

June 24, 1958

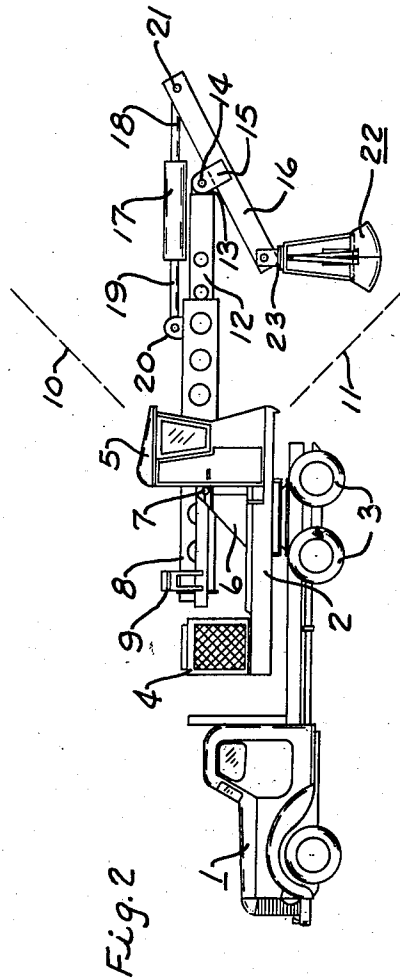
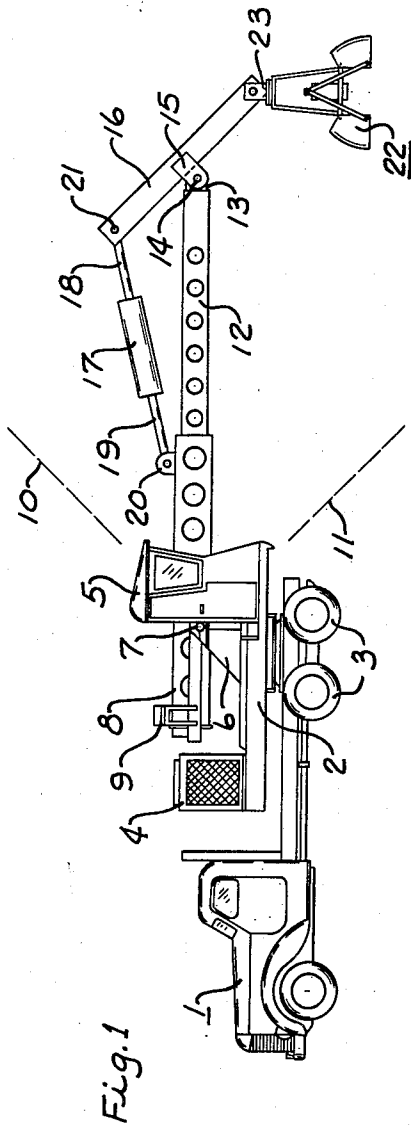
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2,840,254

CLAMSHELL EARTH-MOVING MACHINE

Filed April 15, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

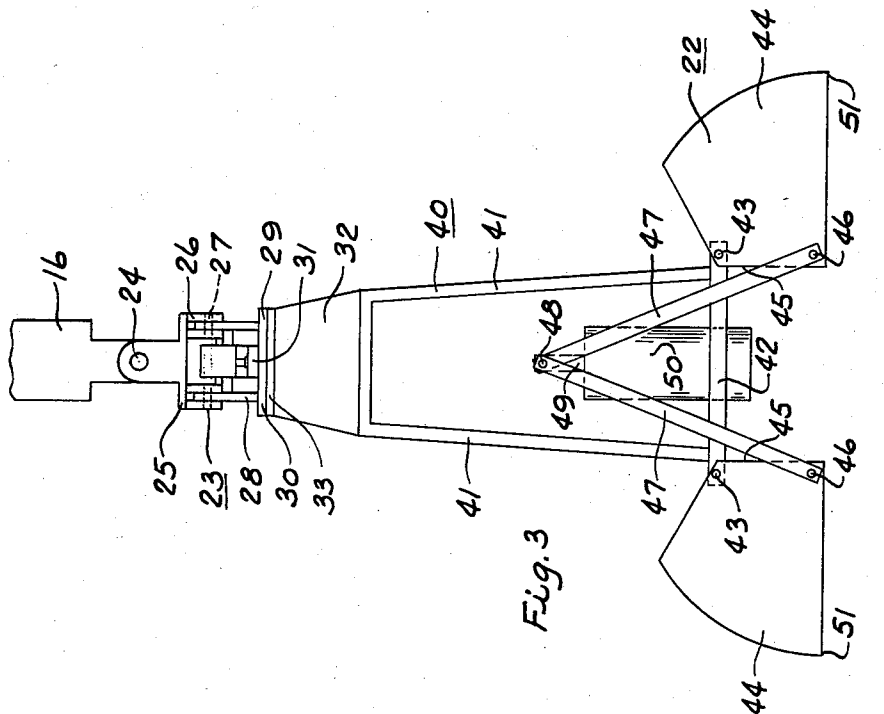


Fig. 3

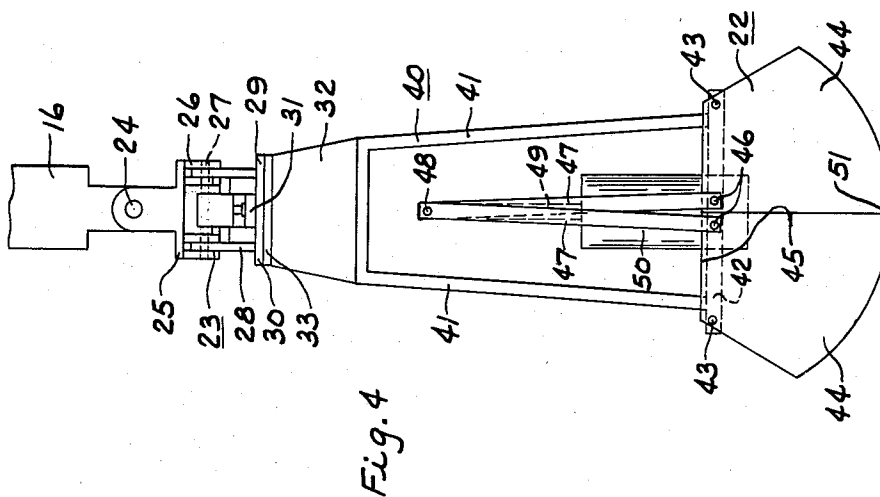


Fig. 4

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1

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CLAMSHELL EARTH-MOVING MACHINE

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Application April 15, 1955, Serial No. 501,620

3 Claims. (Cl. 214—147)

This invention relates to earth-moving vehicles and more particularly to earth-moving vehicles employing the clamshell type of digging bucket.

This invention is a continuation-in-part of my application Serial No. 264,555, filed January 2, 1952, now Patent No. 2,755,946 issued July 24, 1956, which disclosed the use of a clamshell on a backhoe type of machine wherein the boom is a live boom and may or may not be capable of being extended or retracted.

The principal object of this invention is the provision of a clamshell bucket universally connected to the end of a hoe stick pivotally mounted on the end of a boom capable of telescoping to extend and retract the same.

Another object of this invention is the provision of a telescopic boom clamshell bucket mounted on the end of a hoe stick pivoted on the outer end of a live boom capable of being extended and retracted and having motor means to hold or change the relative position of the hoe stick on the end of the boom as the latter is extended or retracted.

Another object of this invention is the provision of a novel clamshell bucket structure mounted for use on a hoe stick pivotally mounted intermediate its ends on the end of a live boom capable of being extended or retracted.

Other objects and advantages appear hereinafter in the following description and claims:

The accompanying drawings show for the purpose of exemplification, without limiting the invention or claims thereto, certain practical embodiments illustrating the principles of the invention wherein:

Fig. 1 is a view in side elevation of the clamshell bucket on the end of a backhoe stick pivoted on a live telescopic boom.

Fig. 2 is a view similar to that of Fig. 1 showing the clamshell bucket moved to a different operative position.

Fig. 3 is a large detail view of the clamshell bucket in its open position.

Fig. 4 is a detail view of the clamshell bucket in its closed position.

As shown in the drawings, applicant's invention is applied to a popular type of grading machine which is mounted on a truck as indicated at 1, the bed of the truck being provided with a turntable base 2 rotatable over the truck's rear wheels as indicated at 3. The turntable is provided with an engine 4 to actuate the grading machine and is provided with a cab 5 in which the operator is housed for controlling the machine, the cab being positioned on the rotary turntable mechanism 2 which swings with the structure as the grading is accomplished.

The turntable 2 is provided with a pair of base brackets 6 having a shaft 7 extending therebetween to pivotally support the boom structure 8. The boom section 8 is of trihedral form and is provided with a counterweight as indicated at 9. The base of the boom is pivoted on the shaft 7 and is capable of moving up and down on this pivot to the limits as indicated by the dotted construction lines 10 and 11. The boom section 8, being of trihedral

2

form is hollow and is provided with rollers in each corner to telescopically receive the boom section 12 which is likewise trihedral in shape and is smaller with its corners engaging in rollers mounted in the boom section 8 and is capable of telescoping therein. A power means which is not shown in the drawings is provided on the inside of the boom member 8 for extending and retracting the boom section 12 in telescopic relation.

The operator in the cab may likewise swing the turntable 2 through 360° and thus operate the device at any position relative to the truck.

The outer end of the boom section 12 is provided with a bracket 13 on which is mounted a pivot pin 14. A complementary bracket 15 is provided on the hoe stick 16 and is journaled on the pivot pin 14. Thus the hoe stick 16 may be moved relative to the outer boom section 12. A fluid-actuated cylinder 17 is provided with the piston 18 and an anchor member 19, the latter being pivotally connected to the bracket 20 on the top of the boom section 8. The piston 18 in turn is pivotally mounted as indicated at 21 to the upper end of the hoe stick 16. If the piston 18 is not actuated it remains fixed within the cylinder and any telescopic movement of the boom section 12 causes the hoe stick 16 to rotate on its pivot pin 14.

A clamshell bucket 22 is mounted on a swivel structure generally indicated at 23 and which comprises a swivel joint pivot pin 24 connecting the upper portion 25 of the universal joint 23 to the lower end of the hoe stick 16. The upper portion 25 of the universal joint member has the depending ears 26 provided with a pivot pin 27 extending therethrough and on this pin is pivoted the upwardly extending ears 28 of the lower universal joint section 29. Pivot pin 24 is ninety degrees from the pivot pin 27. The lower universal joint section 29 has a bottom plate 30 which is provided with a central swivel bolt member 31 which permits the clamshell bucket structure 22 to be swiveled relative thereto. The upper frame 32 of the clamshell bucket has a plate 33 that matches the plate 30 and is secured by the large nut locknut on the bolt 31. This plate 33 may be positioned in different angular positions relative to the plate 30 so that the bucket may be angled at any desired rotary position with respect to the vertical axis on the bottom of the hoe stick 16. This rotary movement may be made manual or power operated. Thus the clamshell bucket 22, when suspended in this universal joint, may be rotated about the vertical axis of the bolt 31 or it may swing on the pivot member 27 or the pivot member 24, each of which is ninety degrees with respect to each other. Thus the three axes, that is, of the pivot pins 24, 27, and the bolt 31, are all disposed at ninety degrees relative to each other and provide a universal movement of the clamshell bucket 22.

A motor may be supplied to rotate the clamshell bucket relative to the vertical axis of the bolt 31. However, this bucket may be positioned by hand and the plates 30 and 33 may be bolted together if desired. This specific structure does not form a part of this invention and therefore is not specifically disclosed.

Referring to Figs. 3 and 4, the clamshell bucket 22 comprises the frame structure 40 having a swivel plate 33 connected to its upper end and provided with a pair of quadrangularly disposed arms 41, the lower end of which carry the cross members 42 that provide a box-shaped structure. The outer ends of the cross members 42 are provided with the pivots 43 on which each side 44 of the clamshell bucket 22 is pivoted. The clamshell bucket structure is slightly different in that the upper edge 45 has two pivot points 43 and 46. The pivot points 46 are connected by the movable links 47 of which there are four, and they are pivoted to the upper end of the cross arm 48 on the top of the piston 49 actuated by the fluid-

3

actuated cylinder 50. Thus by energizing the cylinder 50 with fluid under pressure the piston is extended upwardly in the box frame 40 to the position as illustrated in Fig. 4 with the links 47 being substantially vertical and the biting edges 51 of the clamshell members coming together as illustrated in Fig. 4.

With this clamshell structure mounted on the end of the hoe stick pivoted to the end of a telescopic boom which may be raised or lowered to force the clamshell bucket against the ground under pressure, the bucket may be actuated so that the jaws 51 close and dig the dirt. When the bucket is open and the boom section 12 is extended, the structure will appear as illustrated in Fig. 1. However, when the boom section 12 is retracted the bucket may be retracted further by reason of the linkage formed by the cylinder 17 and its connecting portions 18 and 19 relative to the stick as illustrated in Fig. 2. When the boom section 12 is retracted and the length of the piston 18 is unchanged, the top of the hoe stick 16 is forced outwardly and the clamshell bucket at the bottom of the hoe stick is drawn underneath the boom as illustrated. The bucket may either dig or be transported in this position. By changing the relative lengths of the linkage connection of the piston 18 in the cylinder 17, one can place the hoe stick in any relative position to dig with the bucket. Thus the structure may be employed to dig a hole a considerable number of feet from the truck which may be stopped along the road and still the walls of the hole dug would be vertical and may be dug to the depth of the hoe stick from the boom. This structure can dig holes on the opposite side of a fence. It may also be employed for digging against a building wall and it may dig and back fill at the same time.

I claim:

1. A self-contained earth-moving machine comprising 35

4

a pivoted base having a live boom mounted thereon, a second boom telescopically positioned relative to the first boom, a bucket stick pivotally mounted on the outer end of said second boom, a cylinder and piston means connected between the upper end of the bucket stick and said live boom to control the movement of the bucket stick relative to the boom, a joint means on the lower end of said bucket stick, and a clamshell bucket suspended from said joint means.

2. A self-contained earth-moving machine comprising a base having a live boom mounted thereon, a boom extension mounted on the live boom and movable axially relative thereto, a bucket stick pivotally mounted on the end of said boom extension, a clamshell bucket pivotally mounted on the lower end of said bucket stick, and connecting means which comprises an expansible member between the upper end of said bucket stick and said live boom.

3. The structure of claim 2 characterized in that said expandable member includes a fluid-actuated piston for changing the relative position on the upper end of said bucket and said live boom.

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