Dec. 9, 1930. G. GARDNER 1,784,666

LOADING ATTACHMENT FOR ROAD GRADERS

Filed May 21, 1928 3 Sheets-Sheet 1

Fig. 4.

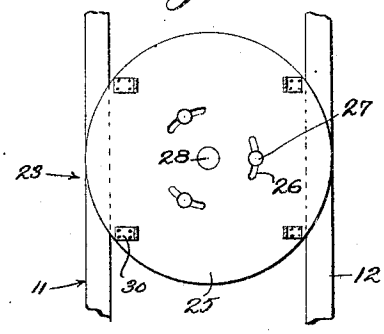


Fig. 1.

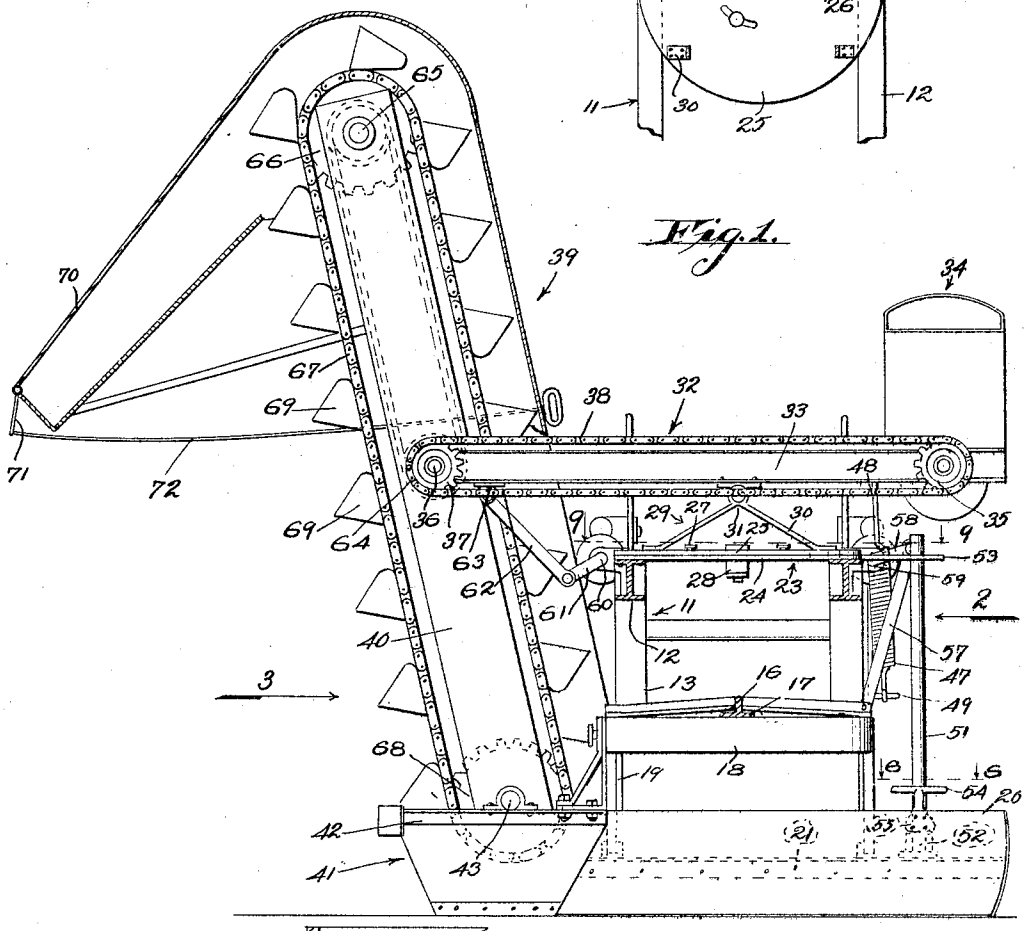


Fig. 5.

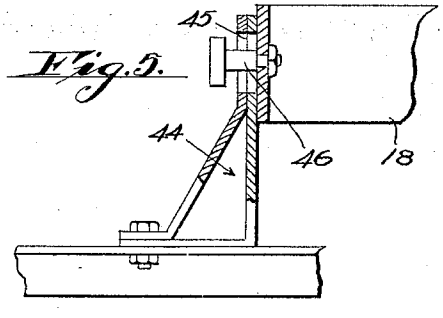
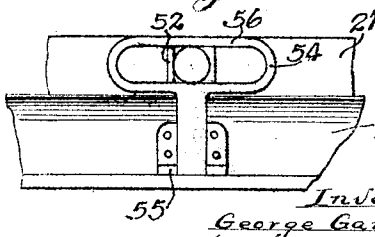


Fig. 6.



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Dec. 9, 1930. G. GARDNER 1,784,666

LOADING ATTACHMENT FOR ROAD GRADERS

Filed May 21, 1928 3 Sheets-Sheet 2

Fig. 2.

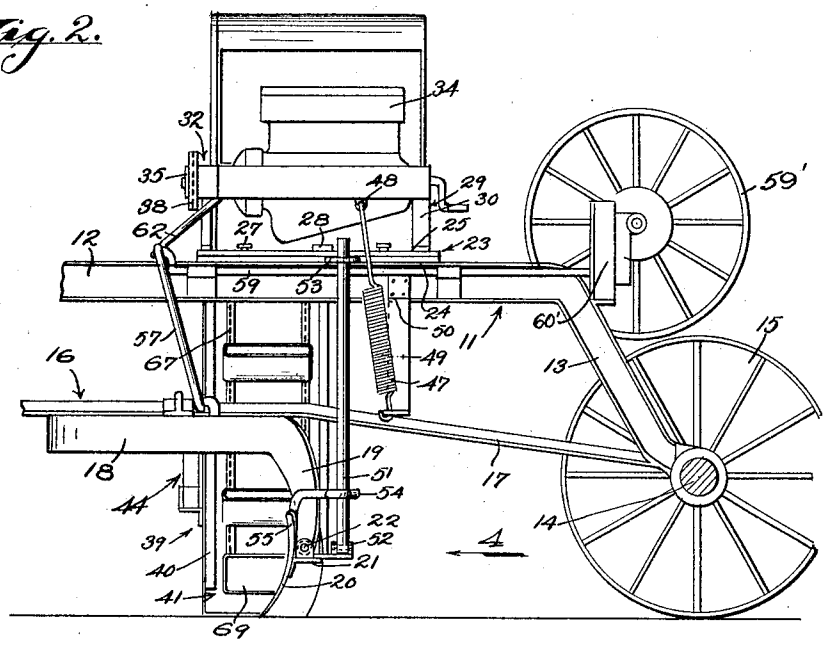
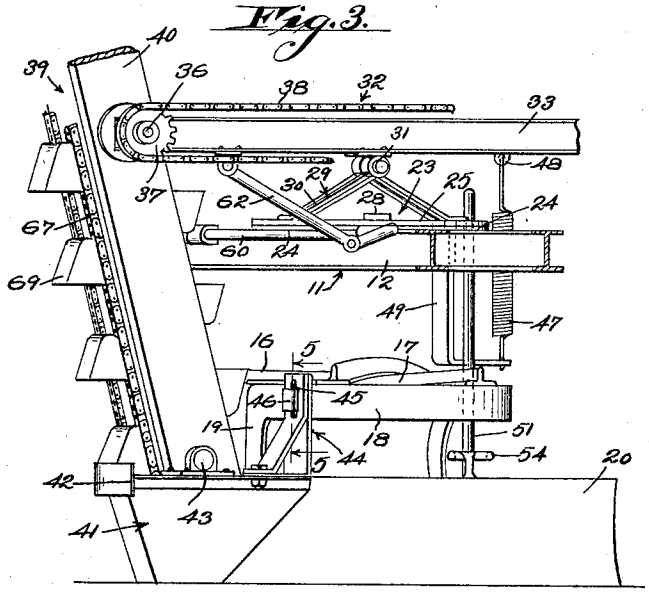


Fig. 3.



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Dec. 9, 1930. G. GARDNER 1,784,666

LOADING ATTACHMENT FOR ROAD GRADERS

Filed May 21, 1928 3 Sheets-Sheet 3

Fig. 4.

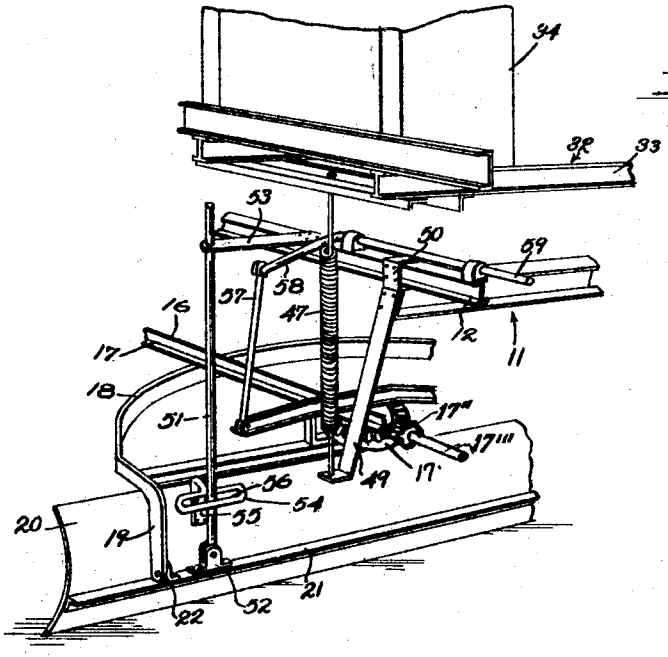


Fig. 7.

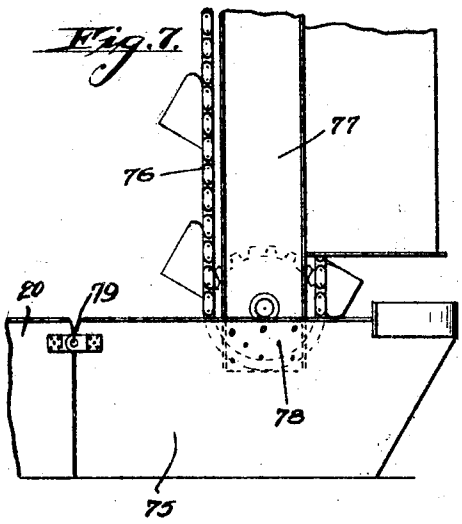
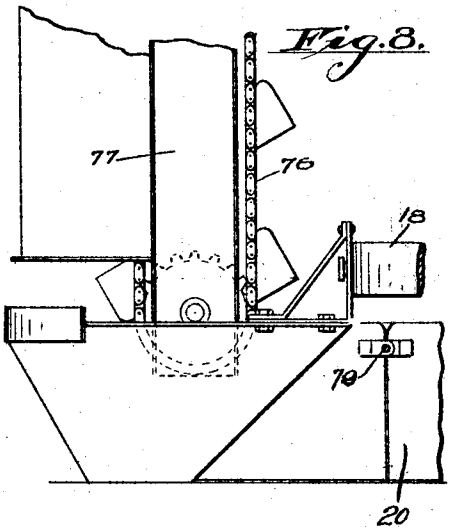


Fig. 8.



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UNITED STATES PATENT OFFICE

GEORGE GARDNER, OF REDLANDS, CALIFORNIA

LOADING ATTACHMENT FOR ROAD GRADERS

Application filed May 21, 1928. Serial No. 279,246.

My invention is a loading attachment for road graders, being an improvement on the invention of my patent application, Serial No. 254,429, filed February 15, 1928.

My patent application above mentioned sets forth a road grader construction having a scraping blade connected to a suitable vehicle framework. This scraper blade may be positioned at an angle transversely to the direction of the forward movement of the grader, and scrapes the dirt off of a road or the like to one side, discharging it into a hopper like construction. An elevator has a series of buckets mounted on an endless chain, the buckets dipping into the hoper and elevating the earth scraped sideways by the blade. The elevator is operated by a motor mounted on the vehicle structure. The elevator discharges into a spout which may discharge into a truck.

An object of the present invention is the improved mounting of the elevator and blade whereby the blade and elevator may be shifted more conveniently to different angles considered transversely of the direction of movement of the grader; and also in which the blade may be tilted at various angles in regard to the horizontal to give grading cuts on a road or the like of varying camber; and in this connection I mount the scraper blade in such relation to the hopper and to the mounting on the elevator so that a sliding movement may take place in the elevator when the blade is shifted at different angles considered transversely of the direction of movement of the grader. I also provide a construction by which the blade may be tilted up or down at the inner end; that is, the end remote from the elevator without interfering with the action of the elevator.

Another object of my invention is an improved construction for supporting and balancing the elevator on the vehicle, and for allowing a partial turn of the supporting structure. To effect this, I mount a suitable supporting frame on a turn table, the turn table being on the vehicle frame and the supporting frame being pivotally connected to the turn table. The engine for operating the elevator is carried on the supporting frame at the side opposite the pivot on the support of the elevator and partly balances such elevator. The unbalanced weight is taken care of by springs connected between the fixed part of the vehicle frame and the supporting frame.

Another object of my invention is an improved manually operated arrangement for controlling the inclination of the elevator and for shifting the supporting frame relative to the vehicle frame.

My invention is illustrated in the accompanying drawings, in which:

Fig. 1 may be considered as a front elevational view, partly broken away, of a vehicle frame having my loading attachment connected thereto, showing the grader blade and associated parts,

Fig. 2 is a side elevation taken substantially in the direction of the arrow 2 of Fig. 1,

Fig. 3 is a side view looking partly rearwardly and showing certain parts in perspective, and taken in the general direction of the arrow 3 of Fig. 1,

Fig. 4 is an elevation in perspective of a portion of the grader taken in the general direction of the arrow 4 of Fig. 2,

Fig. 5 is a detailed vertical section on the line 5—5 of Fig. 3 in the direction of the arrows,

Fig. 6 is a horizontal detailed section on the line 6—6 of Fig. 1 in the direction of the arrows,

Fig. 7 is an alternative construction showing the elevator frame rigidly secured to the hopper,

Fig. 8 is a view diametrically opposite to that of Fig. 7,

Fig. 9 is a diagrammatic section taken on the line 9—9 of Fig. 1 showing only the details of the turn table.

In the illustrations the vehicle frame is designated generally by the numeral 11, this having horizontal beams 12 spaced apart and illustrated as I-beams with struts 13 connecting to the rear axle 14 on which are mounted the rear wheels 15. There is a subframe 16 having side bars 17 connected to the rear axle and extending forwardly in the vehicle. This frame has a blade carrier 18 suspended from

the subframe 16, this being arcuate in shape. The blade carrier 18 has depending arms 19 which pivotally support the blade 20, this blade having an angle arm 21 at the back with a pivotal connection 22. The blade 20 is mounted in the frame of the grader so that it may turn on a substantially vertical axis to incline the blade at various angles to the direction of forward motion of the grader. The blade may also be tilted on a subtsantial horizontal axis to allow digging or scraping to different depths on opposite sides of the blade. This is for the purpose of scraping the proper camber in making a road bed or the like. These features are well known structures in scrapers used in graders and are not fully illustrated or described herein as they do not form an immediate part of this invention.

In Fig. 4 I indicate a segmental gear 17′. This is part of a standard mechanism for turning the blade on a vertical pivot and is usually operated by a pinion, the pinion 17 being rotated by a shaft. In my construction I utilize mechanism which is now employed on graders for this purpose and as it does not form an immediate part of my invention I do not illustrate this in full.

The shaft 17‴ is part of the standard grader mechanism and has an operating wheel, or handle, at the rear portion of the grader, and by turning the shaft 17‴ the segmental gear 17′ may be rotated a sufficient amount to turn the blade on the vertical pivot. It will be noted by reference to Figure 9 that the device is only intended to rotate on the vertical pivot a comparatively small distance, this being limited by the slots. Hence, as rod 51 has a certain amount of loose play in the elongated slot 56 and in the arm 53 as well as in the bracket 52, this rod does not prevent the slight degree of turning of the blade.

I also use a standard mechanism for securing the turning of the blade on the vertical axis and on the horizontal axis. These parts, therefore, need not be described in detail.

Mounted on top of the horizontal beams 12 there is a turn table designated generally by the numeral 23. This has a lower fixed plate 24 and a rotatable upper plate 25, the upper plate having slots 26 therethrough through which extend studs 27, thus giving a limited rotational movement. The turn table has a king pin 28. A bracket 29 has legs 30 secured to the movable top plate 25 and has a journal 31 at its apex.

A carrier frame 32 is formed of cross beams 33, this latter being pivotally mounted on the journal 31. On one end of the carrier frame there is mounted an engine 34 which is preferably of the internal combustion type driving a sprocket gear 35. At the opposite end of the carrier frame there is a pivot shaft 36 also having a sprocket gear 37 connecting by the sprocket chain 38 to the sprocket gear 35. The elevator designated generally by the numeral 39 has a pivotal mounting on the shaft 36 through the medium of the side bars 40 being mounted on this shaft.

The lower end of the elevator has the side bars 40 connected to a hopper 41, this hopper having a top frame 42 with a pivoted shaft connection 43.

The hopper and blade in the construction of Figs. 1, 2 and 3 are connected to the blade in a similar manner to the construction set forth in my patent application above noted; that is, by rigidly securing the structure of the hopper and the end of the blade or a plate secured to the end of the blade.

The top frame 42 has a substantial bracket 44 connected thereto, shown in detail in Fig. 5, this bracket having a vertical slot 45. In this slot there is engaged a stud 46 which is fixedly secured to the blade carrier 18. The blade 20 is designed to scrape the dirt from the surface of the ground sideways into the hopper 41 from whence it is elevated by the elevator buckets.

In order to give a resilient counterbalance of the elevator by the engine a spring 47 is connected between the carrier frame 32 at the end having the engine by the eye 48, and at its lower end is attached to a downwardly extending bracket 49 which is secured to the vehicle frame 11 as indicated at 50.

The movement of the blade is guided by a rod 51 which is pivotally connected to the blade as indicated by the pivotal bracket connection 52, this rod passing through an aperture in an arm 53 extending outwardly from the vehicle frame 11. (Note Figs. 3, 4 and 6.) This rod passes through a yoke 54 which is rigidly secured to the back of the blade 20 as indicated at 55, the yoke having an elongated slot 56 therein to accommodate the rod 51.

The mechanism for tilting the blade employs a link 57 connected to a crank arm 58 mounted on the rock shaft 59, this forming a part of the standard mechanism for tilting the blade. At the opposite side of the vehicle frame there is a second rock shaft 60 which may be operated by a manual control separate from the shaft 59. This shaft 60 has a crank arm 61 to which there is connected a link 62, this link having a pivotal connection, as indicated at 63, with the carrier frame 32 on which frame is mounted the engine 34 and the pivotal connection 36 to the elevator 39. In practice I utilize as the link 62 a link which may connect with the opposite side of a tiltable frame connected to the blade similar to the connection of the link 57.

The shafts 59 and 60 together with their crank arms 58 and 61, form part of a standard scraper mechanism. There is a hand

wheel 59′ operating a shaft through a gear train 60′, there being one of the wheels and gear trains for the shaft 59 and another for the shaft 60. (Note Figs. 1 and 2.) As the blade carrier 18 is mounted in a pivotal manner on the grader machine, a single link 57 is sufficient to tilt this frame and hence the blade 20. However, when the shaft 59 is operated to tilt the blade the opposite shaft 60 is also operated in such a manner as to move the carrier frame 32 in the proper direction, as the carrier frame is connected to the elevator 39, being attached to the side bars 20. This link 62 has a lifting or depressing action on the hopper 41 and hence as the hopper and blade 20 are connected together the blade may be tilted. Therefore if it is desired to tilt the blade to give an increased camber to the road, the shaft 59 will be operated so as to pull up on the link 57 and the shaft 60 operated so as to pull down on the link 62. Thus as the end of the blade towards the center of the road is elevated, the hopper and the portion of the blade adjacent the side of the road is depressed. A reverse operation of the shafts 59 and 60 causes a reverse tilting of the blade 20.

As certain of these parts are old mechanism in graders, I do not illustrate such construction fully.

The manner of drive of the elevator buckets is, as above mentioned, from the engine and through the sprocket chain 38 to the shaft 36. This, preferably on the side opposite the sprocket 37, has a sprocket and sprocket chain connection 64 which drives the upper shaft 65 of the endless chain gear, this having a drive sprocket 66 over which rides the endless chain 67, this passing over the idler sprocket 68 mounted on the shaft 43.

The buckets 69 are mounted on the endless chain 67 and dip into the hopper 41 elevating the dirt scraped to one side by the scraper blade. This dirt is discharged into a spout 70 which has a closable gate 71 controlled by means of a hand-operated control rod 72.

The manner of operating and functioning of my loading attachment for road graders is substantially as follows: It will be understood that the grader is pulled along the road or other place to be graded by a suitable tractor, and that a scraping blade is positioned at the proper angular position in regard to the forward movement of the grader and also at the proper tilt to give the desired camber or cut. The pivotal connection from the vehicle frame to the blade allows, as above mentioned, the tilting motion in a substantially vertical plane to incline the blade for a lesser or greater camber, and, at the same time, the carrier frame 32 may be shifted through the medium of the shaft 60, crank arm 61 and the link 62. This action causes a slight movement of the elevator frame and of the whole elevator. The slight rising and lowering movement of the hopper is accommodated through the slot and stud connection 45 and 46 of the bracket 44, the bracket being connected to the hopper and the stud connected to the blade carrier 18.

The slot 56 in the yoke 54 allows a slight rocking motion of the blade in reference to the rod 51, this rod, as above mentioned, being slidable through an aperture in the arm 53 which is rigidly secured to the vehicle frame. This rod has an additional function of preventing the tilting of the blade should it strike a rock or anything of that nature on its lower edge, due to the fact that the slot 56 is comparatively narrow in the direction at right angles to the blade and is elongated in a direction parallel to the blade.

When it is desired to turn the blade on its vertical axis to vary the angle of cut or sweep transverse to the direction of movement, this is done by the ordinary pivoting mechanism, the hopper being of sufficient size so that the dirt will be discharged into the hopper and drawn in proper alignment to be picked up by the buckets. In this action there is sufficient loose movement of the connection of the rod 51 to the blade, and of this rod operating through the arm 53 to accommodate such motion, which, under the usual circumstances, is more or less limited.

However, in connection with this turning movement of the blade on its vertical axis, or, if desired, independent thereof, the turn table 23 may be actuated within the limits of the slots 26 and studs 27 rotating on the king pin 28. This shifts the carrier frame 32 slightly in regard to the vehicle frame and also shifts the elevator and the hopper. There is sufficient loose connection in the bracket 44 and the slot and stud connection 45 and 46 to accommodate this motion.

In the construction illustrated in Figs. 7 and 8 the hopper is designated by the numeral 75 and the elevator by the numeral 76. The side bars 77 of the elevator are secured to the hopper by a riveted connection 78. In this construction therefore, when the elevator is raised and lowered slightly by the elevating movement of the carrier frame, or when the carrier frame is rotated on the king pin 28, thus carrying the elevator, the hopper is moved to a slight extent within the limits allowed by the connection of the hopper to the blade carrier.

The hopper 75 is illustrated as being secured to the blade 20 by a hinge construction 79. Therefore as the elevator is raised or lowered, thus lifting or depressing the hopper, the end of the blade connected thereto is also given an elevating or depressing movement and as the plates forming the hopper and the blade overlap, this action accommodates the

movement of the blade in working on roads of different cambers.

Various changes may be made in the principles of my invention without departing from the spirit thereof, as set forth in the description, drawings and claims.

I claim:

1. A grader having a vehicle frame with a scraper blade, a carrier frame mounted on the vehicle frame and having an engine at one end, an elevator at the other end of the frame, and means to drive the elevator from the engine, the elevator lifting dirt moved by the blade.

2. A grader having a vehicle frame, a scraper blade, a carrier frame mounted on the vehicle frame, said mounting allowing rotation on a vertical axis, an engine at one end of the carrier frame, and an elevator at the other end, the elevator being driven by the engine, the elevator lifting dirt moved by the blade.

3. In combination with a grader having a vehicle frame and a scraper blade, a carrier horizontally pivotally mounted on the frame, a motor connected to one end of the carrier frame, and an elevator connected to the other end of the carrier frame, the elevator lifting the earth moved by the blade.

4. In combination with a grader as claimed in claim 3, the carrier frame having a pivotal mounting on the vehicle frame for partial rotation on a vertical axis.

5. A grader comprising in combination a vehicle frame having a scraper blade, a carrier frame, a pivotal mounting for the carrier frame on the vehicle frame to allow rotation on a vertical axis, a pivotal connection of the carrier frame to the vehicle frame to allow tilting of the carrier frame on a horizontal axis, an engine at one end of the carrier frame, an elevator connected to the other end of the carrier frame, and means to drive the elevator from the engine, the elevater lifting dirt moved by the blade.

6. A grader as claimed in claim 5, means to incline the blade to obtain cambered cuts, and means to tilt the carrier frame on the horizontal axis connected to operate when tilting the blade.

7. A grader comprising in combination a vehicle frame, a scraper blade, a carrier frame pivotally mounted on a horizontal pivot on the vehicle frame, having an engine at one end and an elevator at the other, the elevator being driven from the engine, means to tilt the blade for a cambered cut, and means to tilt the carrier frame to operate with the means for tilting the blade.

8. A grader as claimed in claim 7, a restraining device operatively connected between the blade and the vehicle frame to allow tilting of the blade, but connected to prevent inclining the blade as by an object engaging the lower edge thereof.

9. A grader comprising in combination a vehicle frame, a scraper blade, a carrier frame pivotally mounted on a horizontal pivot on the vehicle frame and having an engine at one end and an elevator at the other, a hopper connected to the elevator, a relatively fixed frame connected with the vehicle frame, a loose connection between the hopper and said fixed frame, and means to tilt the carrier frame and hence slightly move the elevator and the hopper.

10. A grader as claimed in claim 9, means to tilt the blade to obtain a cambered cut, a restraining rod connected to the blade and to the carrier frame to allow tilting movement thereof, but to prevent inclining of the blade by a pressure against the lower edge.

11. A grader as claimed in claim 9, a turn table mounted on the vehicle frame for limited movement on a vertical pivot, the pivotal mounting of the carrier frame being on said turn table.

12. A grader having in combination a vehicle frame, a scraper blade with means to tilt such blade for different cambered cuts, an elevator positioned to elevate the dirt moved by the scraper, a counterbalancing means connected between the elevator and the frame and having an engine mounted thereon with means to drive the elevator from the engine, and means to tilt the counterbalancing means in accordance with the tilting motion of the blade.

13. A grader as claimed in claim 12, means to permit turning the blade at various angles to the direction of motion of the grader, and means to permit turning the counterbalancing means and the elevator to correspond therewith.

14. A grader having in combination a vehicle frame, a scraper blade mounted thereon, means to turn the blade at different angles to the direction of movement of the grader, an elevator, a counterbalancing means including an engine, connecting the elevator and the frame, the elevator being driven from the engine, and means to permit turning the counterbalancing means in accordance with the turning motion of the blade.

15. A grader as claimed in claim 14, a restraining device connected between the blade and the vehicle frame, said means allowing turning movement of the blade, but preventing an inclination of the blade due to pressure on the lower edge.

16. In a grader having a vehicle frame, a scraper blade, a hopper, an elevator pivotally connected thereto, a carrier frame pivotally mounted on the vehicle frame and pivotally connected to the elevator, and an engine on the carrier frame with means to drive the elevator.

17. In a grader as claimed in claim 16, the blade being carried by a blade carrying struc-

ture, and means forming a loose connection between the hopper and the said structure.

18. In a grader having a vehicle frame, a scraper blade, means to tilt the blade for cambered cuts, a rod pivotally connected to the blade and extending through an aperture in an arm connected to the frame, a yoke connected to the blade having an elongated slot therein, the rod passing through the said slot and allowing tilting of the blade, but preventing an inclination of the blade due to pressure on the lower edge.

19. In a grader having a vehicle frame, a scraper blade, means to tilt the blade for cambered cuts, a hopper, a fixed structure carrying the blade, a bracket connected to the hopper, and a stud and slot connection between the bracket and the structure carrying the blade.

20. In a grader having a vehicle frame, a hopper, a scraper blade connected to the hopper, an elevator connected to the hopper, a carrier frame pivotally mounted on the vehicle frame and connected to the elevator, an engine on the carrier frame with means to drive the elevator, and means to operate the blade and carrier frame to change the camber cut of the blade and thereby shift the elevator and hopper.

21. In a grader as claimed in claim 20, means interconnecting the blade and the vehicle frame, and the carrier frame and the vehicle frame to permit turning of the blade and the carrier frame to a limited extent on a vertical axis.

22. In a grader having a vehicle frame, a hopper, a scraper blade connected thereto, an elevator connected to the hopper, a carrier frame pivotally mounted on the vehicle frame and connected to the elevator, an engine on the carrier frame with means to drive the elevator, means interconnecting the blade and the vehicle frame and the carrier frame and the vehicle frame to permit turning to a limited extent, of the blade and the carrier frame on a vertical pivot.

23. In a grader having a vehicle frame, a hopper, a scraper blade connected thereto, an elevator connected to the hopper and having buckets on an endless chain, a carrier frame pivotally mounted on the vehicle frame and connected to the elevator, an engine on the carrier frame with means to drive the elevator, the vehicle frame being adapted for pulling in a forward direction, whereby the earth shifted laterally by the blade is forced into buckets in a contrary direction to the movement of the buckets in the hopper.

24. In combination with a grader having a vehicle frame and a scraper blade, a carrier mounted on a horizontal pivot on the frame, a motor connected to one end of the carrier and an elevator connected to the other end of the carrier, the motor and elevator in part counterbalancing each other, the elevator lifting the earth moved by the blade, and a manually operated means for tilting the carrier to raise or lower the elevator.

25. In combination with a grader as claimed in claim 24, a second manually operated means with a connection to the blade to incline the blade for a camber cut.

26. In combination with a grader having a vehicle frame and a scraper blade, a carrier horizontally pivotally mounted on the frame, a motor on one end of the carrier frame, an elevator connected to the other end of the carrier frame, the motor and elevator in part counterbalancing each other, a rock shaft extending longitudinally of the vehicle frame and having an operating means at one end to rock said shaft, and a connection from the shaft to the carrier to tilt the carrier on the rocking of said shaft.

27. In combination with a grader as claimed in claim 26, there being a second rock shaft and a link connected to the scraper blade to incline the blade to make a camber cut whereby when the blade is inclined the carrier is simultaneously tilted and the elevator raised or lowered.

28. In a grader having a vehicle frame, a scraper blade, means to tilt the blade for camber cuts, a rod having a pivotal connection to the blade, the pivot being at substantially right angles to the face of the blade and substantially horizontal, said rod extending substantially vertically, a yoke rigidly connected to the blade and having a slot substantially parallel to the blade, the rod extending through said slot, a structure connected to the vehicle frame and having an aperture through which the upper end of the rod may slide, the mounting and connection of the said rod allowing tilting of the blade to make a camber cut, but preventing inclination of the blade due to pressure on its lower edge.

In testimony whereof I have signed my name to this specification.

GEO. GARDNER.