Dec. 12, 1939. J. ANTOS 2,183,058

GRADER

Original Filed Feb. 7, 1934 3 Sheets-Sheet 1

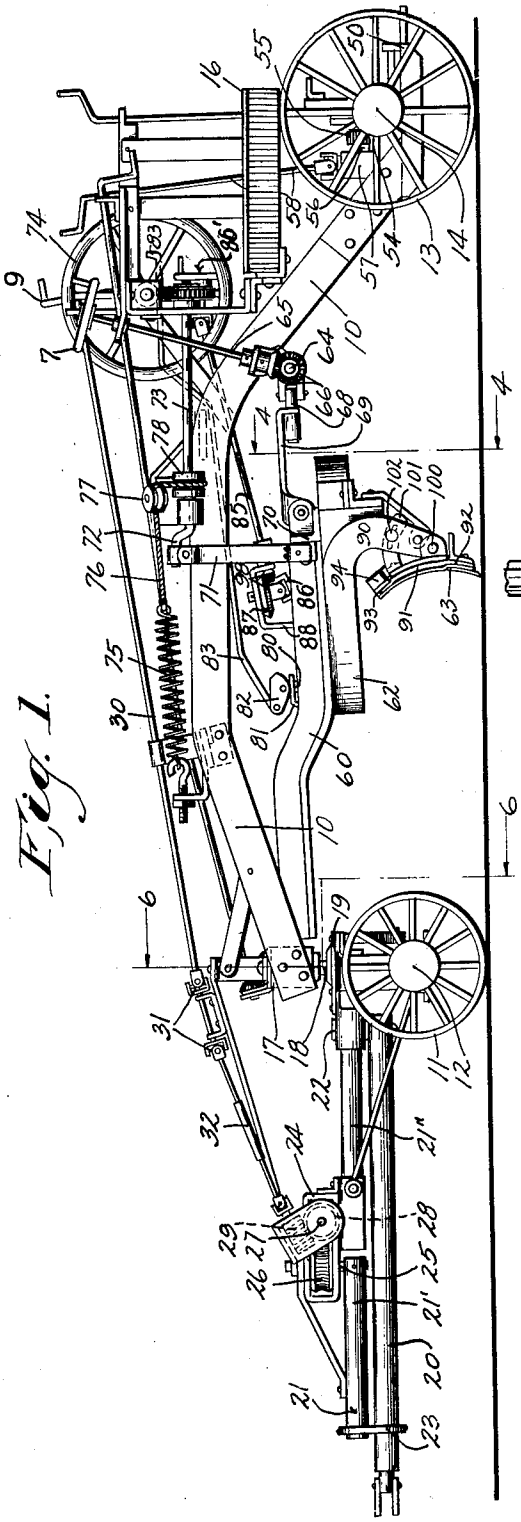


Fig. 1.

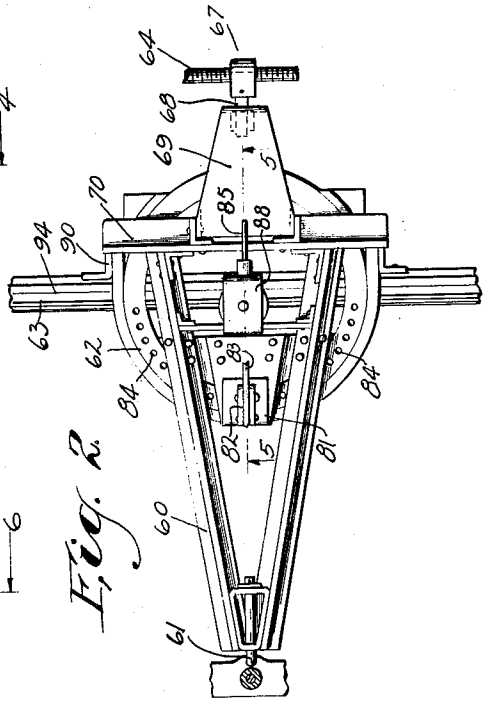


Fig. 2.

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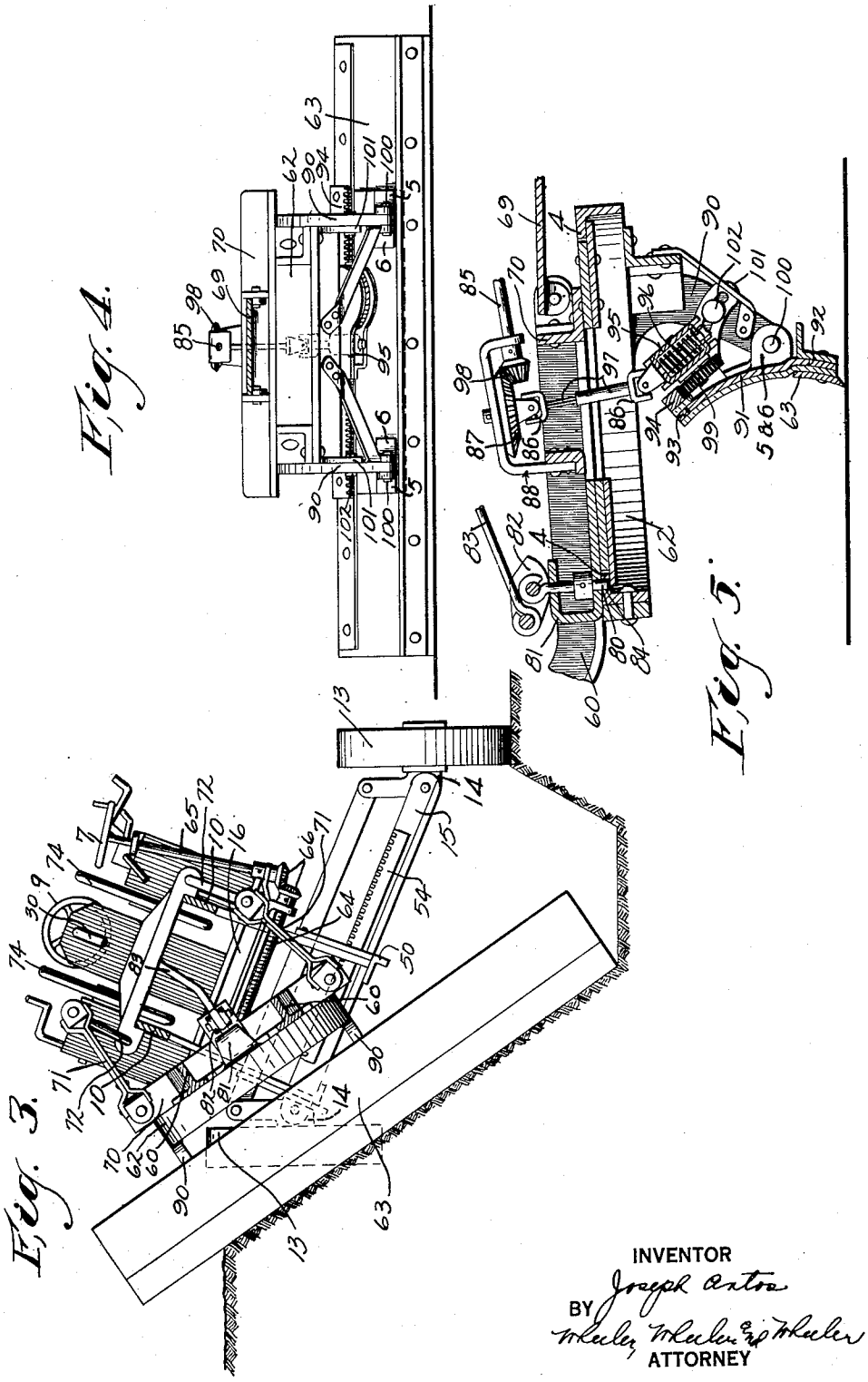


Fig. 3.

Fig. 4.

Fig. 5.

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Fig. 7.

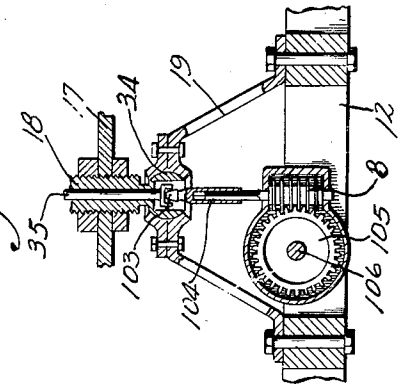


Fig. 6.

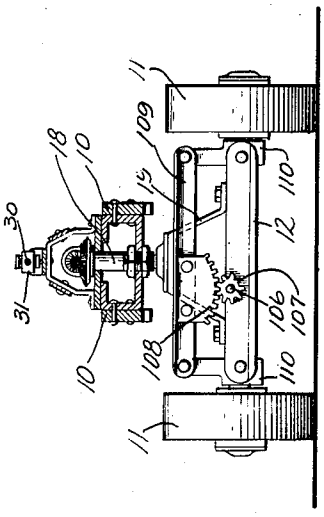
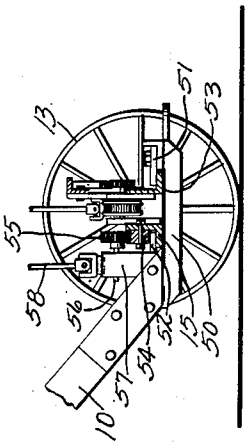


Fig. 8.



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Patented Dec. 12, 1939

2,183,058

UNITED STATES PATENT OFFICE

2,183,058

GRADER

Joseph Antos, Aurora, Ill., assignor to Western-Austin Company, Aurora, Ill., a corporation

Application February 7, 1934, Serial No. 710,099
Renewed May 7, 1937

8 Claims. (Cl. 37—156)

My invention relates to an improvement in graders.

The object of my invention is to provide an improved grader structure for universal service in road construction, road grading and highway maintenance.

More particularly, it is an object of my invention to provide a moldboard or blade construction and moldboard or blade mounting for a road machine, whereby the moldboard or blade may be swung from a scraping position to a ditching and ditch contouring position by manipulation from an operator's platform upon the grader structure.

Another object of my invention is to provide in a number of laterally adjustable mountings for various parts of a road grader structure, facilities for a universality of movement of the grader moldboard or blade to facilitate manipulation of the moldboard or blade from a central point of control or operator's platform.

Another object of my invention is to provide means at the operator's station to control the blade side shifting means, and the side shifting of the moldboard or blade can be of a uniform rate and the ends of the moldboard or blade will make a diagonal movement across the road while the grader is moving in a straight line forward.

Another object of my invention is to provide means at the operator's station whereby the operator at the operator's station can side shift the moldboard or blade on the blade supporting means without stopping the grader.

Another object of my invention is to provide means at the operator's station whereby the operator at the operator's station can side shift the moldboard or blade on its supporting means and the moldboard or blade will retain the same angle in relation to the ground during the entire side shifting movement, this being accomplished while the grader is in motion.

Further objects of this invention are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

Other means, than those described and shown in this application, attached to the blade supporting members and to the moldboard or blade which can be controlled by the grader operator by control means located at the operator's platform for side shifting the moldboard or blade on its supporting means during the forward movement of the grader, can be used which will come within the scope of this invention.

The invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings and, while we have shown therein a preferred embodiment, it is to be understood that the same is susceptible of modification and change without departing from the spirit of my invention.

In the drawings:

Figure 1 is a side elevation of my entire grader structure.

Figure 2 is a plan view of the gooseneck and moldboard or blade supported thereby.

Figure 3 is a rear elevation of my grader structure, with the moldboard or blade and the gooseneck swung to a position for ditching and ditch contouring.

Figure 4 is a section on line 4—4 of Fig. 1.

Figure 5 is a section on line 5—5 of Fig. 2.

Figure 6 is a vertical section on line 6—6 in Fig. 1.

Figure 7 is a vertical section through the tubular king bolt and portions of the front axle and spindle control thereof.

Figure 8 is a vertical section through the control devices and mounting members of the rear portion of the frame.

Like parts are designated by the same reference characters throughout the several views.

My grader structure is naturally divisible into certain main structural parts, including the chassis or main frame and steering controls, a rear frame mounting, a gooseneck adjustably supported with reference to the frame and various control devices, and the moldboard or blade itself, with its mounting and control means.

Chassis or main frame

The general structure of my grader includes a chassis or main frame 10 and supporting front wheels 11, mounted on spindles 110, which in turn are secured to front axle 12, and supporting rear wheels 13 mounted upon spindles 14, which in turn are secured to rear axle 15, providing for pivotal movement between the front and rear axles and the front and rear spindles, as will be clearly seen in Figs. 3 and 6.

The rear axle is of considerable length in comparison with the width of the rearward portion of the main frame 10 and the main frame 10 is adjustable laterally, as will be clear from the description hereinafter set forth.

At the rearward portion of main frame 10 and supported above the rear axle 15, I provide an operator's platform 16 to which are extended all of the control rods, shafts and hand wheels to

provide for central control of the various adjustable features of my improved grader and which are so important to my invention.

The forward portion of the main frame 10 is provided with a narrow cross head 17 into which a tubular king pin 18 is set. Upon this king pin the entire front portion of my grader structure is supported, and the front axle 12 with its bolster 19 is in universal ball connection with the king pin 18 at 34 to permit the frame 10 and the rear wheels to assume extreme degrees of angularity with respect to the front axle 12.

The king pin 18 is of tubular construction so that a front spindle control shaft 35 may extend through the king pin 18 to a universal joint 103, from which the shaft 35 extends in the form of a splined connection 104 to a worm 8. The worm 8 is in mesh with a worm gear 105 upon pinion shaft 106, and the pinion 107 shown in Fig. 6 is mounted on the shaft 106 and is in mesh with a gear sector block 108 mounted upon spindle bar 109. Therefore, in the rotation of the spindle control shaft 35 the pinion meshed with the sector block 108 is enabled to rock the front wheel spindles 110 to a position comparable to that shown in Fig. 3, which discloses oscillation of the rear wheel spindles 14.

The front axle and king pin assembly likewise permits of complete freedom of steering movement under control, not only of a draw bar 20, but also under control of a steering bar 21 which is rigidly connected to the bolster 19 and is pivotally connected to the draw bar 20 adjacent the bolster 19 by means of a draw bar king pin 22.

At the forward end of the hinge section 21' of the steering bar 21 is a yoke 23 loosely forked over the draw bar 20. The steering bar 21 comprises two hinge sections 21' and 21'', the hinged joint of which is provided with worm wheel control including a hinge box 24, a worm wheel shaft 25, comprising virtually the pintle of the hinge, a worm wheel 26, a cross shaft 27 with a worm (not shown) in engagement with the worm wheel 26. The cross shaft 27 is provided with a worm wheel 28 in engagement with a worm 29 on steering control shaft 30, which is provided with universal joints 31 and a splined connection at 32. Shaft 30 is revoluble and extends to the control position upon operator's platform 16 and is attached to hand wheel 9.

When shaft 30 is rotated by hand wheel 9, the connections described above cause the worm wheel 26 to be rotated and with it the worm shaft 25 is caused to hingedly move the parts 21' and 21'' of the steering bar 21, thus causing the draw bar 20 to be disposed at an angle to the longitudinal axis of the entire grader mechanism and the reverse movement of shaft 30 by hand wheel 9 will cause steering bar 21 to return to normal position.

Rear frame mounting

The rearward portion of the main frame 10 comprises a horizontal platform 50 which is built in the form of a slide having guideways 51 and 52 into which the inverted T head 53 of the rear axle 15 is fitted so that the comparatively narrow rear portion of the platform 50 may slide from one end to the other of the axle 15.

To control the adjustment of the position of the platform 50 with respect to the rear axle 15, I provide a rack bar 54 upon the axle 15 and a pinion 55 in mesh therewith. The shaft 56 of the pinion 55 extends into a gear box 57 containing reduction gearing from which a control shaft 58 extends upwardly to a convenient position with respect to the operator's platform 16. Rotation of the shaft 58 therefore will cause the rear portion of the main frame 10 and the platform 50 to be adjusted laterally within the limits of the length of the axle.

Gooseneck and gooseneck adjustment

It will be noted that the main frame 10 is arched as clearly shown in Fig. 1. Under the arch of the main frame 10, space is provided for the universal mounting and adjustment of a gooseneck 60, yoked at its forward end for free swinging movement with respect to the cross head 17 by means of an eye bolt 61. Rearwardly the gooseneck 60 develops into a broad support for a circle 62 which is directly attached to the supporting means 90 for moldboard or blade 63, which is the principal working unit of the entire grader structure.

Under the arch of the main frame 10, I provide a gooseneck adjusting screw 64 which extends across the entire frame and is rotated by means of a gooseneck control shaft 65 extending upwardly and rearwardly to the operator's position upon operator's platform 16 and mounted thereon is hand wheel 7. This shaft 65, through miter gears at 66, rotates the screw 64 and thereby adjustably positions laterally a nut 67 to which is universally secured at 68, in a splined connection, a broad gooseneck control plate 69 hingedly secured at its forward end to a gooseneck cross member 70.

At each end of the gooseneck cross member 70, a gooseneck swing link 71 is connected to the gooseneck height adjusting cranks 72, with shaft 73 which extends to a position adjacent the operator's platform 16 where large control wheels 74 with appropriate worm and worm wheel connections provide means for the raising or lowering of the gooseneck 60 which is counterbalanced by means of springs 75 with cables 76 extending around sheaves 77 to drums 78.

It will be apparent from the above description that the gooseneck 60 as to either side thereof may be raised and lowered by rotation of one or the other of the gooseneck control wheels 74 and that the gooseneck 60 may be swung laterally by rotation of the shaft 65 and screw 64 by hand wheel 7, thus permitting the gooseneck 60 to assume the position indicated in Fig. 3, so as to dispose the moldboard or blade 63 at an angle for ditch contouring.

To control the angularity of the moldboard or blade 63 with respect to the longitudinal axis of the main frame of the grader, the circle 62 may be rotated upon its supporting means 4 of gooseneck 60 and a pin 80 rigidly supported upon a bracket 81 by means of a cam 82, and control rod 83, so that the reciprocation of the rod 83 will cause the cam 82 to be adjusted to permit the pin 80 to drop into holes 84 of the circle 62. When the pin 80 is withdrawn from the holes 84, the circle 62 may be rotated to any convenient position.

Moldboard or blade supporting means

Projecting downward and attached to circle 62 are arms 90 on the lower ends of which is hung the blade supporting plate 91 by means of brackets 5 and 6 and pin 100 to permit oscillation of the moldboard or blade 63 and blade supporting plate 91. Attached to the upper portion of the blade supporting plate 91 are sector arms 101 with slots to receive the adjusting bolts 102 which pass through the arms 90 for the purpose of ad-

justing the moldboard or blade 63 and the blade supporting plate 91 to the proper cutting angle for the easy movement of material.

At the top and bottom of the moldboard or blade 63 are guideways 93 and 92 for attaching the moldboard or blade 63 to the blade supporting plate 91 and permitting endwise movement of the moldboard or blade 63 on the blade supporting plate 91. On the upper guideway 93 and attached to the moldboard or blade 63 is rack bar 94. Mounted on blade supporting plate 91 is gear box 95 which consists of worm and gear 96 and gear 99. The gear 99 contacts and meshes with rack bar 94. Attached to the shaft of worm 96 is universal joint 86 and splined shaft 97. Bevel gears 87 and 98 are supported and attached to the gooseneck 60 by bevel gears support 88. Bevel gear 87 has attached thereto universal joint 86 to which is connected the splined shaft 97. Attached to bevel gear 98 is control shaft 85 which extends to the operator's platform 16 and has attached thereto hand wheel 86' which controls the rotation of splined shaft 97. Revolving the hand wheel 86' and gear 99, which is engaged or in contact with the rack bar 94, will cause endwise movement of the moldboard or blade 63 on the supporting means 90 and 91.

From the description set forth it can readily be seen that with the forward movement of the grader the operator on the operator's station 16 can simultaneously cause a sidewise movement of the moldboard or blade 63. It is important that this operation can be performed during the forward movement of the grader, as obstructions will frequently be found on the side of the road which necessitate the side shifting of the moldboard or blade 63 without changing the angular relation of the moldboard or blade 63 with the road. The grader moving forward and the operator side shifting the moldboard or blade 63 on its supporting means, will produce a diagonal movement relative to the line of movement of the grader.

The control of this sidewise movement of the moldboard or blade 63 on its supporting means by the operator on the operator's platform 16 while the grader is moving is also very important where excess material is found which necessitates a quick endwise movement of the moldboard or blade 63 on its supporting means without changing its angular relation to the road in order to transfer this material to another point on the road, which requires more material than is ordinarily gathered by the moldboard or blade 63 in the usual straight-forward movement of the grader.

In cutting ditches, obstructions such as small trees and culverts are met and the side shifting of the moldboard or blade 63 on its supporting means is required to be done hurriedly and it is absolutely necessary to retain the same angularity of the moldboard or blade 63 with the road in order that the water will flow and also to prevent humps in the ditch, which is the case when the side shifting of the moldboard or blade 63 on its supporting means cannot be accomplished, as heretofore the only method of moving the moldboard or blade 63 in relation to the forward movement of the grader was to side shift the circle 62 and gooseneck 60 and in doing this the alinement of the moldboard or blade 63 with the road was changed.

It also appears that other important features of my invention are to be found in means for adjustment and control of the moldboard or blade 63 so that the moldboard or blade 63 may be adjusted from the position shown in Fig. 1 to the position shown in Fig. 3 by one man control from the control position upon operator's platform 16. To illustrate the sequence of movements of such adjustment and assuming that the moldboard or blade 63 is in the position indicated in Fig. 1, it would be possible for the operator on operator's platform to initially rotate shaft 85 to cause the moldboard or blade 63 to slide endwise upon blade supporting plate 91 to the extreme left hand position under the influence of the rotation of pinion 99 in mesh with rack bar 94.

After the moldboard or blade 63 has been slidably moved to its extreme left hand position, the gooseneck control shaft 65 may be rotated to cause nut 67 to move to the extreme left hand position upon screw 64, thus positioning the gooseneck 60 in the extreme left hand position.

After this is done, or while this movement is in progress, the operator on operator's platform may move the gooseneck raising and lowering cranks 72 to the positions indicated in Fig. 3, thus depressing the right hand side of the gooseneck 60 and elevating the left hand side thereof.

Depending upon the particular demands of the situation in which the ditch contouring task is to be accomplished, as indicated in Fig. 3, the entire main frame 10 of the grader may be shifted to the left or to the right with respect to the rear axle 15 as desired by the operator.

Under the requirements of the task as set forth in Fig. 3, the steering adjustments may be made through steering control shaft 30 to swing the draw bar 20 to the extreme right to permit the tractor or other motive power to travel at the extreme right out of the ditch.

I claim:

1. In a road grader, a blade arcuately curved upwardly and forwardly from a cutting lower margin, a narrow space bar and a wide angle iron comprising a channel-forming reinforcement for the lower margin of the blade, a narrow space bar and a wide rack bar comprising a channel-forming means spaced from the angle iron and a blade supporting plate receivable in the channels and comprising a mounting for the blade, said blade supporting plate being provided with means for mounting the blade upon the grader, and a pinion mounted upon said means for engagement with the rack bar, whereby to adjust the blade upon the blade supporting plate.

2. In a road grader provided with a cradle and supporting arms depending therefrom, a blade supporting plate pivotally connected with the arms and provided with a pinion and reduction gear connected therewith, and a curved grader blade slidably mounted upon the blade supporting plate and provided with a rack bar in mesh with said pinion, whereby the rotation of the reduction gear and said pinion moves said rack bar and said blade slidably upon the blade supporting plate, said plate being curved to conform to the curve of the grader blade to provide a reinforcement therefor.

3. In a road grader comprising, a main frame supported for movement over the road, a circle rotatably supported by said frame for rotation in a substantially horizontal plane, moldboard supporting means and a moldboard slidably mounted thereon for endwise displacement supported by said circle, an operator's station on said frame, control means at the operator's station to cause endwise displacement of said mold-

board on said moldboard supporting means during the movement of the grader.

4. In a road grader comprising, a main frame supported for movement over the road, a circle rotatably supported by said frame for rotation in a substantially horizontal plane, moldboard supporting means and a moldboard mounted thereon for endwise displacement supported by said circle, a rotatable gear mounted on said moldboard supporting means engaging a rack bar mounted on said moldboard, an operator's station on said frame, control means at the operator's station interconnected with said rotatable gear to rotate the rotatable gear and produce endwise displacement of the moldboard during the movement of the grader.

5. In a road grader, a frame supported for movement, a member pivotally secured thereto for rotation in a substantially horizontal plane, a moldboard slidably mounted for endwise displacement on said member and generally across the line of movement of said grader, and means interconnecting said member and moldboard for causing said displacement of the moldboard during the movement of the grader to effect a continuous and uniform diagonal movement of said moldboard relative to the line of movement of the grader.

6. In a road grader comprising, a frame supported for movement over a road, a circle mounted on said frame for rotation in a substantially horizontal plane, a moldboard slidably mounted for endwise displacement on said circle, and means providing a continuous uniform endwise displacement of said moldboard generally across the line of movement of said frame and during the course of movement thereof to produce a continuous and uniform diagonal movement of said moldboard relative to the line of movement of the grader, and said moldboard retaining the same angularity with the ground during its entire endwise displacement.

7. A road grader comprising, a frame supported for movement over a road, a circle support mounted on said frame for rotation in a substantially horizontal plane, a moldboard slidably mounted for endwise displacement on said circle support, and means providing a continuous uniform endwise displacement of said moldboard generally across the line of movement of said frame and during the course of movement thereof to produce a continuous and uniform diagonal movement of said moldboard relative to the line of movement of the grader.

8. In a road grader, in combination, a frame with an operator's station thereon supported for movement over the road, a circle rotatably supported by said frame for rotation in a substantially horizontal plane, a moldboard support and a moldboard slidably mounted thereon for endwise movement supported by said circle, rotatable means mounted on the moldboard support engaging means on said moldboard, control means at the operator's station interconnected with said rotatable means to produce endwise movement of the moldboard during the movement of the grader.

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