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J. C. REEVES

2,292,241

GRADE INDICATOR

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Fig. 1.

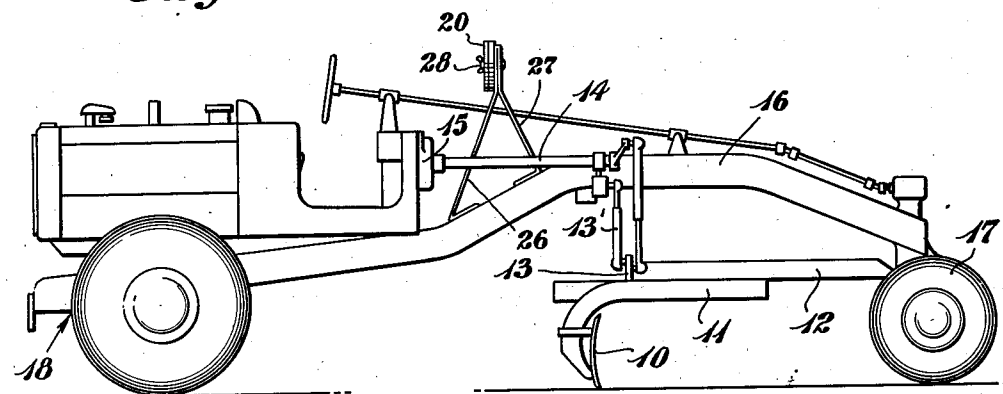


Fig. 4.

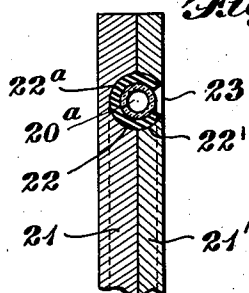


Fig. 2.

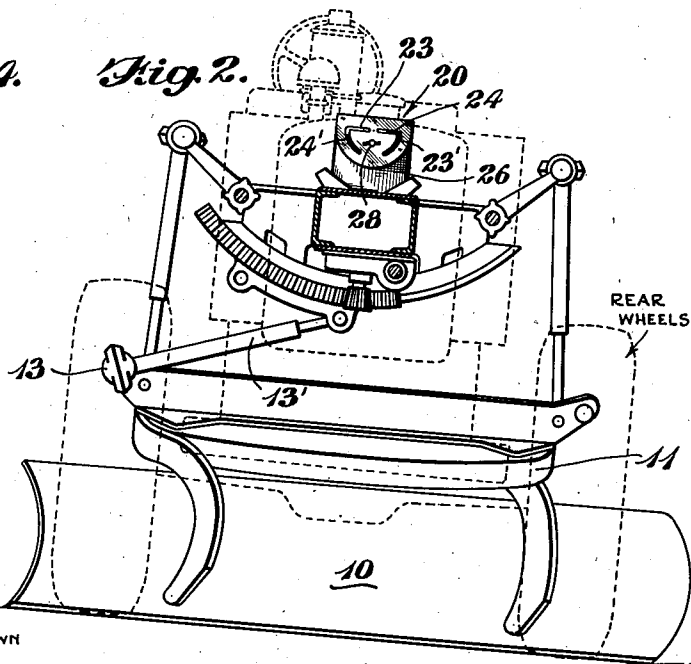
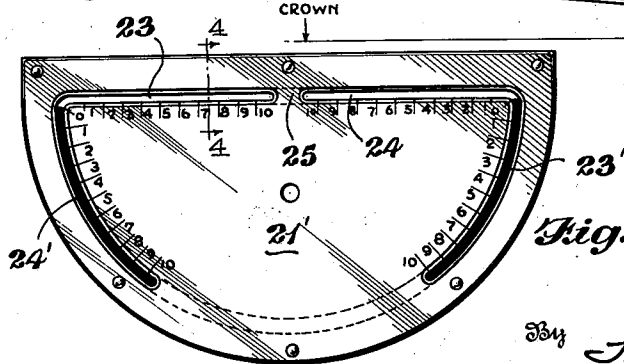


Fig. 5.



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GRADE INDICATOR

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2 Claims. (Cl. 37—143)

This invention relates to a grade indicator particularly adapted for use with graders and like road building machinery.

In modern road building, the grading operation is generally done by means of power graders carrying a blade which makes a so-called windrow each time it travels along the road bed. Generally the width of a crowned road is such as to require a plurality of windrows on opposite sides of the crown or center line of the road, the operator of the grader moving in one direction for one windrow and then turning the grader and coming back and taking the next succeeding windrow until the crown of the road is reached. Operators of road graders are usually men of limited technical education who receive their instructions from the contractor or superintendent handling the construction of a given length of road. The intention of course is to construct a road having a crown of a given height. Thus, for example, a road of 26 feet in width might have a crown of 9 inches. In working from the outer edge of the road inwardly towards the crown, the angle of tilt of the blade is such as to work the excavated dirt or earth inwardly towards the crown. Thus, the angle of tilt for the initial or first windrow might be 30°, the next succeeding windrow 20° and the third or final windrow 8°. The slope or angle of the blade in making the ditch windrow need not be held with any degree of accuracy, but in making the actual road bed windrows, the slope or angle of the blade should be such as to result in a given crown, or a crown of a given height which is uniform along the length of the road. The average operator of a grader simply guesses at the tilt of the blade, with the result that the crown of the road is oftentimes irregular or non-uniform.

An object of the present invention, therefore, is to provide an indicating device for use on a road grader, or a machine having the functions of a grader, which will indicate at a glance through easily read indicia the proper angle of tilt of the blade to provide a crown of a given height.

Another object of the invention is to provide a grade-indicating instrument in the nature of a spirit level which may be readily mounted upon a road grader or like machine and which will indicate the slope or tilt of the grade irrespective of which direction the grader is traveling.

Other objects include the provision of a device of the type specified which is of simple yet rugged construction, may be easily read by a person of limited technical education, and may be easily

and quickly positioned at the correct angle with respect to the machine on which it is mounted.

The foregoing and other objects and advantages will become apparent in view of the following description taken in conjunction with the drawing, wherein:

Fig. 1 is a view in side elevation of a road grader having my improved grade-indicator mounted thereon;

Fig. 2 is a view of the grade-indicator and parts of the machine of Fig. 1 as viewed from the driver's seat while the machine is in operation;

Fig. 3 is an enlarged detail view in front or face elevation of the indicator;

Fig. 4 is a section taken on the line 4—4, Fig. 3; and

Fig. 5 is a detail view of the spirit level tube removed from its supporting frame.

Referring to the drawing in detail, and first to Figs. 1 and 2, the machine illustrated in these figures is a road grader of the power driven type but obviously could be any type of road building machinery adapted to carry out the functions of a grader. Referring briefly to the grading machine herein illustrated, a blade is indicated at 10 and is supported for revolving movement from a so-called "circle guide" 11, carried by a drawbar or analogous frame member 12 mounted for tilting movement by means of connections 13—13' and shaft 14 leading to gear box 15 which houses power driven gears for tilting the blade by means of a hand-operated clutch, not shown. The drawbar 12 together with the blade and coacting mechanism is supported as a unit from a heavy frame section or beam 16 carried at its front end by the front wheels 17 of the grader, said beam or frame section having a universal mounting with respect to the front wheels so that the latter may assume any angle without affecting the angle of the said frame section. At its rear end, however, the frame section has a rigid connection with the rear chassis and wheels 18 of the grader so that said frame section will tilt in accordance with the terrain or contour over which the rear wheels of the grader move.

The improved indicator is generally indicated at 20 and includes a tube in the nature of a spirit level 20', note Fig. 5, preferably of semi-circular shape with a horizontal connecting chord 20a. The tube thus shaped is mounted within a frame preferably composed of a base member or section 21 and a face plate or section 21'; said sections being formed with coacting recesses 22 and 22' in which the tube is disposed. The recesses are

preferably lined with a resilient substance 22a such as rubber felt or other cushioning material to ensure against damage to the tube through shocks and jars. This material is preferably of a color or shade in sharp contrast to the tube 20' to facilitate reading of the indicator.

The face plate 21' is formed with upper spaced horizontal openings or slots 23 and 24, each continuing at its outer end into an arcuate slot 23' and 24'. The slots 23 and 24 are separated at an intermediate point as indicated at 25. The calibrations of slots 23 and 23' are similar and should be read together, and the same holds true with respect to slots 24 and 24'.

The instrument so constructed is preferably calibrated so that it reads in numerals or like indicia indicating the crown of the road resulting from a blade of a given width tilted at a given angle. Thus, assuming the blade is to be 12 feet in width, the calibrations may be initially computed from the degree of tilt of the blade which will result in a crown having a given height. For example, let it be assumed that after the initial ditching of the road, to reach the crown or middle line requires two windrows, one with the grader moving in one direction and the other with the grader returning or moving in the opposite direction. The first windrow would then require a tilt of the blade which would indicate 6 on the readings in the slots 23 and 23' when the grader is moving in one direction and a reading indicating 3 in the slots 24 and 24' when the grader is returning or moving in the opposite direction. Actually, these readings, if read in the terms of degrees, might indicate a tilt of 18° for the first windrow and a tilt of 12° for the second or crown windrow. Once the combinations of numbers for a given crown is known, the operator can produce a uniform crown with certainty.

In mounting the instrument on the grader, it should be disposed on the center line of the main frame section 16. The means for mounting the instrument as here shown comprises holding or supporting brackets 26 and 27 anchored to the said member 16, the instrument being supported for bodily movement or adjustment on bracket 26 by means of thumb screw 28. While the instrument is preferably mounted at the point indicated, it could obviously be disposed on any other member whereby it would show the angle of tilt of the road bed formed or scraped by the blade 10. When mounted in the position shown,

the center frame section takes the angle of tilt of the rear wheels of the grader, and since these follow in the path of the blade 10, the angle of tilt is approximately the same as that of the blade 10. Obviously, in road work a certain amount of tolerance is allowed.

It will be understood that the field of use of the improved grade indicator has not been fully outlined herein, and that certain changes in construction and design and the manner of mounting the instrument may be adopted without departing from the spirit or scope of the invention as defined by the appended claims.

What is claimed is:

1. A grade-indicator particularly adapted for use with a road grading machine comprising a spirit level including a frame and a transparent tube having an indicating fluid therein, said tube having a portion of semi-circular contour, and a horizontal portion connecting the opposite ends of the semi-circular portion, said frame being formed with a slot to receive the tube, the frame covering the central part of both the horizontal and semi-circular portions of the tube leaving the remainder exposed and said slot being calibrated in opposite directions from the covered portions of the tube to indicate the degree of slope necessary to obtain a road crown of a given height, the diagonally opposed portions of the slot being similarly calibrated.
2. In combination with a grading machine having a main frame and a blade tiltable about a horizontal axis and a draw bar supporting said blade and mounted substantially centrally of the longitudinal axis of the machine, a grade indicator comprising an indicator frame and a spirit level in the form of a transparent tube defining a closed conduit having an indicating fluid therein, said tube having a substantially straight portion and a communicating curved portion, said indicator frame being calibrated adjacent said tube to indicate the degree of slope necessary to obtain a road crown of a given height, said calibrations starting from zero adjacent the points where the straight and curved portions join, there being two similar sets of calibrations for the curved portion of the tube and like sets for the straight portion of the tube, and means mounting said indicator frame on said main frame in a manner such as to indicate the corresponding angular adjustment of the blade with respect to said main frame.

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