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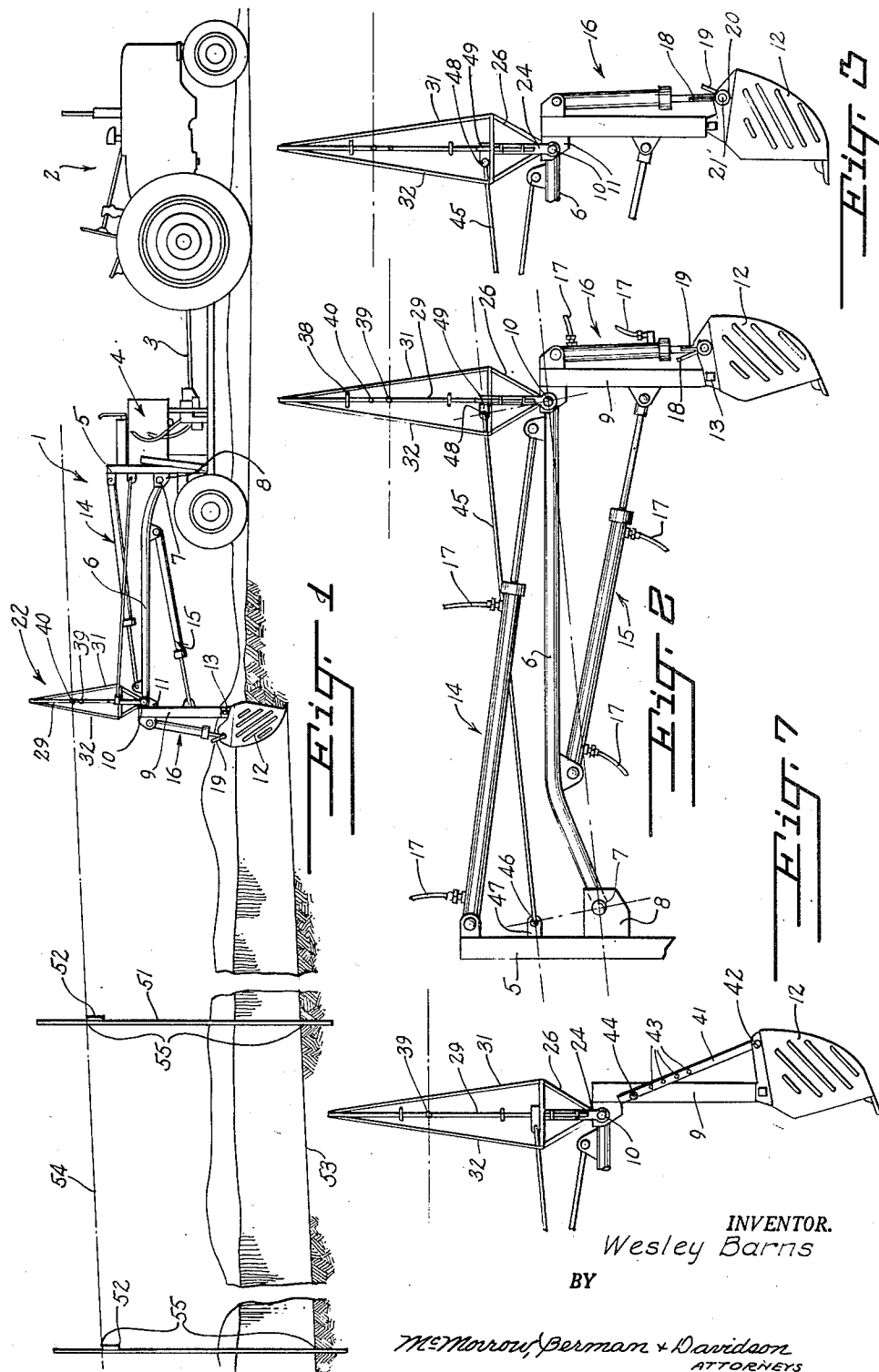
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WORKING LEVEL INDICATOR FOR BACKHOE ATTACHMENTS

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2 Sheets-Sheet 1



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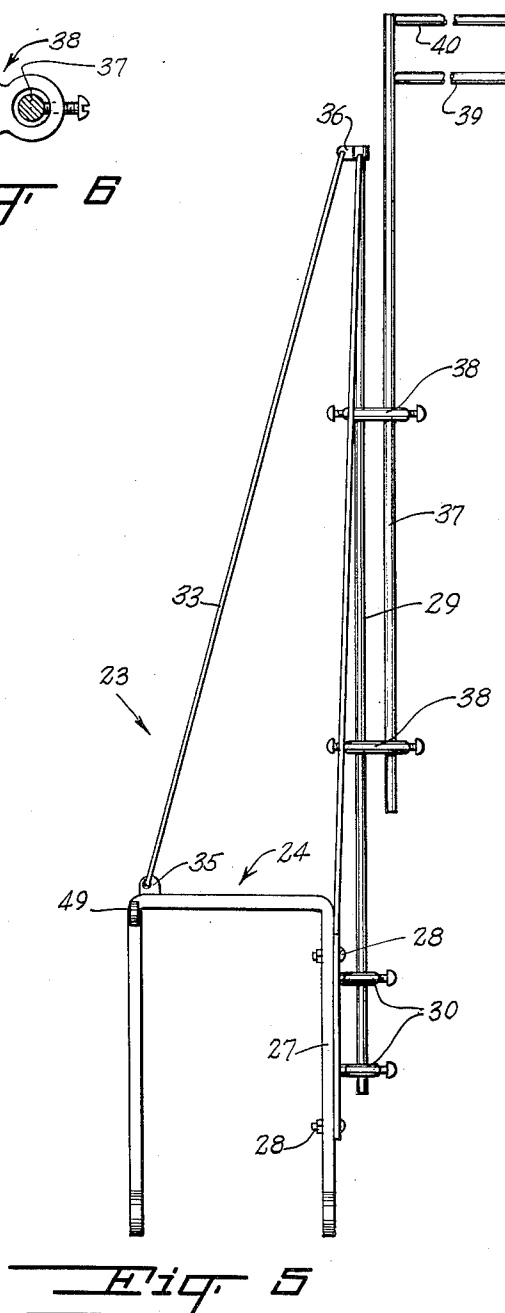
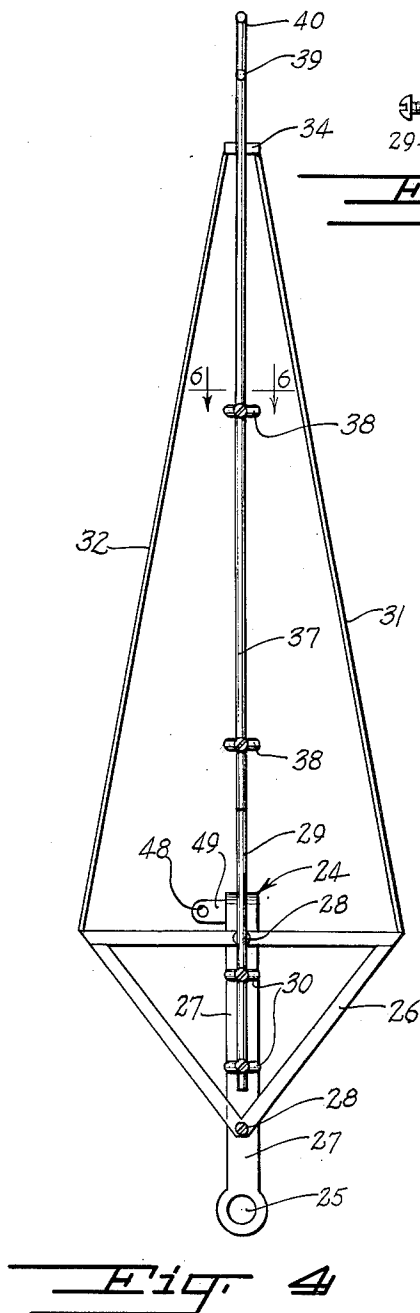
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2 Sheets-Sheet 2



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WORKING LEVEL INDICATOR FOR BACKHOE ATTACHMENTS

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2 Claims. (Cl. 33—185)

This invention relates to working level indicators for backhoe attachments.

An object of the invention is to provide a device for indicating the working level of the dipper of a backhoe attachment with respect to a predetermined grade.

Another object of the invention is to provide a working level indicator for a backhoe attachment which is connected to the attachment and is observable from the customary position of the operator of the attachment.

Another object of the invention is to provide a working level indicator for a backhoe attachment which is automatically and constantly maintained in the upright, operative position.

A further object of the invention is to provide a working level indicator for backhoe attachments which indicates alternative working levels for the dipper, one applicable when the dipper is being used for hard digging and the other applicable when the dipper is being used for cleaning out or clearing relatively loose material.

Other objects and advantages of the invention will appear in the course of the following description in conjunction with the attached drawings, in which:

Figure 1 is a side elevational view of the indicator of the present invention installed upon a backhoe attachment which is operatively connected to a motor tractor and which is in the process of digging a trench along a predetermined grade.

Figure 2 is a side elevational view on an enlarged scale of the indicator of Figure 1, but turned 180 degrees from such figure mounted upon a backhoe attachment in which the dipper is set in the digging position.

Figure 3 is a view of the dipper portion of the assembly of Figure 2 showing the indicator of the present invention and showing the dipper in the clearing position.

Figure 4 is a side elevational view on an enlarged scale of the indicator of the present invention.

Figure 5 is a rear elevational view of the indicator of the present invention.

Figure 6 is a view taken along the line 6—6 of Figure 4.

Figure 7 is a view of the dipper portion of the assembly of Figure 3, but showing an alternative means of setting the dipper in alternative working positions.

Referring now to the drawings in more detail, numeral 1 represents generally a backhoe attachment connected to a conventional tractor, generally designated 2. The attachment 1 includes a power takeoff 3, hydraulic pumps and mast turning mechanism 4, a mast 5, a boom 6 having one end connected to the mast 5 for raising and lowering movement about a horizontal axis or pivot pin 7 mounted in spaced lugs 8 projecting transversely from the mast 5, a dipper stick 9 having its upper end connected to the other end of the boom 6 for rocking movement about a horizontal axis or pivot pin 10 mounted between spaced lugs 11 projecting from the dipper stick 9, and a dipper 12 facing the mast 5 and connected to the lower end 13 of the dipper stick 9 for movement toward and away from the mast 5. A double-acting hydraulic cylinder 14 is operatively connected between the mast 5 and the boom 6 for effecting the raising and lowering of the boom 6. A double-acting hydraulic cylinder 15 is operatively connected between the boom 6 and dipper stick 9 for effecting the rocking movement of the latter. A double-acting hydraulic cylinder 16 is connected between the dipper stick 9 and the dipper 12 for effecting the movement of the latter toward and away from the mast 5. Hydraulic fluid enters and leaves the cylinders 14, 15, and 16 through

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tubes 17. As an alternative to the use of the hydraulic cylinder 16 for moving and positioning the dipper 12 upon the end 13 of the stick 9, the dipper may be moved by means of a bar 41, as shown in Figure 7, which bar 41 is pivotally secured at one end to the dipper 12 at 42 and has a plurality of spaced apertures 43 in its other end portion, each of which is selectively engageable with a pin 44 projecting from the adjacent side of the stick 9 to hold the dipper 12 in one of its movement positions. A pair of radially extending fingers 18 and 19, of different lengths, project, at different angles, from a collar 20 connected to the dipper 12 and surrounding a pivot pin 21 which serves to connect the hydraulic cylinder 16 to the dipper 12, the fingers 18 and 19 indicating by their relative position at any time, the movement position of the dipper 12.

An upstanding sighting device for indicating the work level of the dipper 12, embodying the present invention and generally indicated at 22, is mounted upon the attachment 1. The indicator 22 includes a standard 23, Figure 5, having the lower end connected to the boom 6, adjacent the end connected to the dipper stick 9, for pivotal movement about a horizontal axis. The standard 23 consists of an inverted U-shaped base 24, a triangular frame 26, an upstanding rod 29 and stays 31, 32 and 33. The triangular frame 26 is positioned transversely of the base 24 with its apex downward, and is fixedly secured to one leg 27 of the base 24 by means of bolts 28. The upright rod 29 is positioned longitudinally of and spaced from the leg 27 and is connected adjacent its lower end to the leg 27 by means of spaced screw clamps 30 which project from and are fixedly secured to the leg 27. The stays 31 and 32 are connected to the opposite ends respectively of the base portions of the frame 26, by welding or other suitable means, and have their other ends similarly connected to a cross member 34 at the top of the rod 29. The stay 33 has one end looped through an aperture in the lug 35 projecting from the base 24, remote from the leg 27, and the other end looped through an aperture in a lug 36 projecting from a cross member 34. The base 24 is mounted with its legs astride the lugs 11 and is supported upon the pivot pin 10 which extends through an aperture 25 formed in the free end of each leg to receive the pin 10.

A rigid guy 45 is arranged above and spaced from the boom 6 and has one end pivotally connected to the mast 5 and the other end pivotally connected to the standard 23. Specifically, the guy 45 has one end looped through a conformably sized aperture 46 in a lug 47 projecting from the mast 5, and the other end looped through an aperture 48 in a lug 49 projecting from the base 24 remote from the leg 27. The length and positioning of the lugs 47 and 49 and the positioning of the apertures 46 and 48 therein are such that the distance between the center of the aperture 46 and the center of the pivot pin 7 is equal to the distance between the center of the aperture 48 and the center of the pivot pin 10 and the distance between the centers of the apertures 46 and 48 is equal to the distance between the centers of the pivot pins 7 and 10. By virtue of the arrangement of parts just described, the standard 23 is maintained in the vertical position at all times by the guy 45, regardless of the angle to which the boom 6 may be raised or lowered.

An extension rod 37 is arranged in parallel spaced relation with respect to the rod 29 and is connected to the rod 29 for up and down movement therealong by coacting means consisting of double-screw clamps 38 which connect the rods 29 and 37 together and are effective in securing the rod 37 in any selected position of its movements. A horizontally disposed sighting element is connected to the rod 37 adjacent its upper end. The sighting element consists of spaced horizontal bars 39 and 40 fixedly secured to the rod 37 by welding or other suitable means.

While the indicator of the present invention may be used in connection with a backhoe attachment in a variety of leveling, digging and grading operations, its operation in the digging of a ditch on grade for the laying of tile or pipelines will be illustrative of its use. A pair of stakes 51, Figure 1, are driven into the ground in alignment with the ditch being dug and to the rear of the

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point at which the digging is to be done. Paddles 52 are connected to the stakes 51 at a predetermined distance 55 above the correct grade level of the bottom 53 of the ditch at, or projected to, the position of each stake. A line of sight 54 extending across the top of the paddles 52 will thus be parallel to and at the predetermined distance 55 from the desired grade level 53 of the bottom of the ditch. If now the dipper 12 is being used in the tilted position shown in Figure 2, the customary position for digging operations, the operator will move the dipper stick 9 to the vertical position and rest the bottom of the dipper 12 upon the ground at the point at which the digging is to be done. He will then set the extension rod 37 upon the rod 29 at a position at which the distance of the lower sighting bar 39 from the pivot pin 10 is equal to the difference between the distance from the pivot pin 10 to the lowest point of the dipper 12 and the predetermined distance 55. If now he sights across the lower sight bar 39 in the direction of the aligned paddles 52, he can tell whether the level of the bottom of the dipper 12 is, at the time, above or below the desired grade by observing whether the line of sight established by the paddles 52 passes below or above the level of the sighting bar 39. If the level of the dipper bottom is above the desired grade, he continues to dig at the point at which he is then located, checking the level of the bar 39 with the line of sight from time to time, until the two coincide. He then knows that he has dug to the desired level and may clear the excavation and move the apparatus forward to repeat the process.

When the dipper is to be used in the flat position, as shown in Figure 3, the customary position for clearing operations or working in relatively loose material, the indicator of the present invention is used in the same manner as described above except that the upper sighting bar 40 is used in determining the position of the dipper with respect to the desired grade, the distance between the bars being equal to the difference in depth of the dipper in its tilted as compared to its flat position. The operator of the hoe attachment may tell the position of the dipper, at any given time, by observing the position of the fingers 18 and 19 as previously described.

What is claimed is:

1. For use with a machine having a mast, a boom having one end connected to said mast for raising and lowering movement about a horizontal axis, a dipper stick having the upper end connected to the other end of said boom for rocking movement about a horizontal axis, and a dipper facing said mast and connected to the lower end of said dipper stick for movement toward and away from said mast; an upstanding sighting device for indicating the working level of said dipper, said device comprising a standard having the lower end connected to said boom adjacent said other end of said boom for pivotal movement

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about a horizontal axis, a rigid guy arranged above and spaced from said boom and having one end pivotally connected to said mast and having the other end pivotally connected to said standard, the distance between the pivotal connection of said one end of said guy and the horizontal axis on said one end of said boom being equal to the distance between the other end of said guy and the pivotal movement axis of said standard and the distance between the pivotal connection of said one end of said guy and said other end of said guy being equal to the distance between the horizontal axis of said one end of said boom and the pivotal movement axis of said standard, a horizontally disposed sighting element connected to said standard for up and down movement therealong, and coacting means on said sighting element and said standard for securing said sighting element in any selected position of its movements.

2. For use with a machine having a mast, a boom having one end connected to said mast for raising and lowering movement about a horizontal axis, a dipper stick having the upper end connected to the other end of said boom for rocking movement about a horizontal axis, and a dipper facing said mast and connected to the lower end of said dipper stick for movement toward and away from said mast; an upstanding sighting device for indicating the working level of said dipper, said device comprising a standard having the lower end connected to said boom adjacent said other end of said boom for pivotal movement about a horizontal axis, a rigid guy arranged above and spaced from said boom and having one end pivotally connected to said mast and having the other end pivotally connected to said standard, the distance between the pivotal connection of said one end of said guy and the horizontal axis of said one end of said boom being equal to the distance between the other end of said guy and the pivotal movement axis of said standard and the distance between the pivotal connection of said one end of said guy and said other end of said guy being equal to the distance between the horizontal axis of said one end of said boom and the pivotal movement axis of said standard, an extension rod arranged in parallel spaced relation with respect to said standard and connected to said standard for up and down movement therealong, coacting means on said standard and said extension rod for securing said rod in any selected position of its movements, and a horizontally disposed sighting element connected to said rod.

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