ROAD GRADER BLADE MOUNTING MEANS
12 Claims, 4 Drawing Figs.

ABSTRACT: A road grader having means for mounting the blade to the frame for vertical adjustability by adjustment of the connection of control wheel means to the blade support. The blade is urged downwardly by coil spring means extending intermediate the frame and the blade carrier.
ROAD GRADER BLADE MOUNTING MEANS

This invention relates to road graders and in particular to means for adjustably mounting the blade of a road grader.

In one conventional form of road grader, a frame is carried by front wheel means and rear wheel means with the roadgrading blade, or mold board, supported subjacent the frame intermediate the front and rear wheels for engaging the ground therebetween. A number of different mechanisms have been devised for controlling the vertical positioning of the blade. The known devices, however, have the disadvantages of insufficient support of the blade, lack of flexibility in the mounting, and failure to suitably track the front wheels in negotiating turns in the grading operation.

The present invention comprehends an improved road grader blade-mounting means eliminating the disadvantages of the above discussed road graders in a simple and economical manner.

Thus, a principal feature of the present invention is the provision of a new and improved blade-mounting means for use in a road grader or the like.

Another feature of the invention is the provision of such a blade-mounting means for use in a road grader having a frame having a front portion, a midportion, and a rear portion, steerable front wheel means movably carrying the front portion of the frame, rear wheel means movably carrying the rear portion of the frame, and a blade wherein the blade-mounting means includes a carrier, means for vertically adjustably mounting the carrier subjacent the frame midportion, means rigidly securing the blade to the carrier to extend generally horizontally, means carried by the frame for forcibly urging the carrier downwardly, control wheel means, means for mounting the control wheel means on the carrier including means for adjustably vertically positioning the carrier relative to the control wheel means.

A further feature of the invention is the provision of such a road grader including means for turnably mounting the control wheel means on the carrier to track the front wheel means.

Another feature of the invention is the provision of such a blade-mounting means wherein the positioning means of the control wheel-mounting means comprises piston means and link means connected by the wheel means and the piston means for adjusting the vertical relationship between the wheel means and the carrier.

Still another feature of the invention is the provision of such a blade-mounting means including means for horizontally movably mounting the link and piston means to the carrier.

A yet further feature of the invention is the provision of such a blade-mounting means including new and improved means for maintaining each of a plurality of control wheels in engagement with the ground while moving over an uneven ground surface.

Still another feature of the invention is the provision of such a blade-mounting means including new and improved means for locking the carrier in an elevated position.

A yet further feature of the invention is the provision of such a blade-mounting means including new and improved means for adjusting the urging force of the carrier urging means.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevation of a road grader having a blade-mounting means embodying the invention, with the end portions of the grader broken away to facilitate illustration of the invention;

FIG. 2 is a fragmentary enlarged perspective view illustrating the means for mounting the blade to the grader frame;

FIG. 3 is a fragmentary perspective view illustrating a portion of the blade-mounting means with one pair of control wheels shown removed from the axle to facilitate illustration of the invention; and

FIG. 4 is a fragmentary diametric section of the coil spring device.
mechanisms 44, each including a bar 45 rigidly secured to retainer 39 and extending longitudinally movably through a guide 46 fixed to the upper housing portion 37. A pin 47 is secured in a slot 48 in each of the locking mechanism bars 45 in the upper end of the bar 45 to secure a block 49 carried by the pin in any one of a number of different positions on the bar for limiting the downward movement of the bar relative to frame portion 13 by abutment of the block with the upper end of the guide 46. The retainer 39 includes a flange 39c at lower end of outer portion 39a and having a periphery of holes 40 in each of the locking mechanism bars 45. A bottom plate 45b is secured to the lower end of the bars 45 to cooperate with guide 46 in stabilizing the locking mechanisms 44.

As indicated briefly above, the invention comprehends the provision of improved means for controlling the elevation of the blade 17 relative to the subjacent ground surface. As best seen in FIG. 3, the elevation control means, generally designated 50, includes control wheel means 51 comprising spaced pairs of wheels 52. One pair of wheels 52 is carried on an end portion 53 of an axle 54 which is journaled for movement about a horizontal axis in a block 55 secured by a bracket support 56 to an arm 57 connected to a pivot 58 on the blade means 19. The motion of the blade means 19 without concurrent movement of the arm 57 may swing about the vertical axis of the pivot. The other pair of wheels 52 is rotatably mounted on an opposite end portion 59 of the axle 54. As best seen in FIG. 3, the axle end portion 53 is axially offset from the midportion of the axle in block 55, and the opposite end portion 59 is axially offset in an opposite direction from the midportion of the axle. Thus, a movement of one of the wheels upwardly or downwardly as by engagement thereof with a rise or depression in the subjacent road surface causes an opposite movement of the other set of wheels downwardly or upwardly to permit maintained engagement of each set of wheels with the ground surface.

The bracket support 56 includes a pair of links 60 which are rigidly secured to the block 55 at one end by suitable mounting plates 61 and pivotally secured at the opposite ends to a pivot block 62 which is rigidly secured to the rear portion of the arm 57 and to connecting bars 63 which are in turn pivotally connected to a connector 64 at an outer end of piston rod 65. The piston rod extends into a piston cylinder 66 of a conventional hydraulic piston device generally designated 73 which includes a piston (not shown) therein for axial adjustment of the piston rod as desired by the operator of the grader. The cylinder 66 is connected to the arm 57 by a suitable bracket 67 and a pivot 68 permitting swivelling of the cylinder 66 about a horizontal axis while maintaining the cylinder 66 aligned with the arm 57. The base plate 28 is supported on a pair of rollers 69 at opposite sides of the arm 57 which are carried rotatably on the arm 57 on suitable mounting brackets 70 and 71. As shown in FIG. 3, the bracket 67 projects upwardly from arm 57 through an opening 72 in the base plate 28 to permit limited movement of the control means 50 and the wheel means 51 carried thereby to track the front wheels 14 of the grader during forward movement thereof.

In operation, the grader 10 may be driven to move forwardly over the subjacent ground surface with the blade 17 disposed at a suitable elevation as for grading different ground surfaces. The blade 17 may be positioned at an angle to the fore and aft axis of the grader by suitable operation of the drive 31 which rotates the support circle 20 suitably about the selectable receivable in any one of a plurality of holes 50 carried thereby. The support 56 is suitably pivoted relative to block 62 to vertically, adjustably position the wheel means 51 relative to the carrier 19 by suitable hydraulic adjustment of the piston rod 65. Thus, for example, if it is desired to dispose the blade 17 relatively low, the piston device 73 is caused to move rod 65 inwardly into the cylinder 66. The wheel means 51 in a clockwise direction as seen in FIG. 3, is thereby raised to raise the wheel means relative to the carrier 19 and permit spring mechanism 35 to urge the blade 17 downwardly by a corresponding downward movement of the carrier 19. It should be noted that the blade 17 is supported subjacent the frame portion 13 at all times in the operation of the grader and the wheel means 51 which are maintained in engagement with the ground respectively, forwardly of and rearwardly of the blade. If it is desired to adjust the urging force applied downwardly on the blade 17, the operator may adjust the compression of spring 37 by suitable manipulation of mechanism 42.

Should the operator desire to utilize the grader with the blade 17 at a relatively high level, such as for grading a gravel road, the piston device 73 is actuated to urge the piston rod 65 outwardly and thereby move the wheel means 51 downwardly or in a counterclockwise direction as seen in FIG. 1. The adjustment mechanism 42 may be suitably actuated to provide the desired downward urging force on the blade 17 for this grading operation.

When the operator wishes to move the grader from one location to another without engaging the blade with the subjacent ground surface, he need merely raise the blade to an upper position and reposition the pin 47 in the desired hole 48 of the bar 45, thereby locking the retainer 39 in the upper position and permitting the wheel means 51 to be lowered without concurrent movement of the blade 17 thereby to space the blade above the ground surface.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:
1. In a grader provided with a frame having a front portion, a midportion, and a rear portion, steerable wheel means movably carrying said front portion of the frame, rear wheel means movably carrying said midportion of the frame, and a blade means movably carrying said rear portion of the frame, control wheel means for resiliently connecting said carrier to said frame to be disposed subjacent said frame midportion; and means rigidly securing the blade to said carrier to extend generally horizontally, said connecting means resiliently carrying the weight of the blade and carrier while forcibly biasing the carrier and blade downwardly to a grading position; control wheel means; and means for mounting said control wheel means to said carrier including means for adjustably vertically positioning said carrier relative to said control wheel means thereby to vary the disposition of said blade relative to the level of the bottom of said control wheel means.
2. The grader means of claim 1 wherein said control wheel-mounting means comprises means for turnably mounting said control wheel means on said carrier to track said front wheel means.
3. The grader means of claim 1 wherein said positioning means of the control wheel-mounting means comprises piston means.
4. In a grader provided with a frame having a front portion, a midportion, and a rear portion, steerable wheel means movably carrying said front portion of the frame, rear wheel means movably carrying said rear portion of the frame, a blade, and means for adjustably mounting the blade relative to said frame comprising: a carrier; means for connecting said carrier to said frame to be disposed subjacent said frame midportion; means rigidly securing the blade to said carrier to extend generally horizontally; means carried by the frame for forcibly urging the carrier downwardly; control wheel means; and means for mounting said control wheel means to said carrier including means for adjustably vertically positioning said carrier relative to said control wheel means, said positioning means of the control wheel-mounting means including a link connected to the control wheel means axially thereof and pivotally connected to said carrier to swing said carrier in a clockwise direction, and piston means acting between said link and said carrier for adjusting the pivotal disposition of the link thereby to selectively raise and lower said carrier.
5. The grader means of claim 4 including means for horizontally movably securing said link and piston means to said carrier for enabling said control wheel means to track said front wheel means.

6. The grader means of claim 1 further including means for releasably locking said carrier in an elevated position against the biasing action of said resilient connecting means.

7. The grader means of claim 1 wherein said carrier urging means comprises spring means compressively extended intermediate said frame and said carrier.

8. The grader means of claim 7 further including means for releasably locking said spring means for retaining said carrier in an elevated position.

9. The grader means of claim 1 further including means for adjusting the urging force of said resilient connecting means.

10. The grader means of claim 9 wherein said urging means comprises spring means and said adjusting means comprises means carried by the frame for adjustably compressing the spring means.

11. In a grader provided with a frame having a front portion, a midportion, and a rear portion, steerable wheel means movably carrying said front portion of the frame, rear wheel means movably carrying said rear portion of the frame, and a blade, means for adjustably mounting the blade relative to said frame comprising: a carrier; means for connecting said carrier to said frame to be disposed subjacent said frame midportion; means rigidly securing the blade to said carrier to extend generally horizontally; means carried by the frame for forcibly urging the carrier downwardly; control wheel means; and means for mounting said control wheel means to said carrier including means for adjustably vertically positioning said carrier relative to said control wheel means, said urging means comprising a coil spring and means for causing one portion of the coil spring to carry the weight of said blade and another portion of said coil spring to apply pressure against the blade.

12. The grader means of claim 11 wherein the last named means comprises a split washer disposed between turns of the coil spring intermediate the ends thereof, said split washer being fixedly connected to said carrier.