

March 6, 1928.

A. A. SMITH

1,661,812

SIGHTING DEVICE FOR TRENCH DIGGERS

Filed March 3, 1927

2 Sheets-Sheet 1

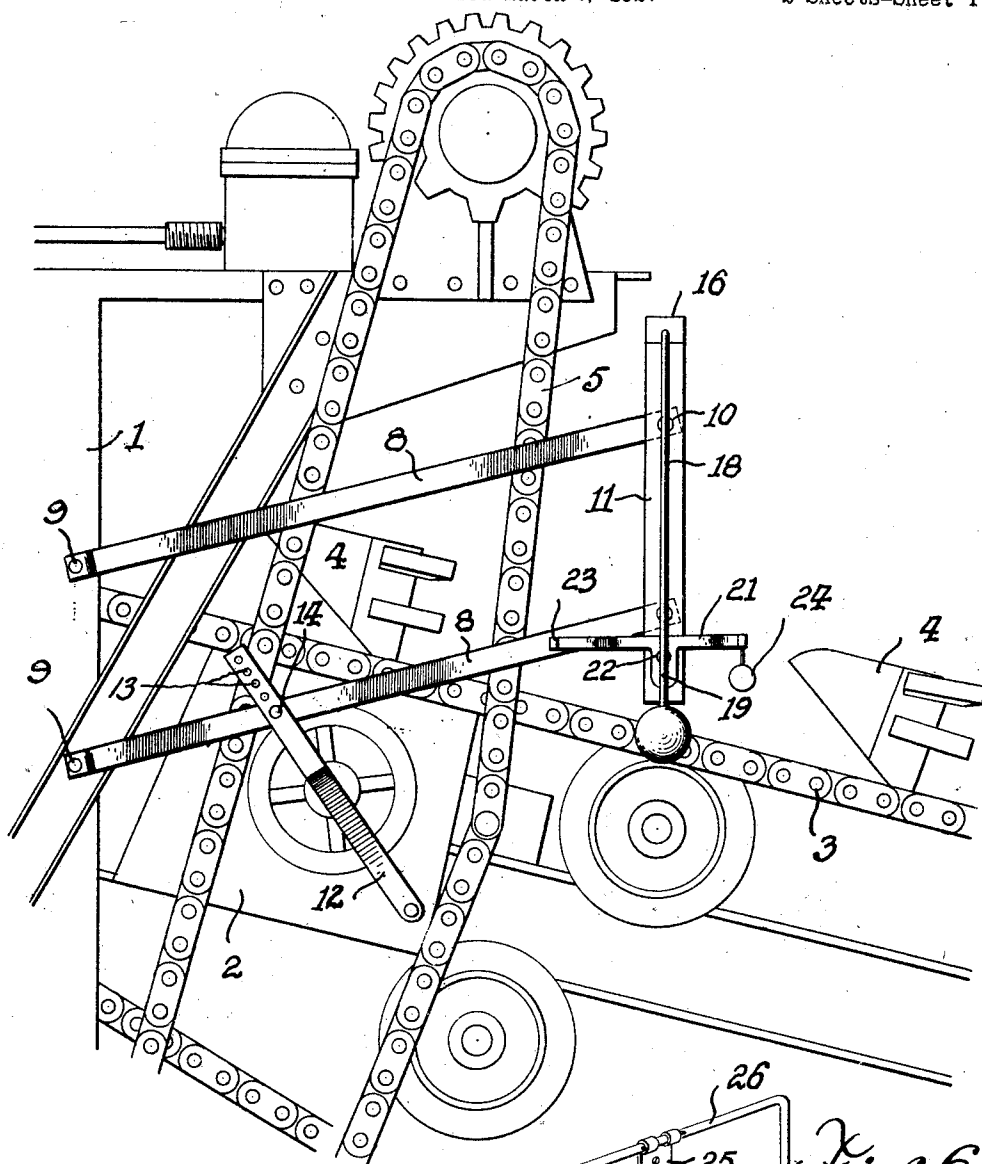
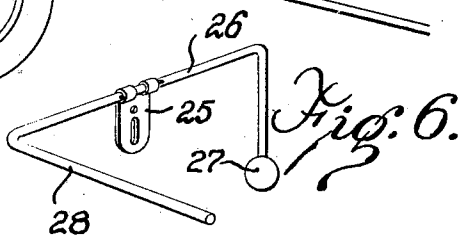


Fig. 1.



INVENTOR.

Albert A. Smith

BY

Butt & Butt

ATTORNEYS

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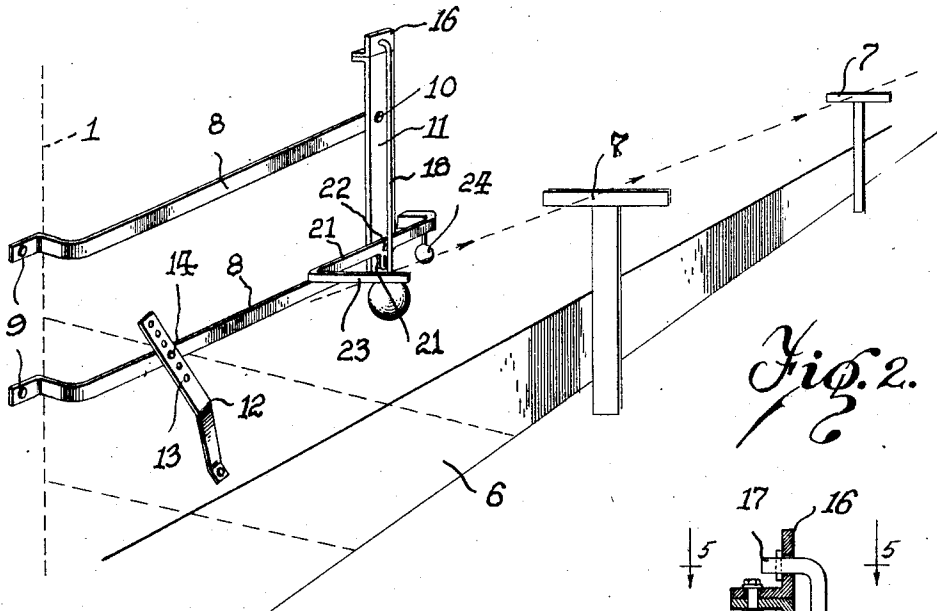


Fig. 2.

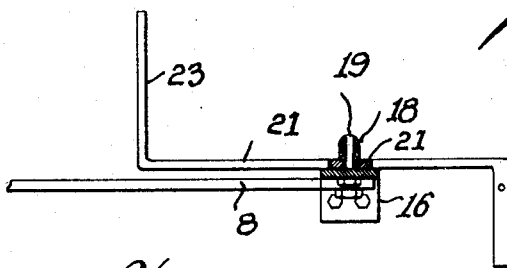


Fig. 4.

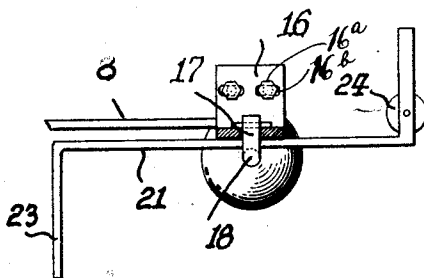


Fig. 5.

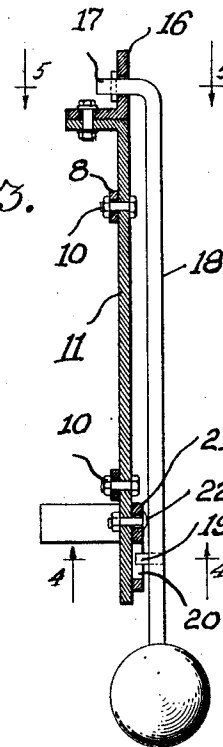


Fig. 3.

INVENTOR.

Albert A. Smith

BY

Robert W. Smith

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT A. SMITH, OF BERKLEY, MICHIGAN.

SIGHTING DEVICE FOR TRENCH DIGGERS.

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This invention relates to a sighting device for excavating machine, particularly trenching machines which move over the ground and dig a trench or ditch. These machines are ordinarily of considerable length and include a boom equipped with an endless carrier for a multiplicity of diggers, scrapers, shovels or other instrumentalities by which earth is loosened and removed for the formation of a trench or ditch of desired depth. The boom has one end pivotally mounted on the machine proper and a raising and lowering chain is connected to the boom intermediate its ends. It is the present practice to position a plurality of targets or indicators along a trench or course and sufficiently in the rear of the machine to assist the operator of the machine in properly guiding the machine and judging the position of the machine for digging a ditch of desired depth. Very often uneven and irregular ground is encountered with the result that one or the other end of the machine will be above or below the normal level of the ground with the result that the boom is supported whereby a trench or ditch is dug having an uneven and irregular bottom. In other words, the trench or ditch is not of a uniform depth throughout relative to a predetermined grade.

My invention aims to obviate the above defects in trench digging by equipping a trench machine with a sighting device adapted to cooperate with targets in indicating to the operator of the trench machine when the boom should be raised or lowered, also the degree of adjustment, so that irrespective of the uneven or irregular surface on which the machine travels a trench or ditch may be dug having a bottom uniform throughout.

The sighting device is applicable to any trench machine that has a boom or digging instrumentality adapted to be adjusted, and the device includes a double pendulum action by which a sight member is automatically adjusted. Comparing this sight with targets it is possible for the operator of the machine to determine the position of the outer end of a boom relative to a predetermined grade and consequently may adjust the boom when incorrectly supported for maintaining a uniform trench or ditch bottom.

On account of uneven and irregular ground one side of the machine may be lower than the other thus tilting the sight

member, which when compared to the targets, might mislead the operator, causing the trench to be dug too shallow or too deep. This would result in an uneven trench bottom and a few inches difference often interferes with the laying of pipes, particularly at joints. The double pendulum action maintains the sight constantly horizontal, yet permits of it raising and lowering according to the action of the machine.

My invention will be better understood when reference is had to the drawings and the detail description thereof, the drawings showing the sighting device in two forms, either of which may be used.

Figure 1 is a side elevation of a portion of a trench machine provided with the sighting device;

Fig. 2 is a perspective view of the device illustrating diagrammatically its position relative to a trench and targets;

Fig. 3 is a vertical sectional view of a portion of the device;

Fig. 4 is a horizontal sectional view taken on the line 4-4 of Fig. 3;

Fig. 5 is a similar view taken on the line 5-5 of Fig. 3; and

Fig. 6 is a perspective view of a rockable sight member.

In the drawings the reference numeral 1 denotes a cab or some stationary member at the rear end of a trench or ditch digging machine and adjustable relative to this machine member is a movable boom 2 adapted to be raised and lowered in a vertical plane, the boom including a driven carrier or conveyor 3 having a plurality of digging instrumentalities 4. This boom may be raised and lowered by a suitable mechanism, generally designated 5, and the digging instrumentalities are adapted to produce a trench or ditch 6. After a portion of the trench is dug or the course of the trench is laid out two or more targets 7 are placed in position, these targets being of a predetermined height and in alinement so that the operator of the trench machine may be guided by the targets and regulate the position of the boom 2 so that a trench may be dug that is of a uniform grade.

My sighting device is adapted to be supported from the stationary member 1 of the machine and convenient to the operator of the machine, so that the sighting device may be compared with the targets 7. The device comprises parallel bars 8 having the

inner ends thereof pivotally connected, as at 9 to the stationary machine member 1. The outer ends of the bars 8 are pivotally connected, as at 10 to an upright 11. The distance between the pivot points on the upright 11 is equal to the distance between the pivot points 9, 9. The structure may be regarded as a parallelogram having a leg 9, 9 on the fixed part of the machine and it is by virtue of this parallelogram arrangement that the bars 8 will remain constantly in parallelism and constantly support the upright 11 parallel to the stationary member 1.

Pivotally connected to the boom 2 is a gauge arm 12 provided with a series of apertures 13 representing graduations in elevation. The upper free end of the arm 12 is adapted to be pivotally connected by a pin 14 or other pivotal means to the lowermost arm 8, so that the connection between the arm and bar may be easily changed. Obviously any up and down movement of the boom is translated to the adjustable parallelogram structure and the movement of the bar may be noted relative to the target 7 by comparing the position of the outer end of the parallelogram structure with the targets. In connecting the gauge arm 12 to the lowermost bar 8 of the parallelogram structure, I desire to resort to a ratio of connection based on its connection with the boom. It is by virtue of the apertures 13 and pin 14 that the gauge arm may be positioned relative to the lowermost bar 8 so that the distance between the pin 14 and the pivot 9 is in proportion to the distance between the pivot of the boom and the gauge arm connection with said boom, also the distance between the pin 14 and the outer end of the bar 8 is in proportion to the distance between the outer end of the boom and the gauge arm connection therewith. This insures a degree of accuracy that might not otherwise be attained.

On the upper end of the upright 11 is a detachable bracket 16 fixed to the upright by bolts 16^a passed through slots 16^b in the bracket, whereby the latter may be adjusted longitudinally of the machine. Pivotally mounted in said bracket is the upper angular end 17 of a pendulum 18. The bracket 16 is made adjustable for fine adjustments that ordinarily could not be attained by the apertures 13 of the arm 12. The pendulum is adapted to swing in a vertical plane parallel to the direction of machine travel and adjacent the lower weighted end of said pendulum is a pin 19. This pin extends into the slotted crank portion 20 of a sighting member 21, which is pivotally connected, as at 22, to the lower end of the upright 11. The sighting member 21 extends longitudinally of the machine and has its front end provided with a sight 23 and its rear end with a counterbalance 24. The

counterbalance 24 is for the sight 23 and the pendulum 18 is adapted to take care of the ups and downs of the front wheels of the machine, which of necessity would cause a variation in the depth of the trench. Under normal operating conditions the sight 23 is in alinement with the targets 7 and in the same horizontal plane as said targets. If uneven ground causes the machine to be raised or lowered obviously the sight member 21 is raised or lowered by the machine and the operator can determine whether the sight 23 is above or below the plane of the target 7. If above the plane of the targets the boom 2 is lowered until the sight 23 is in the plane of the targets and lowering of the boom would dig the trench deeper so as to maintain a trench bottom grade parallel to the plane of the targets and the trench of uniform grade. If the sight 23 is lower than the plane of the targets the boom is raised, and by the operator keeping his eye on the sight 23 when uneven and irregular ground is encountered may adjust the boom 2 and thus obtain a uniform bottom for the trench.

A modified form of sight member is shown in Fig. 6 wherein a slotted clip 25 supports a rockable sight member 26 provided with a counterbalance 27 for the sight 28. This rockable sight member operates as a pendulum to compensate for sidewise tilting of the trench machine. The slotted clip 25 may be easily mounted on the upright 11 so that the pendulum 18 can be operatively connected thereto.

What I claim is:—

1. A sighting device for a trench digging machine, comprising a parallelogram having a fixed leg on a stationary part of the machine, a gauge arm connected to said parallelogram and adapted for support from a movable part of the machine, a pendulum carried by said structure, and a sight member articulated with said pendulum and adapted to be moved thereby.

2. A sighting device as called for in claim 1, including also means for balancing said sight member for a constant horizontal position relative to a grade surface.

3. The combination of a trench digging machine having a movable boom adapted to be raised and lowered, a structure pivotally connected to a fixed part of said machine and to said boom, a sight member pivotally connected to said structure and adapted to be raised and lowered in synchronism with said boom, and means on said structure affected by movement of said structure and adapted for raising and lowering said sight member relative to said structure.

4. The combination of a trench digging machine having a movable boom, adapted to be raised and lowered, a structure pivotally connected to a fixed part of said machine

and to said boom to move in a vertical plane under the influence of said boom, a sight member pivotally connected to said structure to move in a vertical plane, a pendulum
5 connected to said structure and engaging said sight member to move it in synchronism with said pendulum, and means maintaining said sight member constantly horizontal.

30 5. A sighting device for a trench digging machine having an adjustable boom, said device comprising an articulated parallelogram structure, a gauge arm adapted to connect said structure to the machine boom, a pendulum carried by said structure, and a

counterbalanced rockable sighting member 15 carried by said structure and adapted to be actuated by said pendulum.

6. A sighting device for a trench digging machine, comprising a parallelogram having a fixed leg on a stationary part of the ma- 20 chine, a gauge arm adjustably connected to said parallelogram and adapted for support from a movable part of the machine, a pendulum carried by said parallelogram, and a sight member articulated with said pendu- 25 lum and adapted to be moved thereby.

In testimony whereof I affix my signature.

ALBERT A. SMITH.