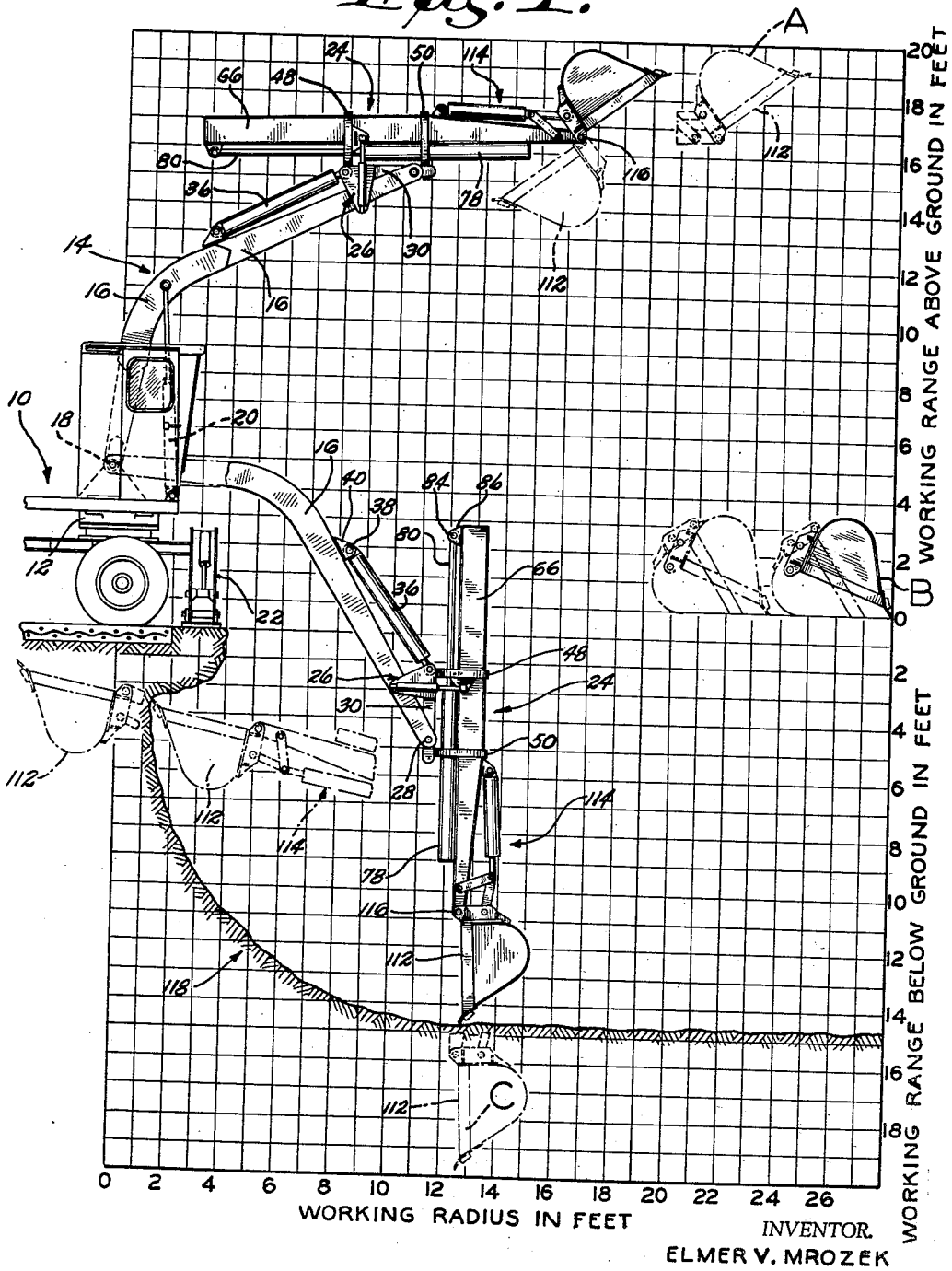
April 21, 1964 E. V. MROZEK 3,129,831

DIPSTICK ASSEMBLIES FOR MATERIAL HANDLING EQUIPMENT

Filed Aug. 22, 1961

2 Sheets-Sheet 1

Fig. 1.



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2 Sheets-Sheet 2

Fig. 2.

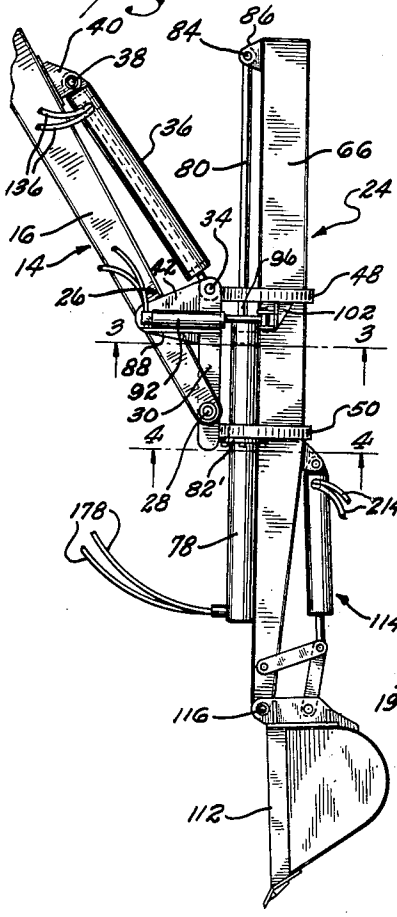


Fig. 3.

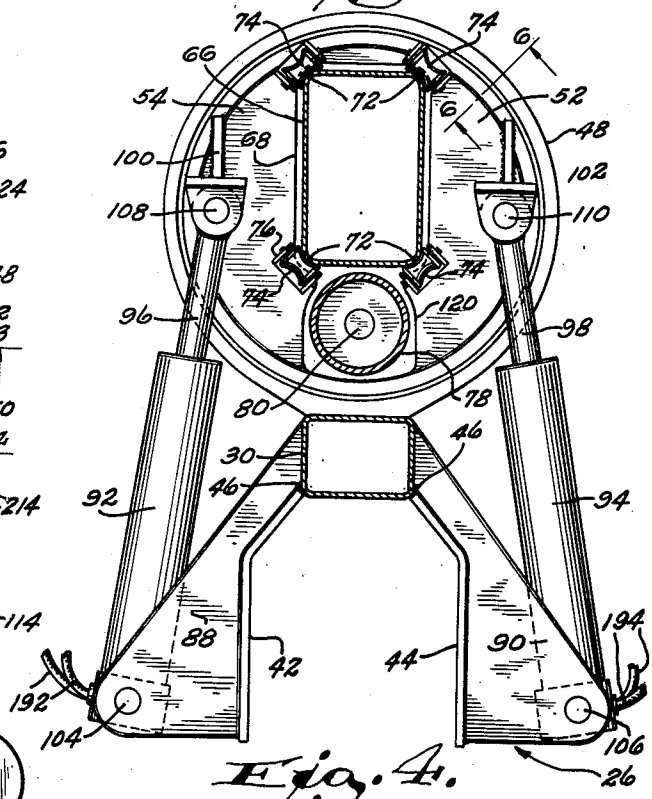


Fig. 4.

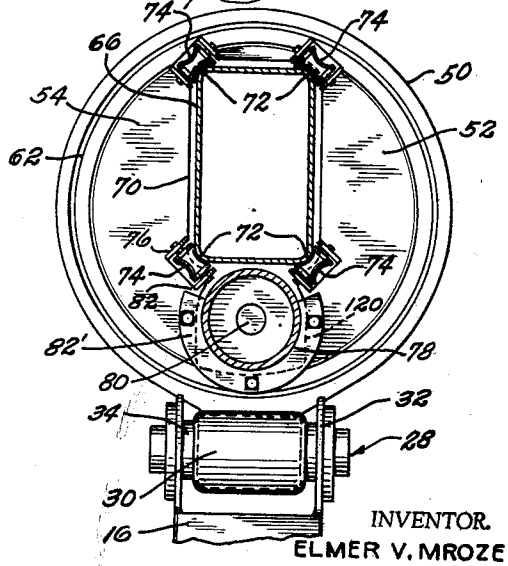


Fig. 5

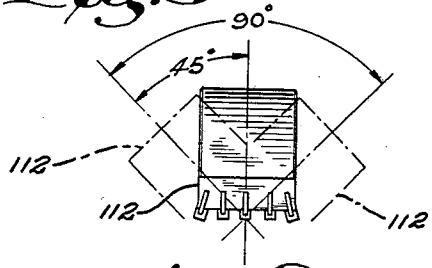
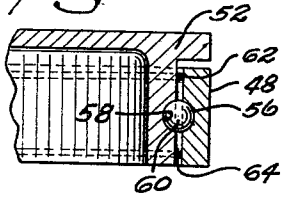


Fig. 6.



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DIPSTICK ASSEMBLIES FOR MATERIAL HANDLING EQUIPMENT

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3 Claims. (Cl. 214—137)

This invention relates to an earth excavating machine called a backhoe, and especially to the portion of the machine known as the dipstick, and which carries the bucket or other attachment or instrument. While used principally for excavating, the features of the invention have applicability in other material handling equipment.

Backhoes are usually carried by a transport means such as a truck or crawler, and which means includes a turntable platform on which the backbone is mounted to permit rotation and swinging of the machine to allow working in various directions.

Backhoes now available lack versatility with respect to the control of the bucket and its position. When excavating trenches of a narrow width it is sometimes necessary to widen the cut beyond that made by the initial cut of the bucket. Presently-available machines do not have a provision for conveniently widening the trench, but require time-consuming and irksome transverse shifting of the entire transport means preparatory to making another cut adjacent to and parallel to the first cut.

Presently-available machines are also limited in their ability to conveniently "undercut" beneath the machine or in certain other directions.

The prior machines also do not have the means of advancing the cut linearly along the dipstick independently of the movement of the boom.

Therefore an object of this invention is to provide a backhoe having a dipstick arrangement that embraces means permitting the excavating of a trench of a width greater than that of the bucket or shovel without having to shift the transport machine or backshoe transversely.

Another object is to provide a dipstick and its controls that permits undercutting to a greater distance and in a greater number of directions than possible with available machines.

Another object is to provide a backhoe that has a dipstick that permits digging a trench to a greater depth by shifting the dipstick linearly regardless of the angle of the dipstick, without swinging or pivoting the boom, therefore permitting even a vertical adjustment.

Further objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein an embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations as fall within the spirit of the invention.

Referring to the drawings:

FIG. 1 shows a side elevational view of a backhoe embracing this invention and indicating graphically the range of operation of the machine.

FIG. 2 is an enlargement of a portion of FIG. 1 showing the dipstick to which a bucket is attached.

FIG. 3 is an enlarged sectional view taken at 3—3 of FIG. 2, the boom being omitted.

FIG. 4 is an enlarged sectional view taken at 4—4 of FIG. 2.

FIG. 5 is a view looking upwardly toward FIG. 2 and showing the bucket, and also showing the latter in dotted lines to indicate the rotated position of the dipstick.

FIG. 6 is a section taken at 6—6 of FIG. 3.

Describing the invention in detail, a truck or other transport vehicle 10 is provided with a turntable 12 that forms the base for the backhoe 14. Backhoe 14 comprises a boom 16 which is mounted on a horizontal pivot 18 on turntable 12, and which boom can swing upwardly and downwardly about the pivot 18 within the range shown in FIG. 1, in addition to rotating about the vertical axis of turntable 12. A fluid cylinder 20 provides the means to swing the boom 16 about the pivot 18 for raising and lowering thereof, and to hold the boom in any desired fixed position about the pivot. The means for swinging the backhoe about the turntable 12 is conventional and of no concern in describing the present invention. A conventional jack 22 is provided on the vehicle 10 to prevent tipping of the latter during the operation of the backhoe.

Dipstick 24 is carried on boom 16 by a pivot frame 26 which swings about a pivot 28 at the lower end of boom 16. Frame 26 has an upright strut 30 which is of a box-like construction. Boom 16 is bifurcated at the lower end thereof to embrace strut 30, as shown in FIGS. 2 and 4. Pivot 28 includes spacers 32 and 34 between strut 30 and the bifurcations of boom 16. Pivot 28 is otherwise conventional and need not be further described.

Strut 30 extends upwardly and has a pivot pin 34. A fluid cylinder 36 extends along boom 16 from pin 34 and is anchored by a pin 38 to a bracket 40 which is in turn secured to boom 16 as by welding. A pair of stiffening webs 42 and 44 are positioned, one on each side of boom 16, are bent as shown in FIG. 3 and are welded to strut 30 as at 46. Webs 42 and 44 extend rearwardly a substantial distance to embrace boom 16 for a purpose that will appear.

A pair of bearing rings or frames are provided vertically along strut 30 and welded thereto. Ring 48 is positioned near the upper end of strut 30 and ring 50 is positioned near the lower end of the strut, and which rings have a common axis.

Dipstick support plates 52 and 54 are fitted for rotation in rings 48 and 50 respectively. A ball groove 56 is machined in the inner surface of ring 48 and a corresponding groove 58 is machined on the cylindrical surface of plate 52. A suitable number of bearing balls 60 are assembled in the corresponding grooves, thereby permitting plate 52 to rotate freely relative to ring 48. Resilient O-rings 62 and 64 are inserted between ring 48 and plate 52 for the purpose of retaining lubricant and excluding dirt from the bearing. Ring 50 and plate 54 are provided with a similar bearing and sealing arrangement and need not be further described.

A dipstick 66 extends through plates 52 and 54, apertures 68 and 70 being provided for that purpose. Dipstick 66 is of a rectangular box section having rounded edges 72 in this instance. A guide roller 74 is positioned on plates 52 and 54 at each corner 72 and is rotatable on lugs such as 76 which are integral with plates 52 and 54. Rollers 74 serve to guide the dipstick with a minimum of friction when it telescopes.

A fluid power cylinder 78 is positioned along dipstick 66 and has the usual piston rod 80. Ram 80 of cylinder 78 passes extensibly through the aperture 120 in plate 52, and cylinder 78 has an annular flange 82' which is bolted to plate 54 as at 82. Rod 80 is anchored to dipstick 66 by means of a pin 84 in bracket 86, the latter being welded or otherwise secured to the dipstick 66.

The means of rotating the dipstick 66 relative to the boom 16 and pivot frame 26 will now be described, reference being made to FIGS. 2 and 3. A pair of flanges 88 and 90 are positioned with their planes normal to webs 42 and 44 respectively, and are welded to the webs and to strut 30 as shown in FIG. 3. A pair of fluid power cylinders 92 and 94 are positioned, one on each side of dipstick 66. Cylinders 92 and 94 include rods 96 and 98. Brackets 100 and 102 are secured to the underside of rotating plate 52. Cylinders 92 and 94 are

pivoted to flanges **88** and **90** by pins **104** and **106** respectively. Rods **96** and **98** are pivoted to brackets **100** and **102** by pins **108** and **110** respectively.

The bucket **112** and its operating ram and linkage **114** is conventional and operates about a pivot **116** on dipstick **66**, known as "wristing," and need not be further described but may be referred to in describing the operation of the backhoe.

The usual hydraulic conduits **136** for the ram **36**, **178** for the ram **78**, **214** for the ram **114**, **192** for the ram **92**, and **194** for the ram **94** are provided as is the hydraulic pump and the necessary valves, which latter can be conveniently located in the cab on the turntable to permit remote control of all of the rams, as is customary.

The operation of a backhoe embracing this invention will now be described:

When beginning an excavation, the vehicle carrying the backhoe is positioned at a convenient location at the excavation site. If the excavation is one confined to the width of the bucket **112**, boom **16** is swung about pivot **18** until bucket **112** engages the earth. Fluid cylinder **36** is then actuated to swing the bucket **112** and dipstick **66** in a vertical plane and about pivot **28** so as to describe an arc as at **118** of FIG. 1. There may be instances when the boom **16** has been lowered or raised to the maximum position and it is desired to extend the reach as at A or B (FIG. 1) or to excavate deeper as indicated by the bucket at the 20-foot depth in FIG. 1 at C. This invention permits the operator to extend the dipstick **66** linearly so as to reach farther or deeper by merely actuating cylinder **78** to retract the ram **80**.

Instances may arise when the width of the bucket is less than the desired width of the trench. This invention permits rotating of the bucket to miss an obstruction or to widen the trench. Either operation may be performed without the necessity of shifting the vehicle transversely, the latter being a rather time consuming operation. With this arrangement widening of the trench in excess of the bucket width is accomplished by first digging the trench of the width of the bucket. The boom **16** is then swung transversely about the turntable **12** a suitable amount and then rotating the bucket (see FIG. 5) by actuating the fluid cylinder **92** or **94** so as to bring the bucket sides parallel to the side of the proposed continuation of the excavation. This is done without moving the vehicle transversely.

It may also be necessary to undercut the earth adjacent the end of the backhoe as indicated in FIG. 1, and which can be done with this invention by shifting the dipstick **66** linearly in the pivot frame **26** by means of fluid cylinder **78**. The only limitation as to distance being the limit of travel of the dipstick **66**.

The above being a complete description of an illustrative embodiment of the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a material handling machine having a boom extending therefrom and having an implement, a dipstick assembly comprising a relatively short pivot frame carried on a transverse pivot on the outer end of said boom, power means connected between said boom and said pivot frame to tilt the latter, a dipstick carried in said pivot frame and projecting from both ends thereof for longitudinal sliding travel and rotation therein and carrying said implement at an end thereof, said pivot frame including a pair of spaced bearing rings surrounding the exterior of said dipstick in longitudinally spaced relationship therealong, dipstick supported discs journalled in said rings and having apertures slidably and non-rotatably guiding said dipstick for its sliding movement, power means connected between one of said discs and said dipstick to move the latter longitudinally relative to said discs, and power means located close to that end of the boom which supports the dipstick and connected between said pivot frame and one of said discs through which the dipstick slides to rotate the latter and said dipstick with respect to the pivot frame.

2. In a material handling machine having a boom extending therefrom and having an implement, a dipstick assembly comprising a relatively short pivot frame carried on a transverse pivot on the outer end of said boom, power means connected between said boom and said pivot frame to tilt the latter, a dipstick of rectangular cross section carried in said pivot frame and projecting from both ends thereof for longitudinal sliding travel and rotation therein and carrying said implement at an end thereof, said pivot frame including a pair of spaced bearing rings surrounding the exterior of said dipstick in longitudinally spaced relationship therealong, dipstick supported discs journalled in said rings and having rectangular apertures slidably and non-rotatably guiding said dipstick for sliding movement, power means connected between one of said discs and said dipstick to move the latter longitudinally relative to said discs, and power means located close to that end of the boom which supports the dipstick and connected between said pivot frame and one of said discs through which the dipstick slides to rotate the latter and said dipstick with respect to the pivot frame.

3. In a material handling machine having a boom extending therefrom and having a material handling implement, a dipstick assembly comprising a relatively short pivot frame pivotally connected to the outer end of said boom, power means connected between said boom and said pivot frame to cause pivotal movement of the pivot frame relative to the boom, said pivot frame having longitudinally spaced concentric bearing rings, dipstick support discs journalled in said bearing rings, a dipstick longitudinally slidably and non-rotatably carried by said discs, the latter normally surrounding said lipstick intermediate its length, and power means located close to that end of the boom which supports the dipstick and connected between said pivot frame and one of the discs through which the dipstick is slidable to rotate the latter and said dipstick in one direction or the other with respect to said frame.

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