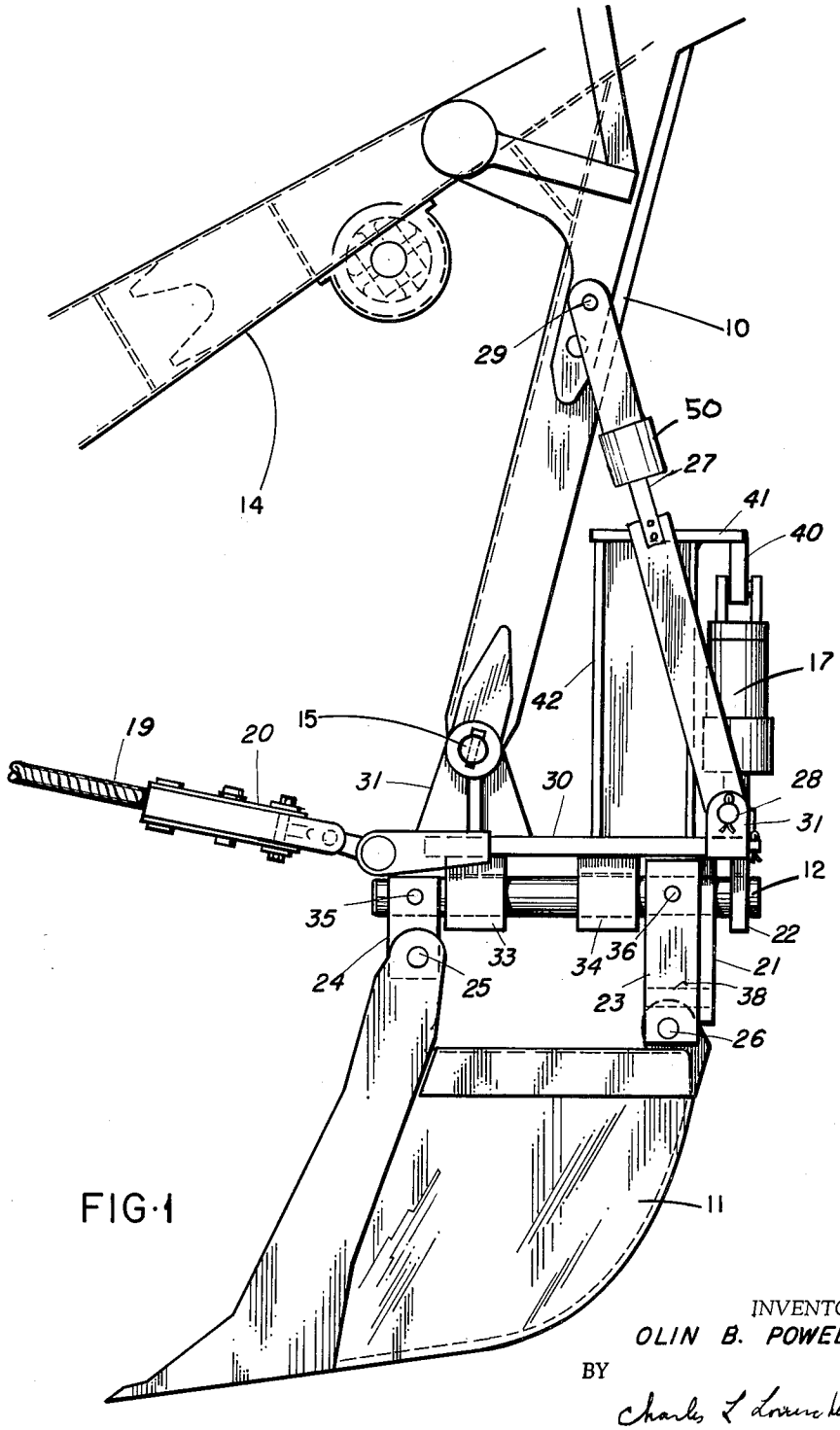
Jan. 25, 1966 O. B. POWELL 3,231,116

EXCAVATING MACHINE

Filed Oct. 23, 1963 2 Sheets-Sheet 1



FIG·1

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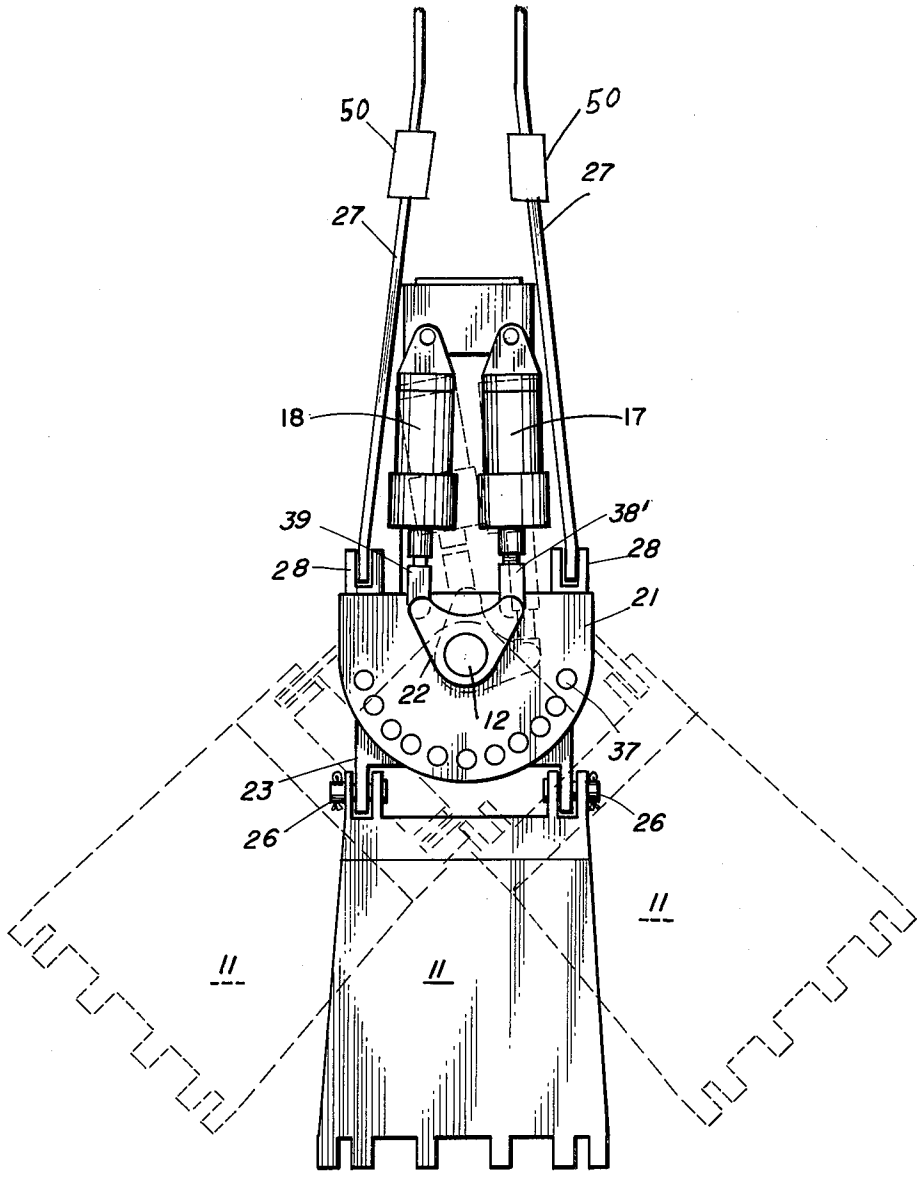


FIG. 2

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EXCAVATING MACHINE

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9 Claims. (Cl. 214—138)

This invention relates to earthworking apparatus and, more particularly, to the type of earthworking apparatus mounted on vehicles and commonly known as back hoes.

Back hoes which are made according to present designs have the disadvantage that the leading edge of the bucket of the back hoe is usually disposed parallel to the axle of the machine carrying the back hoe. Thus, if a trench is dug on a hillside, the bottom of the trench will be parallel to the ground surface and the same lateral grade as the hillside. It is sometimes desirable for the bottom of the trench to be level, regardless of the incline of the surface of the terrain.

It has been discovered that by providing a means for tilting the back hoe bucket on the end of the dipper stick, the bucket can be tilted independent of the angularity of the axle and, therefore, the grade of the bottom of the trench can be controlled.

It is, accordingly, an object of the present invention to provide a back hoe or the like incorporating an improved means for supporting a bucket thereon.

Another object of the invention is to provide an improved bucket supporting means for an earthworking device.

Still another object of the invention is to provide a combination bucket, dipper stick, and vehicle wherein the bucket can be inclined laterally relative to the vehicle axle.

A further object of the invention is to provide an improved bucket supporting means for an earthworking machine which is simple in construction, economical to manufacture, and simple and efficient in operation.

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 drawings 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.

In the drawings:

FIG. 1 is a partial side view of a bucket, boom, and dipper stick according to the invention; and

FIG. 2 is a view taken from the end of the bucket showing the bucket in phantom swung to a plurality of lateral positions.

Now with more particular reference to the drawings, a boom 14 is shown which could be attached to a tractor or other suitable vehicle and a dipper stick 10 supported thereon by a suitable supporting arrangement shown generally in the drawings.

The lower end of the dipper stick 10 is pivoted at 15 to a bracket 31 on a bucket support 30. The rear end of the bucket support plate 30 has the bracket 31 extending upwardly and it has links 27 connected thereto by means of pins 28. The links 27 may be extensions of the piston rods of a cylinder 50 which are shown schematically but will be familiar to those skilled in the art. The upper end of the cylinder 50 is connected to the dipper stick 10 by means of a pin 29. The front edge of the bucket support plate 30 is connected to a clevis 20 which is, in turn, connected to a drag cable 19.

The bottom of the bucket support plate 30 has brackets 33 and 34 fixed thereto. These brackets rotatably receive an axle pivot pin 12. The front end of the axle pivot pin 12 has a front support 24 fixed thereto by means of a pin 35 and a rear support bracket 23 fixed thereto by means

of a pin 36. The front of the bucket 11 is pivoted to the front support 24 at 25 and the rear support bracket 23 at 26. The bucket 11 is of a conventional type frequently found on back hoes.

The rear end of the axle pivot pin 12 has a crank plate 22 fixed thereto and this crank plate swings with the pin 12. An index plate 21 is fixed to the support plate 30 and has a plurality of holes 37 therein. The holes 37 may be aligned with a hole 38 in the rear support bracket 23 so that the bucket can be swung relative to the central position thereof and may be fixed in any selected position by a pin through the holes 37 and 38.

The crank plate 22 is also fixed to the pin 12 and extends upwardly thereon. The upper corners of the crank plate 22 are pivoted to piston rods 38' and 39 of cylinders 17 and 18.

The upper ends of the cylinders 17 and 18 are pivoted to a bracket 40 which is welded to a plate 41 which, in turn, extends downwardly from the upper end of an I-beam column 42. The lower end of the I-beam column 42 is fixed to the bucket support plate 30. Thus, when one of the cylinders 17 or 18 is extended and the other retracted, the crank plate 22 can be swung to either of the dotted line positions to the right or to the left to swing the bucket 11 to either of the positions shown.

It will thus be seen that the back hoe shown can be used to dig a trench or a grade with a level bottom regardless of the incline of the terrain on which it is used.

Since the bucket support plate 30 is swingably supported on the dipper stick by means of the pivot 15 and swings around this pivot actuated by cylinder 50, it may be adjusted to dig deeper or less deep. It is to be noted that the drag or pull cables 19 are connected to the bucket support plate 30 so that a pull is exerted on this plate. The bucket support platform plate 30 has the brackets 31 fixed to its rear end and these brackets are pivotally connected to the links 27 through which the bucket angling is accomplished.

Since the bucket 11 is connected to the pivot pin 12 by means of pins 35 and 36, the bucket swings with this pivot pin 12. The crank plate 22 is fixed to the rear end of the pivot pin 12 by welding or the like. Therefore, the crank plate 22 acts as a crank to swing the pin 12 and, with it, the bucket 11.

The cylinders 17 and 18 are connected at their upper ends to the bracket 40 which is, in turn, fixed to the I-beam column 42. The piston rods of cylinders 17 and 18 are connected to the crank plate 22 so that when the cylinders 17 and 18 are energized, they will actuate the crank plate and thereby swing the bucket 11 which is attached to the pivot pin 12. Therefore, to control the angularity of the bucket, it is merely necessary to swing the crank plate 22, pivot pin 12, and bucket 11 by means of the cylinders 17 and 18.

The foregoing specification sets forth the invention in its preferred practical form 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 bucket and tilting means for mounting it at the end of the dipper stick of a back hoe or the like comprising

a bucket,

a dipper stick adapted to be attached to a boom,

means to swing said dipper stick toward and away from said boom,

a bucket support,

means swingably connecting said bucket support to said boom,
and means swingably connecting said bucket to said bucket support whereby said bucket support may be swung about a generally horizontal axis extending toward said back hoe.

2. In combination, a bucket and means for mounting said bucket on a dipper stick comprising
a dipper stick,
a bucket,
said dipper stick being adapted to be connected to the boom of a back hoe or the like,
a bucket support,
means swingably connecting said bucket support to said dipper stick, means connecting said bucket to said bucket support to swing about a horizontal axis extending toward said boom,
a crank plate attached to said bucket,
and a hydraulic cylinder attached to said crank plate for swinging said bucket about said horizontal axis whereby the lateral angularity of said bucket can be adjusted relative to a machine on which said boom is mounted whereby said bucket can be adjusted to dig a ditch having a bottom of any desired angle relative to the surface thereof.

3. In combination, a boom, a dipper stick, and a bucket,
said boom being swingably connected to said dipper stick,
horizontally spaced pivot members swingably connecting said bucket to said dipper stick to swing about an axis extending toward said boom,
means to swing said dipper stick toward said boom,
a bucket support connected to said dipper stick,
and a crank plate fixed to said bucket,
and a hydraulic cylinder having one end attached to said bucket support and its other end to said crank plate to swing said bucket relative to a horizontal plane.

4. The combination recited in claim 3 wherein
said pivot members comprise an elongated pin fixed to said bucket and journalled in bearing members on said bucket support,
said crank plate being fixed to one end of said pin,
said crank plate having sides diverging upwardly,
said cylinder having one end attached to one side of said plate,
and a second hydraulic cylinder fixed to said stick at one end and to said bucket support at the other end and at a position spaced from the said first mentioned cylinder.

5. The combination recited in claim 4 wherein

an index plate is fixed to said dipper stick generally coplanar to said crank plate,
and means is provided to lock said crank plate to said index plate in a predetermined position thereon.

6. The combination recited in claim 5 wherein
said means to lock said crank plate and index plate comprises a plurality of holes in said index plate,
and a pin extending selectively through one said hole in said index plate and into one said pivot member.

7. The combination recited in claim 6 wherein
means is provided to swing said bucket in a plane passing through said dipper stick.

8. In combination, a dipper stick, a boom, and a bucket attached to said boom,
said boom having said dipper stick swingably attached thereto,
a bracket swingably connected to said dipper stick to swing about an axis parallel to the axis of swing of said dipper stick to said boom,
a bucket support plate fixed to said bracket,
a hydraulic cylinder swingable connected to said dipper stick and to said plate to swing said plate on said dipper stick,
spaced brackets attached to said plate and extending downwardly therefrom,
a first pin rotatably received in said spaced brackets,
said bucket being fixed to said first pin,
an index plate fixed to said support plate,
spaced holes in said index plate,
and means on said bucket to receive a second pin therein with said pin selectively received in one said hole in said index plate whereby said bucket can be fixed in a predetermined angular position relative to said dipper stick.

9. The combination recited in claim 8 wherein
a crank plate is fixed to said first pin,
and a hydraulic cylinder is connected to said support plate and to said crank plate to swing said bucket with said first pin.

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