May 22, 1956 J. M. MOLENE ET AL 2,746,181

ROAD GRADING ATTACHMENT

Filed April 20, 1953 4 Sheets-Sheet 1

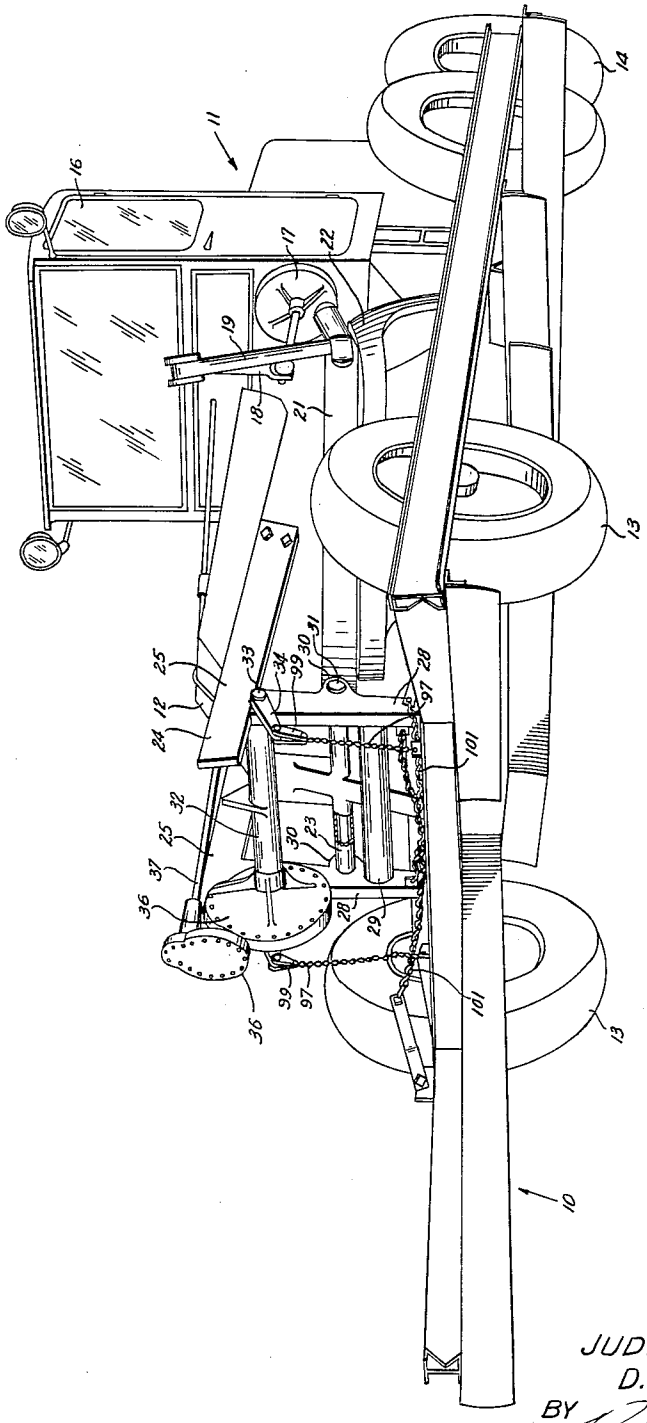


FIG. 1

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ROAD GRADING ATTACHMENT

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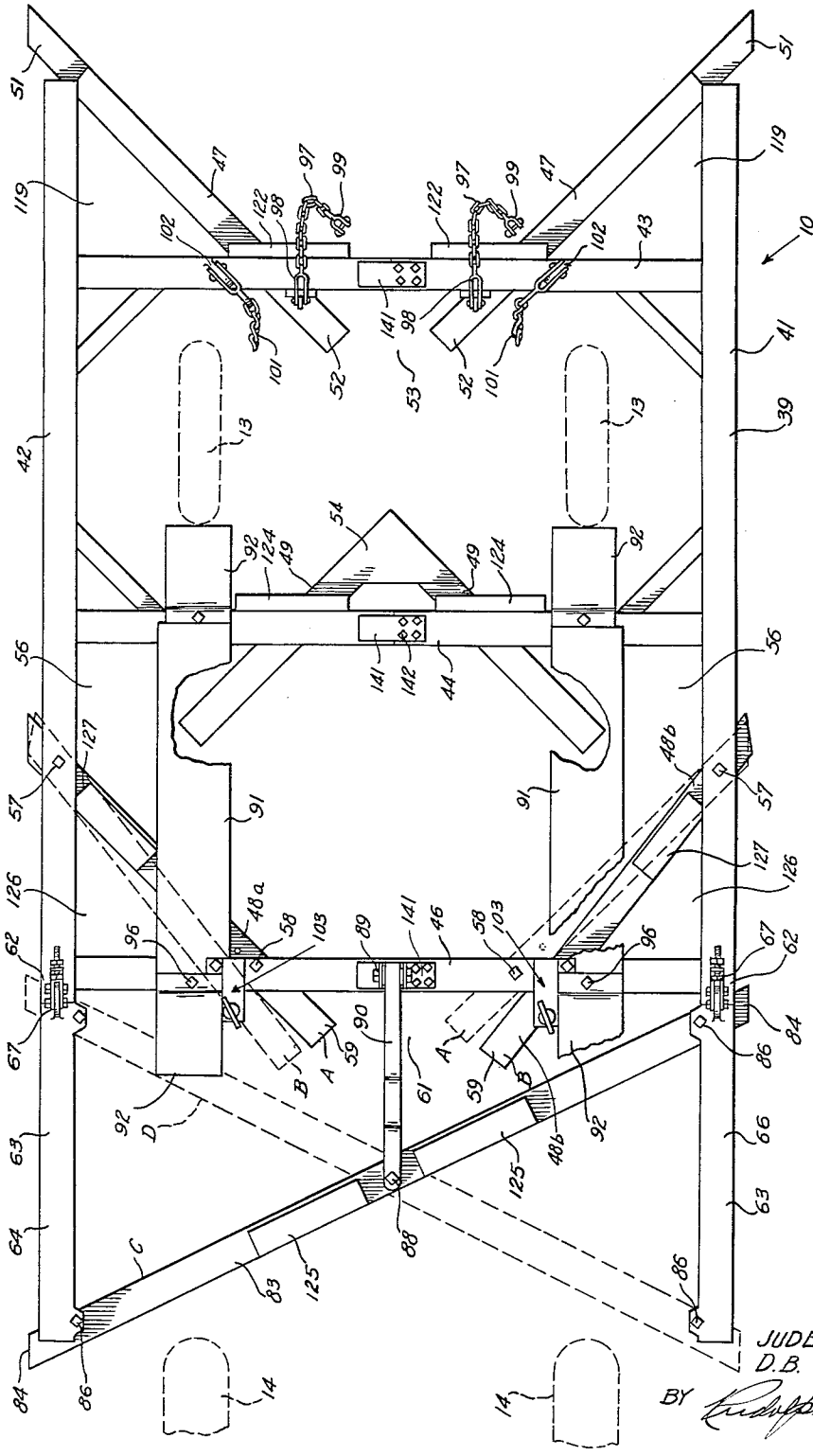


FIG. 2

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ROAD GRADING ATTACHMENT

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FIG. 3

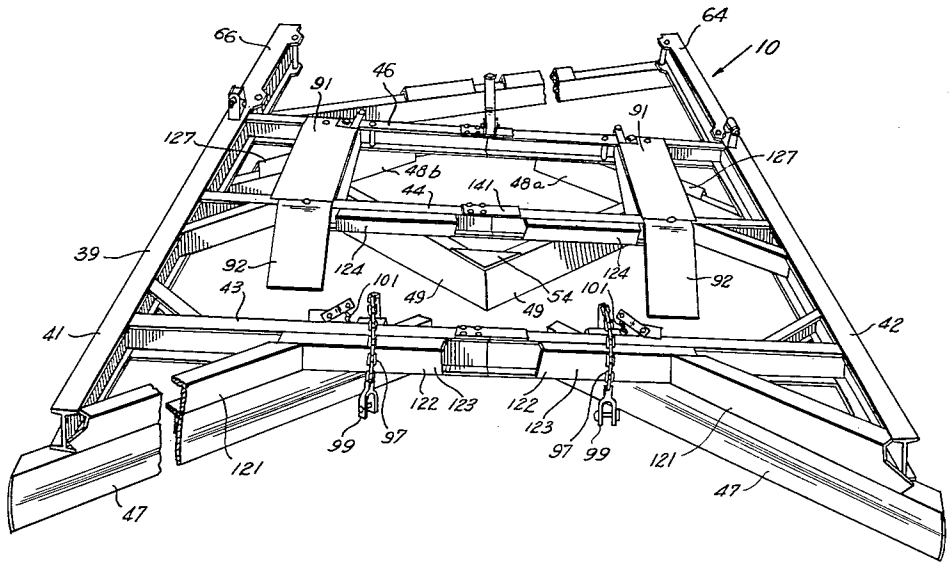
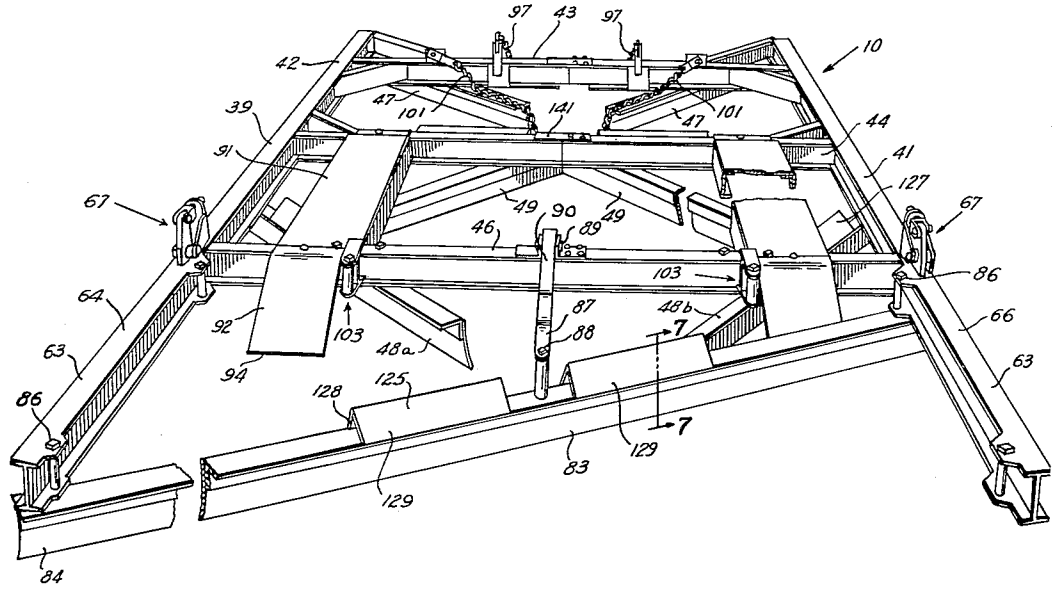


FIG. 4



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ROAD GRADING ATTACHMENT

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FIG. 5

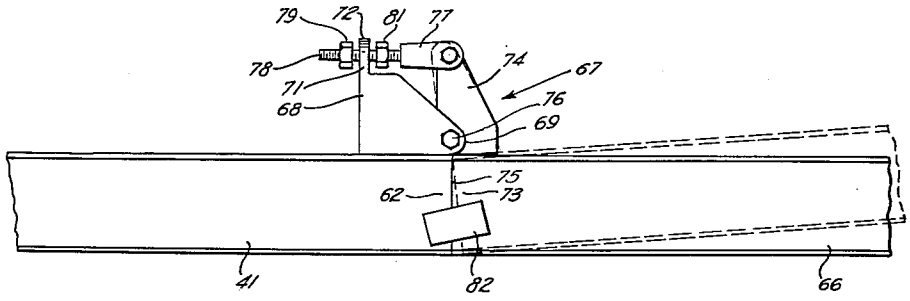


FIG. 6

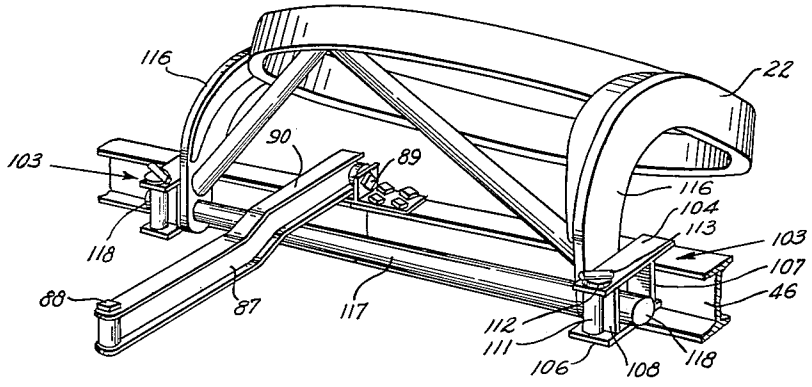
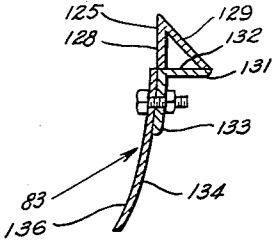


FIG. 7



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United States Patent Office 2,746,181 Patented May 22, 1956

2,746,181

ROAD GRADING ATTACHMENT

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Application April 20, 1953, Serial No. 349,714

2 Claims. (Cl. 37—153)

This invention relates generally to road drags or graders and in particular to a road grading attachment for a vehicle.

An object of this invention is to provide an improved road grading attachment for a vehicle.

A further object of this invention is to provide a road grading attachment which includes a series of longitudinally spaced scraper blades arranged to direct the road material scraped thereby to a rearwardly located leveler blade which is mounted for a floating up and down movement relative to the scraper blades.

A further object of this invention is to provide a road grading attachment for a vehicle which includes ramp means to provide for the vehicle front wheels being driven to a position within the confines of the attachment for ready assembly of the attachment on the vehicle.

Another object of this invention is to provide a road grading attachment having a transverse leveler blade mounted so as to be horizontally movable to reversely inclined transverse positions and a pair of rearwardly converged scraper blades arranged forwardly of the leveler blade and adjustably mounted for relative horizontal movement to positions to direct the material scraped thereby toward a forward portion of the leveler blade.

Still a further object of this invention is to provide a road grading attachment which is rugged in construction, efficient in operation and readily assembled on a supporting vehicle.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description when taken in connection with the accompanying drawing in which:

Fig. 1 is a perspective view of a road grader attachment of this invention shown in assembly relation with a road maintaining machine of a well known type, commonly referred to as a patrol unit;

Fig. 2 is an enlarged plan view of the road grading attachment of this invention with parts broken away for the purpose of clarity;

Figs. 3 and 4 are reduced perspective views of the road grading attachment of this invention with some parts broken away and others shown in section for the purpose of more clearly showing the construction thereof;

Fig. 5 is an enlarged detail elevational view of the rear portion of the road grader attachment of this invention;

Fig. 6 is a detail perspective view of a structure on the patrol unit providing for the mounting of the rear end portion of the road grader attachment of this invention on the patrol unit; and

Fig. 7 is an enlarged transverse sectional view of the leveler blade as seen along the line 7—7 in Fig. 4.

With reference to the drawing, the road grading attachment of this invention, indicated generally at **10**, is shown in Fig. 1 in assembly relation with a patrol unit **11**, of a well known type. The patrol unit **11** consists of a main frame **12** having a pair of front wheels **13**, a set of rear traction wheels **14** and an operator's cab **16**. A pair of

gear housings **17**, only one of which is shown, are arranged at opposite sides of the front of the cab **16**, with each gear housing **17** containing a gear system (not shown) for actuating a rock arm **18** and a connecting arm **19** arranged in a supporting relation with a usual gear **21** and circle **22** for raising and lowering the circle **22**. The circle **22** is arranged to support a road engaging member (not shown), a variety of which are useable with the patrol unit **11**, and cooperates with the gear **21**, in a well known manner, to both raise and lower and swing such road engaging member in a direction transversely of the patrol unit **11**.

Mounted on a front portion of the main frame **12** (Fig. 1) is a snow plow attachment, indicated generally at **24**, which includes a pair of transversely spaced longitudinally extended mounting arms **25** secured to opposite sides of the main frame **12**. Projected downwardly from the front ends of the mounting arms **25**, at positions between the front wheels **13**, are a pair of upright leg members **28** which are maintained in a transversely spaced relation by a connecting member **29**. The legs **28** are secured to the main frame **12** by a transverse rod member **31** carried in a tubular support **23**, formed as a part of the main frame **12**. The opposite ends of the rod member **31** are projected through rearwardly extended projections **30** on the upright legs **28**. Carried between the upper ends of the legs **28** is a hollow casing and spacer member **32** through which is extended a rock shaft **33** provided at its opposite ends with rock arms **34** which are arranged outwardly of the legs **28**. A gear reduction unit **36** is mounted at one end of the casing member **32** for operation by a drive shaft **37** to move the rock shaft **33** for swinging the rock arms **34** in an up and down direction. As will appear later, the road grading attachment **10** is supported by the rock arms **34** and the circle **22** to provide for the raising and lowering of the attachment as a unit or for the selective raising and lowering of the front or rear ends of the attachment.

The road grading attachment **10** (Figs. 2, 3 and 4) consists of a main frame **39** which includes a pair of longitudinally extended transversely spaced parallel side frame members **41** and **42** which are maintained in a spaced relation by three transverse connecting members **43**, **44** and **46**. Secured to the undersides of the main frame **39** and corresponding, respectively, to the transverse connecting members **43**, **46** and **44** are three pairs of upright scraper blades, a front pair **47**, a rear pair **48** *a* and *b*, and an intermediate pair **49**.

The front pair of blades **47** (Fig. 2) are arranged in a forwardly diverged relation and are attached adjacent their front ends **51** to the undersides of the side members **41** and **42** and adjacent their rear ends **52** to the underside of the front transverse connecting member **43**. The rear ends **52** of the blades **47** are positioned in a transversely spaced relation rearwardly of the connecting member **43** so as to provide an opening or space **53** between such rear ends **52**.

The intermediate blades **49** are arranged in a forwardly converged V-formation with the front ends of the blades secured together by a triangular gusset plate **54**. The blades **49** are attached substantially midway between their ends to the underside of a central portion of the intermediate transverse connecting member **44**, with the rear ends of the blades **49** arranged in a spaced relation with the adjacent side frame members **41** and **42** so as to provide openings or spaces **56** between the side frame members **41** and **42** and the adjacent rear ends of the blades **49**.

The rear scraper blades **48***a* and **48***b* are arranged below the side frame members **41** and **42** and rear connecting member **46** and are pivotally connected adjacent their front ends by upright pivot members **47** to the side

frame members 42 and 41, respectively, with the pivots 57 being at positions intermediate the transverse connecting members 44 and 46. By virtue of the pivotal supports 57, the blades 48*a* and 48*b* are transversely movable in horizontal planes between adjusted positions A, indicated in Fig. 2 in solid lines for the blade 48*a*, and dotted lines for the blade 48*b*, and positions B indicated in dotted lines for the blade 48*a* and solid lines for the blade 48*b*. Bolts or pins 58 are extended through the rear transverse connecting member 46 and the blades 48*a* and 48*b*, adjacent the rear ends 59 of such blades, to maintain the blades 48*a* and 48*b* in their adjusted positions. The rear ends 59 of the blades 48*a* and 48*b* are transversely spaced and positioned rearwardly of the rear connecting member 46 so as to provide a space 61 between such rear ends in both positions A and B of the blades 48*a* and 48*b*.

It can thus be seen that the arrangement of the scraper blades 47, 48*a* and 48*b* and 49 on the main frame 39 provides for the alternate arrangement of forwardly diverging blades and forwardly converging blades in a spaced relation longitudinally of the frame 39.

The main frame 39 is provided with a rearwardly projected frame extension 63, which includes a pair of side frame members 64 and 66 pivotally secured at their front ends to the rear ends 62 of the frame members 41 and 42 by means of pivot assemblies 67 (Figs. 2 and 5). Since the pivot assemblies 67 are identical, only the assembly 67 of the main frame side member 41 and the frame extension side member 66 will be described in detail.

A pivot assembly 67 (Fig. 5) includes a pair of upright transversely spaced plate members 68 secured to the top side of the main frame side member 41, and having rear end portions 69 thereof projected slightly rearwardly from the rear end 62 of the side member 41. The plates 68 are connected together at their front ends by an upright transverse member or plate 71 having an upper portion 72 extended above the plate members 68 and provided with an opening (not shown) for a purpose to later appear.

Secured to and projected upwardly from the top side of the frame extension side member 66 and at the front end 73 thereof, is an upright plate or hinge member 74 having a portion thereof positioned between the plate members 68. A pivot member 76, arranged directly above the juncture 75 of the side frame members 41 and 66, extends transversely through the plate members 68 and the hinge member 74 to provide for an up and down pivotal movement of the extension side member 66 relative to the side member 41 of the main frame 39. Pivotally connected to the top end of the hinge member 74 and extended forwardly therefrom is an adjustable arm 77 having a threaded shank 78 extended through the hole (not shown) in the top portion 72 of the transverse plate 71. Threadably received on the shank 78 are a pair of nuts 79 and 81 arranged on opposite sides of the portion 72 of the transverse plate 71.

It can thus be seen that the frame extension side member 66 is pivotally movable in up and down direction about the pivot member 76 and relative to the main frame side member 41, with the engagement of the nut 81, on the threaded shank 78, with the portion 72 of the transverse plate 71 limiting the upward movement of the extension side frame member 66 relative to the main frame side member 41. By virtue of the location of the pivot 76 at the junction 75, the lowermost position of the frame extension side member 66 is defined by the abutting engagement of the front end thereof with the rear end 62 of the side frame member 41. The up and down movement of the extension side member 66 in a vertical plane is maintained by the provision of a pair of guide plates 82 welded to the rear end 62 of the member 41 and projected rearwardly therefrom in a straddling relation with the front end 73 of the extension member

66. The nut 79 is normally spaced away from the plate 71, as shown in Fig. 5, to permit the abutting engagement of the members 41 and 66. However, when it is desired to hold the frame extension side member 66 in a raised position relative to the main frame side member 41, the nut 79 is tightened against the portion 72 of the plate 71 to a desired adjusted position.

The pivot assemblies 67 are arranged opposite each other so that the pivot members 76 of the assemblies 67 are in alignment transversely of the main frame 39. It can thus be seen that the main frame extension 63 is pivotally movable as a unit in an up and down direction about the pivot members 76 and relative to the main frame 39.

The frame extension 63 (Figs. 2 and 4) supports an upright leveler blade 83 which is attached at its ends 84, by upright bolts or the like 86, to the undersides of the frame extension side members 64 and 66. Intermediate its ends 84, the blade 83 is pivotally attached to the rear end of a supporting arm 87 by a vertically extended pivot member 88. The front end of the arm 87 is pivotally secured by a horizontal pivot member 89 to a central portion of the rear transverse connecting member 46, with the front portion 90 of the arm 87 (Fig. 6) being laterally upwardly offset for a purpose to later appear.

By virtue of the pivotal support of the leveler blade 83 on the rear end of the supporting arm 87, the leveler blade 83 is swingable in a horizontal plane between a pair of adjusted positions C and D, with the position C being illustrated in full lines in Fig. 2, and position D in dotted lines in Fig. 2. The frame extension side members 64 and 66 are, therefore, formed with longitudinally spaced openings for selectively receiving the blade supporting bolts 86 to provide for the movement of the leveler blade 83 to its adjusted positions C and D.

It can thus be seen that the main frame extension 63 and the leveler blade 83 are pivotally movable as a unit in an up and down direction about the pivot members 76 and 89. In addition, the leveler blade 83 is mounted for adjustable pivotal movement in a horizontal plane, to either one of a pair of reversely inclined positions C and D.

In the assembly of the road grading attachment 10 on the patrol unit 11, the attachment 10 is arranged on the ground forwardly of the patrol unit 11 so that the rear end of the frame extension 63 is adjacent the patrol unit front wheels 13. The bolts 86, for maintaining the leveler blade 83 is an adjusted position on the main frame extension 63, and the pivot bolt 88 are then removed, and the leveler blade 83 is detached from the attachment 10.

To facilitate the assembly of the attachment 10 on the patrol unit 11, a pair of longitudinally extended plates or track members 91 (Figs. 2, 3 and 4) are secured to and extended between the rear transverse connecting member 46 and the intermediate transverse connecting member 44. The track members 91 are arranged parallel to the main frame side members 41 and 42, in a spaced relation corresponding to the spacing of the patrol unit front wheels 13. A pair of ramp members 92 are arranged on the rear ends of the track members 91. Holes are formed at the front and rear ends of the track members 91 for alignment with corresponding holes in the ramp members 92, so that pins 96 may be freely inserted in the aligned holes to maintain a ramp 92 in position on a track member 91.

With the leveler blade 83 removed and the ramp members 92 mounted on the rear ends of the track members 91, the front wheels 13 of the patrol unit 11 are driven up the inclined ramp members 92 to supported positions on the track members 91. The pins 96 are then withdrawn and the ramp members 92 are removed from the rear ends of the tracks 91 and arranged on the front ends of the track members 91. The front wheels of the patrol unit 11 are then advanced forwardly on the track members 91

off the front ends thereof and down the inclined ramps **92** to positions between the main frame side members **41** and **42** and the main frame transverse connecting members **43** and **44** (Fig. 2). The ramps **92** are then removed.

It can thus be seen that the ramp members **92** along with the track members **91** constitute a continuous ramp means for the travel of the front wheels **13** of the patrol unit **11** over the transverse connecting members **44** and **46** and corresponding blades **49** and **48***a* and **48***b*, respectively, to their positions shown in dotted lines in Fig. 2.

The front end of the attachment **10** is then supported from the patrol unit **11** by a pair of chains **97**, secured at their lower ends **98** to the front transverse connecting member **43**, and attached at their upper ends **99** to the rock arms **34** (Fig. 1) of the snow plow attachment **24**. A second pair of chains **101** (Figs. 1 and 2) secured at their lower ends **102** to the front transverse connecting member **43**, are arranged in a criss-cross relation and attached at their upper ends to the lower ends of the upright legs **28** of the snow plow attachment **24** for limiting the side sway of the grading attachment **10** relative to the patrol unit **11**.

The rear end of the road grading attachment **10** is supported from the patrol unit **11** by the provision of a pair of transversely spaced mounting structures **103** (Figs. 2 and 6) secured to and projected rearwardly from the rear transverse connecting member **46** at positions between the track members **91**. A mounting structure **103** (Fig. 6) consists of a pair of horizontal vertically spaced supporting plates **104** and **106**, secured at their rear ends to the rear transverse connecting member **46**. A front upright bearing plate **107** is connected between intermediate portions of the supporting plates **104** and **106** at a position adjacent to the connecting member **46**. Spaced rearwardly from the bearing plate **107** is a removable rear upright bearing plate **108**, which has an upright tubular sleeve member **111** secured to the rear side thereof. The rear bearing plate **108** and its associated sleeve member **111** are loosely received between the supporting plates **104** and **106** and are maintained between the plates **104** and **106** and in a spaced relation with the front bearing plate **107** by an upright pin **112** which extends through the supporting plates **104** and **106** and the tubular sleeve member **111**. For facilitating the insertion and removal of the pin **112** from the sleeve **111**, a transversely extended handle or rod member **113** is secured to the top end of the pin **112**. It can thus be seen that on removal of the pin **112** from the sleeve **111**, the rear bearing plate **108** and sleeve **111** are removable as a unit from their positions between the supporting plates **104** and **106**.

As best appears in Fig. 6, the patrol unit ring member **22** is provided with a pair of spaced downwardly projected arms **116** which carry at their lower ends a transversely extended cylindrical bar member **117**, having end portions **118** projected outwardly from the arms **116**. The ring member **22** and arms **116** form part of the usual scraper attachment for the patrol unit **11**. With the rear bearing plates **108** removed from the mounting structures **103**, the projected end portions **118** of the bar **117** are positioned between the supporting plates **104** and **106** and against the front bearing plates **107** so that the ring member arms **116** are located between and in contact engagement with an adjacent mounting structure **103**. As previously described the ring member **22** is adjustably movable up and down on the patrol unit **11**, and it is such adjustment which provides for the assembly of the bar ends **118** within the mounting structures **103**. The plates **108** and sleeves **111** are then assembled between the support plates **104** and **106** to maintain the end portions **118** of the bar **117** between the plates **104** and **106** of the mounting structures **103**.

With the bar **117** thus arranged relative to the mounting structures **103**, and below the front offset portion **90** of the blade supporting arm **87**, it can be seen that upon raising of the ring member **22**, the end portions **118** of the bar **117** engage the top plates **104** of the mounting structures **103** so as to raise the rear end of the attachment **10**. However, with the attachment **10** in a normal ground engaging position, the bar end portions **118** are arranged intermediate the support plates **104** and **106** so that the rear end of the grading attachment **10** is mounted for a limiting up and down movement relative to the transverse bar **117** as defined by the engagement of the bar end portions **118** with the support plates **104** and **106**. It is to be noted also that the operation of the ring member **22** to raise the rear end of the attachment **10** facilitates the mounting of the leveler blade **83** on the main frame extension **63**.

With the road grading attachment **10** thus mounted on the patrol unit **11**, the patrol unit **11** is driven in a forward direction so that the scraper blades **47**, **48***a* and **48***b* and **49** operate to scrape or grade a road surface. The road surface material which is scraped loose by the scraper blades **47** (Fig. 2) is directed rearwardly and inwardly of the road grading attachment **10** as a result of the rearwardly converging relation of the scraper blades **47**, to the space **53** between the rear ends **52** of the blades **47**. To prevent this scraped road material from passing rearwardly over the top sides of the blades **47**, and accumulating in the spaces **119** between the blades **47** and the front transverse connecting member **43**, a pair of upright mold boards **121** (Fig. 3) are secured to the top sides of the blades **47** and extended between the front ends of the frame side members **41** and **42** and the transverse connecting member **43**. A pair of mold boards **122** secured to the front side of the front transverse connecting member **43** at positions between the mold boards **121** are provided with downwardly and rearwardly inclined front faces **123** to direct the travel of the scraped material under the transverse connecting member **43** and through the space **53** between the blade rear ends **52**.

The scraped material (Fig. 2) after passing through the space **53**, is directed outwardly and rearwardly, by the rearwardly diverged intermediate pair of blades **49**, through the spaces **56** between the blades **49** and the main frame side members **41** and **42**. After passing through the spaces **56**, the scraped material contacts the front ends of the rear pair of rearwardly converged blades **48***a* and **48***b*, so as to be again directed rearwardly and inwardly of the grading attachment **10** and into the space **61** provided between the rear ends **59** of the blades **48***a* and **48***b*. To prevent this material from passing over the top sides of the blades **48***a* and **48***b* and accumulating in the spaces **126** between the blades **48***a* and **48***b* and the rear transverse connecting member **46**, a pair of upright mold boards **127** (Figs. 3 and 4) are secured to the top sides of the blades **48***a* and **48***b*.

From the space **61**, the scraped material contacts the leveler blade **83**. In order to utilize as much of the leveler blade **83** as possible for leveling purposes assume that it is desired to direct the scraped material along the leveler blade **83** toward the left of the attachment **10**, as viewed in Fig. 2. The leveler blade **83** is arranged in its solid line position C shown in Fig. 2 in which the blade **83** is inclined rearwardly and to the left, and the bolts **86** are inserted in the side members **64** and **66** to maintain the leveler blade **83** in this position. For this position of the leveler blade **83**, the scraper blades **48***a* and **48***b* are in their positions A and B, respectively, shown in Fig. 2 so as to cooperate in directing the scraped material from the blades **48***a* and **48***b* toward the front or leading end of the leveler blade **83**. Thus the scraped material is moved along substantially the entire length of the leveler blade **83** so as to obtain a maximum leveling action for the blade **83**.

Similarly, if it is desired to direct the scraped material toward the right side of the attachment **10**, as viewed in Fig. 2, the leveler blade **83** is arranged in its dotted line position D and the rear pair of scraper blades **48***a* and **48***b*

are arranged in their positions B and A, respectively, so as to again direct the loose road material toward the front or leading end of the leveler blade 83.

By virtue of the pivotal mounting of the frame extension 63 on the pivots 76 and the mounting of the leveler blade 83, on the pivot 89, the blade 83 is free to float up and down relative to the main frame 39 so as to effectively level and spread the road surface material directed to it by the rear pair of scraper blades 48*a* and 48*b*. The blade 83 thus automatically moves up and down in response to the amount of material to be leveled, and is without any effective scraping action. A pair of mold boards 125 (Figs. 4 and 7) having upright front sides 128 and downwardly and rearwardly inclined rear sides 129 are secured to the top side of the leveler blade 83 on opposite sides of the pivotal support 88 for the blade 83, so as to prevent the material contacted by the blade 83 from passing over the top side of the blade 83.

Since the leveler blade 83 and the scraper blades 47, 48*a*, 48*b* and 49 are of a similar construction, only the leveler blade 83 will be described in detail. With reference to Fig. 7, the leveler blade 83 includes a supporting angle member 131 having a flat horizontal leg 132 and a curved leg 133 extended downwardly from the front end of the leg 132. A blade member 134 having a concave working face 136 is secured to the front side of the angle member leg 133, with the shape of the angle member leg 133 conforming to the contour of the blade 134 to provide for the ready assembly of the blade 134 on the angle member leg 133.

To provide for the shipping of the grader attachment 10 in a minimum of shipping space, the attachment 10 is initially constructed in a pair of longitudinally extended sections which are secured together before the attachment 10 is used. Each of the transverse connecting members 43, 44 and 46 are formed with a pair of corresponding parts of equal length with horizontal plates 141, only one of which is shown for each of the members 43, 44 and 46 being provided for securing the adjacent inner ends of the parts together, in the assembly of attachment 10. The plates 141 are secured, by welding or the like, at one of their ends to one of the parts and, on assembly of the attachment 10, are secured to the adjacent end of the corresponding part by bolts or the like 142.

From the above description, it is seen that this invention provides a road grading attachment 10 which includes a leveler blade 83 mounted for up and down floating movement rearwardly of the scraper blades 47, 48*a* and 48*b* and 49 to provide for an effective leveling action of the leveler blade 83. The tracks 91 and the ramp members 92 are provided so that the attachment 10 can be readily arranged for assembly on the patrol unit 11. The horizontally adjustable mounting of the rear scraper blades 48*a* and 48*b* and the leveler blade 83 provides for a cooperative action of the rear scraper blades 48*a* and 48*b* and the leveler blade 83 to obtain a maximum leveling action of the blade 83.

Although the invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes can be made therein which are within the full intended scope of this invention as defined by the appended claims.

We claim:

1. A road grader attachment adapted to be moved along a road surface for leveling the same comprising a longitudinally extended main frame, scraper blades mounted on said frame, with said blades being arranged in longitudinally spaced pairs, with the forward and rear pairs being arranged in a forwardly diverged relation and an intermediate pair being forwardly converged, a rearwardly projected frame extension, a leveler blade adjustably mounted on said frame extension for movement in a horizontal plane between a pair of reversely inclined positions, with said main frame and said frame extension being movably connected together for up and down movement of said extension relative to said main frame and with said rear pair of scraper blades being horizontally adjustably mounted on said frame for directing earth scraped by said scraper blades toward the forward end of said leveler blade.

2. A road grader attachment adapted to be moved along a road surface for leveling the same comprising a longitudinally extended main frame, scraper blades mounted on said main frame and arranged in longitudinally spaced pairs, with the forward and rear pairs being arranged in a forwardly diverged relation and an intermediate pair in a forwardly converged relation, a rearwardly projected frame extension, means movably connecting said frame extension to said frame for up and down movement of said extension relative to said main frame, a leveler blade movably mounted on and positioned rearwardly of said main frame for up and down movement relative thereto, means releasably attaching said leveler blade to said extension for up and down movement therewith, and coacting adjustable stop means on said main frame and said extension for limiting relative movement thereof between predetermined stop positions.

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