

April 12, 1938.

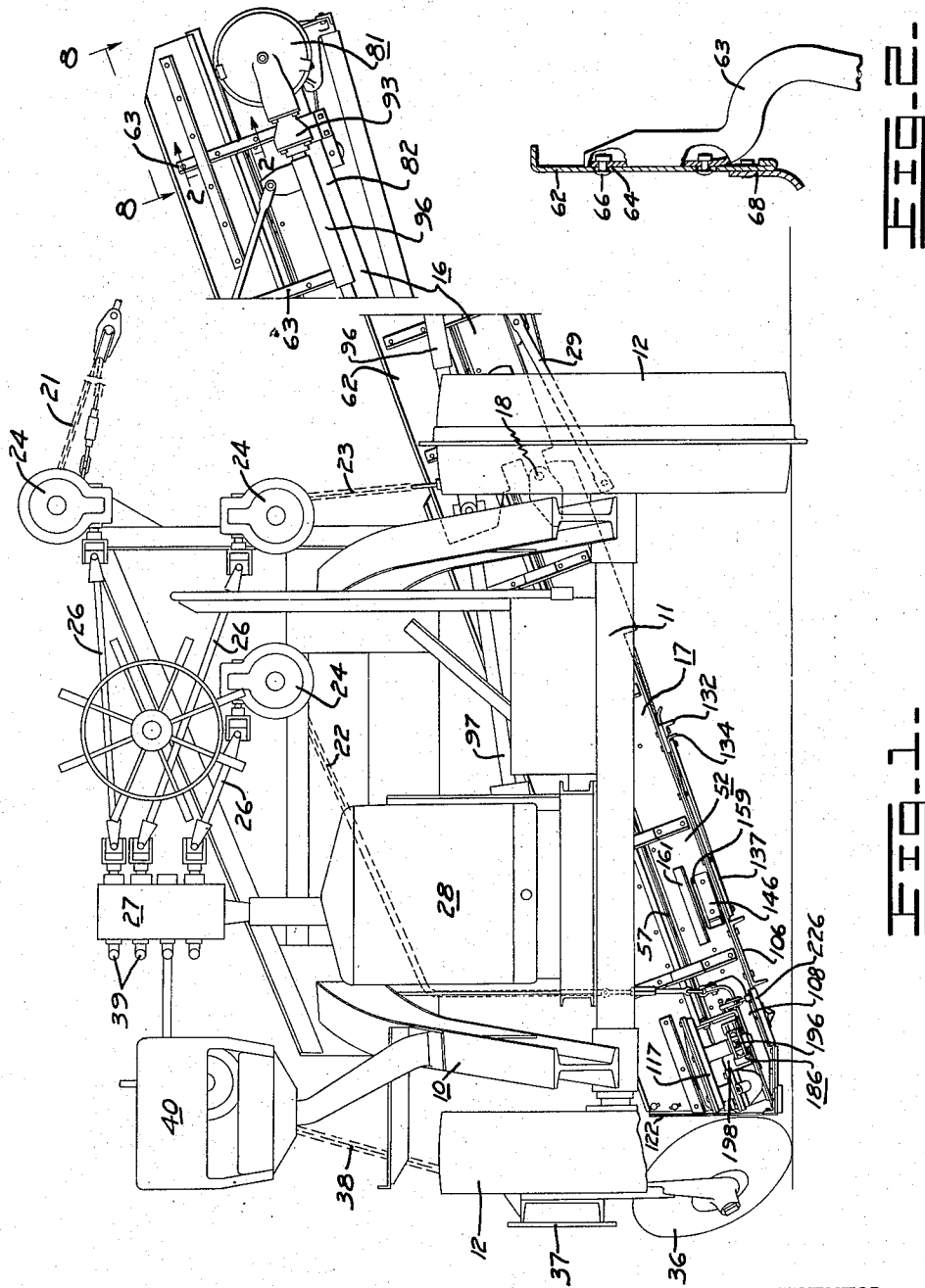
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2,113,941

ROAD MACHINE

Filed Feb. 26, 1934

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

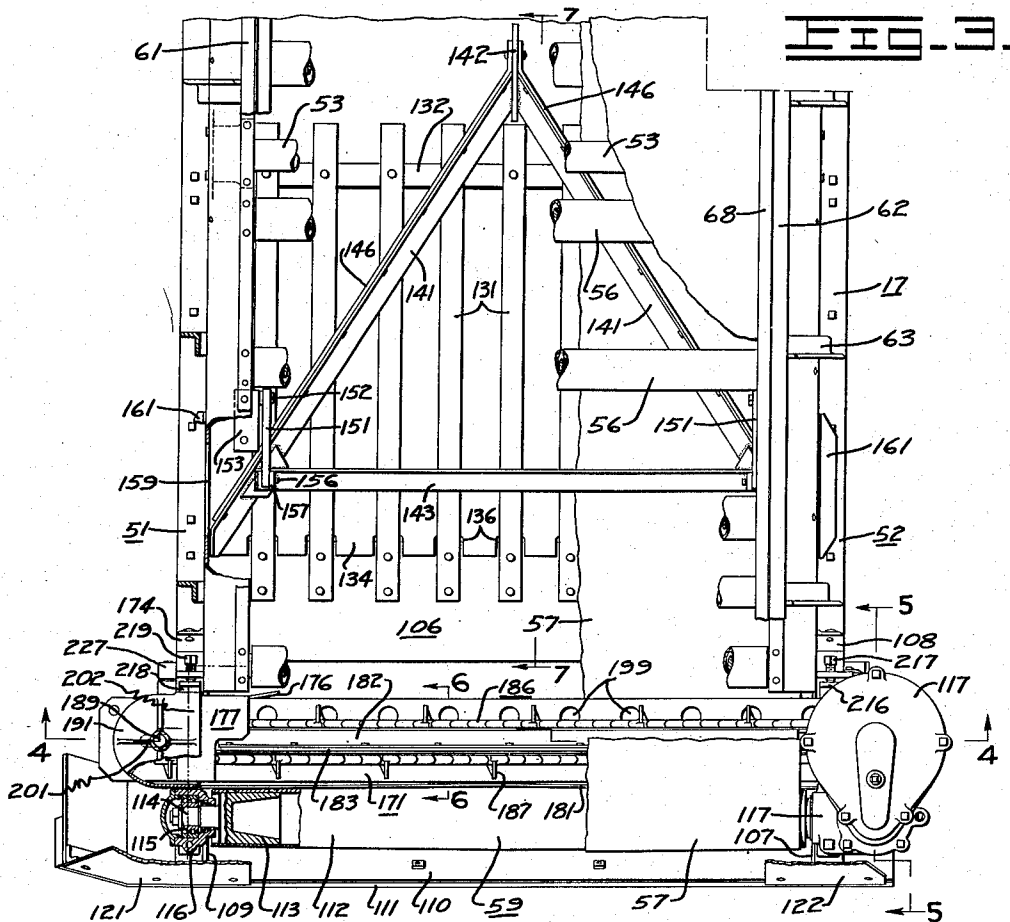


FIG. 3.

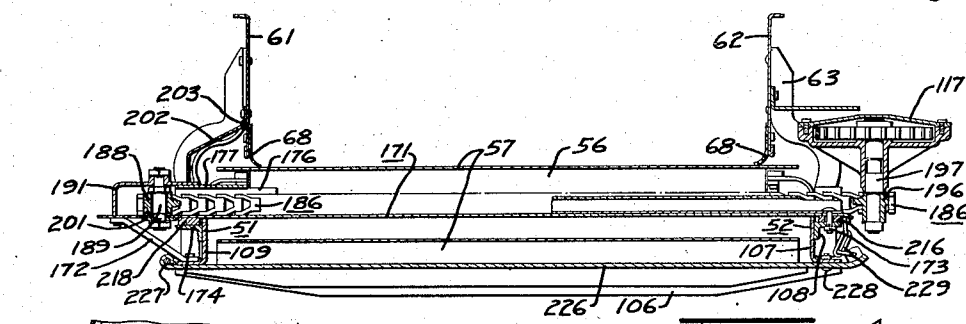
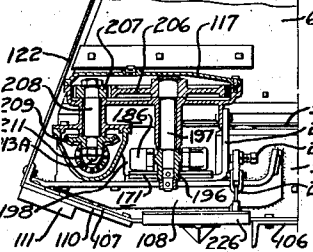


FIG. 4.



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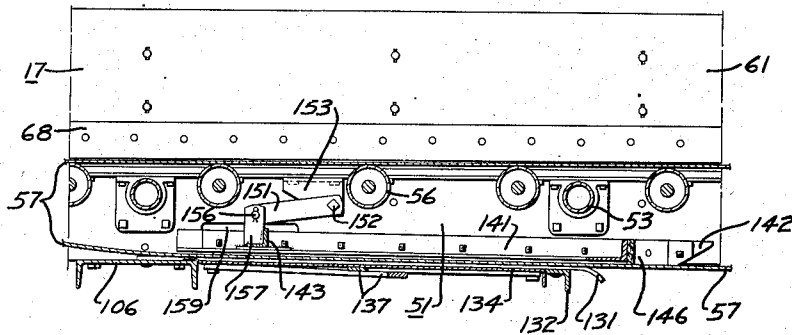


FIG. 7.

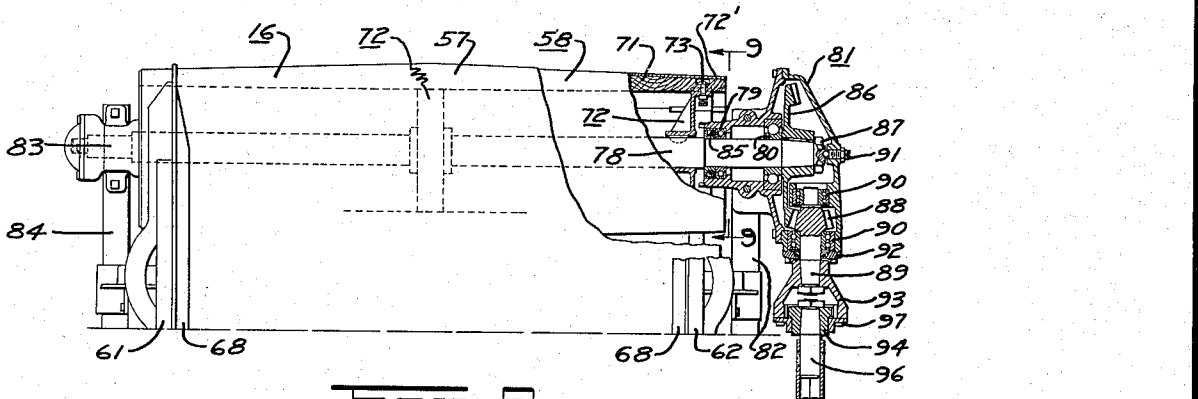


FIG. 8.

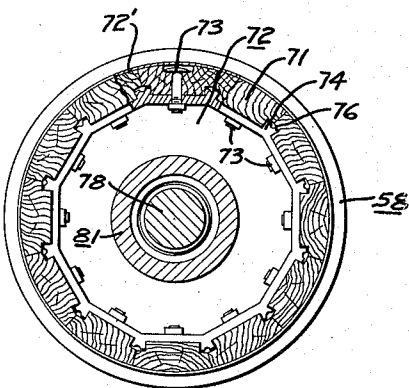


FIG. 9.

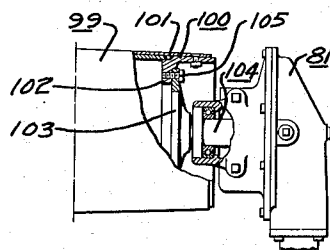


FIG. 10.

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UNITED STATES PATENT OFFICE

2,113,941

ROAD MACHINE

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Application February 26, 1934, Serial No. 712,951

10 Claims. (Cl. 198—230)

Statement of invention

The present invention relates to road machines, and more particularly to the provision of an improved carrier construction for elevating graders.

It is an object of the invention to provide an improved carrier construction for elevating graders which insures efficient operation of the carrier belt without clogging or interruption which might be caused by dirt, clods, rocks and the like on the inside of the carrier.

Another object of the invention is to provide an improved carrier for elevating graders having the lower end constructed to provide compactness to promote efficient picking up of material to be conveyed by the carrier belt.

Another object of the invention is to provide an improved carrier for elevating graders in which the ground end of the carrier is kept free from obstruction by dirt, clods and the like.

Another object of the invention is to provide an improved carrier for elevating graders in which the ground end of the carrier is completely covered and shrouded at the leading edge thereof during travel of the grader, while the trailing edge permits discharge of any material clinging on the inside of the carrier belt.

Another object of the invention is to provide an improved carrier for elevating graders which is constructed to promote long life and efficient operation.

Other objects will appear as the description progresses.

Description of figures

Fig. 1 is a rear end elevation of an elevating grader having a carrier constructed according to the instant invention.

Fig. 2 is a fragmentary section taken on the line 2—2 in Fig. 1.

Figs. 3-7 illustrate the construction of the lower end of the carrier.

Fig. 3 is a plan view of the lower end of the carrier with certain portions broken away to illustrate the construction more completely.

Fig. 4 is a sectional view taken in the plane of line 4—4 in Fig. 3.

Fig. 5 is a fragmentary sectional view taken in the plane of the line 5—5 in Fig. 3.

Fig. 6 is a fragmentary sectional view taken in the plane of the line 6—6 in Fig. 3.

Fig. 7 is a fragmentary sectional view taken in the plane of the line 7—7 in Fig. 3.

Figs. 8-10 illustrate the construction of the upper end of the carrier.

Fig. 8 is a fragmentary plan view indicated by the line 8—8 in Fig. 1, certain portions being broken away to illustrate the construction more clearly.

Fig. 9 is a section taken in the plane of line 9—9 in Fig. 8.

Fig. 10 illustrates a modified construction at the upper end of the carrier similar to that shown in Fig. 8.

Description of mechanism

The elevating grader disclosed herein includes frame 10 having its rear end supported on axle 11 on which wheels 12 are mounted. The front end of the frame 10 is supported on a suitable front wheel and axle assembly, not shown, which has a draft connection for attachment to a draft vehicle.

The carrier comprises upper and lower sections which are pivotally connected together and are adjustably supported by conventional means from the frame of the machine in the following described manner. Mounted on the carrier is an endless carrier belt which is driven from a prime mover, and is adapted to receive material from an earth-engaging tool or plow which is also adjustably supported from the frame of the machine. The carrier (Fig. 1) includes upper section 16 and lower section 17 which are pivotally connected at 18. Three pairs of opposite chains 21, 22, 23 are connected to opposite sides of the carrier at the upper and lower ends, and at the center thereof, only one chain of each pair being seen in Fig. 1. Each pair of chains have their ends wound around shafts (not shown) journaled on frame 10, which are rotated through gearing in respective housings 24 and through respective shafts 26 from gear box 27 which houses suitable reversible clutch mechanisms driven by engine 28. To prevent longitudinal movement of the carrier, i. e., transverse movement with respect to frame 10, opposite struts 29 are placed on each side thereof and connected to the frame of the machine, only one of the struts 29 being seen in Fig. 1.

The plow assembly, which is positioned at the lower or receiving end of the carrier, includes plow 36 on plow frame 37 which is supported by chains 38 from the frame of the machine; chains 38 are operated by power from the motor to raise or lower the plow. All the clutch mechanisms in gear box 27 control adjustments of the carrier and the plow by means of hand control levers 39 associated therewith adjacent operator's seat 40.

Thus far has been described the conventional

parts of a machine in which the carrier of the present invention can be employed; and such carrier will now be described.

The construction of the upper and lower carrier sections are generally similar. Each carrier section includes side frame members which are connected together to form the frame, and have a plurality of rollers journaled thereon to support the upper stretch of the carrier belt. Above the belt, vertically adjustable side boards are supported on the frame members to confine material being conveyed within the width of the belt. Lower carrier section 17 (Figs. 1, 3 and 7) includes opposite side frame members 51, 52 which are connected by a plurality of tubular struts 53. Adjacent the top of side members 51, 52, a plurality of rollers 56 are suitably journaled to carry the upper stretch of carrier belt 57, which passes over driving drum 58 (Fig. 8) at the outer end of upper section 16 and roller 59 (Fig. 3) at the outer end of lower carrier section 17. Drum 58 and roller 59 are described herein-after in detail.

To confine the material within the width of belt 57, opposite side boards 61, 62 (Figs. 1, 4 and 7) are adjustably supported by means of brace members 63 secured at their lower ends to respective side frame members 51, 52 and extending upwardly and inwardly therefrom. Side board 62 (Fig. 2) has pairs of vertically displaced slots 64 adjacent each brace member 63; and bolts 66 disposed in slots 64 connect side board 62 for vertical adjustment with respect to said braces 63. Side board 61 is similarly supported on braces 63 from side frame member 51. Flexible strips 68 (Figs. 2 and 4) of suitable material are secured to and extend along the lower edges of side boards 61, 62 and contact the upper surface of belt 57 to confine the material thereon. Upper carrier section 16 is constructed similarly, and corresponding reference numerals are applied thereto.

From the foregoing description, it is seen that the carrier construction provides closely spaced roller supports for the upper stretch of the endless carrier belt, and has side boards forming a trough with the belt to confine material thereon; the side boards being vertically adjustable to compensate for wear in the flexible strips which seal the space between the lower edges of the side boards and the belt.

Driving drum 58 is constructed to provide durability and long life. Drum 58 (Figs. 8 and 9) includes a plurality of longitudinally disposed staves 71 of wood or other suitable material, which are mounted on a plurality of spaced drum heads, one at each end and one at the center of the drum. Staves 71 are secured to each drum head 72 by means of studs 73. Each drum head 72 (Fig. 9) has spaced lugs 74 which engage in notch portions 76 of adjacent staves 71 to hold the staves securely in place on the drum head during operation. Around staves 71, a cover 72' of any suitable material, such as a heavy fiber sheet, is secured to engage belt 57. Each drum head 72 (Fig. 8) is keyed on shaft 78 which is journaled at its right end in spaced bearings 79, 80 in housing 81 secured on bar 82. A suitable seal 85 is provided, seated in housing 81 adjacent bearing 79 and engaging shaft 78, to prevent entry of deleterious matter within housing 81. At its left end, shaft 78 is similarly journaled in housing 83 mounted on bar 84 similar to bar 82. Bars 82, 84 are slidably mounted in any suitable manner on frame members 51, 52 to provide for adjustment

of drum 58 longitudinally of the carrier to tension carrier belt 57.

Driving drum 58 has a drive connection from engine 28. Within housing 81, bevel gear 86 is keyed on the tapered end of shaft 78; nut 87 being threaded on shaft 78 to secure the shaft with respect to housing 81 through the endwise engagement of gear 86, bearing 80, housing 81, bearing 79, seal 85 and a shoulder on shaft 78. Gear 86 meshes with bevel pinion 88 on stub shaft 89 journaled in bearings 90 in housing 81. Adjusting screw 91 threaded in housing 81 and urging a suitable ball against the end of shaft 78 determines proper meshing of gear 86 and pinion 88. Shaft 89 extends out of housing 81 through sealing collar 92, and has coupling member 93 secured thereon having splined engagement with coupling member 94 on shaft 96. The engagement of coupling members 93, 94 is maintained by collar 97, seated on a reduced portion of member 94 and secured by suitable screws to member 93. Shaft 96 (Fig. 1) is telescopic and extends inwardly along the carrier, and is universally connected to shaft 97 driven through suitable clutch means from engine 28. It is seen, therefore, that the drive for the carrier belt is of a simple and durable construction which can be economically manufactured and assembled. It is to be noted that gear connection from shaft 96 to drum 58 is sealed against the entry of deleterious matter.

In Fig. 10, a modified and preferred construction of the belt driving drum is illustrated. The drum includes central drum portion 99 welded, as indicated at 101; at its ends to similar drum heads 100; only one head 100 is illustrated. By virtue of the welded connection, portion 99 and heads 100 provide an unbroken drum surface to which a suitable covering is secured to engage the carrier belt. Each drum head 100 has an inner annular flange 102 to which, end flange 103 of shaft 104 is secured by a plurality of screws 105. Right end shaft 104 and a similar left end shaft (not shown) are supported in housings 81 and 83 similarly to shaft 78 (Fig. 8). The above construction promotes economical manufacture and assembly, and insures long life without replacement or repairs.

The ground end of lower carrier section 17 is constructed to protect the belt against injury from foreign matter, such as gravel, clods and the like, while providing a compact construction to position the belt as close to the ground as possible. Adjacent their ground ends, side frame members 51, 52 (Figs. 3, 5 and 7) are braced by cross channel 106 secured thereto. Outwardly from channel 106 (Fig. 5), the upper part of frame member 52 is cut away to provide extension 107 having brace 108 welded thereto. Side member 51 (Fig. 3) has similar extension 109, which is connected to extension 107 by cross plate 110, having bar 111 secured along the outer edge thereof. Lower roller 59 (Fig. 3) is of small diameter and comprises a cylinder 112 having head 113 welded at each end thereof; each head 113 terminating in shaft extension 114. Left-hand shaft extension 114 is journaled by bearing 115 in housing 116 on frame extension 109. At the right end, roller 59 is similarly supported in housing 117 on frame extension 107.

To insure the material being cast on the belt centrally thereof, the edges of belt 57 (Fig. 3) are protected by vertical shields 121, 122 secured to respective ends of plate 110 and bar 111. Such shields extend upwardly and are secured to re-

spective side boards 61, 62 (Figs. 1 and 5). Plate 110 and bar 111 (Fig. 3) are bent upwardly at their left or leading ends to provide a shoe to engage the earth as the carrier advances.

5 For protecting the belt at the ground end, various means are employed which will be described in the sequence in which they cooperate with the advancing belt. As the ground stretch of belt 57 advances toward the lower end of the carrier, means are provided for cleaning both the upper and lower sides thereof to protect the belt from injury as it passes over end roller 59. To protect and clean the bottom side of the ground stretch of the belt and to hold said ground stretch in a position to have the upper side thereof thoroughly cleaned, a protecting basket is provided, comprising a plurality of longitudinal and laterally spaced strips 131 (Figs. 3 and 7) secured adjacent their forward ends to cross angle 132 and at their rear ends to channel 106. As illustrated in Fig. 7, the top ends of strips 131 are curved downwardly to facilitate passage of belt 57. Below the basket, removable plate 134 is positioned between angle 132 and channel 106; said plate having its rear end bent to rest on channel 106, notches 136 being provided to engage around strips 131. Cross straps 137 (Figs. 1 and 7) having their ends bolted to respective side frame members 51, 52 hold plate 134 in place. Thus, it is seen that the construction described acts to remove dirt or other similar deleterious matter which might collect on the under surface of the ground stretch, and also serves to provide a planar support to cooperate with scraping for cleaning the upper side of the ground stretch. If, in the character of the work, plate 134 is not necessary to protect the belt, it can be removed.

The upper surface of the ground stretch of the belt is cleaned by means provided between the side frame members of the carrier and over basket 131. Such means has a floating engagement with said upper belt surface of the ground stretch. The belt cleaning means comprises a V-shaped cleaner (Fig. 3) including forwardly converging angles 141 secured at their front ends by welding to strip 142, and connected at their rear or lower ends by cross angle 143 welded thereto. The faces of angles 141 (Figs. 3 and 7) are covered by strips 146 of suitable flexible material extending below angles 141 to engage belt 57. To provide for floating engagement of the cleaner with the belt, links 151 are pivoted at one end on studs 152 in brackets 153 secured to respective frame members 51, 52, and at their other ends on pins 156 in brackets 157 welded to the respective ends of cross angle 143.

The basket 131 which guides and supports the ground stretch of the belt serves to maintain it substantially in a plane for engagement with the V belt cleaner 141, which by virtue of its floating mounting is maintained in constant engagement throughout its length with the belt. Dirt or other material, by movement of the belt, is conveyed outwardly by strips 146 to openings 159 (Figs. 1, 3 and 7) through which it is discharged to the ground. At the rear of left opening 159 (Fig. 3), left-hand angle 141 is formed to fit closely adjacent side member 51 to prevent material passing rearwardly inside of frame member 51. Right angle 141 is similarly formed at right-hand opening 159. Each opening 159 is protected at the top by shrouding angle 161 welded to frame 51, 52 above said openings 159. Thus, the top surface of the ground stretch of the endless carrier is swept clean by the belt cleaner of all large foreign

particles and any mass of finer particles. However, a certain amount of fine material will pass between the cleaner and the belt, and, as a result, between end roller 59 and the belt. If this material is at all damp, an undesirable caking might occur on the roller and the inside of the belt; and means are provided for scraping roller 59 and belt 57 free of caked material.

To accomplish the above noted purpose of freeing caked material from roller 59 and the belt, scraping means are provided to remove material from the roller and the inner surface of the belt; and a chain type cleaner is mounted in a pan which receives material, carries the material to one side, and out through an unrestricted opening. The pan is formed of sheet metal and includes bottom plate 171 (Figs. 3, 4 and 6) which is secured at its left end to frame member 51 by strap 172 and at the right end (Fig. 4) to angle 108 by stud 173. Plate 171 is also secured at its left end to angle 174 similar to angle 108. At its left end, plate 171 has an integral extension including vertical wall 176 (Figs. 3 and 4) and top wall 177 to provide a shroud for precluding entrance of dirt at that end. At the outside edge of plate 171 adjacent roller 59, scraper 181 is riveted, providing a knife edge for cleaning roller 59, which is adjustable in a manner later described into parallel relation in close proximity to said scraper. Centrally of plate 171 (Figs. 3, 4 and 6), framework 182 is provided for scraper 183 which is adapted to remove caked material from the under-side of the upper stretch of the belt.

It is to be noted that the material scraped from roller 59 and belt 57 by respective scrapers 181 and 183, will fall into the trough formed between scraper 181 and framework 182. Endless chain means are provided around framework 182 for removing this material. Endless chain 186 (Fig. 3), having lugs 187 extending outwardly therefrom, is mounted at its left end on idler sprocket 188 (Fig. 4) journaled on stud 189 within cover 191, and at its right end on driving sprocket 196 on shaft 197 in housing 117. Driving sprocket 196 drives chain 186 so that lugs 187 (Figs. 3 and 6) traveling between frame 182 and scraper 181, discharge the loose material onto the ground through an opening 198 (Figs. 1 and 5) at the trailing end of plate 171. Any dirt and the like which may cling to lugs 187 and chain 186 is shaken loose by chain 186 when traveling over the inactive stretch of the chain cleaner and falls through apertures 199 in plate 171 onto the belt 57. Such dirt then repeats the cycle of travel previously explained and is ultimately discharged. Hence, no large amount of dirt can accumulate. To tighten chain 186, housing 191 (Figs. 3 and 4) is adjustable by loosening stud 189, plate 171 being slotted at 201 to accommodate movement of stud 189. Sprocket 196 (Fig. 5) is secured on shaft 197 by means of a suitable shear pin which is designed to break in the event chain 186 becomes clogged to avoid damage to the parts. Above housing 191 (Fig. 4), shield 202 is pivoted at 203 on side board 61, and extends downwardly resting on housing 191. As indicated in phantom lines in Fig. 3, shield 202 extends from the solid portion of side member 51 to above roller 59 to prevent earth falling onto the bottom stretch of the carrier belt through the cut-away portion of side member 51 during travel of the machine. The chain cleaner described above is driven from the belt through end roller 59. Within housing 117 (Fig. 5) shaft 197 has a large

spur gear 206 secured thereon, meshing with small spur gear 207 on shaft 208, also journaled in housing 117. At its lower end, shaft 208 carries bevel gear 209 meshing with bevel gear 211 on shaft extension 113A of roller 59. It is to be noted, therefore, that the drive for the chain is supplied by end roller 59 so that the chain cleaner is in operation whenever the belt is traveling. It should be noted further that driving sprocket 196 is suspended below housing 117 so that a clear discharge opening is provided at the discharge end of the chain cleaner.

The means for adjusting roller 59 with respect to scraper 181 to obtain proper alignment thereof and of belt 57, comprises a slidable mounting for housing 117 and housing 116 which support the ends of roller 59. Housing 117 (Figs. 4 and 5) is slidably mounted on angle 108 and is connected to strap 216 which is also slidable on angle 108, being disposed between angle 108 and plate 171 (Fig. 4). Strap 216 is slotted to provide for movement thereof with respect to stud 173. Movement of strap 216, housing 117 and roller 59 at its right end, is accomplished by set screw 217 (Figs. 3 and 5) abutting the upright portion of strap 216 and urging, when it is turned to move inwardly, the roller against the belt. At its left or leading end, roller 59 is supported in housing 116 on strap 218 (Figs. 3 and 4) slidably mounted on angle 174 under plate 171 similarly to strap 216. Set screw 219 (Fig. 3) provides for adjustment of strap 218, housing 116 and the left end of roller 59 in the manner described in connection with set screw 217.

The bottom of the pick-up turn of the belt is protected by means including plate 134 and channel 106. In order to allow access through the protecting means for cleaning or removing dirt which might gather adjacent the pick-up end of the belt, a hinged clean out plate is provided to form part of the protecting means. This hinged plate can be swung out of position when desired to allow for the access pointed out. Plate 226 (Fig. 4) is pivoted at 227 on frame member 51 and extends across and is secured by bolt 228 to opposite frame member 52. With certain conditions of operation it might be desirable to leave plate 226 open. For this purpose, bolt 228 can be removed and plate 226 allowed to swing downwardly; being held in a displaced position by chain 229 connected thereto and to the carrier frame.

From the foregoing description, it is seen that a compact construction is provided at the lower end of the carrier which includes means for preventing the entry of any large particles of foreign material between the belt and the end roller therefor, and to prevent any excessive caking of material on the roller during operation. It is to be noted also that the leading ground edge of the carrier is fully shrouded to prevent the entry of any dirt or the like which may pile up in front of the carrier during operation, while openings are provided at the trailing ground edge thereof to permit discharge of dirt and the like, these openings being shrouded from the top.

Therefore, I claim as my invention:

1. In an elevating grader, a carrier having a frame, a plurality of rollers on said frame including an end roller, and an endless belt passing over said rollers; and means for removing material from the ground stretch of said belt prior to its passing over said end roller, including opposite apertures in said frame, a substantially V-shaped cleaner structure diverging outwardly

in the direction of travel of said belt ground stretch, and terminating at said apertures, means mounting said cleaner structure on said frame for floating engagement with said belt ground stretch, and means engaging the portion of said belt ground stretch engaged by said cleaner structure for maintaining a substantially planar condition thereof.

2. In an elevating grader, a carrier having a frame, a plurality of rollers on said frame including an end roller, and an endless belt passing over said rollers; and means for removing foreign material from the ground stretch of said belt prior to its passing over said end roller, including a cleaner structure for moving material outwardly on said belt toward an edge of said belt ground stretch, means mounting said cleaner structure on said frame for floating engagement with said belt ground stretch, and means engaging the portion of said belt ground stretch engaged by said cleaner structure for maintaining a substantially planar condition thereof.

3. In an elevating grader, a carrier having a frame, conveyor supporting means on said frame including an end roller, an endless conveyor passing around said end roller, a cleaner structure for removing material from the ground stretch of said conveyor prior to its passing around said end roller, means mounting said cleaner structure on said frame for floating engagement with said conveyor ground stretch, spaced members engaging the portion of said conveyor ground stretch engaged by said cleaner structure for maintaining a substantially planar condition thereof, and a protecting plate detachably secured to said carrier underneath said spaced members.

4. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said end, an endless conveyor on said carrier passing around said roller, a passage adjacent said roller, means for collecting material adjacent said roller and depositing such material into said passage, means for removing deposited material from said passage, a hinged protecting member covering the bottom surface of said carrier adjacent said material removing means, means for normally holding said member in closed position and additional means for optionally maintaining said member in open position and away from said material removing means to allow free discharge of material which might gather adjacent the pick-up end of the conveyor.

5. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said end, an endless belt on said carrier passing around said roller, a passage adjacent said roller, means for collecting material that passes adjacent said roller and depositing such material into said passage, the end of said passage at the leading edge of said carrier being closed, the other end of said passage being open, a chain conveyor for removing deposited material from said passage through the open end thereof; and driving means for said conveyor, including a sprocket engaging said conveyor at said open end, and a drive housing mounted above and shrouding said open end so as to leave said passage unobstructed, and including a drive connection for said sprocket.

6. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said

end, an endless belt on said carrier passing around said roller, a passage adjacent said roller, means for collecting material that passes adjacent said roller and depositing such material into said passage, the end of said passage at the leading edge of said carrier being closed, the other end of said passage being open, a conveyor for removing deposited material from said passage through the open end thereof, driving means for said conveyor including means engaging said conveyor at said open end, and a drive housing mounted above and shrouding said open end so as to leave said passage unobstructed, and including a drive connection for said sprocket.

7. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said end, an endless belt on said carrier passing around said roller, a passage adjacent said roller, means for collecting material that passes adjacent said roller and depositing such material into said passage, the end of said passage at the leading edge of said carrier being closed, the other end of said passage being open, a conveyor for removing deposited material from said passage through the open end thereof; and driving means for said conveyor, including a driving member engaging said conveyor at said open end, a drive housing mounted above and shrouding said open end so as to leave said passage unobstructed, and including a shaft and a shear pin establishing a drive connection between said shaft and said driving member.

8. In an elevating grader, a carrier having a frame and having its pick-up end disposed transversely to the direction of travel of the grader; a roller at said end; an endless conveyor passing around said roller; means mounted between reaches of the conveyor and adjacent said pick-up end for removing material from the ground stretch of said conveyor, including a cleaner structure diverging outwardly in the direction of travel of said conveyor ground stretch and having discharge ends adjacent edges of said con-

veyor ground stretch, and opposite apertures in said frame cooperating with said discharge ends to receive material from said conveyor; and shields associated with said apertures for protecting said apertures.

9. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said end, an endless conveyor on said carrier passing around said roller, a passage adjacent said roller, means for collecting material adjacent said roller and depositing such material into said passage, and means for removing deposited material from said passage, the end of said passage at the leading edge of said carrier being closed against entrance of material, and the other end of said passage being open to allow escape of collected material, and driving means for operating said removing means, said driving means being supported above the open end and shrouding said passage to provide a protected discharge end therefor.

10. In an elevating grader, a carrier disposed transversely of the direction of travel of the grader and having a pick-up end, a roller at said end, an endless conveyor on said carrier passing around said roller, a passage adjacent said roller, means for collecting material adjacent said roller and depositing such material into said passage and means for removing deposited material from said passage, the end of said passage at the leading edge of said carrier being closed against entrance of material, and the other end of said passage being open to allow escape of collected material, driving means for operating said removing means, said driving means being supported above the open end and shrouding said passage to provide a protected open discharge end therefor, and a drive connection between said roller and said driving means, said driving means and roller being supported for adjustment with respect to said material collecting means.

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