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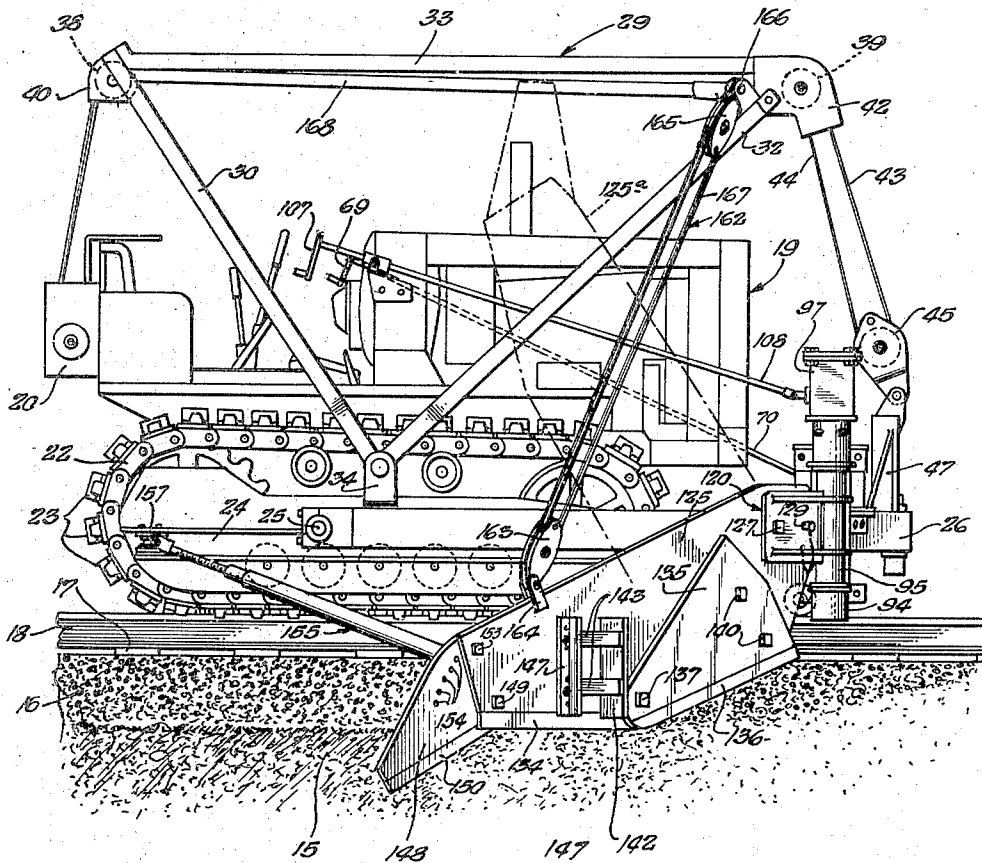
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SIDE GRADING ATTACHMENT FOR TRACTORS AND THE LIKE

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5 Sheets-Sheet 1

Fig. 1



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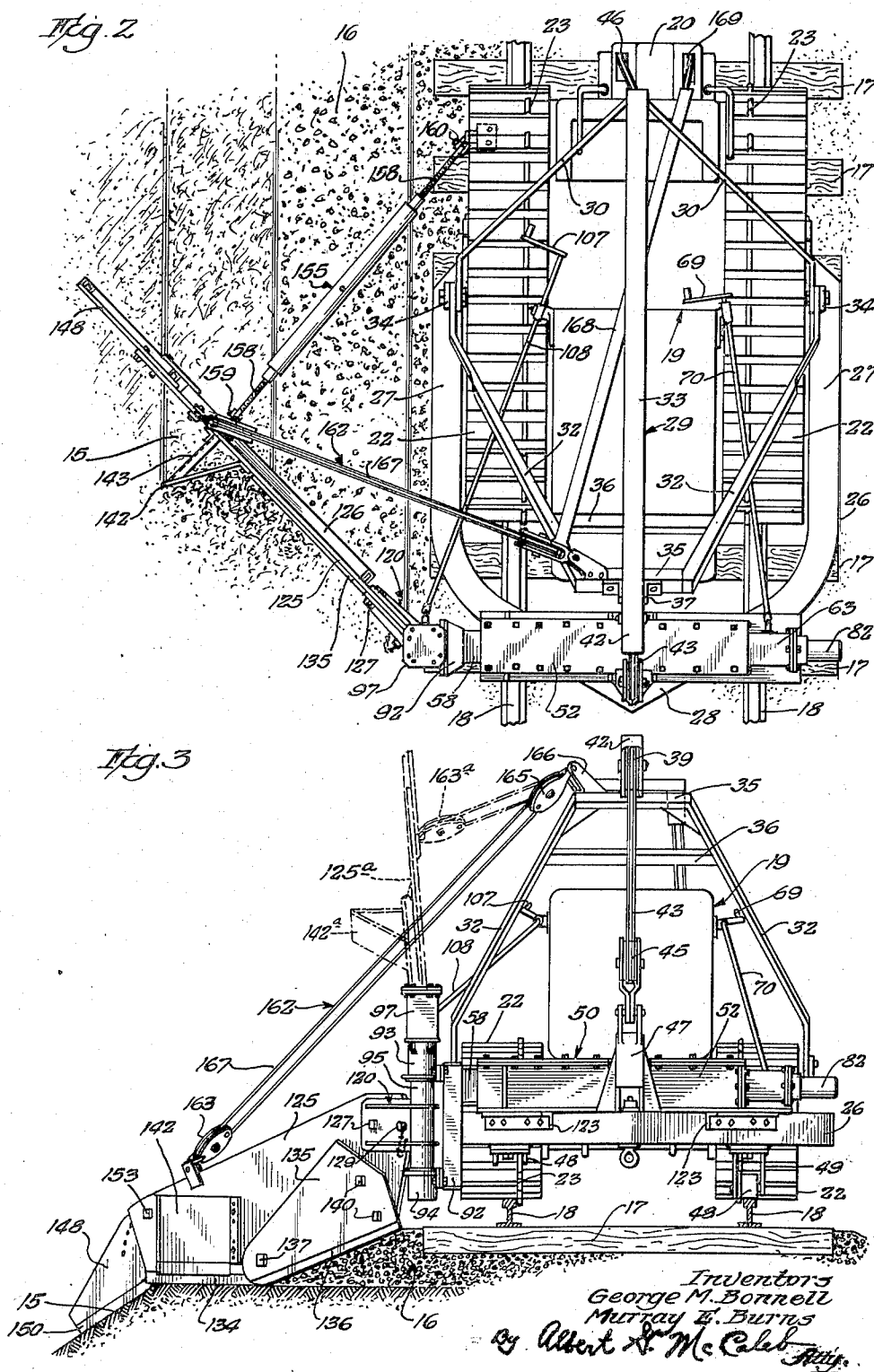
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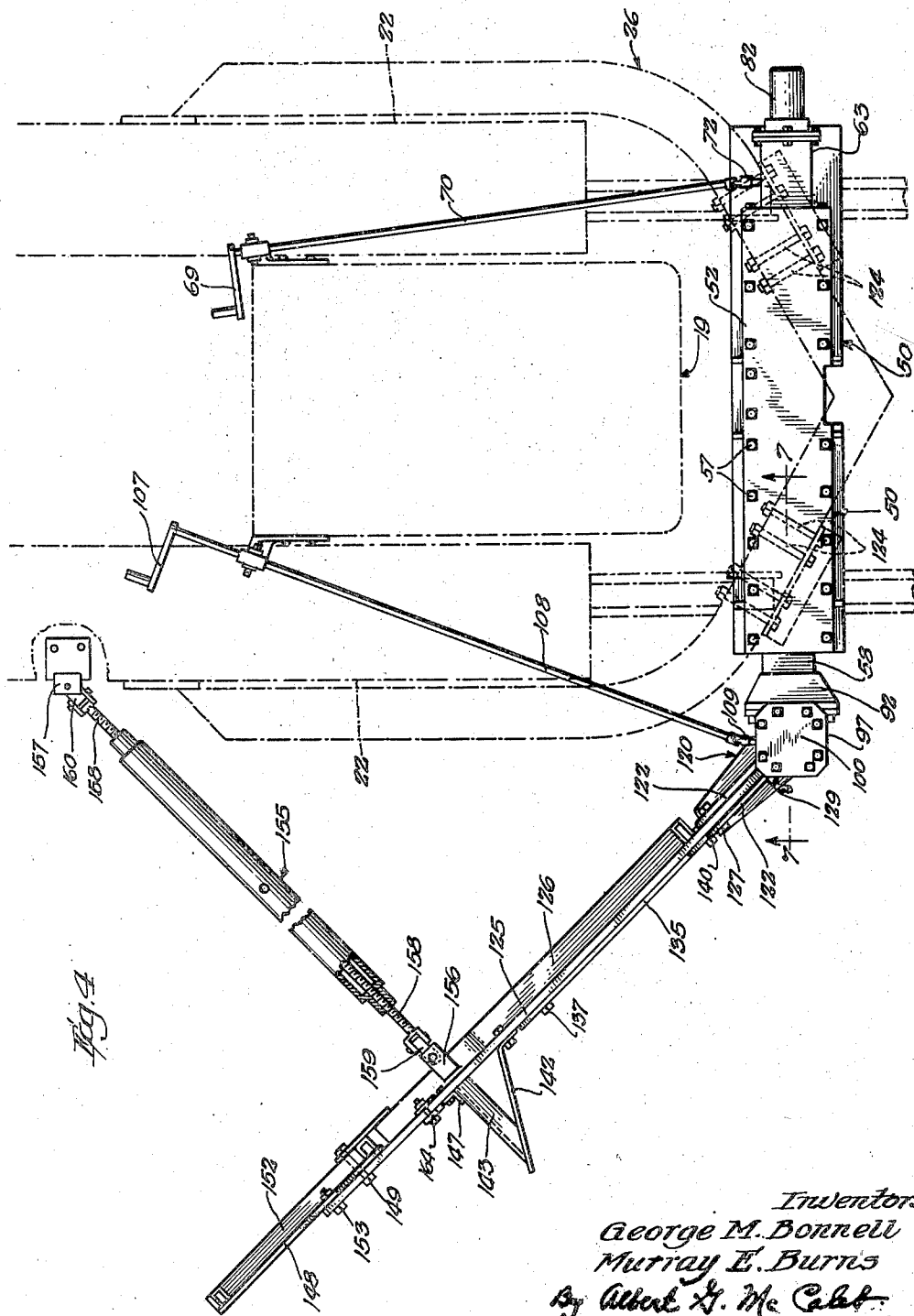
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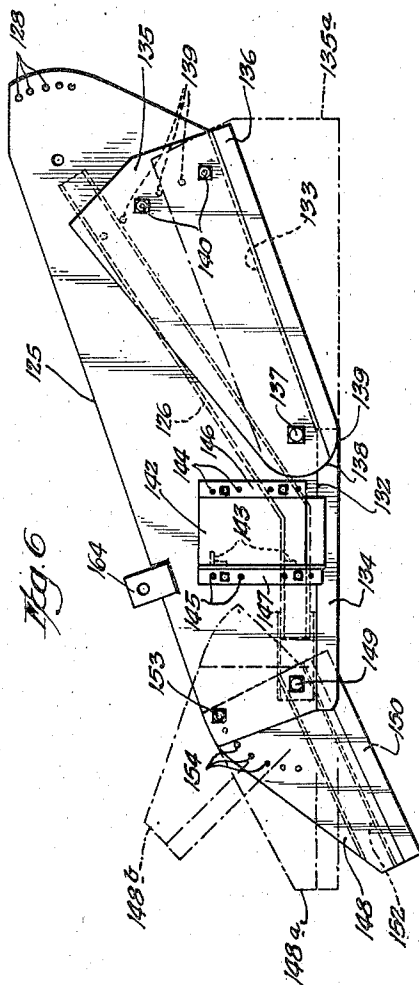
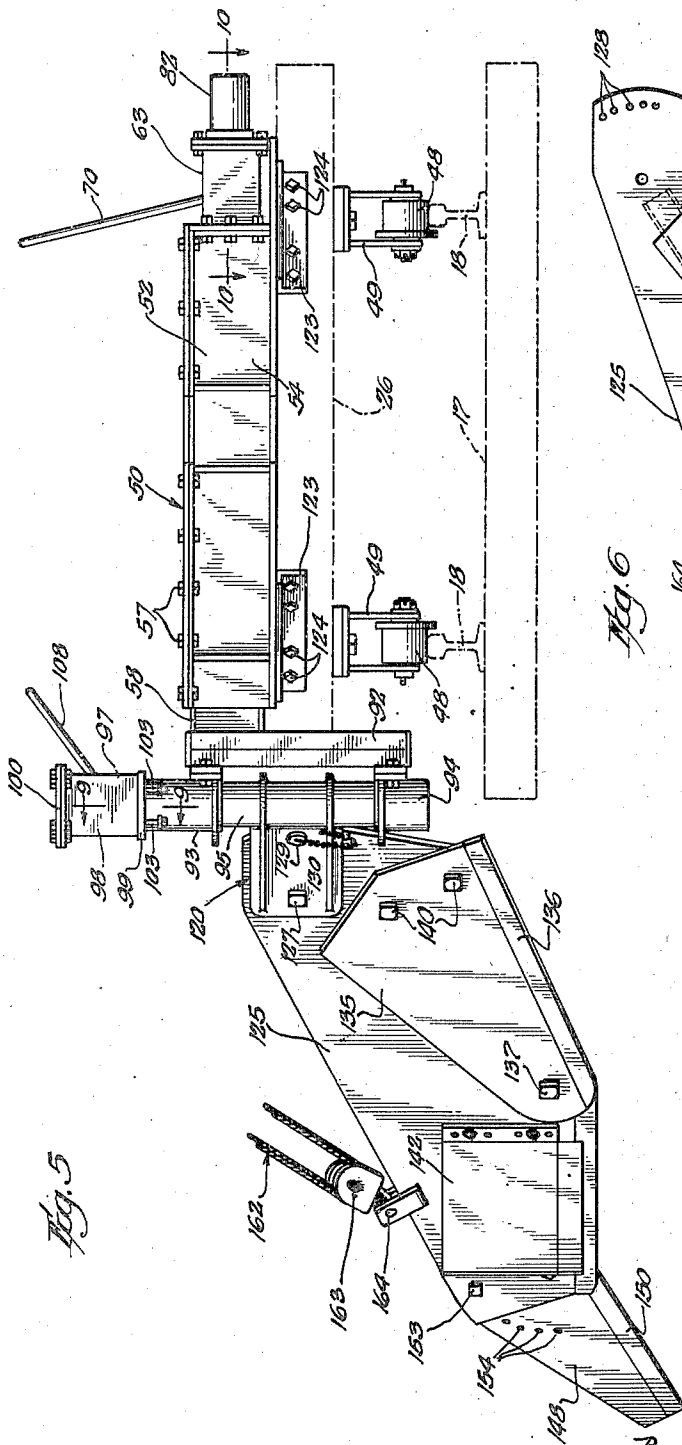
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5 Sheets-Sheet 4



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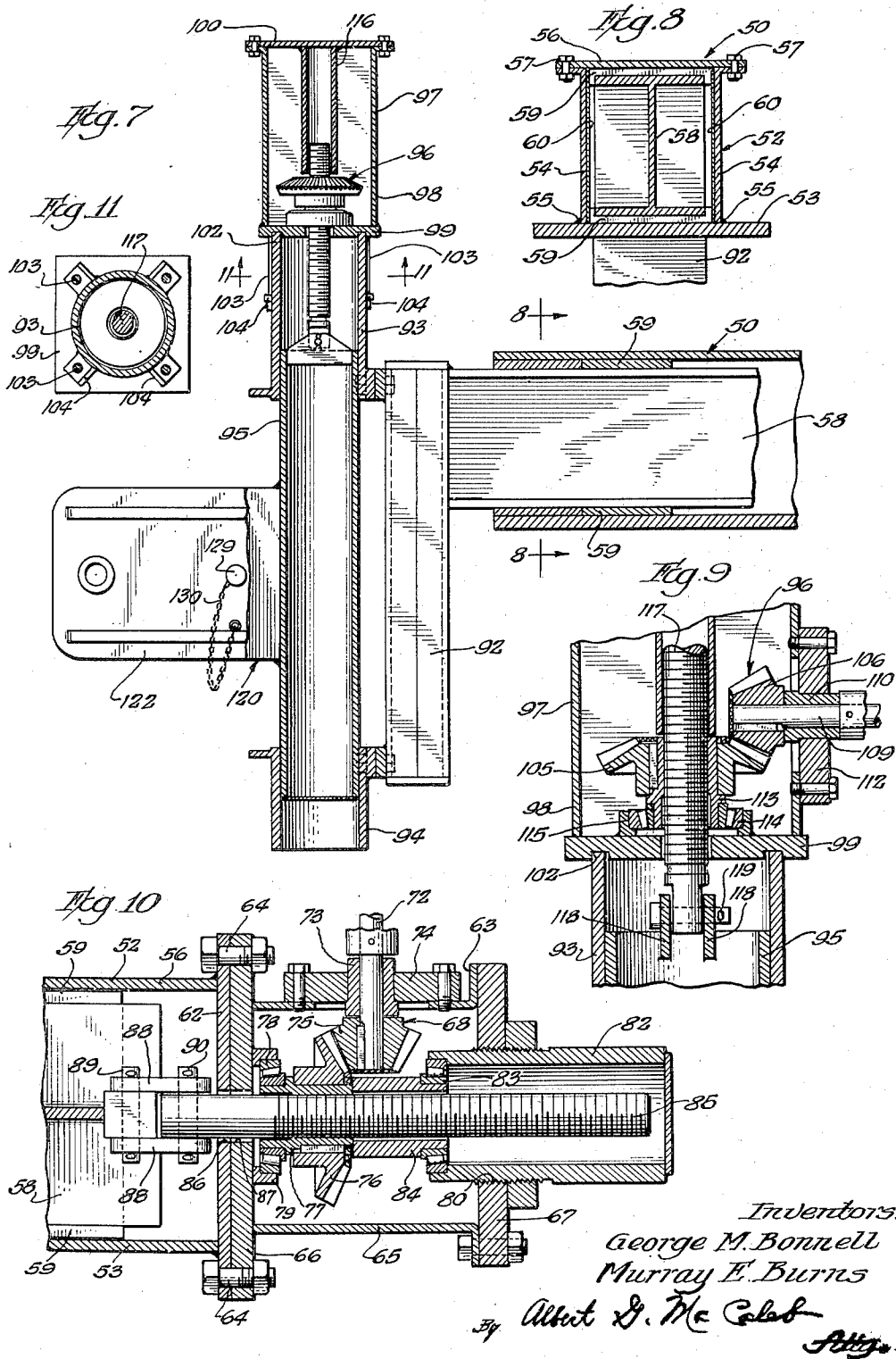
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SIDE GRADING ATTACHMENT FOR TRACTORS AND THE LIKE

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,491,797

SIDE GRADING ATTACHMENT FOR
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Boise, Idaho

Application January 10, 1946, Serial No. 640,240

9 Claims. (Cl. 37—105)

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This invention relates to side grading attachments adapted to be mounted on conventional tractors and utilized for purposes such as the grading of ballast and the road bed shoulders along the sides of a railroad track.

It is a general object of our present invention to provide an improved grading attachment adapted to be secured to and operated at the side of a tractor or the like and which is adjustable in various ways to suit the purposes and conditions of use.

Another object of this invention is to provide a grading attachment for tractors and the like which normally extends outwardly at one side of the tractor during use, but which may be easily and quickly swung upwardly and inwardly to an out-of-the-way position in moving from place to place or to avoid obstacles.

The invention has for a further object the provision of a side grading attachment which may be readily attached to and detached from a standard tractor.

Considered more specifically, it is an object of our invention to provide an attachment for tractors particularly suited and adjustable to the grading of ballast and the road bed shoulder along a railroad track as the tractor runs on the rails.

As another object the invention contemplates the provision of a grading blade including adjustable auxiliary ballast and shoulder sloping parts and an attached wing tending to prevent the spreading of ballast material.

The objects of the invention also comprehend the provision of an improved adjustable support for a grading blade adapted to be utilized on tractors and the like.

Other objects and advantages will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are five sheets,

Fig. 1 is a side elevational view of a preferred form of our side grading attachment shown in its mounted position on a standard tractor and indicates its adaptation to the grading of ballast and the road bed shoulder along the sides of a railroad track;

Figs. 2 and 3 are respectively top plan and front elevational views of the mounted grading attachment shown in Fig. 1 and illustrating the same adaptation;

Figs. 4 and 5 are respectively top plan and

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front elevational views of our preferred grading attachment drawn to a larger scale than that used in Figs. 1, 2 and 3, and having the tractor and associated support parts indicated by dot-and-dash lines;

Fig. 6 is an elevational view looking directly at one face of the preferred form of our grading blade shown from different positions in Figs. 1 to 5 inclusive;

Fig. 7 is a fragmentary sectional view with the section taken substantially on a line 7—7 of Fig. 4 and in the direction indicated by the arrows;

Fig. 8 is a fragmentary sectional view with the section taken substantially on a line 8—8 of Fig. 7 and viewed in the direction indicated by the arrows;

Figs. 9 and 10 are fragmentary sectional views with the sections taken substantially on lines 9—9 and 10—10 of Fig. 5 and viewed as indicated by the arrows; and

Fig. 11 is a sectional view with the section taken substantially on a line 11—11 of Fig. 7.

In Figs. 1, 2 and 3 the preferred embodiment of our invention is illustrated in its adaptation to the grading of ballast and a road bed shoulder along the side of a railroad track wherein the road bed has a shoulder 15 and carries a top layer of ballast 16 which generally consists of rock, gravel or cinders and surrounds the lower side and end surfaces of ties 17 to which rails 18 are secured.

It is desirable that the ballast shall closely surround the lower surfaces of the ties and be sloped upwardly toward the tops of the ties along the sides to form a firm and substantial footing for the tracks. Beyond the edge of the ballast the road beds generally have a flat surface and a shoulder edge which may slope upwardly or downwardly, depending upon the profile of the terrain through which the track is built.

Although the disclosed side grading attachment may be attached to various standard types and makes of tractors, it is disclosed in this instance in Figs. 1, 2 and 3 in its application to a tractor 19 of the track laying or crawling type which is desirably equipped with a double winch 20 mounted at the rear of the tractor and operated from the tractor engine. For convenience in operation on a railroad track, the treads of both endless tracks 22 are equipped with flanged track walking feet 23 such as those illustrated and described in our issued United States Patent No. 2,322,919. When normally running along the rails of a railroad track, as shown in Figs. 1, 2 and 3, the flanges on the track walking feet 23

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run inside of the rails and cause the tractor to follow the track without use of the steering mechanism.

Along each side, the tractor 19 has a frame member 24 to which outwardly projecting studs 25 are secured. The studs 25 rotatably support the ends of a yoke 26 for vertical swinging movement. The yoke 26 has side arms 27 which extend along the opposite sides of the tractor outside of the frame members 24 and tracks 22. It also includes an integral connecting portion 28 which extends across the front of the tractor in spaced relation thereto.

In addition to the yoke 26, an overhead support frame 29 is mounted on the tractor and includes support spars 30 and 32 and a longitudinally extending top beam 33. On each side of the tractor the support spars 30 and 32 have their lower ends secured to support brackets 34 which are in turn secured to the side frame structure of the tractor. The rear support spars 30 extend upwardly and to the rear and are curved inwardly over the tractor with their upper ends secured to opposite sides of one end of the top beam 33. The front support spars 32 extend upwardly and forwardly from the brackets 34 and are curved inwardly and secured to a lateral frame member 35. A cross brace 36 is desirably secured to the support spars 32 intermediate their ends. At the forward end the top beam 33 is secured to the lateral frame member 35 through fastening means such as brackets 37 and is supported thereby.

Desirably the top beam 33 is tubular and acts as a cable conduit as well as serving as a part of the upper support frame. Sheaves 38 and 39 are rotatably supported in housings 40 and 42, respectively, at each end of the top beam 33. A cable 43 has an end 44 anchored to the top beam structure and extends around a pulley 45, over the sheaves 38 and 39, through the top beam 33 and thence downwardly at the rear of the tractor to one winding drum 46 of the winch 20. The pulley 45 is rotatably secured to the mid portion of the front of the yoke 26 through a bracket structure 47 thereon. Thus, by operation of the drum 46 of the winch, the yoke 26 may be swung upwardly or downwardly. When the drum 46 is stationary the yoke 26 is supported at a predetermined level by the cable.

In order to provide additional support for the yoke 26, particularly in a use such as that to which the grading attachment is adapted in the present disclosure, flanged rollers 48 are rotatably supported and secured to the lower surface of the yoke 26 by smaller downwardly projecting yokes 49. In the present adaptation, the flanges are provided on the inner edges of the rollers and they are spaced to suit the gauge of the railroad track on which the tractor is operated so that the flanges run along the inner surfaces of the rails and assist in the guiding of the tractor. The mounting of the rollers 48 is illustrated in Fig. 5; one of the roller yokes 49 being broken away in Fig. 3 better to illustrate the track walking feet 23 on the tractor treads.

A linearly adjustable horizontal support 50, the internal structure of which is illustrated in Figs. 7 and 8, has a housing 52 made up of a base plate 53, oppositely disposed and spaced side plates 54 having their edges secured to the base plate 53 as by welding at 55, and a cover plate 56 removably secured to the upper flanged edges of the side plates 54 by means such as series of bolts 57. Within the housing 52 the horizontal support slide 58 which is desirably of I-beam

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section having a vertical web, is mounted for linear sliding movement in guide bearings 59 carried within the housing and spaced to proper alignment by shims such as 60. The end of the housing 52 to which the grading blade is to be mounted is open and the support slide 52 projects therefrom.

At the opposite end, the housing 52 is closed by a plate 62, welded thereto as shown in Fig. 10 and having projected edges to which an auxiliary housing 63 is removably attached by means such as bolts 64. The auxiliary housing 63 includes a cylindrical side wall 65 welded to an end closing plate 66 at one end and having a removable cover 67 at the other end.

Although various types of adjusting mechanisms might be used for determining the position of the horizontal support slide 58 within the housing 52, the disclosed embodiment includes an adjusting mechanism 68 enclosed within the auxiliary housing 63 and adapted to be manually operated by a crank 69 supported on the tractor structure as shown in Fig. 4 and secured to a shaft 70. The disclosed adjusting mechanism 68 has a shaft 72 journaled in a bearing 73 which is carried by a block 74 on one side of the housing 63 and which shaft has drivingly connected to its inner end a bevel gear 75. Meshing with the bevel gear 75 is a second bevel gear 76 drivingly mounted upon a sleeve 77 which is rotatably carried by a bearing 78. A collar 79 welded to the inner surface of the end closing plate 66 carries the bearing 78. At the opposite end of the auxiliary housing 63 the removable cover 67 has threaded into a central opening 80 therein and in alignment with the axis of the bearing 76, a cylindrical and adjustable housing extension 82 the outer end of which is closed. At its inner end the housing extension 82 carries a bearing 83 which rotatably supports a sleeve 84 the inner end of which abuts the sleeve 77. The bearings 78 and 83 are adapted to absorb axial thrust in opposite directions.

A screw 85 extends through aligned central openings 86 and 87 in the plates 62 and 66, respectively, and is threaded into the collar 77 so that rotation of the shaft 72 by manual operation of the crank 69 turns the bevel gears 75 and 76 and the sleeve 77 to vary the position of the screw 85. Within the housing 52 the end of the screw 85 is connected to the support slide 58 by links 88, which links are secured to the slide 58 and screw 85 by pins 89 and 90 extending therethrough. Thus the horizontal position of the support slide 58 is determined from a convenient place on the tractor structure by turning the crank 69.

Rigidly secured to the end of the support slide 58 which extends from the housing 52 is a vertical cross beam 92. Cylindrical slide bearings 93 and 94 are secured in axial alignment and in spaced relation to the side of the cross beam 92 opposite the support slide 58. An adjustable vertical slide 95 is journaled in the bearings 93 and 94 for both rotary and axial sliding movement. For determining the adjusted axial position of the slide 95, a suitable manually operable adjusting mechanism 96 is provided and enclosed within a housing 97 at one end of the bearing 93. In the disclosed embodiment, the housing 97 includes a cylindrical side wall 98 welded to an end plate 99 and provided with a removable cover 100. The end plate 99 has in its outer surface an annular recess 102 which fits over the end of the bearing 93. As illustrated in Fig. 11,

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the housing 97 is secured to the end of the bearing 93 by screws 103 which extend through lugs 104 on the outer surface of the bearing and are threaded into the projecting side portion of the end plate 99.

As illustrated in Figs. 7 and 9 and like the adjusting mechanism 68 for determining the position of the support slide 58, the adjusting mechanism 96 includes meshing bevel gears 105 and 106, manually operable by turning the crank 107 secured to a shaft 108 and mounted at a convenient position on the tractor structure. A shaft 109 carries at its inner end the bevel gear 106 which is keyed thereto, and is journaled in a bearing 110 supported in a block 112 on the side of the housing wall 98. The co-acting bevel gear 105 is keyed to a sleeve 113, which sleeve is rotatably supported by a bearing 114 carried adjacent the lower end plate 99 by a ring 115. The sleeve 113 is retained axially at the end opposite the bearing 114 by a sleeve 116 secured to the removable end 100 of the housing. A screw 117 is threaded into the sleeve 113 and has one end connected to cross plates 118 in the end of the slide 95 by a pin 119. Rotation of the crank 107 turns the shaft 109 axially to adjust the position of the slide 95 relative to the end of the support slide 58. A hinge plate 120 (Figs. 4, 5 and 7) desirably comprises a pair of reinforced and parallel side plates 122 projecting from the mid portion of one side of the slide 95 in spaced relation relative to one another.

Connecting elements such as brackets 123 are secured to the lower surface of the base plate 53 and are adapted to be removably secured to the connecting portion 28 of the yoke 26 by fastening means such as bolts 124 to support the housing 52 transversely of and adjacent the front end of the tractor. With the horizontal support slide thus mounted at the front end of the tractor and having at one end the vertical slide 95 carrying the hinge plate 120, it may be understood that the hinge plate provides an adjustable supporting element at the front and to one side of the tractor. In addition to being swingable about the axis of the vertical slide 95, the position of the hinge plate 120 may be adjusted to various fixed positions vertically and horizontally by manual operation of the cranks 69 and 107.

A main grading blade 125 which is desirably reinforced on one side by a channel strip 126 has one end disposed between the parallel side plates 122 of the hinge plate 120 and rotatably secured therebetween by fastening means such as a bolt 127. The end surface of the main blade 125 is curved in concentric relation to the bolt 127 to permit the vertical swinging movement of the blade about the axis of that bolt. In order to hold the main blade in any one of a plurality of fixed positions relative to the hinge plate 120, a series of openings 128 (Fig. 6) are concentrically disposed in spaced relation relative to the axis of the bolt 127 to accommodate a pin 129 received in suitable aligned apertures in the hinged plate and extending through a pre-selected one of the openings 128. In order to avoid loss of the pin 129, it may be connected to the hinge plate 120 by flexible means such as a chain 130. While the drawings illustrate only one hole in the main grading blade 125 for the accommodation of the bolt 127 and one set of concentrically disposed holes 128 for receiving the pin 129, it is understood that the possible range of vertical positions to which the blade may be

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set may be increased by the addition of one or more sets of similarly disposed openings vertically displaced from those shown.

The lower edge of the main grading blade 125 has angularly disposed portions 132 and 133 as indicated in Fig. 6. Secured to the blade adjacent the edge portion 132, is a hardened plate 134 which projects beyond the edge 132 to provide a grading edge adapted to withstand wear. The grading edge provided by the plate 134 is desirably at the outer end of the main blade remote from the hinge support provided by the hinge plate 120. The angularly disposed inner edge portion 133 which extends inwardly from the edge 132 slopes upwardly toward the hinge plate.

An auxiliary ballast sloping blade 135 has a hardened grading edge provided by a plate 136 secured thereto and is rotatably connected at one end to the main blade near the inner end of the edge portion 132 by means such as a bolt 137. Outer end portions 138 and 139 of the auxiliary ballast sloping blade and the plate 136 are preferably curved in concentric relationship to the axis of the bolt 137 and at a distance therefrom which effects alignment of the grading edges of the plates 134 and 136. Near the inner end of the auxiliary ballast sloping blade, a series of spaced apertures 139 is disposed in concentric relationship with respect to the axis of the bolt 137 and adapted to receive fastening means such as bolts 140 for securing the auxiliary ballast sloping blade in the desired angular position relative to the grading edge provided by the hardened plate 134. With the main blade adjusted to a desired angular position and to a desired height, the angular position of the auxiliary ballast sloping blade determines the slope of the ballast upwardly toward the ends of the ties. It may also be understood that for preliminary or other grading operations, the position of the auxiliary blade may be adjusted to other angles relative to the main blade or may be set to a position in which the grading edges of the main and auxiliary blades are in alignment, as indicated in dot-and-dash lines at 135a in Fig. 6.

In order to provide for the movement of a supply of ballast material in front of the blade 125 for filling in depressions and also to prevent the loss of ballast material by spreading it at the outer edge of the grading blade, a wing plate 142 has one edge bolted to the main blade near the outer end of the auxiliary ballast sloping blade and projects outwardly at an angle from the front surface of the main blade. As shown in Figs. 4 and 6, braces 143 desirably are provided to extend from the outer or projecting end of the wing plate to the surface of the main blade to rigidify the wing plate. As shown in Fig. 6, it is also desirable that series of spaced openings 144 and 145 are provided in the mounting edge 146 of the wing plate and an anchor bracket 147 secured to the inner ends of the braces 143 to permit adjustment of the position of the wing plate relative to the main blade. Since the function of the wing plate is to retain a supply of ballast in front of the main blade and prevent waste of the ballast by spreading, rather than that of performing the grading function of the main and auxiliary blades, it is considered preferable that the wing plate should be set at a position somewhat above the grading edge of the main blade, and that its position should be de-

pendent upon the depth of the grading operation of the main blade.

At the outer end of the main blade 125 remote from the hinge plate 120, an auxiliary shoulder grading blade 148 is rotatably secured to the main blade at a position near the grading edge thereof by fastening means such as a bolt 149. The auxiliary shoulder sloping blade has a grading edge provided by a hardened plate 150 secured thereto and is desirably reinforced by a channel strip 152 secured to the back surface thereof. In order to accommodate a wide variety of road-bed profiles, the shoulder grading blade is swingable through a relatively wide arc with respect to the main blade and may be secured in any one of a series of angular positions by fastening means such as a bolt 153 extending through any one of a series of openings 154 in the auxiliary blade and an aligned opening in the main blade. In Fig. 6, various angular positions of the auxiliary shoulder grading blade are indicated from the one shown in solid lines in which the grading edge of the auxiliary blade slopes downwardly from the grading edge of the main blade to those indicated in dot-and-dash lines at 148a and 148b wherein the grading edge of the auxiliary blade is in alignment with the grading edge of the main blade or slopes downwardly toward the grading edge of the main blade.

As shown in Figs. 1, 2 and 4, the general plan of the main and auxiliary blades is upright. In addition to extending outwardly from the hinge plate 120, the main blade 125 also extends angularly toward the rear of the tractor or rearwardly of its normal forward direction of motion during the grading operation. In order to maintain the desired extended position of the main blade 125, a brace 155 has one end secured to a bracket 156 on the reinforcing channel strip 126 and its other end anchored to a bracket 157 secured to the frame member 24 of the tractor (Fig. 1). The brace 155 is desirably rigid and has its intermediate portion composed of a tubular member at each end of which turnbuckle type screw connections 158 are provided for adjusting the length of the brace. Also at each end of the brace the connections to the brackets 156 and 157 are made through hinge joints 159 and 160 each of which has two transverse axes of rotation to provide for substantially universal swinging movement.

Referring to Figs. 1, 2, 3 and 5, means for lifting the main blade and its associated auxiliary blades to an out-of-the-way position flatwise along the side of the tractor, as indicated in dot-and-dash lines at 125a in Figs. 1 and 3, for convenience in moving from one place to another and to permit the passage of obstructions such as switches and signal posts, is provided by a block-and-tackle unit indicated generally at 162. A pulley 163 of the block-and-tackle unit is secured near the outer end of the main blade by yoke 164. A second pulley 165 of the block-and-tackle unit is secured by bracket 166 to the lateral frame member 35 of the upper frame structure 28. A cable 167 has one end anchored to the pulley 165 and extends around the pulleys a number of times adapted to provide the desired mechanical advantage and thence through a tubular cable conduit 168 to a second winding drum 169 of the power driven winch 29.

With the holding pin 129 removed from its aperture, in the hinge plate 120, winding of the cable 167 on the drum 169 of the winch swings the grading blade upwardly about the axis of the

bolt 127. Since both ends of the brace 155 are hinged for substantially universal movement, it is not necessary to disconnect the brace to swing the blade upwardly. As the blade swings upwardly about the axis of the mounting bolt 127, it also swings inwardly about the axis of the vertical slide 95. With the blade hinged by the hinge plate 120 for swinging movement about two transverse axes and with the ends of the brace 155 hinged for movement about transverse axes, the upper or out-of-the-way position of the grading blade is close to the side of the tractor and the blade may be quickly and easily swung thereto. Return movement of the blade to the lowered or operating position is effected by gravity upon release of the cable 167 from the drum 169 of the winch.

From the foregoing description of the structural details and operation of the disclosed grading attachment for tractors, it may be understood that the grading attachment may be installed with relative ease upon the tractor equipped with a yoke such as 26 and an upper frame structure such as 28. Likewise, removal of the grading attachment is effected by removal of the bolts 124 and disconnection of the cables and brace.

In use the horizontal and vertical positions of the main and auxiliary blades are determined by adjustment of the positions of the horizontal and vertical slides 58 and 95 respectively. Adjustment of the horizontal slide 58 in the disclosed adaptation to ballast grading determines the relative position of the inner end of the blade to the ends of the ties; while adjustment of the vertical slide compensates for various depths of ballast.

The setting of the holding pin 129 determines the angular position of the main blade 125 relative to the hinge plate and blade supports and thereby controls the angular position of the grading edge of the main blade to suit a desired profile or grading conditions. The determination of the angular positions of the auxiliary ballast and shoulder sloping blades 125 and 148 relative to the main blade 125 establishes the grading angles of the edge of the ballast and of the road-bed shoulder.

With the positions of the blades adjusted to suit a desired purpose, forward movement of the tractor carries the grading blades forwardly to establish the profile of the road-bed and ballast. During such operation the wing plate holds a supply of ballast material for filling depressions and its desirably established angle tends to force that supply of ballast inwardly of the main grading blade. If during the grading operation an obstruction is encountered or if it is desired to move the tractor to a different position or turn it around, the blade is swung upwardly to its out of the way position after removal of the pin 129 but without disconnecting the brace 155.

While we have illustrated a preferred embodiment of our invention, many modifications may be made without departing from the spirit of the invention, and we do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of all changes within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States, is:

1. A side grading attachment for tractors and the like comprising, in combination, a horizontal support adapted to be secured to the tractor to extend across the front thereof and including a

member linearly adjustable laterally of the tractor, a vertical support secured to said member at one side thereof and including a rotatably supported member adjustable vertically of the tractor, an overhead frame adapted to be secured to the tractor, a main blade hingedly connected at one end to the rotatably supported and vertically adjustable member for swinging movement about the horizontal and vertical axes of the hinge connection and rotatable support, said main blade normally extending outwardly from the vertically adjustable member and being angularly disposed rearwardly with respect to the horizontally adjustable member, a substantially rigid blade brace having one end hingedly connected to the main blade and its other end adapted to be hingedly anchored to the tractor at a distance from the horizontal and vertical supports, adjustable cable means supporting the main blade from the overhead frame, a wing plate extending outwardly at an angle to the surface of the main blade on the side thereof opposite the blade brace and near the end of the main blade away from the hinge support therefor, an auxiliary blade mounted against the face of the main blade and adjustable to various angular positions relative to the horizontal to define the slope of a portion of the scraping edge of the main blade, and a second auxiliary blade extending from the end of the main blade and adjustable to various angular positions relative to the horizontal to provide a variable extended scraping edge on the main blade.

2. A side grading attachment for tractors and the like comprising, in combination, main support means adapted to be secured to the tractor and including horizontally and vertically adjustable members, said vertically adjustable member also being rotatable about a vertical axis relative to the horizontally adjustable member and having a connecting plate carried thereby at one side of the support means, auxiliary support means also adapted to be secured to the tractor, a main blade hingedly connected at one end to the connecting plate for swinging movement relative thereto and substantially in the plane thereof, said main blade normally extending outwardly at an angle away from the support means and along one side thereof, a substantially rigid blade brace having one end hingedly connected to the outwardly extending end portion of the main blade and its other end adapted to be hingedly anchored to the tractor, adjustable means supporting the main blade from said auxiliary support means, a wing plate extending outwardly at an angle from the face of the main blade opposite the blade brace and near the end of the main blade, and an auxiliary scraper blade secured to the main blade and adjustable to positions relative thereto for varying the slope of a portion of one edge of the main blade.

3. A road bed and ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track during the grading of the ballast and road bed outside of the ties which support the rails and comprising, in combination, a support yoke adapted to be secured to the sides of a tractor for vertical swinging movement relative thereto and having a connecting portion adapted to extend across the front of the tractor, an upper support frame adapted to be secured to the tractor, means for adjustably supporting the yoke from the upper support frame, track following rollers secured to the connecting portion of the yoke and adapted

to support the yoke from railroad rails, support means secured to the connecting portion of the yoke and having parts adjustable laterally and vertically relative to the yoke, hinge means carried by said support means at one side of the yoke, a main blade secured at one end to said hinge means in an upright position and extending outwardly at an angle and along one side of the yoke, a brace hingedly attached to the extending portion of the main blade and adapted to be hingedly attached to the tractor for holding the main blade at a desired angle relative to the side of the yoke, means for adjustably supporting the main blade at a desired grading angle, a ballast sloping blade adjustably attached to the main blade near the hinge means, and a shoulder sloping blade adjustably attached to the extending end of the main blade, said main blade having a grading edge intermediate said ballast and shoulder sloping blades.

4. A road bed and ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track during the grading of the ballast and road bed outside of the ties which support the rails and comprising, in combination, a support yoke adapted to be secured to the sides of a tractor for vertical swinging movement relative thereto and having a connecting portion adapted to extend across the front of the tractor, an upper support frame adapted to be secured to the tractor, means for adjustably supporting the yoke from the upper support frame, track following rollers secured to the connecting portion of the yoke and adapted to support the yoke from railroad rails, support means secured to the connecting portion of the yoke and having parts adjustable laterally and vertically relative to the yoke, hinge means carried by said support means at one side of the yoke, a main blade secured at one end to said hinge means in an upright position and extending outwardly at an angle and along one side of the yoke, a brace hingedly attached to the extending portion of the main blade and adapted to be hingedly attached to the tractor for holding the main blade at a desired angle relative to the side of the yoke, means for adjustably supporting the main blade at a desired grading angle, a ballast sloping blade adjustably attached to the main blade near the hinge means, a shoulder sloping blade adjustably attached to the extending end of the main blade, said main blade having a grading edge intermediate said ballast and shoulder sloping blades, and a wing plate extending forwardly at an angle from the surface of the main blade at a position near the outer end of the ballast sloping blade to push ballast inwardly of the shoulder.

5. A road bed and ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track during the grading of the ballast and road bed near the ends of the ties which support the rails and comprising, in combination, support means adapted to be secured to the tractor and including a support yoke adapted to be secured to the sides of a tractor with a portion thereof extending across the front of the tractor and having mounted thereon a horizontally swingable hinge plate, rail engaging support elements on the front of the yoke, a main blade secured at one end to said hinge plate in an upright position and extending outwardly therefrom, said main blade being swingable in a vertical direction relative to the hinge plate, a brace having one end hingedly attached to the

main blade and its other end adapted to be hingedly attached to the tractor for normally holding the blade in said outwardly extending position, means for determining the vertical angular position of the main blade relative to the hinge plate, a ballast sloping blade adjustably attached to the main blade at the end thereof near the hinge plate, and a shoulder sloping blade adjustably attached to the extending end of the main blade.

6. A road bed and ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track during the grading of the ballast and road bed near the ends of the ties which support the rails and comprising, in combination, a support yoke adapted to be secured to the tractor and having mounted at one end thereof a horizontally swingable hinge plate, a main blade secured at one end to said hinge plate in an upright position and extending outwardly therefrom, said main blade being swingable in a vertical direction relative to the hinge plate, a brace having one end hingedly attached to the main blade and its other end adapted to be hingedly attached to the tractor for normally holding the blade in said outwardly extending position, means for determining the vertical angular position of the main blade relative to the hinge plate, a ballast sloping blade adjustably attached to the main blade at the end thereof near the hinge plate, a shoulder sloping blade adjustably attached to the extending end of the main blade, and a wing plate extending forwardly at an angle from the surface of the main blade at a position near the outer end of the ballast sloping blade to push ballast inwardly of the shoulder.

7. A road bed and ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track during the grading of the ballast and road bed near the ends of the ties which support the rails and comprising, in combination, support means adapted to be secured to the tractor and including a substantially U-shaped yoke having a horizontally swingable hinge plate mounted at one side of the closed end of the yoke, a main blade secured at one end to said hinge plate in an upright position and extending outwardly therefrom, said main blade being swingable in a vertical direction relative to the hinge plate, a brace having one end hingedly attached to the main blade and its other end adapted to be hingedly attached to the tractor for normally holding the blade in said outwardly extending position, means for determining the vertical angular position of the main blade relative to the hinge plate, a ballast sloping

blade adjustably attached to the main blade at the end thereof near the hinge plate, and a wing plate extending forwardly at an angle from the surface of the main plate opposite that to which the brace is attached and at a position near the outer end of the ballast sloping blade to push ballast inwardly.

8. In a ballast grading attachment for tractors and the like which are adapted to run along the rails of a railroad track the combination comprising, a support yoke adapted to be rotatably secured to the sides of a tractor for vertical swinging movement relative thereto, said yoke having a portion adapted to extend across one end of the tractor, means including a pair of rotatably mounted flanged rollers secured to said portion of the yoke for following railroad rails and supporting said yoke, and a grading blade adjustably mounted on one side of the yoke adjacent said portion thereof.

9. In a side grading attachment for tractors and the like, the combination comprising a grading blade, and means for supporting said blade which includes means providing guide bearings, a support member linearly movable in said guide bearings, means comprehending a screw connected to one end of the support member and a rotatable member co-acting with the screw for adjusting the position of the support member, a transverse beam secured to the other end of the support member and carrying two sleeve bearings in spaced relation, a slide rotatable and linearly movable in said sleeve bearings, a hinge plate secured to said slide intermediate said sleeve bearings, and means comprehending a screw and a co-acting rotatable member for determining the position of the slide longitudinally of said sleeve bearings.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,191,756	Baker	July 18, 1916
1,322,688	Geelhart	Nov. 25, 1919
1,533,193	Mann	Apr. 14, 1925
1,718,550	Ferris et al.	June 25, 1929
1,818,750	Protzeller	Aug. 11, 1931
2,266,633	Gill	Dec. 16, 1941
2,312,255	Lowdermilk	Feb. 23, 1943