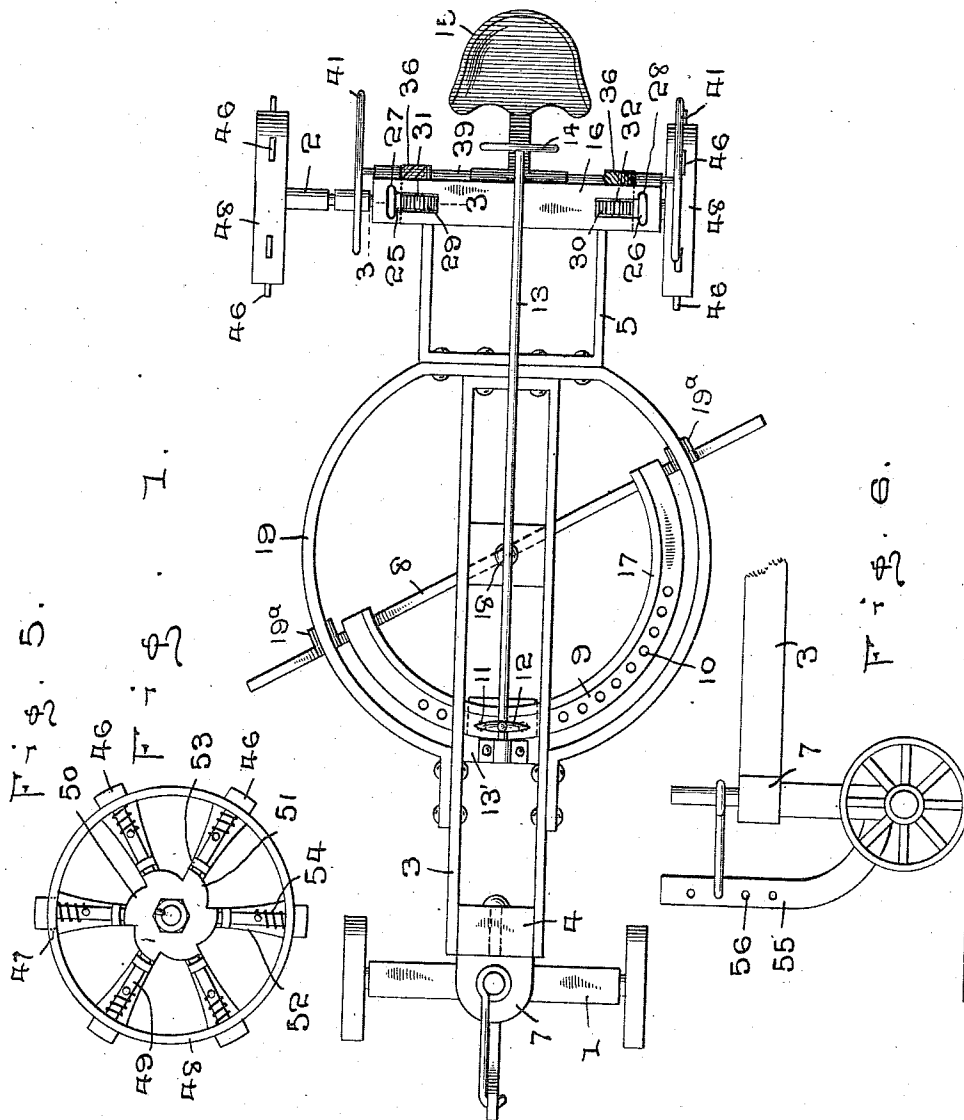


S. C. HANNA.
 GRADING MACHINE.
 APPLICATION FILED OCT. 21, 1909.

972,763.

Patented Oct. 11, 1910.

2 SHEETS-SHEET 1.



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2 SHEETS-SHEET 2.

Fig. 2.

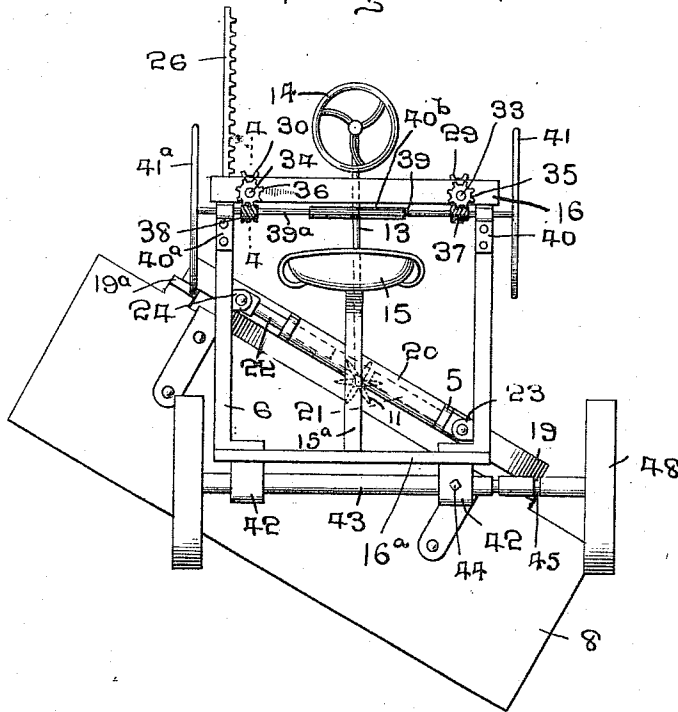


Fig. 3.

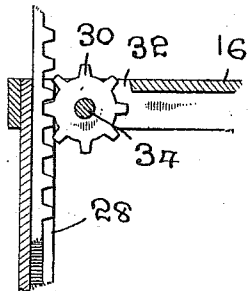
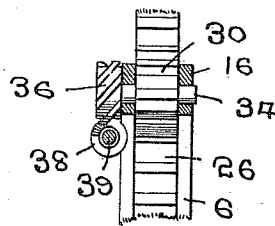


Fig. 4.



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GRADING-MACHINE.

972,763.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL C. HANNA, a citizen of the United States, residing at Shelby, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Grading-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to new and useful improvements in grading machines and more particularly to that class adapted to be used in grading road ways, street surfaces, etc., and my object is to provide a device of this class, whereby the blade may be tilted at various angles vertically.

A further object is to provide means for disposing said blade at various angles to the trend of the road way.

A still further object is to provide means whereby the trend of the blade may be quickly regulated.

A further object is to so mount the scraping blade as to dispose the weight of the blade at the center of the frame.

A further object is to provide means for shifting the frame laterally on the rear axle of the truck and a further object is to provide anti-slipping devices for the rear wheels and a still further object is to provide means for extending said anti-slipping devices beyond the peripheral faces of the wheel when desired.

Other objects and advantages will be hereinafter referred to and more particularly pointed out in the claims.

In the accompanying drawings forming part of this application, Figure 1 is a top plan view of the machine in its operative position. Fig. 2 is a rear elevation thereof, showing one of the positions of the frame of the scraper when tilted. Fig. 3 is a detail sectional view as seen on line 3—3, Fig. 1. Fig. 4 is a detail sectional view on an enlarged scale as seen on line 4—4, Fig. 2. Fig. 5 is an elevation of one of the rear wheels showing the manner of extending the anti-slipping devices, and, Fig. 6 is a side view of the front truck of the grader.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 and 2 indicate the front and rear trucks,

respectively, of the scraper and 3 indicates a frame, to the forward end of which is secured a block 4, while to the rear end thereof is attached an auxiliary frame 5, the rear end of the frame 5 being entered between standards 6, while the block 4 is swiveled to a head 7, carried by the forward truck 1.

Pivotaly secured to the frame 3 and at a point adjacent the longitudinal center of the frame, is a scraping blade 8, extending forwardly of which and attached to the upper edge thereof, is a semi-circular plate 9, through which is disposed a plurality of openings 10 and cooperating with these openings are prongs 11 of a gear 12 fixed to a shaft 13. The forward end of the shaft 13 is rotatably mounted on a slide plate 13', while the rear end thereof is provided with a hand wheel 14, which is positioned adjacent the seat 15, the shaft 13 extending over the cross bar 16 connecting the upper ends of the standards 6, thereby disposing said hand wheel in reach of the operator occupying the seat. Said seat 15, it will be seen, is positioned beyond the standards 6 on the brace 15^a, which in turn is secured to a cross bar 16^a connecting the lower ends of said standards 6 and therefore has no cooperative movement with the pivotal and swinging parts of the machine between the trucks. By this construction it will be readily seen that when the shaft 13 is rotated, the blade 8 will be swung on its pivot 18 and the angle of the blade with respect to the trend of the roadway, changed and in order to relieve strain on the pivot 18, a guide frame 19 is attached to the frame 3 in any suitable manner, a projection 19^a on the upper edge of said blade 8 being adapted to bear against the lower edge of said guide frame, and as said frame is circular, it extends a distance at each side of the frame and engages the blade adjacent the outer ends thereof and a portion of the strain is removed from the guide frame by providing an upwardly extending flange 17 on the plate 9, which engages the frame 3 and slides thereon.

The rear end of the auxiliary frame 5 is provided with a tubular socket 20, in which are adapted to take plungers 21 and 22 and as the standards 6 are positioned a distance from the auxiliary frame 5, said plungers will have longitudinal movement in the tubular socket. The outer ends of the plungers are pivotaly secured between ears 23

and 24, carried by rack bars 25 and 26, the posts 6 being preferably constructed with channels 27 and 28 to receive said rack bars and it will be readily seen that when the rack bars are raised or lowered, the frame 3 and auxiliary frame 5 will be correspondingly raised or lowered.

The primary object of my invention is to so construct the device that the entire frame will tilt with the scraping blade, thereby maintaining the full strength of the parts in whatever position the same may be placed and to this end, pinions 29 and 30 are entered through slots 31 and 32 in the cross bar 16, the shafts 33 and 34 upon which said pinions are mounted, extending through one wall of the cross bar 16 and having attached thereto gears 35 and 36, respectively, with which gears mesh, worms 37 and 38, respectively and as the pinions 29 and 30 mesh, respectively, with the rack bars 25 and 26, it will be readily seen that when said pinions are rotated, the rack bars will be elevated or lowered and if it is desired to tilt the blade and frame, one of the pinions may be rotated with a greater speed than the other, or one pinion rotated in one direction and the opposite pinion in the opposite direction until the blade and frame have been tilted to the proper angle, when both of the pinions are operated to lower the blade and frame the proper distance.

The worms 37 and 38 are fixed to shafts 39 and 39^a, respectively, which shafts are extended through bearings 40 and 40^a on the standards 6 and have their inner ends entered in a socket 40^b, while the outer ends of said shafts are provided with hand wheels 41 and 41^a, respectively and as said hand wheels are in close proximity to the seat 15, they will always be in position to be operated by the attendant. The trend of the threads on the worms 37 and 38 are opposed to each other so that when the shafts are rotated in unison, the blade and frame carrying the same will be raised or lowered bodily, but when one of the shafts is rotated in one direction and the other in the opposite direction, one of the rack bars will be elevated and the other lowered, thereby tilting the frame and blade thereon and as the plungers 21 and 22 are slidably mounted in the tubular socket 20, the end of the auxiliary frame 5 carrying the tubular socket will move toward the end of the lowermost plunger until it rests against a shoulder adjacent the pivoted end thereof and as the forward end of the frame 3 is swivelly attached to the block 4, it will be readily seen that said frame will tilt with the scraper blade and overcome objectionable features in other forms of scrapers wherein it is required to move the blade away from the frame when said blade is tilted. At times it is desirable to have the scraping blade extend a greater

distance to one side of the rear wheels of the scraper than to the other and in order to accomplish this result, the lower ends of the standards 6 are provided with hubs 42, which surround the axle 43 of the rear truck and are adapted to slide longitudinally of said axle, the standards being held in their adjusted positions by means of a binding screw 44 which extends through one of the hubs and engages grooves 45 in the axle 43, thus holding the standards in their adjusted positions.

In some instances, as when the machine is being employed for heavy grading, it is necessary to provide means for preventing the rear trucks of the machine from slipping laterally and to accomplish this result, I provide anti-slipping blocks 46, which extend through slots 47 in the rear wheels 48, said blocks terminating at their inner ends in shanks 49, which shanks extend inwardly toward the hub of the wheel and engage a disk 50, which disk is provided with teeth 51, the surface of said teeth engaged by the shanks, being eccentric to the axis of the wheel and curved so that when the disk is turned until the ends of the shanks 49 engage the highest points of the teeth, the anti-slipping blocks 46 will be moved outwardly through the slots 47 and in their operative position, while, when the disk is turned until the shanks engage the lowermost portion of the teeth the outer faces of the blocks will be flush with the peripheral faces of the wheels, thereby providing a uniform surface on the wheel. The shanks 49 extend parallel with the spokes 52, of the wheels, and if desired, loops 53 may be placed on the spokes, through which the shanks are extended, thereby holding the shanks in proper alinement with the spokes and in order to cause the shanks and blocks to move inwardly when the disk 50 is operated, springs 54 are placed around the outer ends of the shanks 49 and bear against the rim of the wheel, while the inner ends thereof are fixed to the shanks, thus causing the springs to direct inward pressure on the shanks at all times.

The object in moving the anti-slipping blocks, is to prevent said blocks from mutilating the ground when the grader is passing thereover, as when the scraper is used for leveling or smoothing surfaces and in view of the manner in which the blocks are removed from use, a great deal of time and labor is saved, as the anti-slipping blocks now in use are manually attached or removed from the faces of the wheels.

In operation, should it be desired to move the soil, etc., to the left hand side of the machine, as shown in Figs. 1 and 2 the shaft 13 is rotated, which will swing the scraping blade at an angle to the axial trend of the frame 3, or to the position shown in Fig. 1,

and if the soil is to be thrown to the opposite side of the grader, the hand wheel 14 is rotated in the opposite direction or to the left, which will swing the scraping device 8 on its pivot and dispose the blade at an angle in the opposite direction, whereby the soil will be moved to the right side of the grader, or said scraping blade may be adjusted to extend directly at right angles to the frame 3 and at any angle between right angles and the full swinging movement of the blade. If it is desired to cause one end of the blade to enter deeper into the soil than the opposite end, the shaft 39 or 39^a is rotated through the medium of the hand wheels 41 or 41^a, thereby raising one of the rack bars and lowering the other until the blade has been tilted to its proper angle, when both of the shafts are operated in unison to lower the blade bodily into engagement with the soil and in view of the manner of mounting the frame to the truck, said frame will be tilted with the blade and assume the same angle while the front and rear trucks will remain in their normal position. When the device is being used for grading purposes, the anti-slipping blocks 46 are thrust outwardly to prevent the rear trucks of the machine from sliding laterally, which is accomplished by turning the disk 50 to move the higher parts of the teeth below the shanks of the blocks, but when the grader is being used for leveling purposes, the disk is again rotated until the shanks have reached the lowermost portions of the teeth, thereby disposing the blocks flush with the outer faces of the wheels and leaving a smooth surface as the wheels pass over the soil. It will thus be seen that when it is desired to tilt the scraping blade, the entire frame to which the blade is attached, is tilted, thereby obviating any weak parts which would become broken if the scraping blade were tilted independently of its supporting frame and further, by providing the adjusting or tilting means in the manner shown, the forward and rear trucks are independent of each other and likewise independent of the frame which supports the scraping blade, so that the tilting of said scraping blade and frame will not affect the position of said truck. It will likewise be seen that by providing the shifting mechanism, the blade can be quickly adjusted to various angles and in position to direct the soil to either side of the grader and by placing the operating hand wheels in juxtaposition to the seat on the grader, said wheels will always be in position to be readily grasped by the operator. It will also be seen that by placing the scraping blade midway between the front and rear trucks, the grader will be more securely held against slipping laterally in view of the weight of the rear trucks, while the forward truck is

held in position to direct downward weight on the blade by the manner of hitching the draft animals to the front truck, this being accomplished by extending upwardly from the axle portion of the forward truck, a curved arm 55, in which is placed a plurality of holes 56 for receiving the usual form of clevis employed for attaching the double trees to the grader and by attaching the clevis at a point adjacent the upper end of the arm, the pull thereon by the draft animals will direct downward pressure on the forward truck and apply this pressure on the scraping blade and more securely hold the grader against slipping laterally.

Although I have shown and described the device as applicable for grading street surfaces or the like, it will be readily understood that it can be used for a variety of purposes, such as excavating for ditches, digging potatoes, and various other purposes.

What I claim is:

1. In a grader, the combination with a forward and rear truck, a frame swiveled to the forward truck and adjustably attached to the rear truck; of a scraping blade pivotally mounted on said frame and between the forward and rear trucks, a curved plate attached to said scraping blade and having a plurality of openings therein, a rotatably mounted shaft on the frame, a gear attached to said shaft adapted to engage said openings and swing the blade on its pivot when the shaft is rotated and a slide plate for said curved plate.

2. In a grader, the combination with a forward and rear truck; of a frame swiveled at one end to the forward truck, an auxiliary frame at the rear end thereof, a tubular socket carried by said auxiliary frame, standards adjustably mounted on the rear truck, said standards being channel shaped in cross section, rack bars slidably mounted in said standards, means entering said tubular socket and connecting the auxiliary frame with said rack bars and additional means to raise and lower said rack bars, whereby the scraping blade and frame to which the same is attached will be tilted at different vertical angles.

3. In a grader, the combination with a front and rear truck, and standards mounted on said rear truck, said standards being channel-shaped in cross section; of a frame having one end thereof swiveled to said front truck, the opposite end of said frame being adjustably mounted in said channel-shaped standards, a scraping blade carried by said frame, means to adjust said blade horizontally in the arc of a circle, and additional means coöperating with said standards for adjusting said frame and blade at an angle to the horizontal without affecting said trucks and parts carried thereon.

4. In a grader, the combination with a frame, a front truck swiveled to said frame, an auxiliary frame at the rear of the main frame, a guide frame carried by the main frame, a rear truck, standards adjustably mounted on said rear truck, a scraping device pivotally attached to said frame and between the front and rear trucks, the upper edge of which is adapted to bear against the guide frame, means carried by said standards adapted to tilt said frames and scraping device at an angle to the horizontal, a semi-circular plate attached to said blade, said plate having a plurality of openings therein, a shaft extending longitudinally of said frame and rotatably mounted thereon and a gear having prongs adapted to engage the openings in the plate and swing the blade on its pivot when said shaft is rotated.

5. In a grader, the combination with a frame, a front truck swiveled to said frame, a rear truck and an auxiliary frame having one of its ends extending over said rear truck; of standards, rack bars carried by said standards, a tubular socket carried by the auxiliary frame, plungers carried by said rack bars adapted to enter said tubular socket and means to raise or lower said rack bars, whereby the frames and parts carried thereby will be disposed at an angle to the horizontal.

6. In a grader, the combination with a frame, a scraper pivotally attached thereto, means to rotate said scraper, a front axle

swiveled to said frame, and a rear axle; of standards adjustably attached to said rear axle, rack bars carried by said standards, pinions meshing with said rack bars, means carried by said standards adapted to rotate said pinions to raise and lower said rack bars and additional means to connect the rack bars to said frame, whereby when one of the bars is raised and the other lowered, said frame and scraper will be tilted at an angle to the horizontal.

7. In a grader, the combination with a frame, a scraper pivotally attached thereto, a front axle swiveled to said frame and a rear axle; of standards adjustably mounted on said rear axle, rack bars carried by said rear standards, pinions meshing with said rack bars, means carried by said standards adapted to raise or lower said rack bars when operated in unison or raise one of the rack bars and lower the opposite bar when operated in opposition to each other and additional means to connect the rack bars to said frame whereby when one of the bars is raised and the other lowered, said frame and scraper will be tilted at an angle to the horizontal.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL C. HANNA.

Witnesses:

F. B. ZIEG,

J. D. SMOOTS.