April 19, 1938. M. M. SPENCER 2,114,434

ROAD WORKING MACHINE

Filed March 14, 1936 3 Sheets-Sheet 1

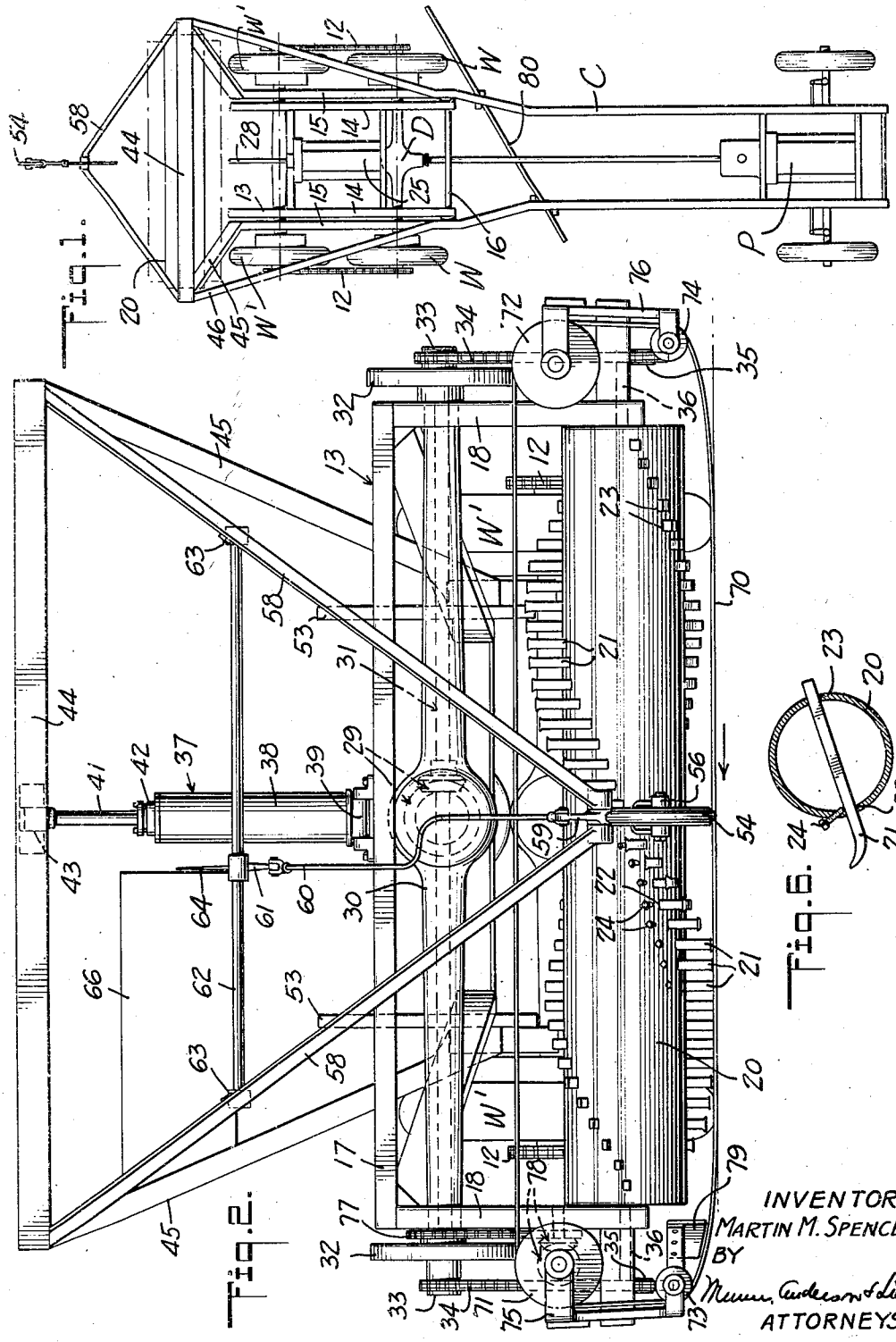


Fig. 1.

Fig. 2.

Fig. 6.

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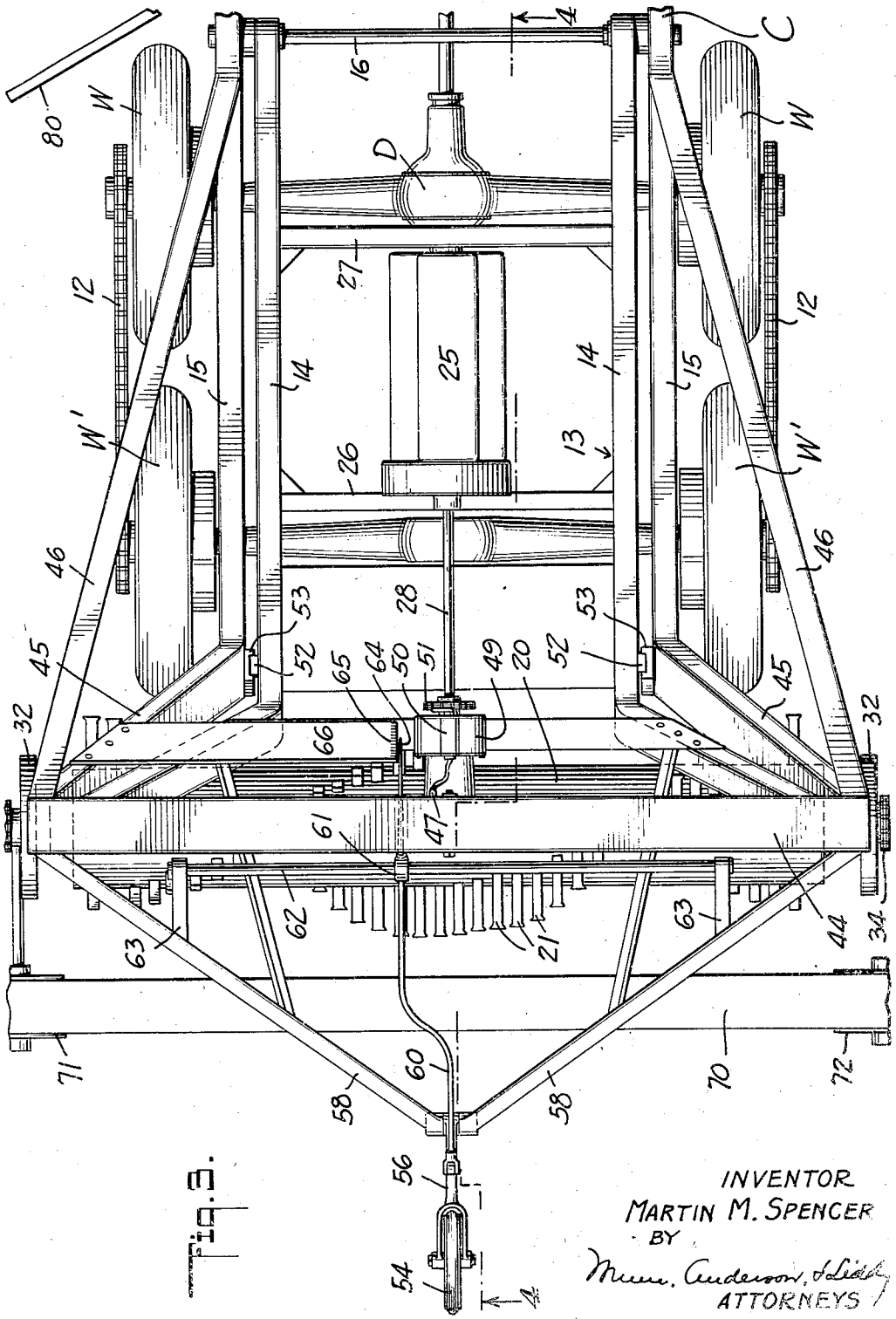


Fig. 3.

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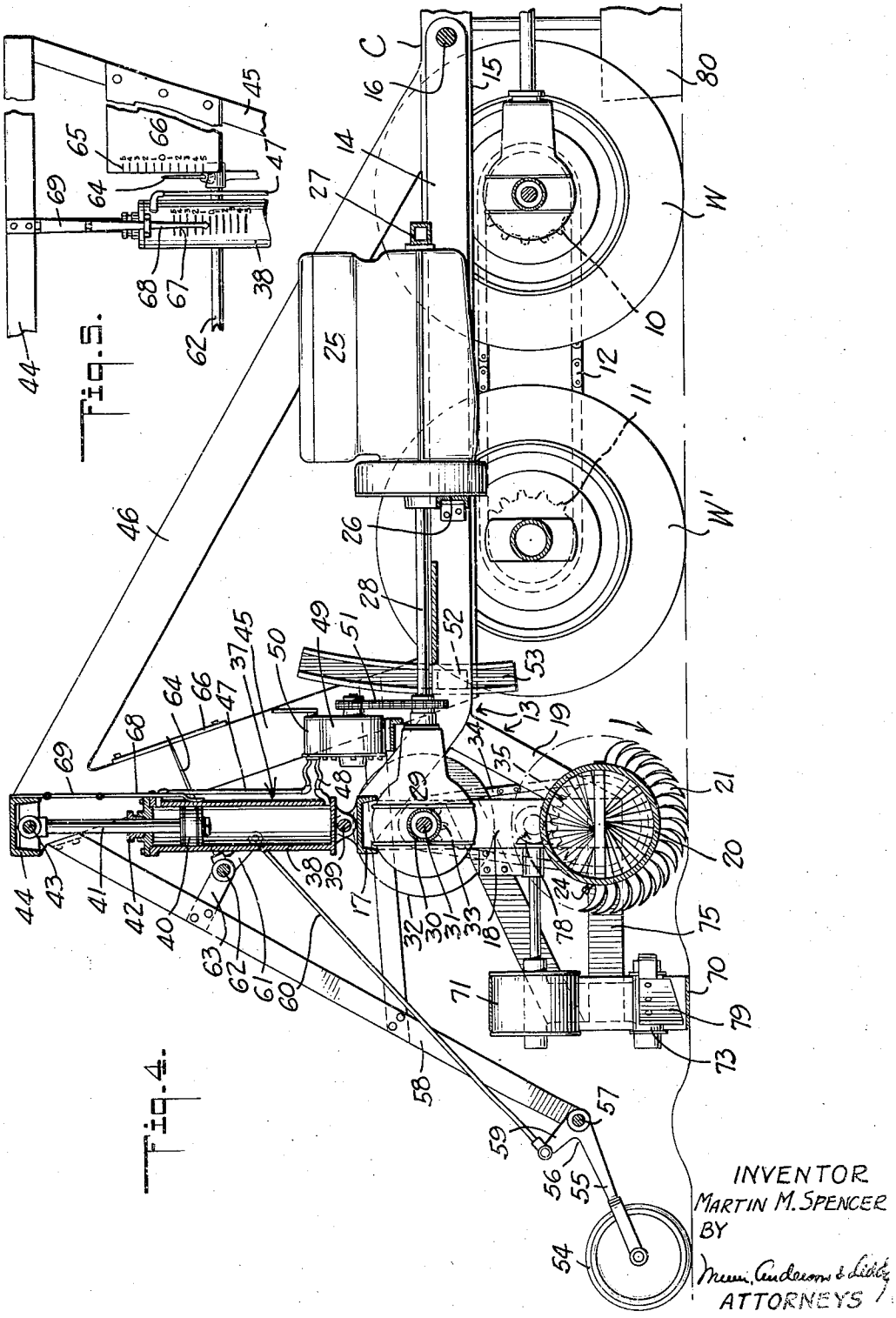


Fig. 4.

Fig. 5.

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2,114,434

ROAD WORKING MACHINE

Martin M. Spencer, Sunland, Calif.

Application March 14, 1936, Serial No. 68,860

8 Claims. (Cl. 37—108)

This invention relates generally to excavating machinery and more particularly to road working machines.

An object of this invention is to provide a road working machine by which surface projections, bumps, ridges, and other forms of raised areas relative to the general grade of a paved road can be removed therefrom in an economical and highly efficient manner so as to enable the road to be refinished expeditiously and again rendered satisfactorily to traffic.

A further object of the invention is to provide a road working machine of the above described character embodying means by which the cutting mechanism of the machine can be readily adjusted vertically to compensate for changes in the grade of the road in advance of the machine as indicated to the operator by a suitable indicating mechanism correlated with the machine.

Another object of the invention is to provide a road working machine wherein the material removed from the road surface by the cutting mechanism will be windrowed in a manner to prevent such material from interfering with the cutting operation as the machine advances over the road.

Still another object of the invention is to provide a road working machine wherein the cutters of the cutting mechanism can be relatively adjusted to conform in their cutting action to the contour of a crowned road so as not to change the surface contour, yet permit all projections to be cut therefrom.

A further object of the invention is to provide a road working machine wherein its road wheels are so related to the chassis and to the cutters as to minimize vertical displacement of the chassis by road inequalities, whereby to enable a more level trimming of the road to be effected than can be accomplished by machines heretofore proposed.

With these and other objects in view, the invention consists in the combinations and arrangements of elements as set forth in the following specification and particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a semi-diagrammatic plan view of the road working machine embodying this invention;

Figure 2 is a view of the machine in front elevation;

Figure 3 is a fragmentary plan view of the forward end of the machine;

Figure 4 is a vertical longitudinal sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a fragmentary detail view of a grade indicating mechanism embodied in the invention;

Figure 6 is a detail sectional view illustrating the manner in which each of the cutters embodied in the cutting mechanism is mounted.

Referring specifically to the drawings, the road working machine is shown generally in Figure 1 as utilizing the chassis C_c of a six wheel automobile truck, the power plant P of which drives one pair of the rear wheels W—W through the usual differential mechanism D. The other pair of rear wheels W'—W' is driven from the pair W—W by outboard sprockets 10—11 and chains 12, and it is to be understood that in the use of the truck as one form of mounting for this invention, the truck is intended to be operated in reverse gear so as to be driven backwards over a road during operation of the cutting mechanism embodying this invention, which mechanism is disposed beyond the rear wheels of the truck to therefore be in advance of the truck as the latter travels rearwardly over a road. The wheels W and W' thus become the front wheels of the vehicle during a road cutting operation. To increase the speed of the truck in reverse gear, it will be manifest that an additional transmission (not shown) can be utilized, and that the usual steering mechanism for the front wheels of the truck can be modified and suitably extended to a point convenient to an operator stationed on a suitable platform at the rear end of the truck.

The invention in its present embodiment comprises a mounting frame 13 having side members 14—14 disposed between the longitudinal members 15—15 of the chassis C and pivotally mounted at one end on a rod 16 spanning said longitudinal members. At their other ends the side members 14—14 diverge and incline upwardly to a transverse channel bar 17. From the side members 14—14 depend other members 18 and 19 in the lower joined ends of which is mounted for rotation about an axis parallel to the axis of the truck wheels, the cutting mechanism embodying this invention.

The cutting mechanism comprises a drum 20 journaled in the members 18 and 19 and carrying a multiplicity of cutters or chisels 21 passing through suitable openings 22 and 23 in the wall of the drum so as to extend diametrically through the drum. The cutting ends of the chisels are curved and flared, and the chisels are secured in

fixed positions of adjustment radially of the drum by means of set screws 24 as shown in Figure 6. From Figure 2 it will be noted that the chisels are arranged in a spiral series along the length of the drum so as to successively have cutting contact with the surface of a road when the drum is rotated in the direction of the arrow in Figure 4. The radial adjustment of the chisels enables them to be individually adjusted to conform to the surface contour of both crowned and flat roads.

The drum 20 is adapted to be power driven from a suitable engine 25 supported on cross bars 26 and 27 from the side members 14—14 of the cutter mounting frame 13 so as to be disposed longitudinally between the side members. A drive shaft 28 from the engine 25 is coupled into a suitable gear driving mechanism 29 mounted in a housing 30 spanning and supported by the depending members 18 of the frame 13 above the cutting mechanism. The shaft 31 of the driving mechanism 29 is extended from the respective ends of the housing 30 and through the frame members 18 to receive fly wheels 32—32 and driving sprockets 33—33 which drive the drum 20 through chains 34—34 and sprockets 35—35 fixed to the trunnions 36—36 on the ends of the drum 20.

The cutting mechanism is supported and rendered adjustable vertically relative to the chassis C by a hydraulically controlled actuating mechanism 37. This mechanism comprises a cylinder 38 pivotally connected at 39 to the transverse channel bar 17 at a point medially between the ends of the bar, and having working therein a piston 40 fixed to a rod 41 passing through a packing gland 42 at the upper end of the cylinder for pivotal connection at 43 to a second transverse channel bar 44 forming a rigid part of the chassis C by being supported at its ends from frame members 45—45 and 46—46 converging upwardly and rearwardly from the members 15—15 of the chassis C.

Liquid is adapted to be forced into one end of the cylinder and discharged from the other end or vice versa through pipes 47 and 48 by a conventional rotary pump 49, under the control of a suitable manually operable valve 50, the pump being constantly driven from the engine shaft 28 by a sprocket and chain connection 51. It will be clear that this operation of the pump will cause the cylinder 38 and piston 40 to coact in raising or lowering the cutting mechanism relative to the chassis and to the ground wheels W and W' which have unsprung mountings on the chassis frame. It will be understood that in a neutral position of the valve 50, the liquid will be held against circulating so that the cutting mechanism can be supported in any desired position of vertical adjustment about the axis of the rod 16 on which the cutter frame 13 is mounted. In order to confine the frame 13 against lateral displacement and yet permit of its vertical swinging movement, guide blocks 52—52 are fixed to the side members 14—14 and work in arcuate guideways 53—53 fixed to the inner sides of the chassis frame members 15—15 as shown in Figures 3 and 4.

Rolling freely on the road in advance of the cutting mechanism is a grade following wheel 54 journaled in one arm 55 of a bell crank lever 56 pivoted at 57 on a bracket structure 58 supported from the members 45—45 of the chassis frame. To the other arm 59 of the bell crank lever is connected one end of a connecting rod 60, the other end of which is connected to a lever 61 fixed to a rock shaft 62 journaled in bearings 63—63 on the bracket structure 58. Also fixed to the shaft 62 is a pointer 64, the end of which is adapted to traverse graduations of a height scale 65 provided on a panel 66 projecting from one of the members 45. The graduations of the scale represent inches of height in grade of the road at the wheel 54, above and below the grade of the road at the wheels W and W', from a zero or medial position on the scale at which the grades of the wheel 54 and wheels W—W' coincide.

On the cylinder 38 are graduations of a second height scale 67 adapted to be traversed by a pointer 68 connected to the transverse member 44 of the chassis frame by a link 69. The graduations of the scale 67 represent inches of height in grade of the road directly beneath the cutting mechanism, above and below the grade of the road at the wheels W and W', from a zero or medial position on the scale at which the grades at these two locations coincide. The provision of these two indicating devices enables the operator to adjust the cutting mechanism to compensate for changes in the grade of the road in advance of the machine so that the cutting mechanism will not cut into the body of the roadway but will only remove therefrom any raised areas, bumps, ridges or other projections in advance of the mechanism.

In order to prevent any excessive accumulation of cuttings from clogging the cutting mechanism as the machine advances, an endless transverse belt 70 having its lower stretch freely riding the road surface sufficiently in advance of the mechanism to receive cuttings therefrom, is trained over pulleys 71 and 72 and idler pulleys 73 and 74 journaled in brackets 75 and 76 supported from the frame 13. This belt is driven in the direction of the arrow in Figure 2 from one of the axles 31 through a sprocket and chain connection 77 and bevel gearing 78. At the discharge end of the belt 70 and coacting with its lower stretch is a deflector 79 for forcing the cuttings rearwardly from the belt so as to windrow the cuttings during operation of the belt.

A scraper blade 80 suitably supported from the chassis frame to occupy an oblique position, windrows all surplus material for hauling away to fill depressions and holes in the road.

The operation of the invention is as follows:

Assuming that the vehicle is being driven over the road to be planed, and that the cutting element is in operation so as to cut from the road surface any bumps, ridges or other projections above the grade of the road wheels W and W', the cutting element occupying its position of vertical adjustment wherein its cutters 21 trim the road surface to a grade coinciding with the grade of the road at the wheels W and W'. Under this condition the grade following wheel 54 will coact with the road surface to cause its correlated pointer 64 to indicate on the scale 65 that a generally unchanging grade temporarily exists in advance of the cutting element, it being understood that the pointer 64 indicates zero on the scale so long as there is no change in grade.

However, should the grade change in advance of the cutting element, the wheel 54 in following the grade, will cause the pointer 64 to indicate on its scale whether the grade is rising or descending, and the amount thereof. The operator in nothing this change in grade will actuate the hydraulic valve 50 to cause the hydraulic cylinder and piston unit to vertically adjust the cutting

element a corresponding amount as indicated on the scale 67 by the pointer 68. At each change in grade the necessary vertical adjustment of the cutting element should be made to insure that only the projections above the road surface will be removed flush with the surface. When the cutting element is not in use it can be raised to a height affording necessary road clearance, and the wheel 54 can be removed so that the truck will be free for forward travel over the highways at normal cruising speeds. When the amount of material to be removed from a road is not excessive, the belt 70 can be dispensed with.

It is to be understood that the rigid mounting of the pairs of wheels W—W and W'—W' on the chassis frame directly through the medium of their axles, enables either pair to support the vehicle should the other pair encounter a road surface depression, thus minimizing vertical displacement of the chassis by road surface inequalities and insuring a much more level trimming of the road.

I claim:

1. A machine of the class described comprising a wheeled vehicle; a cutting element; means for mounting the cutting element on the vehicle for rotary movement about an axis transversely of the vehicle and for adjustment vertically relative to the wheels of the vehicle; means for adjusting the mounting means so as to enable said element to cut projections from a road surface as the vehicle is advanced over a road; means for driving the cutting element; means for indicating the position of vertical adjustment of the cutting element relative to the wheels of the vehicle; and means coacting with the road in advance of the cutting element to indicate changes in the grade of the road so that the operator can adjust the cutting element to compensate for the grade change.

2. A machine of the class described comprising a wheeled vehicle; a cutting element; means for mounting the cutting element on the vehicle for rotary movement about an axis transversely of the vehicle and for adjustment vertically relative to the wheels of the vehicle; means for adjusting the mounting means so as to enable said element to cut projections from a road surface as the vehicle is advanced over a road; means for driving the cutting element; means for indicating the position of vertical adjustment of the cutting element relative to the wheels of the vehicle; a wheel mounted on the vehicle to contact and follow the grade of the road in advance of the cutting elment; and indicating means operatively associated with said wheel to indicate changes in the grade of the road so that the operator can adjust the cutting element accordingly to compensate for the change in grade.

3. A machine of the class described comprising a wheeled vehicle; a cutting element having a multiplicity of cutters spirally arranged thereon along the length thereof; a frame on which the cutting element is mounted for rotation; means for pivotally mounting the frame on the vehicle with the axis of the cutting element disposed transversely of the vehicle, for adjustment of the cutting element vertically with respect to a road over which the vehicle is adapted to travel; manually controlled means for adjusting the frame to a selected position of adjustment so as to enable the cutting element to remove projections from a road surface as the vehicle travels thereover; means for driving the cutting element; and means for indicating the changes in the grade of the road in advance of the cutting element so as to enable the operator to adjust the frame in accordance with the grade change.

4. A machine of the class described comprising a wheeled vehicle; a cutting element having a multiplicity of cutters spirally arranged thereon along the length thereof; a frame on which the cutting element is mounted for rotation; means for pivotally mounting the frame on the vehicle with the axis of the cutting element disposed transversely of the vehicle for adjustment of the cutting element vertically with respect to a road over which the vehicle is adapted to travel; manually controlled means for adjusting the frame to a selected position of adjustment so as to enable the cutting element to remove projections from a road surface as the vehicle travels thereover; means for driving the cutting element; a wheel mounted on the vehicle in contact with the road in advance of the vehicle, and to follow the road contour independently of the vehicle; and indicating means operatively associated with said wheel to indicate changes in the grade of the road in accordance with vertical movements of said wheel relative to the ground wheels of the vehicle, so as to enable the operator to adjust the frame in accordance with the grade crossing.

5. A machine of the class described comprising a wheeled vehicle; a cutting element having a multiplicity of cutters spirally arranged thereon along the length thereof; a frame on which the cutting element is mounted for rotation; means for pivotally mounting the frame on the vehicle with the axis of the cutting element disposed transversely of the vehicle, for adjustment of the cutting element vertically with respect to a road over which the vehicle is adapted to travel; manually controlled means for adjusting the frame to a selected position of adjustment so as to enable the cutting element to remove projections from a road surface as the vehicle travels thereover; means for driving the cutting element; means responsive to vertical adjustment of the frame to indicate the position of adjustment thereof relative to the road grade at the vehicle wheels; and means coacting with the road in advance of the cutting element to indicate changes in the road grade so that the operator can adjust the frame accordingly to compensate for the change in grade.

6. A machine of the class described comprising a vehicle; a cutter; means for mounting the cutter on the vehicle for vertical adjustment; means for indicating the vertically adjusted position of the cutter; and means carried by the vehicle adapted to co-act with the road in advance of the cutter to indicate changes in the road grade so that the cutter can be vertically adjusted accordingly to compensate for the grade change.

7. A machine of the class described comprising a vehicle; a cutter; means for mounting the cutter on the vehicle for vertical adjustment; means for indicating the vertically adjusted position of the cutter; a wheel mounted on the vehicle to roll on the road in advance of the vehicle and follow the grade of the road; and indicating means operatively associated with said wheel to indicate road grade changes so that the cutter can be vertically adjusted accordingly to compensate for the change in grade.

8. A machine for removing projections from a road surface as the machine is advanced over a

road, comprising a chassis having front and rear wheels; there being at least two pairs of front wheels rigidly mounted on the chassis with one pair disposed in advance of the other so that either pair will support the chassis should the other encounter a road surface depression, whereby the pairs of wheels will co-act in minimizing vertical displacement of the chassis by road surface inequalities; a cutter mounted on the chassis in advance of the front wheels; and means for propelling the machine.

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