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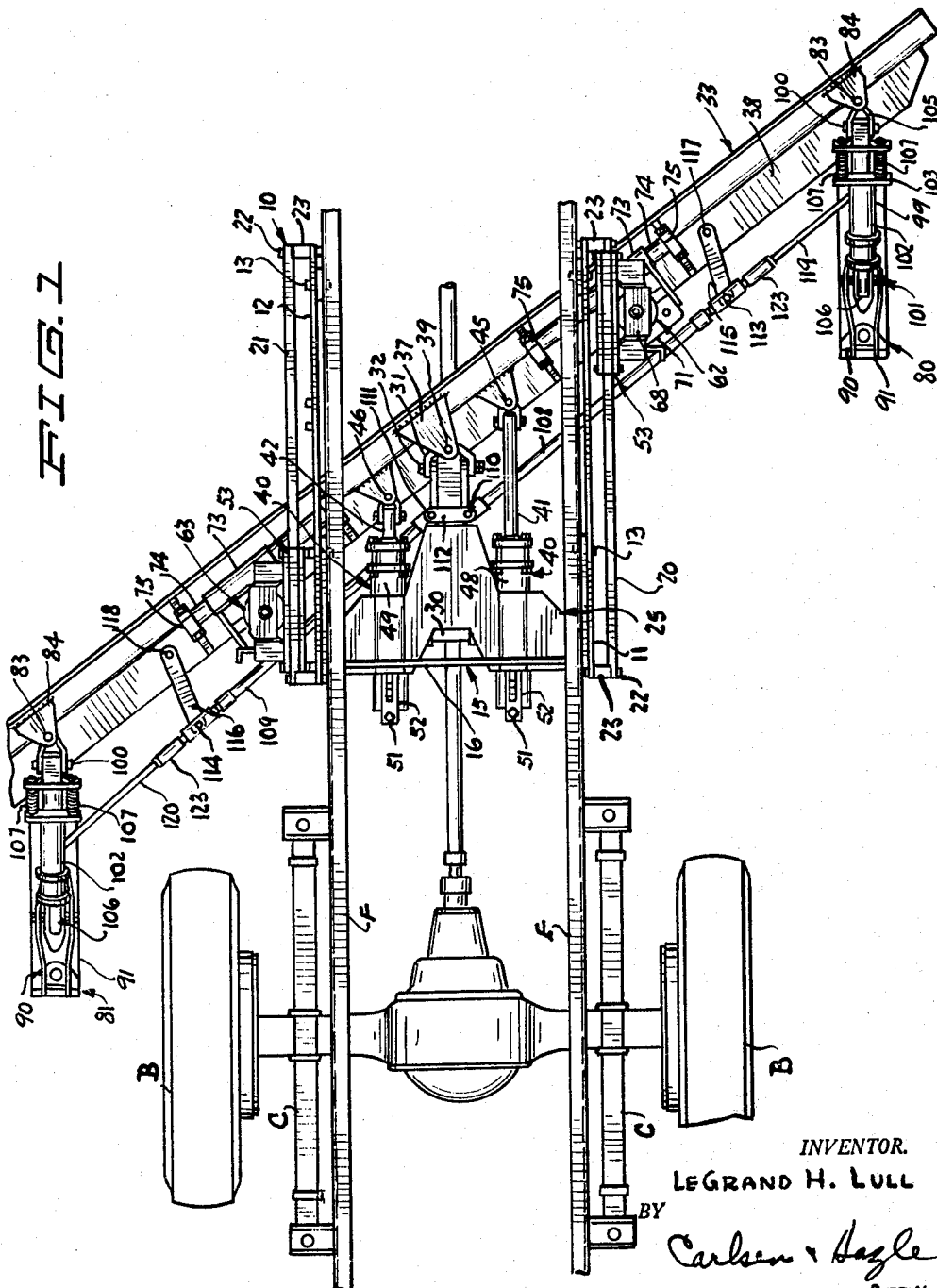
LE GRAND H. LULL

2,959,876

GRADER

Filed July 30, 1956

6 Sheets-Sheet 1



Nov. 15, 1960

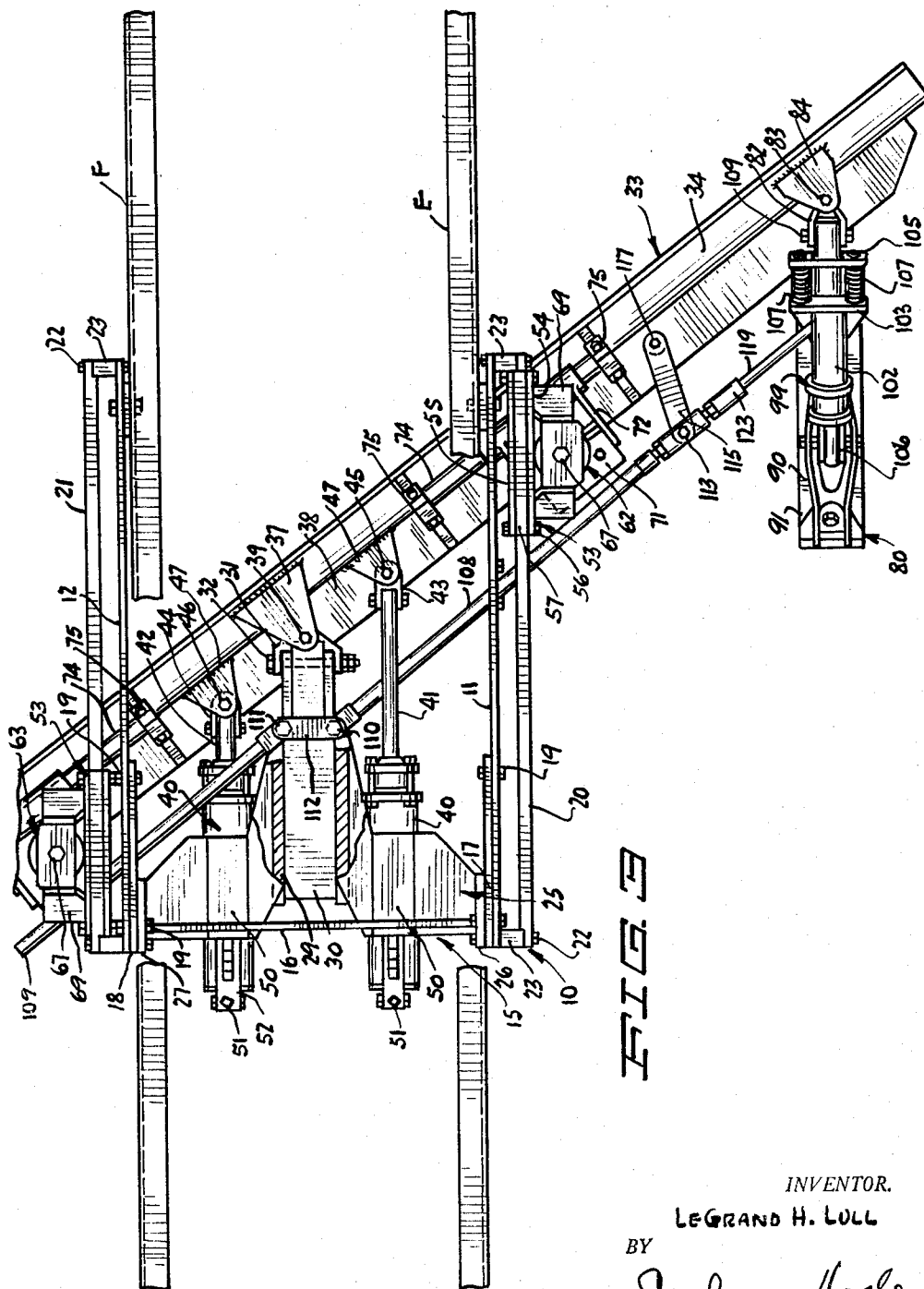
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GRADER

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6 Sheets-Sheet 3



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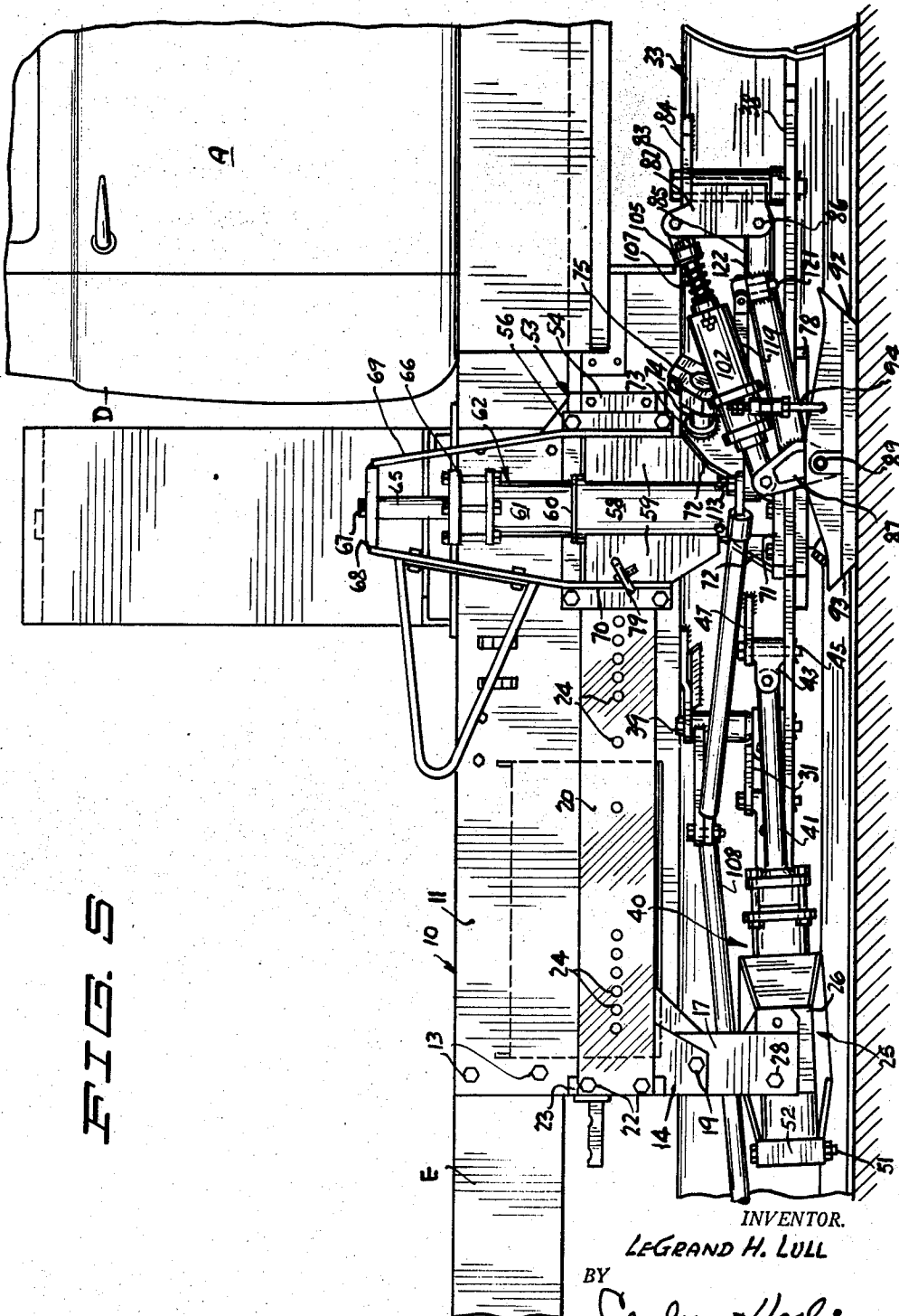
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Filed July 30, 1956

6 Sheets-Sheet 5



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GRADER

Filed July 30, 1956

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FIG. 6

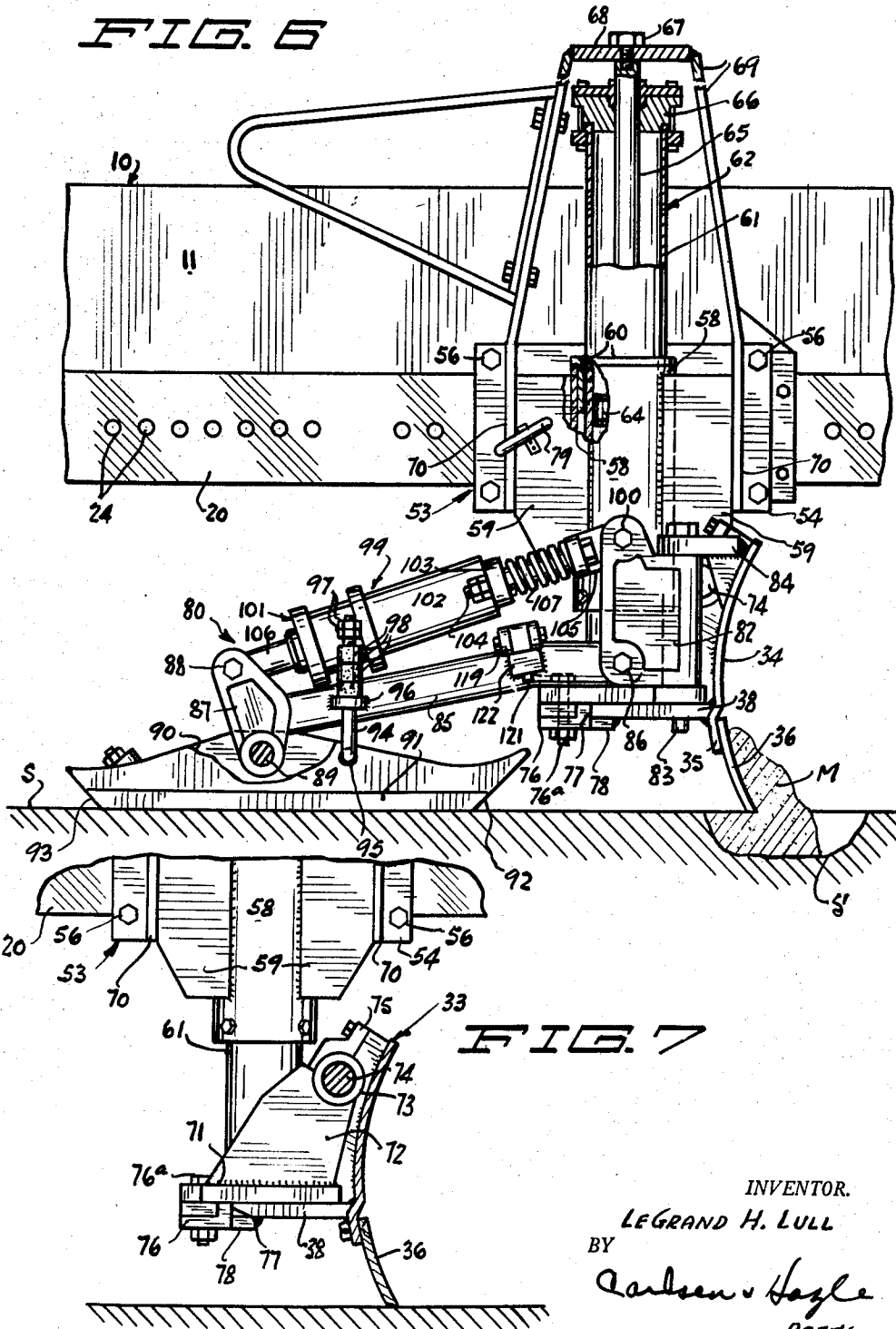


FIG. 7

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Filed July 30, 1956, Ser. No. 600,900

8 Claims. (Cl. 37—163)

My invention relates generally to improvements in road graders which are customarily used in the maintenance of secondary roads or other vehicle supporting surfaces of a material which requires periodic blading attention in order to maintain it in a smooth condition. The primary object of my invention is to provide what is called in this art an underbody grader, or one which is mounted on and beneath the body frame of a motor vehicle, preferably a dump truck, and in accordance with my invention the grader assembly is readily mounted upon or dismounted from the truck so that the truck becomes a truck-grader combination and may be used by its owner more days per year. Further in accordance with this object of my invention I provide a grader which is relatively simple and inexpensive in construction but is capable of high speed operation, in either wet or dry weather, so that a greater mileage of road surface may be maintained at less expense than is the case with comparative equipment today. The mounting of the grader upon a dump truck has the further advantage that the dump body of the truck may remain empty for maximum fuel economy, but when required the body may be filled with material to add weight for heavy grading operations.

Another and important object of my invention is to provide a grader of this general type which is provided with levelizers or anti-chatter devices, located one adjacent each end of the grader blade or moldboard. As is seen in my earlier Patent No. 1,968,412, issued July 31, 1934, these anti-chatter devices each comprises a runner element which runs in contact with the road surface immediately behind the grader blade and which is adjustably held down against said road surface in a manner such as to tend to lift the blade. The blade, however, is held down to its work by its mounting and supporting means and by the weight of the vehicle and the anti-chatter devices then overcome the tendency of the grader blade to vibrate vertically, so that it will plane off the high spots in a road surface and fill in the low spots with accumulated road surface material. Secondary highways are noted for their tendency to become what is called washboarded, or to develop alternating and generally transversely extending, high and low areas. A vehicle traveling such a roadway will, of course, tend to vibrate and without some means to counteract this tendency the grader blade would also tend to follow the undulations in the road surface so that the condition thereof might actually be aggravated rather than alleviated. The operation of the anti-chatter runners behind the blade completely eliminates this chattering tendency causing the blade, as stated above, to plane off the highs and fill in the lows, leaving the road in a perfect, smooth condition. In accordance with this object of my invention I have improved these anti-chatter devices in certain respects and notably by the provision of hydraulic rams for adjusting the runners down toward the road surface, thus making it possible to adjust the

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runners from a remote location, such as the driver's position in the cab of the truck, as well as to make adjustments as frequently as the nature and condition of the road surface may require.

5 Another object of my invention is to provide an improved mounting and supporting arrangement or frame structure for an underbody grader which makes it possible to quickly mount or dismount the grader blade and which frame structure actually reinforces the frame of the dump truck or other vehicle to which it is applied. 10 This frame structure includes parallel side bars upon each of which is mounted an upright hydraulic ram which supports the grader blade to move the same upwardly and downwardly. These rams are slidable on the 15 the side bars in order to make it possible to adjust the angle of the blade through a wide range and to cause either of its ends to lead the other, in addition to which the rams control the tilt of the blade in a transverse, upright plane. The central portion of the blade is pivotally mounted on the frame structure to permit such 20 angling adjustments and at each side of said pivot connection there is a hydraulic ram connected between the frame structure and the blade and operating in a generally longitudinal plane to adjust the blade angle. Provision is also made for forward and rearward move- 25 ments of the said pivot connection as the blade is shifted from one angle to another, and associated with the pivot connection is a parallel linkage which connects the anti-chatter devices and operates to maintain them substantially parallel with the direction of travel of the vehicle at any angle to which the blade is adjusted.

Another object of my invention is to provide an improved hold-down ram construction wherein each of 35 the rams, described above as slidable upon the side bars, includes an upright cylinder and a seat slidably connected to the grader blade so that the latter may move endwise as necessary in making blade angle adjustments. This seat connection to the blade, however, is such that the blade is held to its work and any tendency of the 40 blade to tip back under the load of material ahead of it, as well as the thrust placed upon the blade as it planes the road surfaces, is completely eliminated. The ram cylinder is slidably mounted through an upright bearing guide forming part of the mounting which slides 45 upon the side bar, and the piston rod of the ram extends upwardly from the upper end of the cylinder with the exposed end of the rod firmly anchored to said carrier assembly by a saddle member which ties the piston rod to said carrier member. I find this particular arrangement and construction of these rams to be one 50 which will readily stand up to all of the very considerable forces to which it is subjected in the support and operation of the grader blade and which is in addition a relatively simple and inexpensive type of construction.

55 These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which—

60 Fig. 1 is a top plan view of the rear portion only of the body or chassis frame of a motor vehicle, showing the rear wheels and rear spring suspension thereof, and showing my improved underbody grader associated with said frame.

65 Fig. 2 is a view similar to Fig. 1 but omitting the wheels of the vehicle and showing the grader blade as adjusted to an angle opposite that at which it appears in Fig. 1.

70 Fig. 3 is an enlarged plan view with portions of the vehicle frame broken away to better illustrate the construction of the grader mounting frame structure and with a portion of the latter also broken away to illustrate

the slidable mounting for the pivot connection between the grader blade and mounting frame.

Fig. 4 is a rear view of the center and one end portion of the grader, showing the vehicle frame sides in cross section and indicating the outline of the forepart or cab of the vehicle.

Fig. 5 is a side elevation on the same scale as Fig. 4 with one end portion of the grader blade as well as the front and rear of the vehicle broken away.

Fig. 6 is an enlarged side elevation with the grader blade adjusted to a position crosswise with respect to the vehicle, and therefore viewed straight on endwise, in order to better illustrate the action of the anti-chatter devices in cooperation with the hold-down rams in holding the grader blade to its work. In this view an upper part of the hold-down ram is shown in section to better illustrate the construction thereof.

Fig. 7 is an enlarged fragmentary sectional view through the grader blade and adjacent components, taken substantially along the line 7—7 in Fig. 2 and particularly illustrating the slidable association of the blade and the cylinder seat.

As stated supra my improved grader is particularly designed for underbody mounting on a conventional form of dump truck, designated generally at A, and while I have herein shown the rear wheels B and rear spring suspension C, as well as the cab D of the truck, the chief point of interest insofar as understanding and construction of the grader is concerned are the two side channels E and F which form the major members of the chassis or body frame of the truck. I do not, of course, limit myself to the application of the grader to this particular type of motor vehicle and it may, in fact, be mounted upon any type of vehicular frame without departing from the scope of my invention.

The mounting for the grader includes a mounting frame structure, which I have designated generally at 10, made up of main, heavy side gusset plates 11 and 12 which are bolted at 13 to the aforesaid channels E and F and which have rear corner portions 14 depending well beneath said channels. As seen in Fig. 4 to best advantage there is a transverse inverted U-shaped yoke, designated generally at 15, which joins the rear corners of the gusset plates 11—12 and comprises an overhead, slightly arched cross member 16 which is welded and braced to legs 17 and 18, which legs are bolted at 19 to the rear corners 14 of the gusset plates and depend well below the same. Heavy side bars or draft bars 20 and 21 are mounted one at each side of the frame and are secured at opposite ends by bolts 22 and spacers 23 upon the gusset plates 11—12 as well as the legs 17—18. Thus the side bars 20—21 are spaced outwardly from the gusset plates 11—12 and as is clearly shown in the drawings the side bars extend longitudinally as well as horizontally and are provided with a series of locking openings, designated collectively at 24. Completing this mounting frame structure is a transversely extending lower cross frame 25 the opposite ends 26—27 of which are pivotally mounted by bolts 28 upon the lower ends of the legs 17—18 of the yoke 15 so that this cross frame 25 may tilt about a transverse axis. Said cross frame 25 is fabricated from sheet and tube stock and centrally is provided with a longitudinally extending guideway 29 in which there is slidably retained a heavy slide bar 30 upon the forward end of which there is a clevis 31 mounted by a bolt 32 to permit upward and downward swinging movements of the clevis about a transverse axis, as will be understood and as is best shown in Fig. 3.

The grader blade or moldboard is designated generally at 33 and is, so far as its shape and construction is concerned, quite conventional, the blade having an upper portion 34 which is curved as viewed from the end (Fig. 6), with its lower edge 35 offset for the mounting thereon of a replaceable cutting edge 36. Centrally of the length of the blade 33 the same is provided with a

bracket 37 welded in place above a stiffening flange 38 which extends along the back of the blade substantially from end to end thereof. The aforesaid clevis 31 is pivoted to the bracket 37 and flange 38, such pivot connection being made by means of a heavy king pin or bolt 39 passing downwardly through the aforesaid clevis 31. This pivot connection 39 thus provides for angling adjustments of the blade 33 in a horizontal plane so that either end thereof may be positioned in advance of the other, as is seen in Figs. 1 and 2, as is customary in the operation of such equipment. For thus angling the blade I provide at opposite sides of a centerline passing through the pivot connection 39 a pair of angling rams, designated generally at 40, located in generally horizontal and longitudinal planes, with forwardly extending piston rods 41—42 which are connected by clevises 43—44 and vertical pivots 45—46 to brackets 47 similar to the aforesaid center bracket 37. The cylinders 48—49 of the rams 40 extend rearwardly through tubular portions 50 of the cross frame 25 and rearwardly thereof said pistons are anchored but pivoted for movement about vertical axes by means of pins 51 to brackets 52 extending rearwardly from said tubular parts. Thus it will be seen that the rams 40 are effectively braced between the mounting frame structure and the blade at opposite sides of the center pivot connection 39 so that the opposite reciprocation of the piston rods 41—42 will swing the blade about said pivot connection. The necessary complete flexibility of movement of the blade is provided by the pivotal mounting of the ram cylinders 48—49 as well as the clevis connections 43, 44, 45 and 46 between the piston rods and the blade.

Mounted upon each of the side bars 20—21 is a heavy sliding carrier, designated generally at 53, which comprises a heavy outer plate 54 to which is bolted an inner plate 55 by means of bolts 56. Spacer elements, denoted collectively at 57, are interposed between the plates 54 and 55 so that when the bolts 56 are pulled tight this carrier element will still be free for sliding movement along the length of the respective side bars. A heavy tubular bearing guide 58 is provided upon each carrier element 53 and is rigidly held in place thereon by welded gusset plates 59. The upper and lower ends of the bearing guides 58 are provided with bushings, one of which appears at 60 in Fig. 6, to slidably receive the cylinders 61 of hold-down rams, one at each side of the machine and designated generally at 62 and 63 respectively. Slidable in these cylinders 62 are pistons, one of which appears at 64 in Fig. 6, and from which there upwardly extend the usual piston rods 65. The upper ends of the cylinders 62 are closed by heavy caps 66 through which the piston rods 65 slidably project and at each side the respective piston rod is secured by a cap screw 67 to the horizontal portion 68 of an inverted U-shaped saddle member 69, the lower legs 70 of which are welded to and form a part of the gusset structure 59 which rigidly mounts the aforesaid bearing guides 58. The piston rods 65 are braced beneath the upper ends of these saddles 69 and thus the admission of fluid to the upper end of the cylinders 61 will elevate same with respect to the frame structure, raising the blade 33, while the admission of fluid to the cylinders beneath said pistons will reverse this relative travel of the parts as will be readily understood.

The lower ends of the cylinders 61 depend beneath the bearings 58, as is best seen in Fig. 7, and they are closed by seat flanges 71 which bear downwardly upon the aforesaid stiffening flange 38 and which are provided with upwardly extending, transversely spaced brackets 72 the upper extremities of which are joined by tubular bearings 73 slidably engaging guide rods 74 of some length, extending parallel with the upper portion of the blade 33 and on the rear side thereof. These rods 74 are held in place by bearings 75 secured to the blade and the aforesaid seat flanges 71 are provided with clips 76 bolted at 76^a to the flanges which bear against the rear edges 77

of the flange 38 as well as the added stiffener ribs 78 which are welded beneath the flange adjacent these portions of the blade. Thus it will be seen that the aforesaid upward and downward movements of the cylinders 61 through the bearing guides 58 will correspondingly adjust the blade 33 but that the blade may slide endwise a limited distance relative to the cylinders, such movements being limited by the length of the slide rods 74. This movement is necessary as the angling adjustments of the blade 33 are carried out by opposite movements of the angling rams 40 previously described. Also in making such adjustments the carriers 53 for the hold-down rams 62—63 must slide forwardly and rearwardly upon the side bars 20—21, as will be readily understood from the comparison of Figs. 1 and 2. While these angling adjustments are carried out by the operation of the hydraulic rams it may be desirable, once the proper working angle is determined, to lock the carriers 53 in order to relieve the angling rams 40 of strain during long periods of operation. This may be accomplished by the use of locking pins 79, one for each of said carriers 53, which pins are thrust through the appropriate openings 24 in the side bars 20, as will be readily understood. In addition to the slidable engagement between the cylinders 61 and the blade 33 as provided by the seat flanges 71 and rods 74 this structure, including the brackets 72 and clips 76, also rigidly holds the blade against tipping rearwardly at either upper or rear edges under the thrust of the material being planed from the road surface.

Adjacent each end portion of the blade or moldboard 33 is a levelizer or anti-chatter device, the same being designated generally at 80 and 81. Each of these devices comprises a mounting bracket 82 carried by an upright pivot pin 83 between an apertured ear 84 welded to the back of the blade near its upper edge, and the aforesaid stiffening flange 38, so that the bracket may swing in a horizontal plane with respect to the blade. Pivoted to the bracket 82 on a horizontal axis, generally paralleling the length of the blade, is a lower supporting or torque member 85 extending rearwardly from the blade and attached by a bolt 86 to said bracket. At its rear end the member 85 is vertically enlarged at 87 and provided with spaced, upper and lower pivots 88 and 89. A runner mounting shoe 90 is fulcrumed intermediate its ends to the lower pivot 89 and carries a replaceable runner 91 extending in a generally longitudinal plane and having upwardly angling front and rear ends 92—93. This mounting permits oscillation of the shoe 90 and runner 91 about the pivot 89 but such oscillation is restricted by a hook bolt 94 connected at 95 to the shoe, extending loosely upwardly through an apertured lug 96 on the member 85 and provided at its upper end with lock nuts 97. Rubber bumper sleeves 98 are located on the bolt 94 between the lug 96 and lock nuts 97 to snub such oscillation of the shoe and runner but permit the runner sufficient play so that it will always closely follow the road surface behind the blade 33. An upper support member designated generally at 99 is pivoted at 100 to the bracket 82, also on an axis generally paralleling the blade and above said pivot 86, and is pivoted at its rear end to the aforesaid upper pivot 88 on the enlarged rear end 87 of member 85. Said member 99 includes a hydraulic ram 101 the cylinder 102 of which is provided with a flange 103 mounting two tie bolts 104 connected to and extending through a tie member 105 attached to said pivot 100. The piston rod 106 extends rearwardly and is attached to pivot 88. Heavy expansion coil springs 107 surround the tie bolts 104 and, bearing between the flange 103 and tie member 105, tend to expand or increase the length of the upper member 99 and yieldably force the runner 91 against the ground surface, such expansion being limited by the tie bolts of course. Extension of the piston rod 106 by admission of fluid to the cylinder 102 will also force the runner 91 against the road surface and place the springs 107 under compression whereas retraction of the piston rod

by the opposite admission of fluid to the cylinder will raise the runner clear as will be understood.

Turning now particularly to Figs. 1 and 2, in which the blade 33 is shown full length and at opposite angles, it will be noted that there is a parallel motion linkage connecting the anti-chatter devices 80—81. Such linkage comprises a pair of inner link rods 108—109 extending in opposite directions, behind the blade, from transversely spaced pivot connections 110—111 to a cross member 112 forming part of the aforesaid slide bar 30. The outer ends of the inner link rods 108—109 are pivoted at 113—114 to the rear ends of parallel motion levers 115—116 the forward ends of which are pivoted at 117—118 to the aforesaid flange 38 behind the blade 33. Outer link rods 119—120 are also connected to and extend outwardly from the respective pivots 113—114 and at their outer forked extremities these outer link rods are pivoted to the lower support or torque members 85 of the respective anti-chatter devices 80—81, behind the front pivots 86 of said members, by means of upright pivot pins 121 (Figs. 5 and 6) which engage apertured lugs 122 on said members. These outer link rods include swivel joints 123 in order not to interfere with the upward and downward adjustments of the anti-chatter devices 80—81 as has heretofore been described.

As the blade or moldboard 33 is swung between its various working angles, by the angling rams as has been described, the inner link rods 108—109 and associated outer link rods 119—120 are moved endwise by the parallel action of the pivots 110—111 and levers 115—116 to swing the anti-chatter devices 80—81 about their upright pivots 83 and operate to maintain the runner elements 91 parallel with the direction of travel in all positions of the blade, as will be readily understood.

Fig. 6 illustrates the importance of the anti-chatter devices 80—81 the runners 91 of which are forced by the rams 101 down against the planed road surface S behind the blade or moldboard 33. The tendency of the runners 91 thus brought to bear forcibly upon the surface S is to raise the blade 33 but the blade is, of course, held downward to its work by the hold-down rams 62—63 as has been described. Thus the blade is prevented from vibrating vertically, or chattering, which action if not prevented not only causes the blade to grade or plane the road surface unevenly but also produces very rapid wear on all of the components supporting or connected to the blade. Without the devices 80—81 the blade would, as will be apparent in Fig. 6, tend to drop into a low spot S' in the surface S but because of the levelizing action of my improved anti-chatter devices the blade is held up and caused to fill such lows S' with material M accumulated ahead of the blade resulting in a very smooth road surface and completely curing the surface of its washboard condition as heretofore set forth.

The unitized construction of the mounting frame structure 10 reduces the cost of fabrication thereof, makes it convenient to mount or dismount the grader upon the truck frame and when in use reinforces that frame so that it will safely bear the stresses set up by operation of the grader. For the sake of simplicity I have not herein shown the various fluid supply lines for the six hydraulic rams embodied in my grader but it is to be understood that all of said rams are preferably if not actually necessarily of the double-action variety and appropriate conduit connections will, of course, be made to the opposite ends of the ram cylinders for selectively supplying fluid thereto under control of a suitable valve bank (not shown) positioned by the operator of the truck on which the grader is mounted.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and de-

scribed my invention, what I claim to be new and desire to protect by Letters Patent is:

1. A grader for a road surface and for mounting upon a traveling frame such as a motor vehicle, comprising in combination, a grader blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame and for raising and lowering the blade and consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, means forming a vertical pivot connection between the central part of the blade and the frame, a pair of generally horizontally positioned rams arranged one to each side of and behind said pivot connection and connecting the frame and blade for angling the latter in a horizontal plane with respect to the direction of travel, means mounting the said upright rams on the frame for fore and aft movement on the frame as the angle of the blade is adjusted, and means slidably mounting the said vertical pivot connection upon the frame for fore and aft movements as the angle of the blade is adjusted.

2. A road surface grader for mounting beneath the frame of a motor vehicle, comprising in combination, a grader blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame for raising and lowering the blade and consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, each ram including a cylinder fastened to the blade and a piston rod fastened to the frame, means forming a vertical pivot connection between the central part of the blade and the frame, a pair of generally horizontally and longitudinally positioned rams arranged one to each side of and behind said pivot connection and connecting the frame and blade for angling the latter in a horizontal plane with respect to the direction of travel, means mounting the said cylinders of the upright rams on the frame for fore and aft movement on the frame as the angle of the blade is adjusted, and means slidably mounting the said vertical pivot connection upon the frame for fore and aft movements as the angle of the blade is adjusted.

3. A road surface grader for mounting upon the frame of a motor vehicle, comprising in combination, a grader blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame and for raising and lowering the blade, said means consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, side bars extending fore and aft on the frame, the said rams having cylinders and carrier members slidably mounting the same on said side bars for fore and aft as well as upward and downward movements, said rams also having pistons and upwardly extending piston rods, means securing the upper ends of the piston rods to said carrier members, seats for the lower ends of said cylinders, means slidably mounting said seats upon the blade for sliding movements lengthwise of the blade, means forming a vertical pivot connection between the central part of the blade and the frame, and at least one ram connecting the frame and blade for angling the latter in a horizontal plane about said pivot connection and with respect to the direction of travel.

4. For grading a road surface and for mounting upon a traveling frame such as a motor vehicle, a grader comprising in combination, a blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame and for raising and lowering the blade and consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, side bars extending fore and aft on the frame, the said rams having cylinders, carrier members slidably mounting the cylinders on said side bars for fore and aft movements, said carrier members having guides for the cylinders for upward and downward movements thereof, said rams also having pistons and upwardly extending piston rods, saddle members

secured to the upper ends of the piston rods and to said carrier members, seats for the lower ends of said cylinders, means slidably mounting said seats upon the blade for sliding movements lengthwise of the blade, means forming a vertical pivot connection between the central part of the blade and the frame, and a pair of generally horizontally arranged rams arranged one to each side of said pivot connections and connecting the frame and blade for angling the latter in a horizontal plane with respect to the direction of travel.

5. A grader for a road surface and for mounting upon the frame of a motor vehicle, comprising in combination, a grader blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame for raising and lowering the blade and consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, side bars extending fore and aft on the frame, the said rams having cylinders, carrier members slidably mounting the cylinders on said side bars for fore and aft movements and said carrier members having upright guides slidably receiving the cylinders, said rams also having pistons and upwardly extending piston rods, saddle members securing the upper ends of the piston rods to said carrier members, seats for the lower ends of said cylinders, means including guide rods and bearing flanges secured to the blade and mounting said seats upon the blade so that the blade may slide lengthwise relative to the rams, means forming a vertical pivot connection between the central part of the blade and the frame, a pair of generally horizontally extending rams arranged one at each side of and behind said pivot connections and connecting the frame and blade for angling the latter in a horizontal plane with respect to the direction of travel, and means slidably mounting the said vertical pivot connection upon the frame for fore and aft movements as the angle of the blade is adjusted.

6. A grader for a road surface and for mounting upon a traveling frame such as a motor vehicle, comprising in combination, a grader blade located in a generally crosswise direction beneath said frame, means supportably connecting said blade to the frame for raising and lowering the blade and consisting of a transversely spaced pair of upright hydraulic rams connected between the frame and blade, side bars extending fore and aft on the frame, the said rams having cylinders, means slidably mounting the cylinders on the side bars for both forward and rearward and upward and downward movements, said rams also having pistons and upwardly extending piston rods, means connecting the upper ends of the piston rods to the frame, seats for the lower ends of said cylinders, means slidably mounting the blade upon said seats for lengthwise sliding movements of the blade, means forming a vertical pivot connection between the central part of the blade and the frame, a pair of generally horizontally and longitudinally extending rams arranged one at each side of and behind said pivot connections and connecting the frame and blade for angling the latter in a horizontal plane with respect to the direction of travel, and means including a guide and a slidable bar therein slidably mounting the said vertical pivot connection upon the frame for fore and aft movements as the angle of the blade is adjusted.

7. For underbody mounting upon the frame of a motor truck, a road surface grader of the character described comprising a grader blade located in a generally crosswise direction beneath the truck, a mounting frame structure including longitudinally extending side bars secured to the opposite sides of the truck frame, hold-down rams for connecting the blade to said frame structure, the said rams comprising upright relatively reciprocable cylinders and piston rods, guide means on the blade mounting the lower ends of the cylinders on the blade and permitting the latter to move lengthwise with respect to the rams, carrier members slidable forwardly and rearwardly

on the side bars, each carrier member having a tubular guide and the respective cylinders being slidable upwardly and downwardly in said guides, and means securing the upper ends of the piston rods against upward and downward displacement with respect to the carrier members whereby the ram cylinders act as supports for as well as vertically adjust the blade with respect to the frame.

8. For underbody mounting upon the frame of a motor truck, a road surface grader of the character described comprising a grader blade located in a generally cross-wise direction beneath the truck, a mounting frame structure including longitudinally extending side bars secured to the opposite sides of the truck frame, hold-down rams for connecting the blade to said frame structure, the said rams comprising upright relatively reciprocable cylinders and piston rods, guide means on the blade mounting the lower ends of the cylinders on the blade and permitting the latter to move lengthwise with respect to the rams, carrier members slidable forwardly and rearwardly on the side bars, each carrier member having a tubular guide and the respective cylinders being slidable upwardly and downwardly in said guides, means securing the upper ends of the piston rods against upward and downward

displacement with respect to the carrier members whereby the ram cylinders act as supports for as well as vertically adjust the blade with respect to the frame, means pivoting the center part of the blade to the mounting frame structure, and means for angling the blade about said pivot means in a generally horizontal plane.

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