May 29, 1956 W. DUMLER 2,747,292

DITCH-DIGGING GAUGE

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Fig. 1.

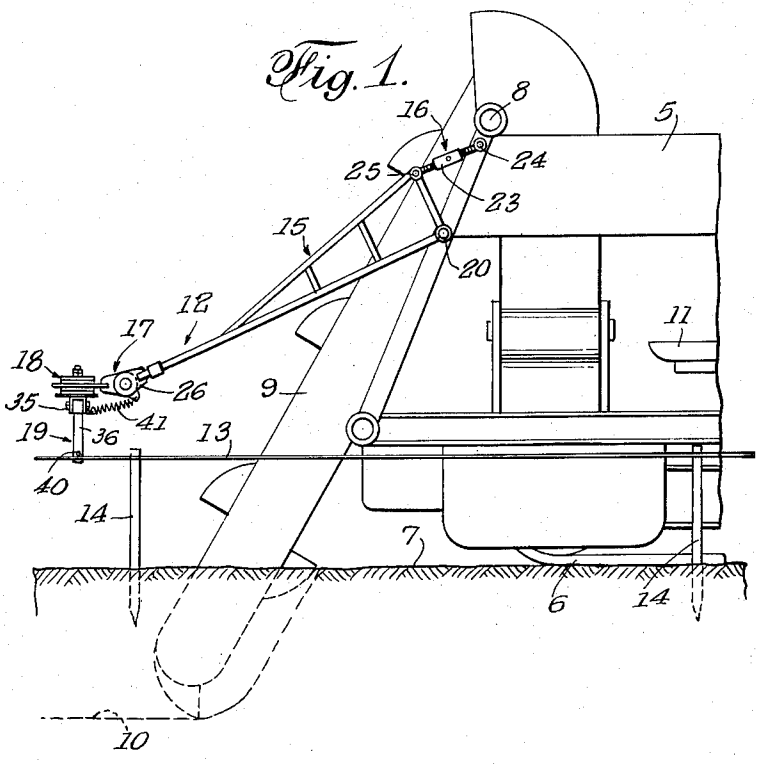


Fig. 2.

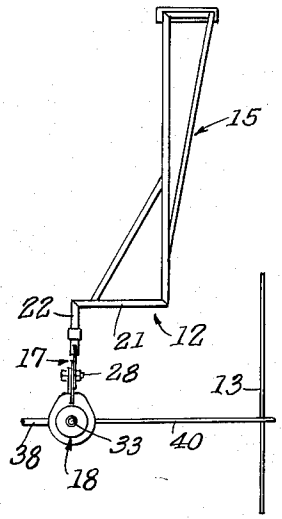


Fig. 3.

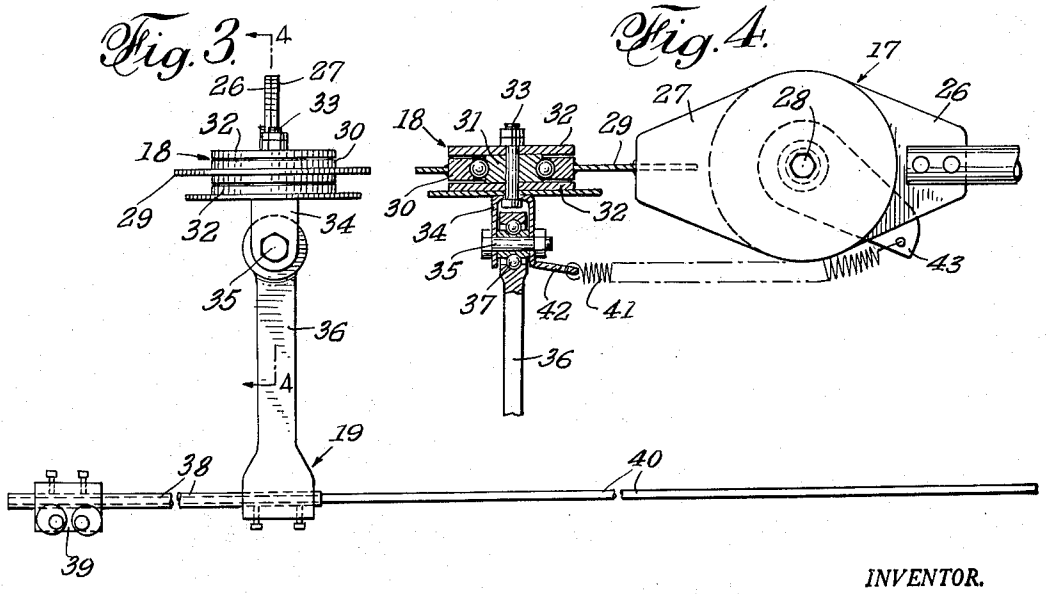


Fig. 4.

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DITCH-DIGGING GAUGE

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4 Claims. (Cl. 33—185)

This invention relates to a gauge to determine the level below the surface and the transverse squareness of the bottom of a ditch or trench. Departure from proper grade of a ditch being dug by a ditcher may result from either or both longitudinal and transverse angularity, or slope of the surface along which the ditcher progresses in operation. It is common practice to provide a guide line or wire initially stretched between stakes or stations alongside of where the ditch is to be dug and at a suitable elevation above the road surface and to use said wire as a reference line relative to which the grade of the ditch is maintained.

It is an object of the present invention to provide a novel and improved gauge that is adapted to be adjustably mounted on a ditcher and have gauging association with a guide line to apprize the ditcher operator of variations in the desired disposition, as to depth and transverse normality, of the excavating boom of the ditcher to, thereby, enable said operator to make the necessary adjustments in the disposition of the boom if the same is indicated.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a side elevational view of the present gauge and shown mounted on a ditcher in operative position.

Fig. 2 is a plan view of said gauge.

Fig. 3 is an enlarged broken front view.

Fig. 4 is a longitudinal sectional view as taken on line 4—4 of Fig. 3.

The ditcher that is shown in Fig. 1 is intended as conventional of machines that excavate ditches or trenches as they are propelled along a surface or roadway in which a ditch is being dug. Essentially, such a machine comprises a chassis 5 that is mounted on traction means 6 so as to be moved along a surface 7. Said chassis, as at 8, pivotally and/or otherwise adjustably mounts the carriage of a ditch-excavating boom 9 that is adapted to dig a trench or ditch 10 as the ditcher is propelled toward the right, as in the drawing. The grade or depth of the trench 10, in this case, is determined by the angular disposition of said boom, being deeper when the boom is at a relatively steep angle and shallower when said angle, with relation to surface 7, is reduced.

Such machines usually have the excavating boom 9 disposed centrally of the sides of the machine with the traction means 6 on each side so as to travel along surface 7 on each side of the trench being dug. Consequently, should said surface 7 be higher on one side of the trench than on the other, the boom, conforming to the resultant transverse cant of the ditcher chassis, will become elevated relative to the low side of the surface 7 and the trench being dug will be shallower than desired. In any case, the trench will not be on grade. Forward and rearward tilt of the ditcher may result from the surface 7 being angular longitudinally, thereby either raising or lowering boom 9 with resultant variation in the grade of the trench.

The ditcher that is illustrated embodies a seat 11 from which vantage point an operator may follow the different movements of the boom and make adjustments in the disposition thereof, as desired. However, because the operator is positioned on chassis 5, he cannot, with any degree of accuracy, determine when boom adjustment is needed nor the degree of such adjustment. The present gauge 12 is provided for this purpose and the same is used in association with a line 13, mounted on suitable stakes or the like 14 and arranged along a suitable level alongside of where the trench is to be dug and clear of the machine as the same is operating. The gauge 12 is mounted on the boom carriage on the side of the ditcher where the operator is stationed.

The present gauge comprises, generally, a mounting arm 15, means 16 to adjust the upward and downward disposition of said arm, means 17 on the free end of arm 15 and adjustable in a vertical plane to be settable in horizontal position regardless of the sloping position of said arm, a swivel 18 carried by the end of means 17 and rotational on a vertical axis, and a gauging pendulum 19 carried by said swivel and mounted to tilt transversely on a horizontal axis longitudinal to the line of movement of the ditcher.

The arm 15 is mounted on the chassis on a pivot 20 so as to be movable in a vertical plane around said pivot. Said arm is constructed as a rigid truss and, at its free end, is provided with a transverse extension 21 that terminates at the medial line or plane of the boom 9. Said extension 21 terminates in a mounting end 22 that resides on said medial plane.

The means 16 is shown as a turnbuckle 23 connected to the chassis at 24 and to arm 15 at 25. The same enables angular adjustment of said arm to bring end 22 in suitable relationship to surface 7 or gauge line 13.

The means 17 comprises a plate 26 secured to end 22 in vertical disposition, as shown, a second plate 27 in flatwise contact with plate 26 and rotationally angularly adjustable relative to said plate 26 on a horizontal pivot bolt 28 that is used to lock the adjustment, and a third plate 29 affixed to plate 27 and in a plane transverse to the latter plate. It will be clear that pivot bolt 28 enables adjustment of plate 29 to a horizontal position regardless of the angular disposition of arm 15.

The swivel 18 is shown as the outer race 30 of a ball bearing and affixed to plate 29, the inner race 31 of said bearing, washer plates 32 at each side face of race 31, and a bolt 33 serving to clamp inner race 31 and plates 32 together so as to be revoluble in outer race 30. The thickness of the inner race is slightly greater than that of the outer race enabling such swivelability of the inner race.

In this case, the bolt 33 is used to secure a clevis 34 to the bottom of the swivel. The gauging pendulum 19 is mounted on a bolt 35 extending across the fork in said clevis.

The pendulum 19 comprises a depending bar 36 that has one end fitted with a ball bearing 37 and disposed in the fork of the clevis with bolt 35 passing through the inner race of said bearing. Thus, said bar is freely pendant. The other end of said bar is bored transversely to the

axis of bolt **35** and in said bore is fitted a tube **38** that mounts an adjustable counterweight **39**. Said tube **38** extends in one direction (away from the side of the gauge arm **15** and of gauge line **13**), and an elongated feeler rod **40** extends in the opposite direction toward said gauge line. Said rod may be extended or retracted so its end is positioned adjacent to line **13**, as suggested in Fig. 2. The counterweight **37** may be adjusted to achieve a level position of rod **40** and, therefore, balance of the pendulum.

The rod **40** is maintained in an accurately transverse position by a spring **41** extending between a tab **42** on the clevis **34** and a tension-adjusting arm **43** that is locked by bolt **28**. If, at any time during the use of the gauge, the transverse disposition of rod **40** is disturbed, as by encountering the end of a stake **14**, the swivel **18** will enable the end of said rod to wipe by such interfering element and spring **41** will restore the rod to transverse position.

It will be seen that the gauging pendulum normally has only pivotal movement on the axis of bolt **35**. Actually, the pendulum gravitationally maintains a vertical position and the arm **15** and the parts affixed thereto move with the ditcher chassis' movement as caused by unevenness in surface **7**. Unless such movement of the ditcher from a level position is material, the relationship between gauge line **13** and the end of rod **40** is not altered. However, a material front to back change of angle of the ditcher will be immediately observed because the rod **40** will either move away from the gauge line **13** or the end of said rod will cause a tilt in the pendulum. Also, any material change in the transverse angle of the ditcher, depending on which is the low side, will similarly disturb the established gauging relationship between line **13** and the end of rod **40**.

It will be noted that the swivel **18** serves only to restore rod **40** to transverse position and does not enter into the gauging operation. The latter results from the single-plane pendulum, as described.

When the operator observes the variations in position of rod **40**, as above, he makes the necessary changes in the angular disposition of the excavating boom to restore the grade of the trench being dug by the ditcher.

While the foregoing illustrates and describes what is now contemplated to be the best mode of carrying out the invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A gauge for operative association with a gauge line and adapted to be mounted on a ditch-digging machine, said gauge comprising a horizontal swivel revolvable about a vertical axis, a horizontal pivot bolt carried by said swivel, resilient means to normally hold said bolt in a plane of travel of said machine, and a pendulum carried by said bolt and having a rod with one end of said rod being in operative association with said gauge line.

2. A gauge mechanism for use with a ditching machine and a gauge reference line strung along a ditch, said mechanism including a gauge arm mounted on said machine and having a gauge end, a horizontal swivel mounted at the gauge end of said arm, said horizontal swivel being rotatable about a vertical axis, a clevis supported by said horizontal swivel, said clevis having a horizontal axis, a pendulum suspended from said clevis, and spring means for biasing the position of said horizontal axis into a plane of travel of said machine for preventing free oscillation of said pendulum in a horizontal plane and around said vertical axis.

3. A gauge for a ditch-digging machine comprising a gauge arm having one end thereof mounted on said machine and the other end disposed in a longitudinal plane of said machine, a horizontal swivel rotatable about a vertical axis mounted on said other end of said arm, a clevis connected to and rotatable with said swivel, said clevis having a horizontal pivot bolt across the fork thereof, a pendulum suspended from said bolt, said pendulum being rotatable in a plane transverse to the longitudinal plane of said machine, and resilient means interconnecting said clevis and the other end of said arm to bias said bolt in a longitudinal direction.

4. A gauge for a ditch-digging machine comprising a gauge arm, said arm having one end mounted on a ditch-excavating boom and the other end disposed in the medial longitudinal plane of said boom, a horizontal swivel rotatable about a vertical axis mounted on said other end of said arm, a clevis connected to and rotatable with said swivel, said clevis having a horizontal pivot bolt across the fork thereof, a pendulum suspended from said bolt, said pendulum being rotatable in a plane transverse to the medial longitudinal plane of said boom, a laterally directed rod carried by said pendulum, said rod also being rotatable in a transverse plane and in operative association with a gauge line, and resilient means interconnecting said clevis and the other end of said arm to bias said bolt in a longitudinal direction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,194,460	Yocum	Aug. 15, 1916
1,969,522	Penote	Aug. 7, 1934
2,489,196	Reising	Nov. 22, 1949
2,580,954	Przybylski	Jan. 1, 1952