March 30, 1943. D. M. MANNING 2,314,888

GRADE FINISHING MACHINE

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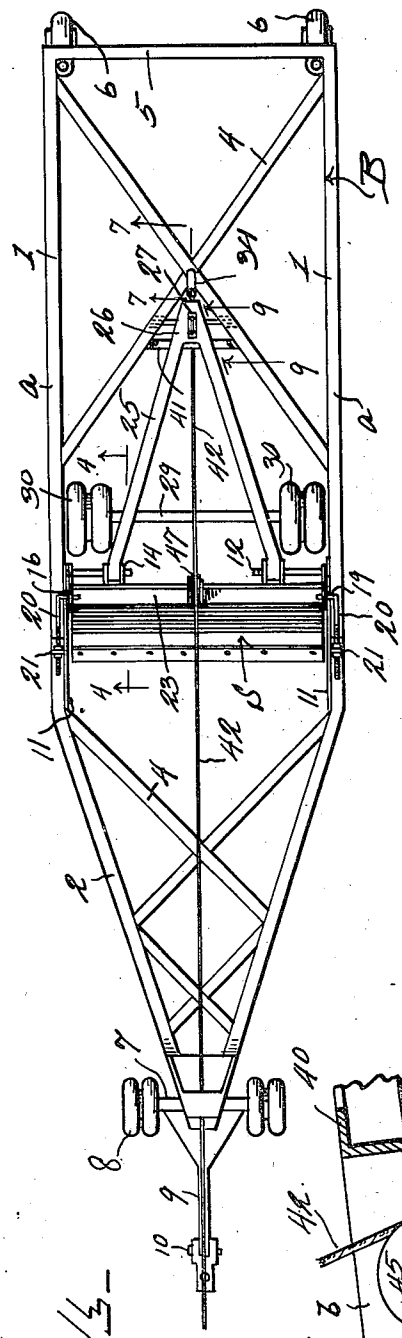

Fig. 1

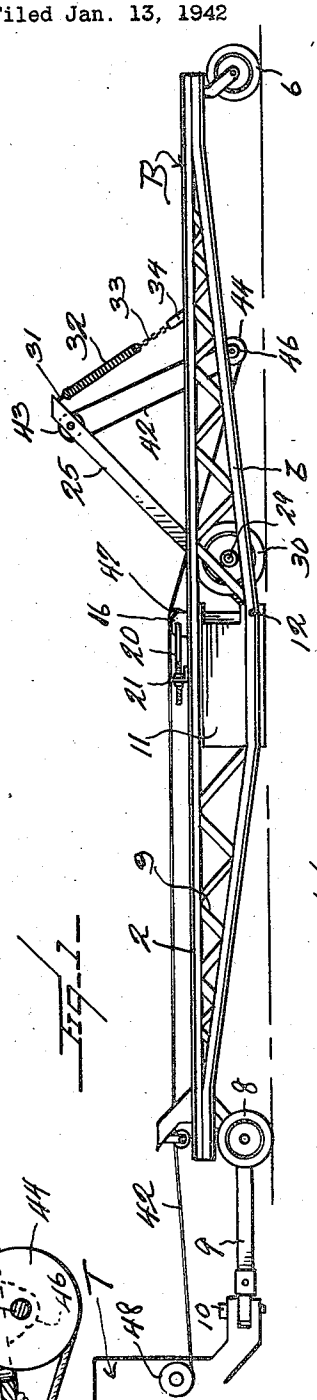

Fig. 2

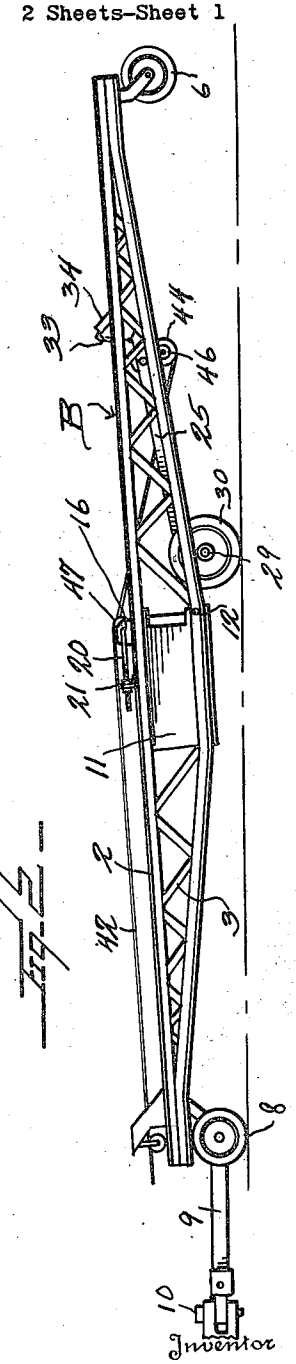

Fig. 3

Fig. 4

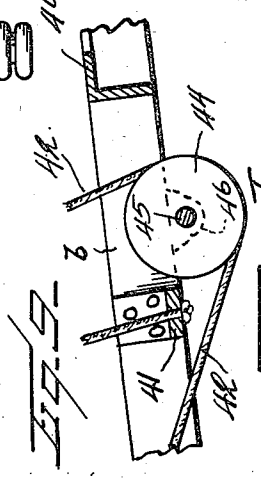

Fig. 5

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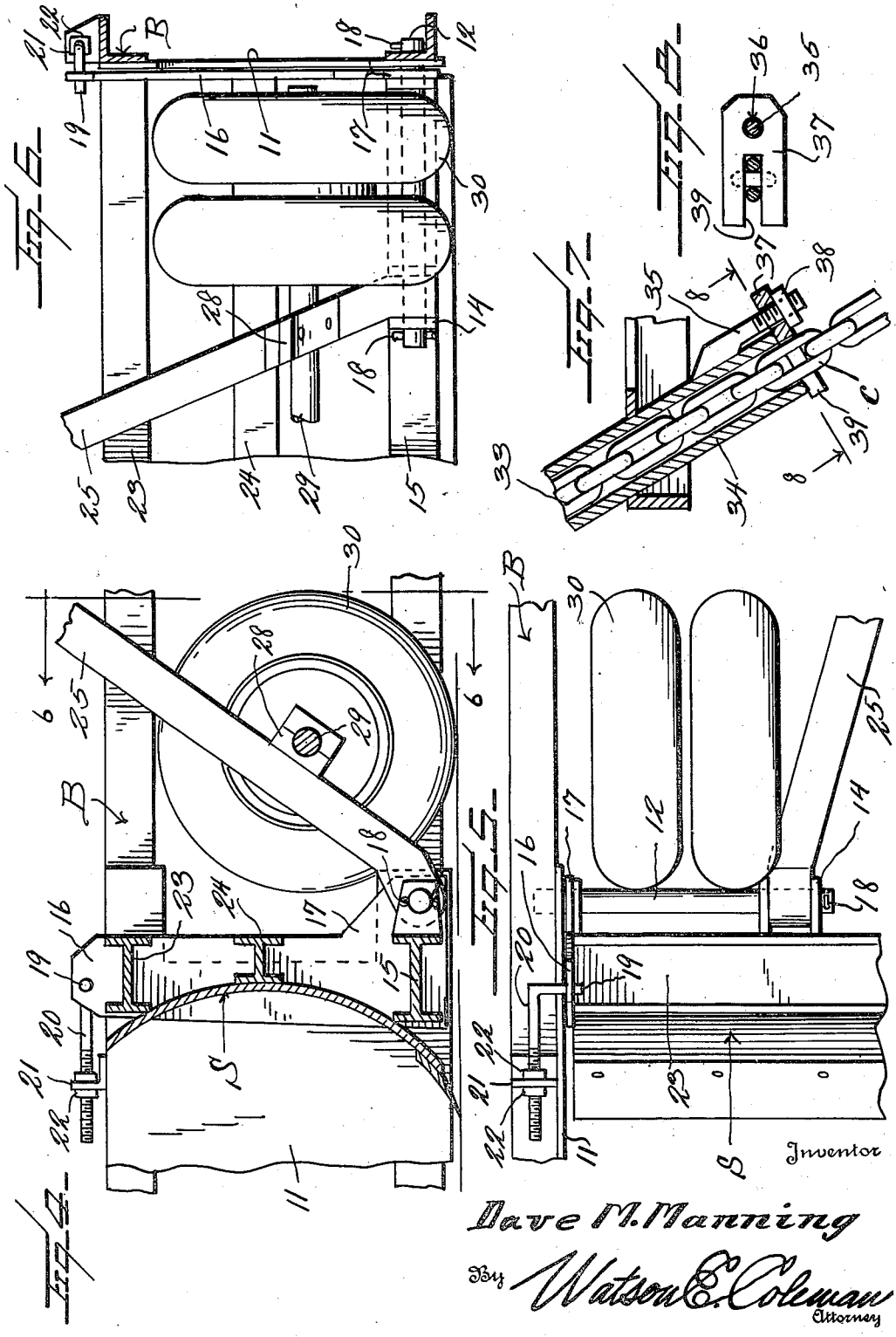

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GRADE FINISHING MACHINE

Dave M. Manning, Hysham, Mont.

Application January 13, 1942, Serial No. 426,625

10 Claims. (Cl. 37—180)

This invention relates to a grade finishing machine, and it is a particular object of the invention to provide a machine of this kind which operates as a land leveler and to finish and level choppy or uneven rough grades where machines of shorter wheelbase have been working.

It is also an object of the invention to provide a machine of this kind which is of considerable length, yet capable of turning within a short radius, and wherein the machine is of a character not to drag on the ground.

It is a particular object of the invention to provide a machine of this kind of considerable length and which is provided at its opopsite end portions with ground engaging members together with substantially centrally arranged ground engaging members carried by a floating axle, and wherein said floating axle and ground engaging means carried thereby provide means for raising one end portion of the machine to facilitate turning.

A still further object of the invention is to provide a machine of this kind including a centrally arranged floating axle carrying ground engaging members together with means for raising and lowering said axle as desired, and wherein tension means are provided for urging said axle toward the ground surface.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved grade finishing machine whereby certain important advantages are attained, as will be hereinafter more fully set forth.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a view in side elevation of a grade finishing machine in adjustment for leveling a ground surface, an associated tractor being diagrammatically indicated;

Figure 2 is a view similar to Figure 1 but showing the machine in a second adjustment for turning or for transportation from one operation to another;

Figure 3 is a view in top plan of the machine as herein comprised;

Figure 4 is an enlarged fragmentary sectional view taken substantially on the line 4—4 of Figure 3, looking in the direction of the arrows;

Figure 5 is a fragmentary view in top plan of the structure as illustrated in Figure 4;

Figure 6 is a sectional view taken substantially on the line 6—6 of Figure 4, looking in the direction of the arrows;

Figure 7 is a fragmentary sectional view taken substantially on the line 7—7 of Figure 3;

Figure 8 is a detailed sectional view, taken substantially on the line 8—8 of Figure 7, looking in the direction of the arrows; and

Figure 9 is a fragmentary detailed sectional view taken substantially on the line 9—9 of Figure 3.

As disclosed in the accompanying drawings, B denotes the body of the machine which is of considerable length. This body B includes the side beams 1 having their forward portions 2 in convergence. These beams 1 each comprises an elongated upper member *a* substantially coplanar from end to end and a lower member *b*. This member *b* has its opposite end portions downwardly inclined on a predetermined angle toward the center portion of the beam 1 with the extremities of the members *a* and *b* rigidly connected, as by welding or otherwise as may be preferred. Interposed between the members *a* and *b*, in a well-known manner, are the reinforcing or bracing diagonals or trusses 3.

The beams 1 of the body B are effectively maintained in desired spaced assembly by the interposed crossed members 4 and the rear end cross member 5. Carried by the rear end portion of the body B at the corners thereof are the caster wheels 6 which provide a supporting means for the rear of the body B, and particularly when the machine is in working adjustment.

Carried by the forward extremity of the body B and underlying the same is a transversely disposed axle 7 carrying the ground wheels 8 for contact with the ground surface to provide support for the forward end of the machine. The axle 7 has operatively engaged therewith, in any desired manner, a hitch bar 9 adapted to be coupled, as at 10, to the rear end of a tractor or the like.

As is particularly illustrated in Figure 3 of the drawings, the rear portions of the beams 1 are substantially in parallel and the forward extremities of said parallel portions of the beams 1 have suitably secured to the inner faces thereof the plates 11. These plates 11 are opposed in a direction transversely of the body B and each of the plates 11 has its lower marginal portion extending a slight distance below its associated beam 1.

The lower member *b* of each of the beams 1 at the rear portion of a plate 11 receives an extremity of a stub shaft 12. This shaft 12 is of desired length and is also disposed through the suitably positioned ears 14 carried by and extending rear-

wardly from an I-beam 15 substantially bridging the space between the members *b* of both of the beams 1. This stub shaft 12 extends inwardly of the body B and there is one of these shafts 12 at each side of the machine. Welded or otherwise rigidly secured to each end of the beam 15 is an upstanding flat side arm 16, the bottom portion of which being formed with a rearwardly disposed extension 17 through which a stub shaft 12 is also disposed. In the present embodiment of my invention each shaft 12 is held in applied position by the removable pins 18. The extension 17, as herein disclosed, is of a length to extend a slight distance above the adjacent upper member *a* of a beam 1 and pivotally connected, as at 19, with the upper extended portion of the arm 16 is an elongated shank 20. This shank 20 is forwardly directed and is freely disposed through an upstanding bracket 21 carried by the adjacent upper member *a* and threading upon this shank 20, at opposite sides of the bracket 21 and contacting therewith, are the holding nuts 22. By manipulation of these nuts 22 the arm 16 may be swung rearwardly as desired and effectively locked in selected adjustment.

The upper portion of the arms 16 are connected by the interposed I-member 23 and also by an intermediate I-member 24. It is believed to be obvious that the members 15, 23 and 24 connect the arms 16 and are so designed and positioned one with respect to the other to provide for the desired mounting for the scraper blade S. This blade S may be welded or otherwise rigidly secured to the members 15, 23 and 24 and the blade S is of a length to substantially bridge the space between the plates 11. The arms 16 are tilted when desired to effect the desired adjustment of the blade S, and it is believed to be apparent that when the machine is in operation the plates 11 serve to box in the blade to keep the dirt from spilling at the sides of the machine or at the ends of the blade S.

Pivotally engaged with the shafts 12 are the lower end portions of the upwardly and rearwardly disposed arms 25. These arms 25 converge toward their outer or upper ends with said end portions formed to provide a solid outer extremity 26 provided therethrough with an opening 27. These arms 25 provide what may be termed a vertically swinging and rearwardly disposed boom.

The lower portion of each of the arms 25 is provided with a depending bearing 28 which provides a mounting for a transversely disposed floating axle 29. This axle 29 extends beyond opposite sides of the boom and the extremities of the axle 29 have mounted thereon the ground engaging wheels 30. When the boom is raised the weight of the machine is substantially carried by the wheels 6 and 8, but when it is desired to make a turn and also in transporting the machine from one location to the other the boom is swung downwardly, resulting in the raising of the rear portion of the body B, as illustrated in Figure 2, to elevate the blade S up out of working position with respect to the road or ground surface. In this adjustment the transportation of the machine is materially facilitated and it is with the further advantage that a desired turn can be made in a much reduced radius.

The outer or solid end portion 26 of the boom has suitably anchored thereto, as at 31, an end portion of a downwardly and rearwardly disposed retractile member 32 of desired tension. This member 32 constitutes a coil spring and has secured to its lower end portion an elongated flexible member 33. This member 33 constitutes a chain and is threaded through an upwardly and forwardly inclined tubular member or sleeve 34 of desired length and which is rigidly carried by the body B, and preferably directly held by the overlying portions of the rear crossed members 4. The lower end portion of this sleeve 34 has secured exteriorly thereto a downwardly disposed shank 35. This shank 35 is of a length to extend beyond the lower end of the sleeve 34, and it freely passes through an opening 36 in an end portion of a lock plate 37, said plate being held against the lower adjacent end of the sleeve 34 by the holding nut 38 threading upon the shank 35 below the adjacent end portion of the plate 37 and having direct contact from below with said plate.

The plate 37 in one end portion is provided with a longitudinally disposed open slot 39 whereby the plate may readily straddle a link *c* comprised within the chain 33 to allow said plate 37 to coact with the link immediately therebelow to hold the chain 33 in desired selected adjustment in order to regulate the tension of the spring 32.

The spring 32 serves to constantly urge the ground engaging members 30 toward the road or ground surface, yet allows the members or wheels 30 to readily raise upon coming into contact with any undue obstruction in their path of travel. It is also to be pointed out that the spring 32 upon proper regulation as to tension, by shortening or lengthening the member or chain 33, serves to transfer any desired part of the weight of the machine from the rear caster wheels 6 to the members or wheels 30. The resilient action upon the members or wheels 30 also allow the caster wheels 6 to follow the ground contours under normal operating conditions.

When it is desired to make a turn or to transport the machine from one locality to another the rear portion of the machine is raised by imposing downward pull upon the boom, and in the present embodiment of my invention means are provided for this purpose which is operated from the tractor T or other motor for operating the machine. The lower members *b* of the beams 1 are also connected by the interposed crossed members 40 which underlie the crossed members 4 connecting the upper members *a* of the beams 1. The rear lower crossed members 40 are connected by a strut 41 to which is anchored an end portion of a flexible member or cable 42. This cable 42 extends upwardly and over a pulley 43 rotatably carried by the solid outer extremity 26 of the boom and positioned within the opening 27.

The cable 42 extends downwardly from the pulley 43 and under a pulley 44 mounted on a shaft 45. The shaft 45 is supported by the bearings 46 depending at desired points from the crossed members 40. The flexible member or cable 42 extends from the pulley 44 over a guide pulley 47 rotatably mounted upon the central portion of the upper I-beam 23. The flexible member or cable 42 extends from this pulley 47 to a winding drum 48 carried by the tractor T or kindred motor. The operation of the winding drum 48 is to be effected and controlled in any desired manner and upon rotation of said drum 48 in one direction the boom will be pulled downwardly with resultant contact of the members or wheels 30 with the road or ground surface in a manner to elevate the rear portion of the body B as desired to facilitate making a turn or to transport the machine from one locality to another.

In view of the foregoing, it is believed to be

apparent that the machine as herein disclosed can be employed to a particular advantage as a land leveler, and particularly to finish and level choppy or uneven earth grades where machines of shorter wheelbase have been working. It is further to be pointed out that the machine operates on somewhat the same principle as a jackplane and that the material length of the machine in connection with the various adjustable features hereinbefore set forth makes it possible to level land to a plane surface regardless of irregularities or unevenness of the land to be leveled.

From the foregoing description it is thought to be obvious that a grade finishing machine constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated.

I claim:

1. A machine of the class described comprising an elongated body, ground engaging supporting members carried by the opposite end portions of the body, a scraper blade carried by the body at the central part thereof and disposed transversely thereof, a boom pivotally connected at one end with the rear side of the blade for vertical swinging movement, said boom being disposed rearwardly of the transverse center of the body, an axle carried by the boom rearwardly of the pivotal support for the boom and disposed transversely of the body, ground engaging supporting wheels carried by said axle, and tensioned means operatively connecting the other end of the boom with the body and constantly urging swinging of the boom downwardly.

2. A ground scraping machine of the class described comprising a body including side beams, means for maintaining said beams in spaced relation, ground engaging supporting members for the frame, plates carried by opposed faces of the beams, an elongated blade supporting structure disposed transversely of the machine between said plates, pivot means connecting said structure with the body for tilting movement on an axis extending transversely of the machine in close proximity to the ground, a scraper blade carried by said supporting structure, the said axis lying well below the longitudinal center of the blade, the plates providing means to prevent spilling of dirt laterally from the ends of the blade, and means for holding the supporting structure in a selected tilted position.

3. An earth leveling machine comprising an elongated frame having spaced vertical side portions, ground engaging supporting members at each of the two ends of the frame, an earth scraping blade disposed perpendicular to the length of the frame and between the two side portions thereof, a supporting means for said blade pivotally attached to the side portions of the frame adjacent the bottom edge of the blade for oscillation of the blade on an axis extending transversely of the frame, means for maintaining the blade in an operative position, a boom pivotally connected at one end with the blade supporting means and extending upwardly and rearwardly from the blade for oscillation on the axis of oscillation of the blade, ground engaging supporting wheels pivotally mounted upon the boom at an elevation above the oscillation axis for the boom and blade, a yieldable means operatively coupling the other end of the boom with the frame and normally maintaining the boom in a predetermined position with respect to the frame, and means for effecting the vertical oscillation of the boom to bring said wheels into contact with the ground for the raising of the rear end of the frame.

4. An earth leveling structure of the character set forth in claim 3, wherein the said blade maintaining means operatively couples the blade adjacent its top edge with the frame for oscillating the blade upon the pivotal supporting means therefor and secures the oscillated blade in working position.

5. An earth leveling structure as set forth in claim 3, with a panel disposed vertically upon each side of the frame and across each end of said blade, said panels and the blade therebetween forming an earth receptacle.

6. An earth leveling machine of the character stated comprising an elongated frame including spaced parallel side portions, each of said side portions including upper and lower rails, a vertically disposed arm upon the inner side of each side portion of the frame substantially at the transverse center thereof, said arms being in the same plane transversely of the frame, a pivotal coupling between the lower end of each arm and the adjacent lower rail, connecting means between the arms and extending transversely of the frame, a boom connected at one end by said pivotal connecting means with the lower rail of the side portions of the frame and extending upwardly and rearwardly with respect to the arms, a scraper blade extending transversely between said frame side portions and supported by said arms forwardly of the pivotal supporting means, means for maintaining the blade in an operative position, an axle supported by and extending transversely of the boom at a substantial elevation above the pivotal supporting means, ground engaging wheels carried by said axle, a yieldable means operatively coupling the other end of the boom with the frame, and means for swinging the said other end of the boom downwardly for the engagement of the wheels with the ground and the lifting of the rear end of the frame.

7. A ground leveling structure as set forth in claim 6, with means carried by each side portion of the frame to extend across the adjacent end of the scraper blade to form with the scraper blade an earth receiving receptacle.

8. An earth leveling structure as set forth in claim 6, with a plate secured against movement upon each side portion of the frame to extend across the adjacent end of the scraper blade, the plate forming with the scraper blade an earth receiving receptacle, and the said blade maintaining means being additionally adapted for effecting the oscillation of the blade upon the pivotal supports.

9. An earth leveling machine comprising an elongated frame having vertical side portions of substantial height, ground engaging supporting members at the two ends of the frame, an earth scraping blade disposed transversely of the frame between the two side portions thereof, means disposed rearwardly of the blade at each end and adjacent the bottom edge of the blade pivotally coupling the blade to the frame for oscillation on a transverse axis, means for securing the blade against oscillation, a boom pivotally attached to the back of the blade for oscillation upon said axis, the boom extending upwardly and rearwardly from the blade, an axle extending transversely of and supported on the boom at a substantial elevation above said axis, the axle being disposed entirely between the side portions of the frame, ground engaging wheels carried upon the

axle, and means operatively coupling the other end of the boom with the frame.

10. An earth leveling machine as set forth in claim 9, in which the said means for securing the blade against oscillation comprises an elongated bolt at each end of the blade and pivotally operatively coupled at one end with the blade, the said bolts extending substantially longitudinally of the frame, a guide means for each bolt carried by the adjacent side portion of the frame, and means for longitudinally adjustably securing each bolt to its guide means.

DAVE M. MANNING.