Sept. 9, 1930. O. P. MAHONEY ET AL 1,775,314

ROAD GRADING MACHINE

Filed Feb. 3, 1928 2 Sheets-Sheet 1

Fig. 1.

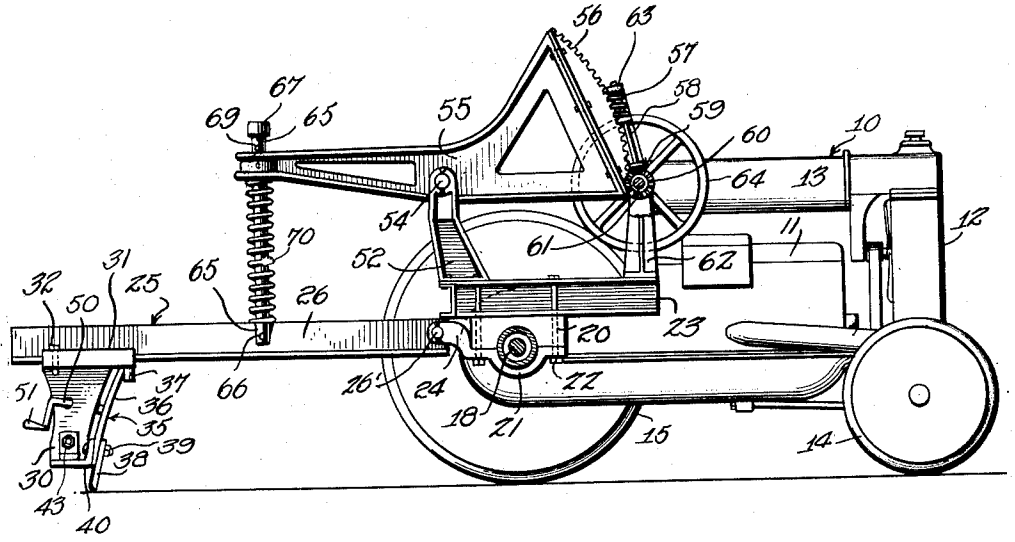


Fig. 2.

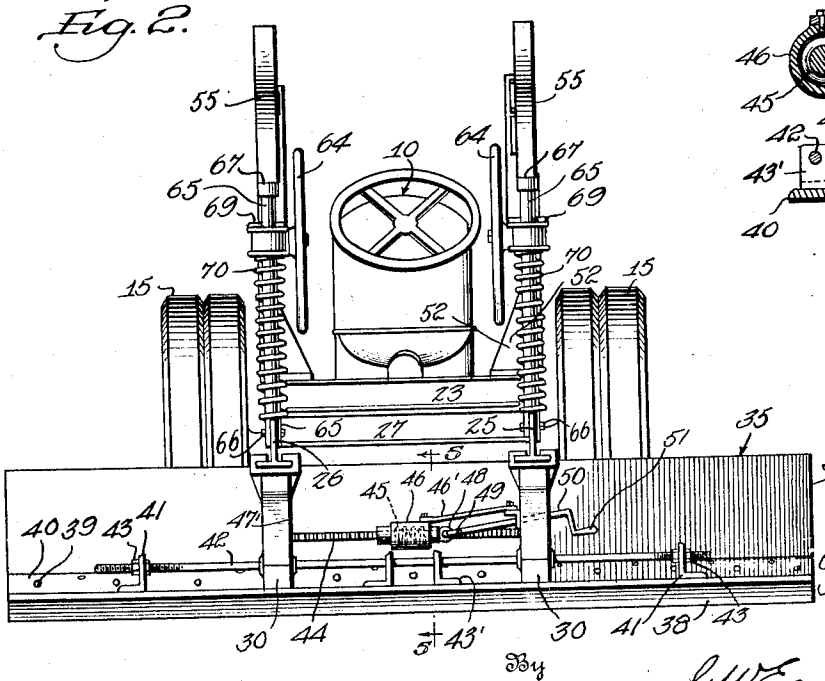
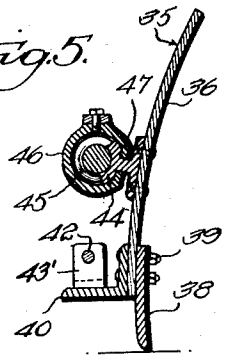


Fig. 5.



Inventor
ORVILLE P. MAHONEY
JOHN P. KEY

By G. W. Earnshaw
Attorney

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Fig. 3.

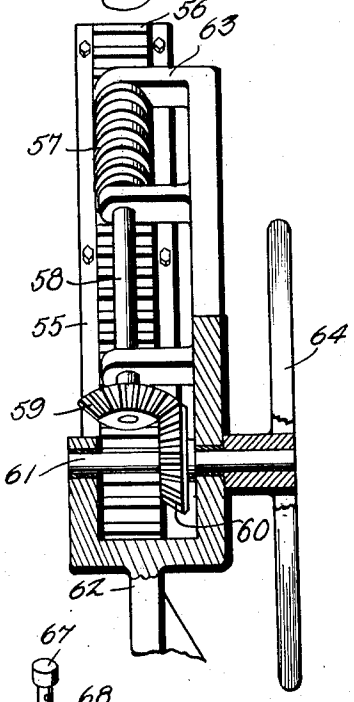
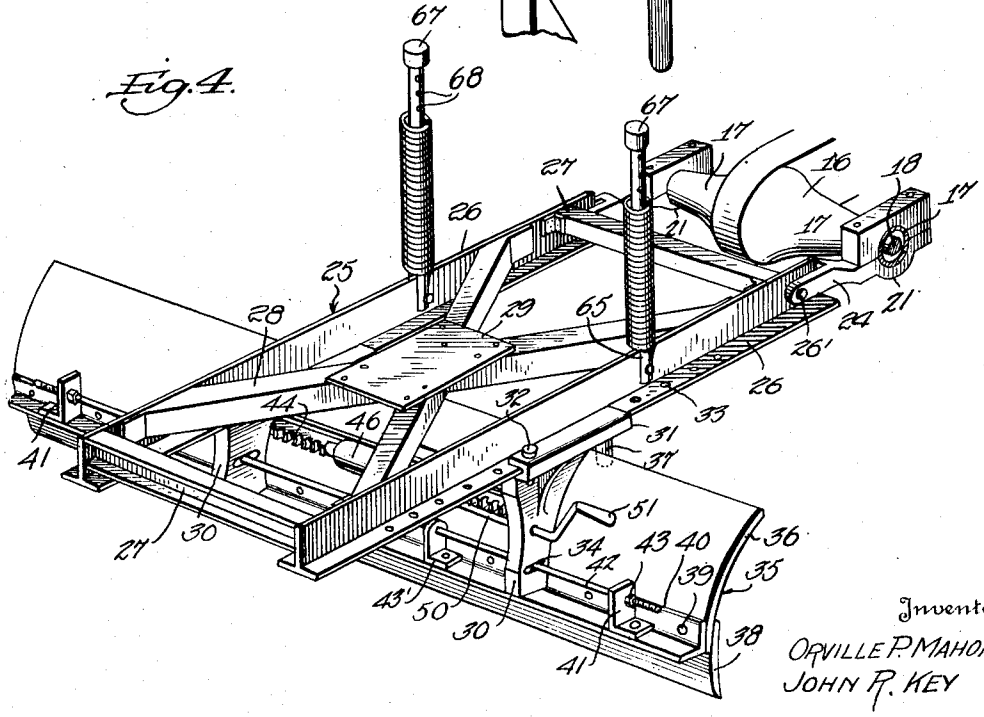


Fig. 4.



Inventor
ORVILLE P. MAHONEY
JOHN R. KEY

By G. W. Earnshaw
Attorney

Patented Sept. 9, 1930 1,775,314

UNITED STATES PATENT OFFICE

ORVILLE P. MAHONEY, OF JOPLIN, AND POHN R. KEY, OF CARTHAGE, MISSOURI

ROAD-GRADING MACHINE

Application filed February 3, 1928. Serial No. 251,679.

This invention relates to road grading or scraping machines.

An important object of the invention is to provide a novel scraping machine which is adapted to be attached to a tractor to be drawn thereby without material alteration of the tractor.

A further object is to provide a device of the character referred to which is adapted to be attached to a tractor in such a manner as to eliminate the necessity for providing supporting wheels for the device, and which is adapted to track behind the tractor without any lateral movement.

A further object is to provide a device of the above mentioned character employing a scraper blade adapted to engage the road surface and having means associated therewith to permit any predetermined pressure to be applied thereto.

A further object is to provide a structure of such character that the blade is maintained in engagement with the road surface at all times, but which is adapted to swing upwardly to pass over surface inequalities in the road to prevent injury to the blade or associated parts.

A further object is to provide a device of the character referred to wherein the blade is adapted to be longitudinally and laterally adjusted with respect to its supporting frame and to be angularly adjusted without the use of a fixed center point.

A further object is to provide a road scraper which is adapted to be connected at its forward end to an ordinary tractor of either the wheel or crawler type to be drawn and supported thereby, the structure being readily attachable and detachable as may be desired, and being relatively cheap to manufacture.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings we have shown one embodiment of the invention. In this showing,

Figure 1 is a side elevation of a tractor showing the invention applied,

Figure 2 is a rear elevation of the same,

Figure 3 is a detail view of the operating mechanism for the rocker arms,

Figure 4 is a detail perspective view of the device and its connections with the tractor, and,

Figure 5 is a detail section on line 5—5 of Figure 2.

Referring to the drawings, the numeral 10 designates a tractor as a whole, illustrated in the present instance as being of the conventional four wheel type, but it will become apparent that the device may be attached to any other form of tractor such as the crawler tread type. The tractor includes a motor 11, radiator 12, and fuel tank 13, and is mounted upon front and rear supporting wheels 14 and 15 respectively. The usual differential housing 16 is arranged at the rear of the vehicle and is provided with oppositely extending housings 17 in which are arranged driving axles 18.

Supporting blocks 20 are arranged over the end portions of the housings 17, and lower relatively heavy caps 21 are arranged against the bottom portions of the housings and are secured to the blocks 20 by bolts 22. Side rails 23 are substituted for the usual structure above the blocks 20, and these rails also are secured in position by the bolts 22. The caps 21 are provided with rearwardly extending ears 24 for a purpose to be described.

A rigid frame indicated as a whole by the numeral 25 is arranged rearwardly of the tractor as shown in Figures 1 and 4. This frame includes side frame members 26, preferably formed of inverted T-rails. The frame is pivotally connected at its forward end to the ears 24 as at 26′. The rails are connected at their opposite ends by cross members 27, and are further braced by angular braces 28 which may be secured together at their centers by a plate 29. It will be apparent that the frame 25 is rigid, and is not subject to any distortion in a horizontal plane.

A depending support 30 is arranged beneath each side frame member 26 and is provided at its upper end with an elongated guide 31 slidable upon the base of the adjacent side

frame member. A bolt or pin 32 is carried by each guide 31 and is adapted to be selectively received in openings 33 formed in the base of the associated side frame member to permit the supports to be adjusted longitudinally along the supporting frame. The supports 30 are provided adjacent their lower ends with horizontally elongated openings or slots 34, for a purpose to be described.

A scraper indicated as a whole by the numeral 35 is arranged beneath the side frame and forwardly of the supports 30. The scraper includes an upper arcuate plate 36, the upper edge of which is arranged rearwardly of lugs 37 depending from the forward portions of the guides 31. It will be noted that the curvature of the forward edges of the supports 30 substantially corresponds to that of the plate 36, whereby the scraper is prevented from swinging forwardly or rearwardly at its upper or lower edges. A scraper blade 38 is secured to the lower edge of the plate 36 by bolts 39 which also extend through an angle iron 40. The bolts are adapted to be removed to permit replacement of the blade 38. Angle brackets 41 are secured to the angle plate 40 and the upstanding portions of these brackets receive a rod 42 which extends through the slots 34 of the supports 30. The rod 42 is threaded at its ends for reception in nuts 43 which are adapted to engage against the brackets 41. Brackets 43′ may be mounted upon the angle iron 40 to support the rod 42 between the supports 30. It will be apparent that the brackets 41 are arranged a substantial distance outwardly of the supports 30, whereby the scraper is adapted to be adjusted transversely of the apparatus in a manner to be described.

A rack bar 44 is carried by the plate 36 and is adapted to mesh with a worm 45 journalled in a housing 46. This housing is provided with edge portions 47 slidably engaging the rack bar as shown in Figure 5. A reach rod 46′ is connected at opposite ends respectively to the housing 46 and one of the supports 30 to prevent movement of the housing and worm longitudinally with respect to the scraper blade. One end of the shaft of the worm 45 is provided with an eye 48 adapted to be engaged by a similar eye 49 carried by a shaft 50. The connection between the eyes 48 and 49 forms a universal joint to permit the shaft 50 to be arranged at an angle. This shaft extends through one of the supports 30 and is provided at its outer end with a suitable operating crank 51.

A bracket 52 is mounted on the rear end of each of the side rails 23 and is provided at its upper end with a shaft 54 rotatably supporting a rocker arm 55. Each rocker arm is provided at its forward end with a segment gear 56 meshing with a worm 57 carried by a shaft 58. This shaft carries a bevel gear 59 at its lower end meshing with a similar gear 60 carried by a shaft 61. A supporting bracket 62 is mounted on the upper end of each side rail 23 and rotatably supports the shaft 61. The brackets 62 extend above the shaft 61 and are provided with lateral extensions 63 forming bearings for the shafts 58. The inner end of each shaft 58 is provided with a hand wheel 64 to permit the shaft to be operated.

A vertical rod 65 is pivotally connected to each of the side frame members 26 as at 66 and extends upwardly through an opening formed in the rear end of the associated rocker arm 55. The rods 65 preferably fit loosely in their openings in the rocker arms to permit them to assume different angular positions with respect to the latter. The rods 65 are capped at their upper ends as at 67 and are provided with a series of openings 68 adapted to receive pins 69 which engage the upper faces of the rear ends of the rocker arms 55 to limit the upward movement of the latter with respect to the rods 65. Relatively heavy coil springs 70 surround the rods 65 between the rocker arms 55 and the side frame members 26.

The operation of the device is as follows:

The forward end of the frame 25 is wholly supported by the rear end of the tractor, and the frame possesses a high degree of horizontal rigidity. The frame of the tractor also is rigid, and since the frame 25 is connected to the tractor at opposite sides by the pivot pins 26′, it will be apparent that side sway of the rear end of the frame 25 and the scraper will be effectively prevented. The pressure of the scraper blade 38 upon the road surface readily may be adjusted by varying the tension of the springs 70. This readily may be accomplished by turning the hand wheels 64 to rotate the shafts 61 and 58, and rotation of the latter shafts will be transmitted to the rocker arms 55 through the worms 57 and segment gears 56. Thus the rear ends of the rocker arms may be moved downwardly to increase the tension of the springs 70 and thus cause the scraper blade more firmly to engage the surface of the road. If it is desired to create a greater scraper blade pressure at one side of the road, or at one end of the blade, one of the hand wheels 64 may be turned to a greater extent than the other.

The pins 69 are inserted in the openings 68 of the rods 65 just above the tops of the rocker arms 55. As the scraper travels over the road, it operates in the usual manner, and the inequalities in the road, if too hard to be scraped smooth, will cause the scraper and frame 25 to be moved upwardly against the tension of the springs 70. Obviously, the rocker arms cannot swing about their pivots because of the engagement between the segment gears 56 and worms 57. When it is desired to elevate the scraper, the hand wheels 64 may be rotated to swing the rear ends of

the rocker arms upwardly, and the latter will engage the pins 69 to lift the rods 65, and consequently elevate the frame 25 and the scraper.

The entire scraper structure may be adjusted longitudinally on the frame 25 merely by removing the pins 32, sliding the guides 30 and reinserting the pins 32 in the desired openings 33. The angularity of the scraper blade also may be varied by sliding one of the guides 31 forwardly to a greater extent than the other guide. Obviously the supports 30. under such conditions, will retain their relative positions with respect to the side frame members 26, but the scraper blade and associated elements may change their angular positions because of the arrangement of the rod 42 in the elongated openings 34. While the rod 42 is adapted to change its angular position horizontally, it acts as the supporting means for the scraper blade. Transverse adjustment of the scraper blade may be accomplished by rotating the crank 51. This action rotates the worm 45 and since this element meshes with the rack 44, the scraper blade and associated elements will be moved transversely with respect to the frame 25. The transverse sliding action of the scraper elements is permitted by virtue of the slidable arrangement of the rod 42 within the openings 34.

From the foregoing it will be apparent that the present device provides a scraper structure which is normally rigid in a horizontal plane, but wherein the scraper blade readily may be adjusted transversely of the frame. The angular position of the scraper also may be readily changed, and the predetermined pressure of the blade upon the road surface may be adjusted from the driver's seat by rotation of the hand wheels 64, the driver's seat being located in the usual position, and supported by the side rails 23. It also will be apparent that the driver of the tractor readily may elevate the scraper from the road without leaving his seat, by rotating the hand wheels 64.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

We claim:

1. A device of the character described comprising a frame pivotally connected at its forward end to the rear end of a supporting and propelling vehicle to swing in a vertical plane, a depending scraper mounted substantially transversely of said frame beneath the other end thereof, means for connecting said scraper to said frame to permit it to be adjusted thereon toward and away from the vehicle, and means for adjusting said scraper transversely with respect to said frame.

2. A device of the character described comprising a frame pivotally connected at its forward end to the rear end of a supporting and propelling vehicle to swing in a vertical plane, a depending scraper mounted substantially transversely of said frame beneath the other end thereof, means for connecting said scraper to said frame to permit it to be adjusted thereon toward and away from the vehicle, and means for transversely adjusting said scraper with respect to said frame comprising a rack and a rotatable worm meshing therewith carried respectively by said scraper and said frame.

3. A device of the character described comprising a frame pivotally connected at its forward end to the rear end of a supporting and propelling vehicle to swing in a vertical plane, said frame including a pair of longitudinal side members, a support slidably mounted on each of said side members, means for retaining said supports in selected positions on said side members, and a scraper connected to said supports.

4. A device of the character described comprising a frame pivotally connected at its forward end to the rear end of a supporting and propelling vehicle to swing in a vertical plane, said frame including a pair of longitudinal side members, a support slidably mounted on each of said side members, means for retaining said supports in selected positions on said side members, each of said supports including a depending portion having an opening extending therethrough, a scraper, and a rod carried by said scraper and slidably mounted in said openings, said openings being enlarged transversely with respect to said rod and longitudinally with respect to said frame whereby said scraper is adapted to swing to a limited extent in a horizontal plane, the upper portion of said scraper engaging a portion of each of said supports to hold said scraper in upright position.

5. A device constructed in accordance with claim 4 provided with means for sliding said scraper transversely with respect to said frame.

6. A device constructed in accordance with claim 4 provided with a rack carried by said scraper and extending transversely of said frame, and a worm meshing with said rack and rotatable to slide said scraper transversely with respect to said frame.

7. A device of the character described comprising a frame pivotally connected at opposite sides of its forward end to the rear end of a supporting and propelling vehicle to swing in a vertical plane, said frame including a pair of longitudinal side members, a support slidably connected at its upper end to each of said side members and depending

therefrom, means for retaining said supports in selected positions on said side members, a scraper carried by said supports and adjustable thereon transversely with respect to said frame, spring means normally urging said frame downwardly to maintain said scraper in contact with the surface being worked, and means movable in one direction to increase the tension of said springs and in the opposite direction to elevate said frame.

8. A device constructed in accordance with claim 7 wherein said last named means comprises a rocker arm arranged over each side of said frame and pivotally connected to the vehicle, said rocker arms contacting with said spring means, and means for connecting said rocker arms to said frame whereby movement of said rocker arms in one direction is adapted to elevate said frame.

O. P. MAHONEY.
JOHN R. KEY.