May 26, 1942.

C. N. ADAMS

2,284,550

SELF LEVELING SCRAPER BLADE

Filed Aug. 3, 1940

3 Sheets-Sheet 1

Fig. 1

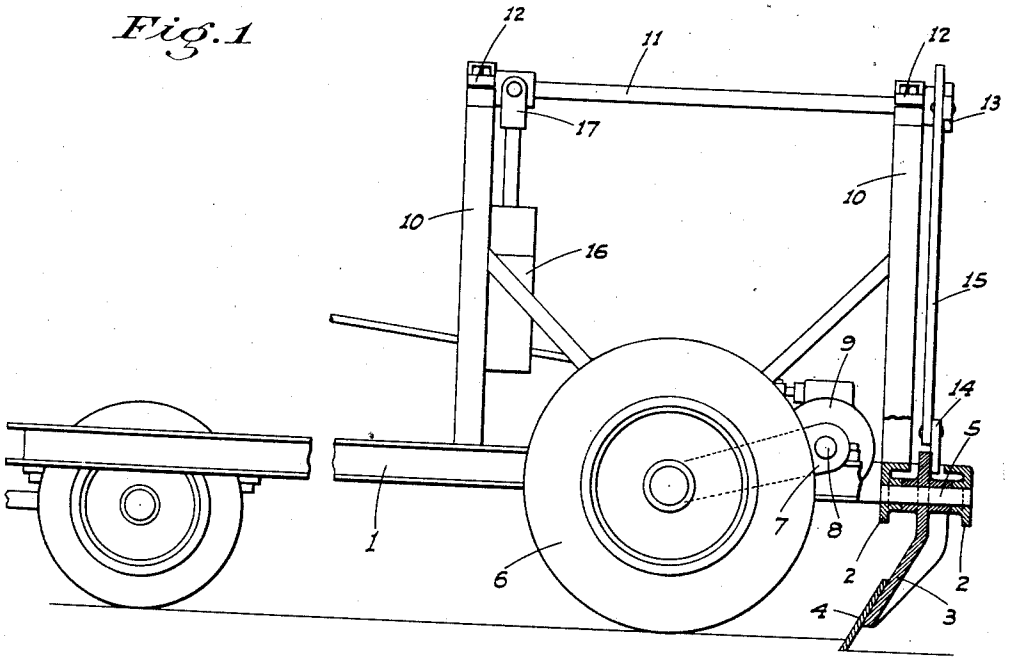

Fig. 2

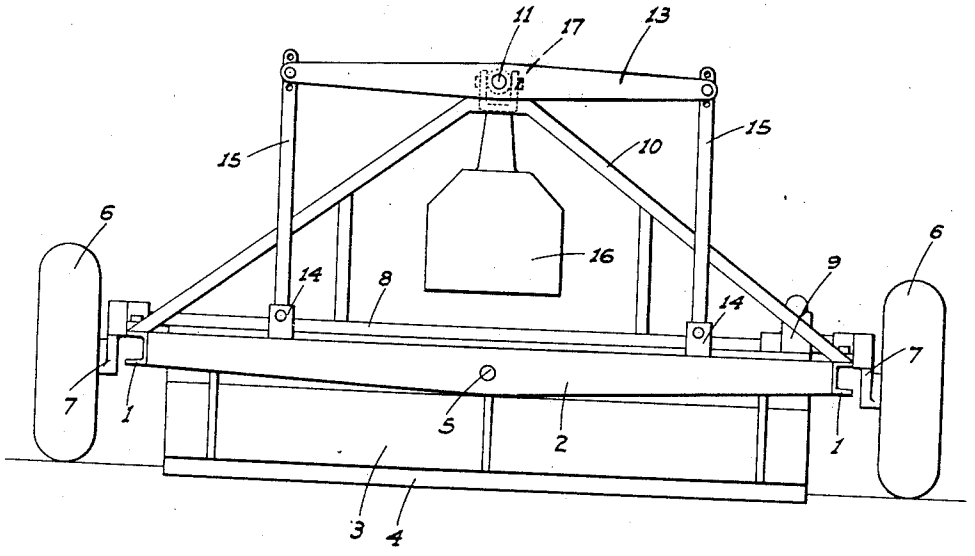

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Fig. 3

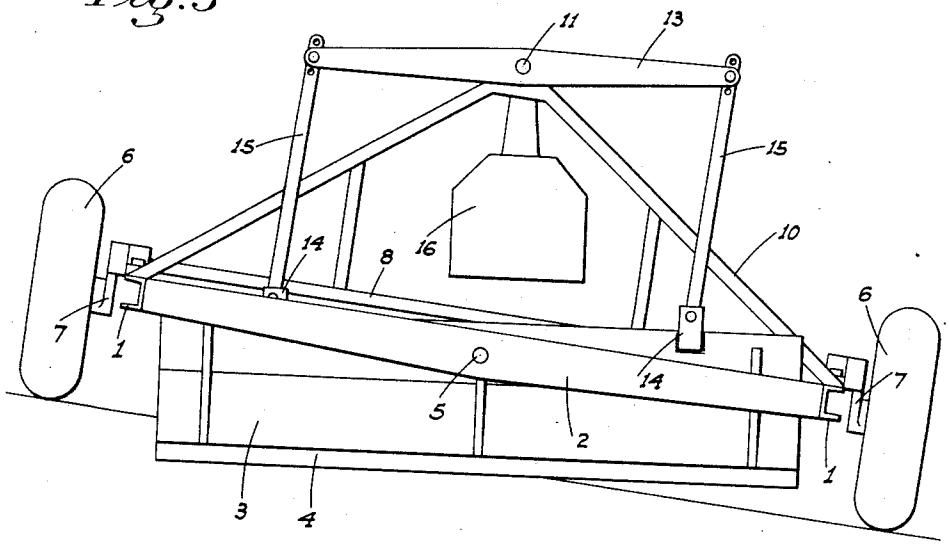

Fig. 4

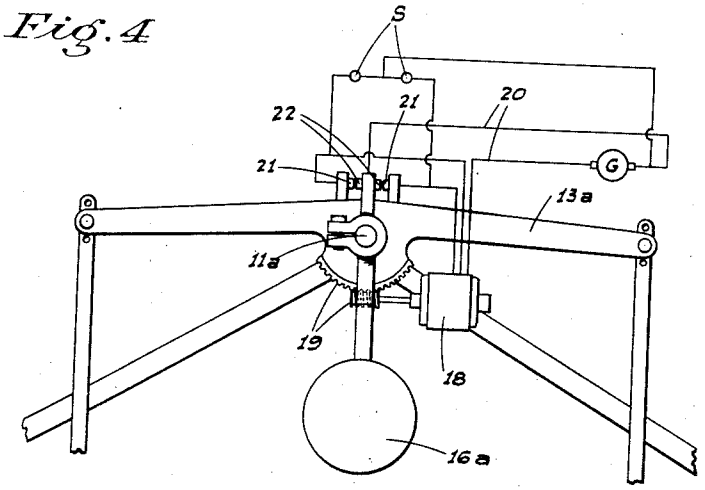

Fig. 5

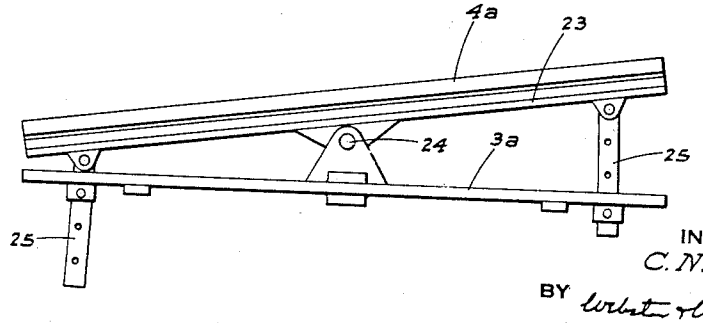

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Fig. 6

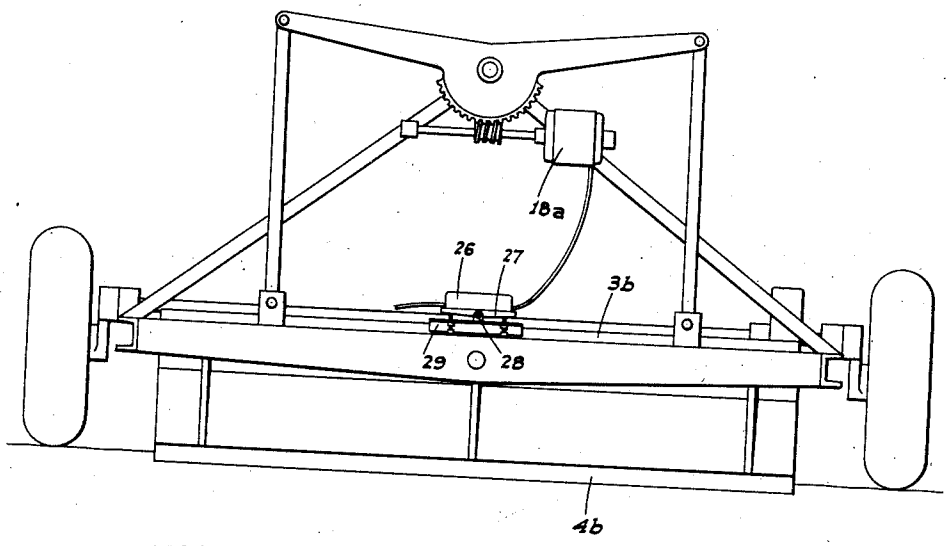
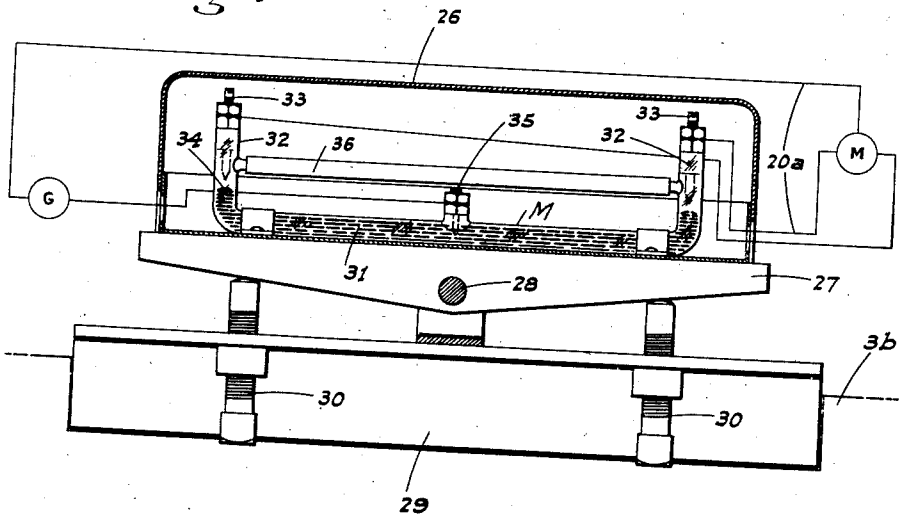


Fig. 7



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UNITED STATES PATENT OFFICE

2,284,550

SELF-LEVELING SCRAPER BLADE

Christopher N. Adams, Galt, Calif.

Application August 3, 1940, Serial No. 350,699

4 Claims. (Cl. 37—153)

This invention relates to graders or levelers, my principal object being to provide a machine of this type so constructed that the leveling blade will automatically maintain itself in a level position, transversely of the direction of movement of the machine, irrespective of any initial transverse slope of the ground being leveled. An actually level finish, when such is desired, is thus obtained with a minimum of effort and attention by the operator, and leveling operations are expedited.

A further object is to provide a mechanism for attaining the desired end which may either be made to function by the force of gravity alone, or with the aid of additional external power.

Although the invention has been initially designed for use with a leveler, and is so shown and described, its utility is not limited to such specific type of implement.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a somewhat diagrammatic side elevation of a leveler equipped with my gravity actuated blade leveling device.

Figure 2 is a rear end view of the same, showing the position of the parts when the ground is initially level.

Figure 3 is a similar view, showing the leveling action when the ground has an initial transverse slope.

Figure 4 is a fragmentary end view showing power means to actually level the blade.

Figure 5 is a top plan view of a modified form of blade unit detached.

Figure 6 is a rear end view of a leveler, equipped with a different type of motor control.

Figure 7 is an enlarged sectional elevation of the special switch unit used for such control.

Referring now more particularly to the characters of reference on the drawings, and particularly at present to the Figs. 1 to 3, the wheel-supported frame or chassis of the leveler, which may either be self-propelled or tractor-drawn, includes spaced side beams 1, connected at the rear end by horizontally spaced cross beams 2. A blade unit comprising a back plate 3 and a blade 4 thereon, depends from between beams 2 and is pivotally mounted centrally of its ends thereon by a pin 5 extending lengthwise of the leveler.

The rear wheels 6 may be disposed ahead of the blade laterally out from the frame beams and blade as shown, or rearwardly of or alongside the blade, as long as they are disposed to ride on ground not disturbed by a cut being made. The wheels are supported for vertical adjustment relative to the frame by any suitable means so that the blade may be raised and lowered relative to the ground. In the present instance, such means is shown as comprising crank arms 7 mounted on a transverse shaft 8 journaled on the frame and to which rotation control means manipulated by the operator is applied, as for instance a worm gearing unit indicated at 9.

Auxiliary cross frames 10 project upwardly from beams 1 at longitudinally spaced points thereon, the rear one of such frames being preferably located adjacent cross beams 2. A longitudinal central shaft 11 is disposed above frames 9, being journaled in adjustable friction bearing boxes 12 mounted on said frames, so as to provide for an adjustable resistance to turning of said shaft. A cross arm 13 is fixed on the shaft 11 in overhanging relation to back plate 3 and is connected to ears 14 thereon by links or connecting rods 15. The ears are disposed equal distances on opposite sides of pivot pin 5.

A heavy weight 16, forming a pendulum, is hung from the shaft 11 adjacent the forward frame 10, this weight being mounted in inflexible relation to the shaft for rotation therewith, but being flexibly mounted as at 17 for swinging movement in a vertical longitudinal plane. In this manner, the weight may remain vertical even though the leveler is working on a longitudinal slope, and bending strains on the unit are relieved.

Since the pendulum naturally tends to remain vertical at all times, it will be seen that this tendency, when the wheels 6 are resting on transversely sloping ground as shown in Fig. 3, will cause the blade to remain level due to the connection between the pendulum and said blade. Any cut made by the blade will thus always be level regardless of the initial transverse slope of the ground, the depth of the cut with any one movement of the leveler being of course determined by the adjustment of wheels 6 relative to the frame.

In order that the blade may be operated if desired with a transverse tilt, the links 15 are

mounted for vertical adjustment at one end or the other as indicated, so that the blade may be set at a tilt even when the pendulum is vertical.

A weight having sufficient effectiveness to directly control the blade movement may be used for relatively small levelers. For larger sizes, where the weight would have to be unduly heavy, I may employ an arrangement as shown in Fig. 4. In this case, the pendulum 16a may be quite small, and is turnable, with adjustable resistance, on shaft 11a on which the blade-connected cross arm 13a is fixed.

A reversible motor 18 is mounted on a frame 10a adjacent arm 12a and to one side of shaft 11a, this motor being operatively connected to said arm to swing the same by suitable gearing connections as indicated at 19. The motor is interposed in a circuit indicated generally at 20, in which spaced and facing contacts 21 are interposed, these contacts being mounted on arm 13a on opposite sides of the plane of shaft 11a. A double contact unit 22 is also interposed in the circuit, this unit being fixed on the pendulum and projecting between contacts 21 in normally spaced relation thereto, or when the pendulum is vertical and the blade is level. Contacts 21 and 22 thus form a reversing switch for the motor, and when a lateral slope of the ground in one direction causes one contact 21 and one contact 22 to engage, the circuit is closed and the motor is driven in one direction to swing arm 13a and return the blade to a level. If the ground slopes in the opposite direction, the other contacts become engaged, and the arm 13a is swung in the opposite direction to restore the blade to a level position. As soon as such position is reached, the arm 12 of course resumes its normal position relative to the pendulum and the circuit is broken.

In connection with the circuit, I may provide signal lights S to indicate the relative swinging of the pendulum and the closing of the circuit. Such lights would be employed mainly with a tractor drawn implement, in which case the lights would of course be disposed in position to be visible to the operator. With such an arrangement, the operation of the motor could be under the control of the operator, or mechanically controlled from the tractor, instead of being automatic as shown.

It is sometimes necessary to dispose the blade at an angle to the line of travel. In Fig. 5 I have illustrated one way in which this may be done without affecting the leveling of the blade by the pendulum action. In this case, the back plate 3a is separate from the blade 4a, which is mounted on an auxiliary back plate 23 disposed in front of plate 3a. Plates 3a and 23 are pivotally connected together centrally of their ends as shown at 24 so that plate 23 may swing horizontally relative to plate 3a.

Adjustable link units 25 connect the plates on opposite sides of the pivot 24 so that the blade may be set and held at any desired angle. The plate 3a, however, always retains its fixed position transversely, so that the connection thereof with the pendulum controlled mechanism is never disturbed.

In Figs. 6 and 7 I show a gravity actuated means for controlling the blade setting motor, which avoids the need of using a pendulum.

In this structure, I employ a double-ended mercury contact switch M to control the circuit of the reversible motor 18a. This switch is enclosed in a housing 26 which is mounted on a base 27. This base is pivoted as at 28 for rocking movement in a vertical plane transversely of the leveler on a bracket 29 supported from the back plate 3b of the blade 4b.

The base is adjustably held at any desired set position by suitable means such as set screws 30.

The switch comprises a horizontal tube 31 having upstanding legs 32 at both ends, into which vertically adjustable contact pins 33 depend; the tube being of dielectric material.

Mercury 34 fills tube 31 and extends up into the legs to a normal termination below both contacts; a third contact 35 having constant engagement with the mercury in the tube 31. A relief or bypass passage 36 connects the legs above the mercury line.

With the switch interposed in the circuiting 20a of the reversible motor, it will thus be seen that when the blade tilts out of level to one side or the other, one or the other of the contacts 33 will be engaged by the mercury and the circuit will be closed to operate the motor in a direction to restore the level of the blade.

If it is desired that the blade shall be normally disposed at a tilt, the switch is correspondingly tilted by adjusting screws 30.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. In a leveler having a frame, a blade unit, means pivoting the unit on the frame for swinging movement in a vertical plane transversely of the leveler, a shaft pivotally supported from the frame above the unit parallel to the pivot thereof, a connection between the shaft and unit to swing the latter with the rotation of the shaft, a pendulum depending from the shaft and a connection between the pendulum and shaft to cause the two to move as a unit with transverse swinging of the pendulum while enabling the pendulum to maintain a perpendicular position in a transverse plane irrespective of tilt of the leveler and shaft in a longitudinal plane.

2. In a leveler having a main frame, a blade unit, means pivoting the unit on the frame for swinging movement in a vertical plane transversely of the leveler, an auxiliary frame upstanding from the main frame, a cross arm pivoted on the auxiliary frame for rotation about an axis parallel to the pivot of the blade unit, a link connecting the blade unit and arm, a transversely swingable pendulum hung from the auxiliary frame, a normally open circuit and a reversing switch in the circuit closed by the swinging of the pendulum to one side or the other, a worm gear fixed with the arm concentric with the pivot thereof, a worm engaging the gear, a reversible electric motor driving the worm and mounted on the auxiliary frame, said motor being interposed in said circuit and a single shaft on which the cross arm and pendulum are mounted in independently swingable relation.

3. In a leveler having a frame which includes a cross member, a transverse plate parallel to and adjacent said member and pivoted thereon for

swinging movement in a vertical transverse plane, control means connected to the plate to swing the same, a blade disposed adjacent and pivotally supported from the plate for angling movement relative thereto in a horizontal plane, a link projecting horizontally from the blade and through the plate to one side of the pivot and means adjustably connecting the link and plate on the side of the latter opposite the blade.

4. In an implement having a main frame, a ground working unit, means pivoting the unit on the frame for swinging movement in a vertical plane transversely of the implement, an auxiliary frame upstanding from the main frame, a shaft mounted on the auxiliary frame parallel to the axis of said pivot means, a cross arm mounted on the shaft, a link connecting the arm and unit, a pendulum hung on the shaft, a normally open circuit including a reversing switch closed by the swinging of the pendulum to one side or the other, and a reversible electrical device interposed in the circuit and operatively connected to the cross arm to swing the same when the circuit is closed; the cross arm and pendulum being independently turnable on the shaft.

CHRISTOPHER N. ADAMS.