M. HAYNES.

ROAD SURFACING GRADER.

APPLICATION FILED FEB. 20, 1912.

1,158,805.

Patented Nov. 2, 1915.

4 SHEETS—SHEET 1.

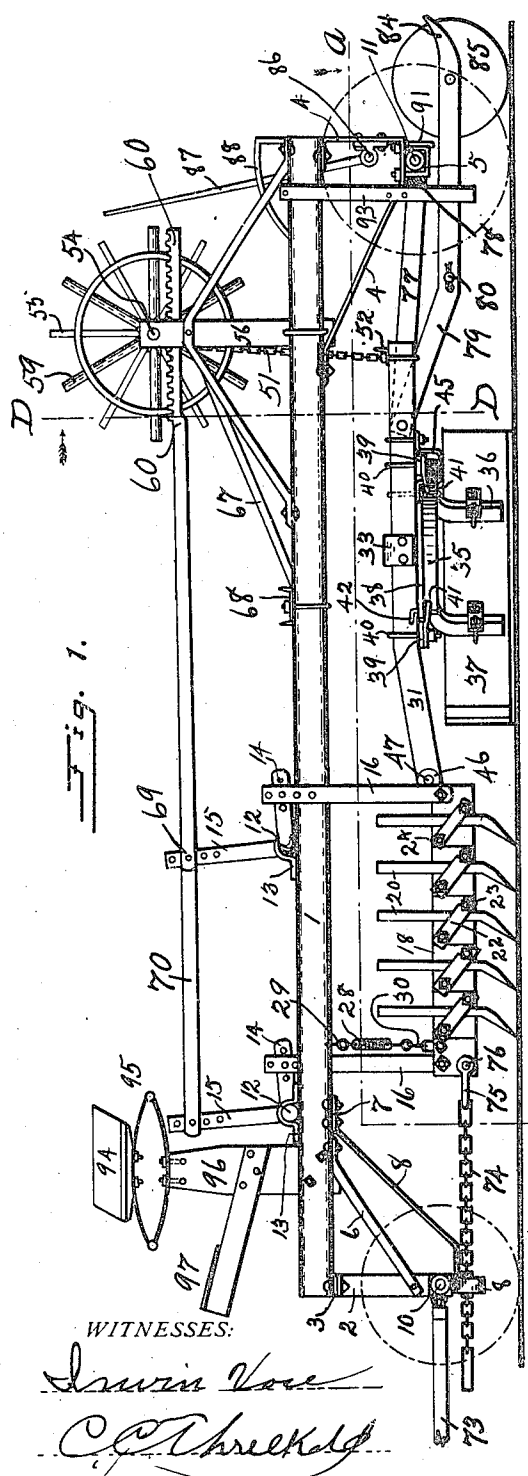


Fig. 1.

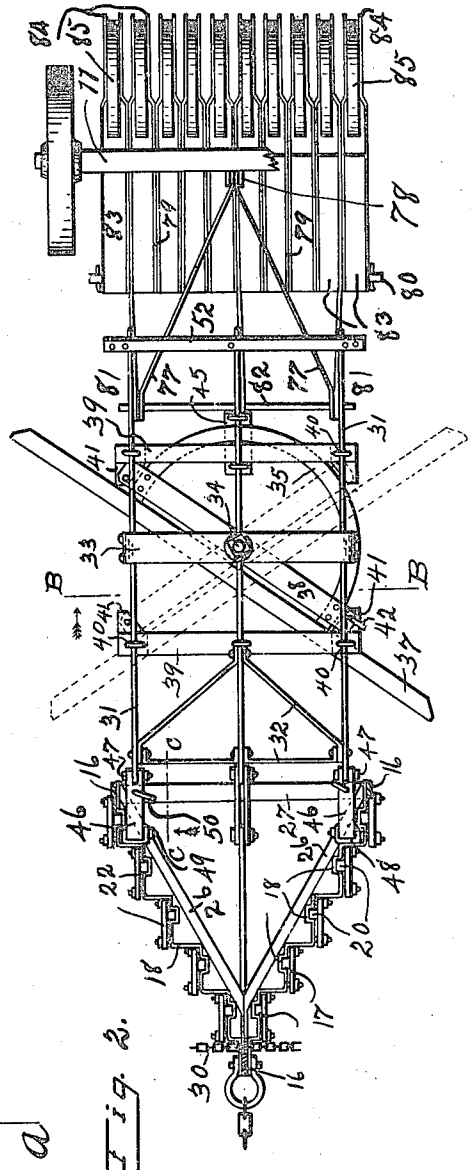


Fig. 2.

WITNESSES:

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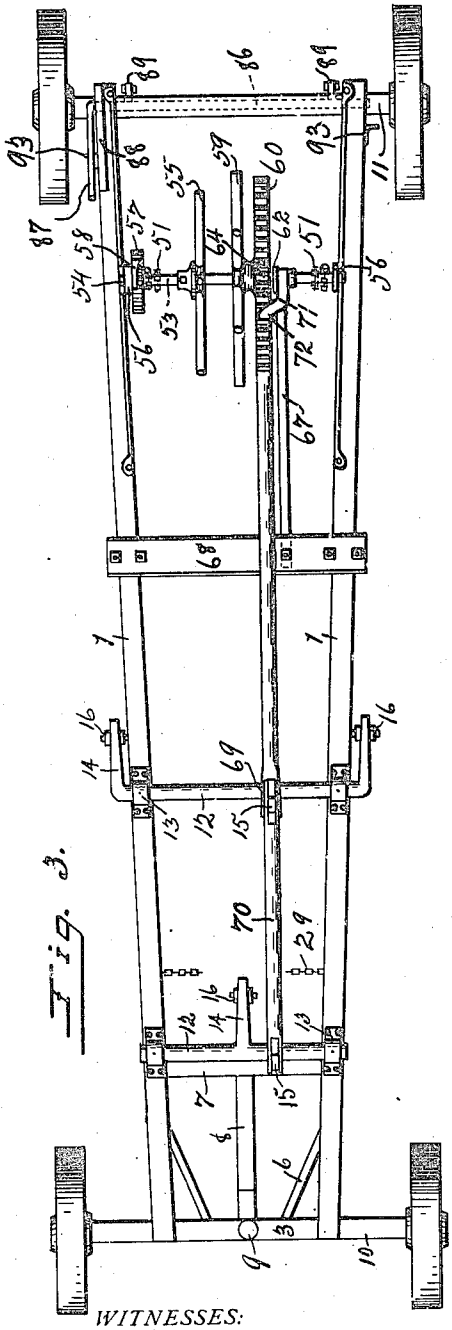


Fig. 3.

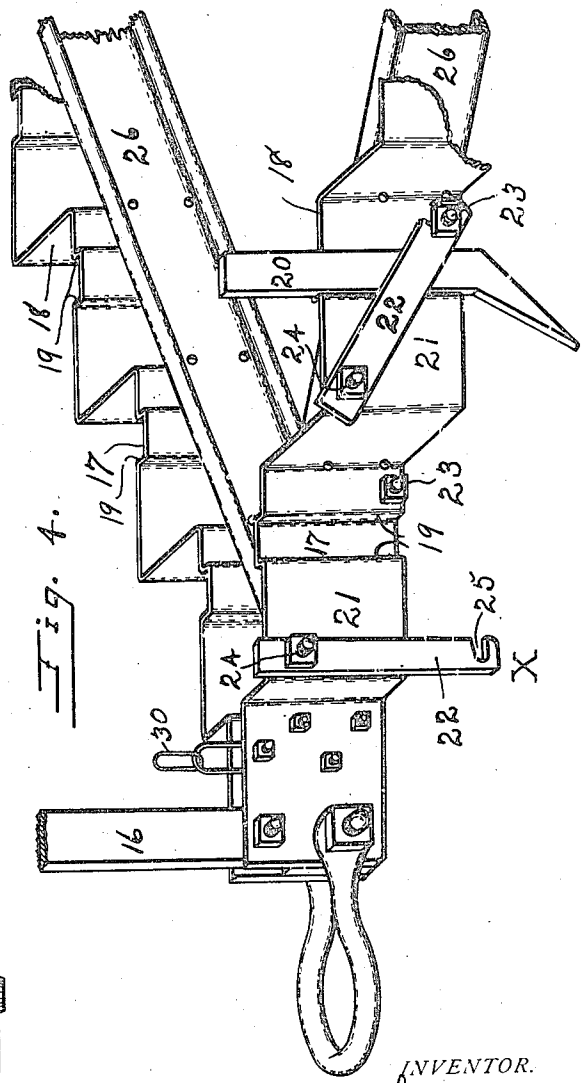


Fig. 4.

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4 SHEETS—SHEET 3.

Fig. 5.

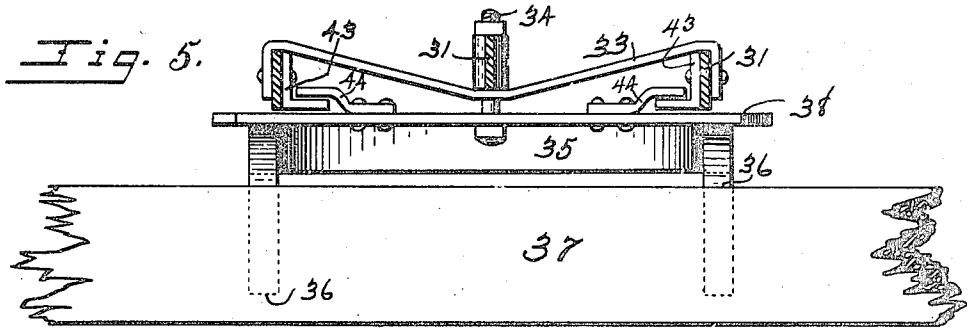


Fig. 6.

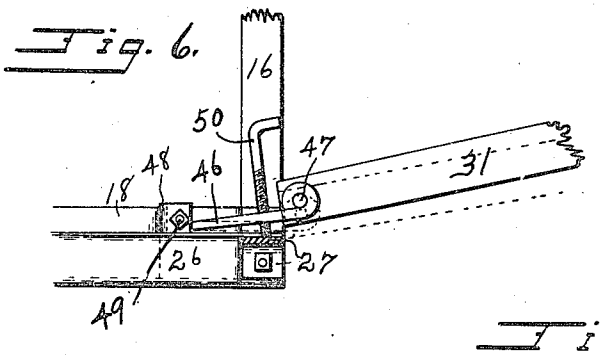


Fig. 7.

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4 SHEETS--SHEET 4.

Fig. 10.

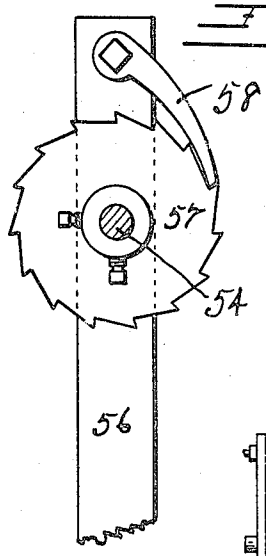


Fig. 9.

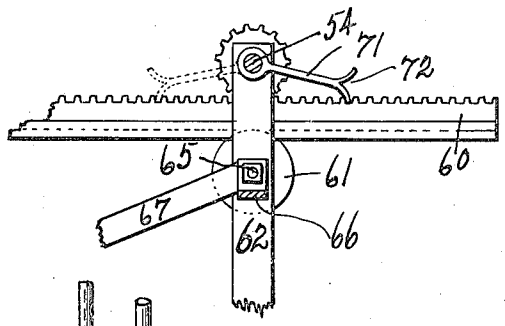
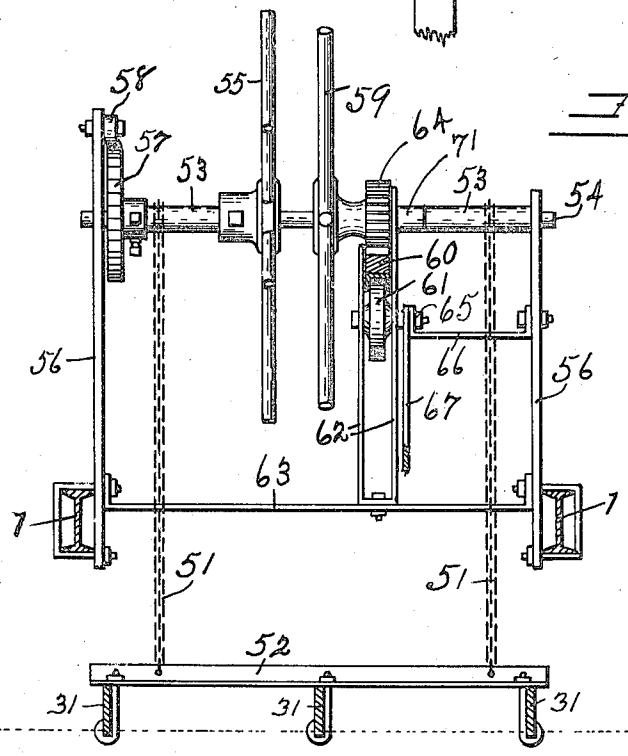


Fig. 8.



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UNITED STATES PATENT OFFICE.

MOLBRY HAYNES, OF VISALIA, CALIFORNIA.

ROAD-SURFACING GRADER.

1,158,805. Specification of Letters Patent. Patented Nov. 2, 1915.

Application filed February 20, 1912. Serial No. 678,782.

To all whom it may concern:

Be it known that I, MOLBRY HAYNES, a citizen of the United States, residing at Visalia, in the county of Tulare and State of California, have invented certain new and useful Improvements in Road-Surfacing Graders; and I do declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of machines used for shaping and dressing the surface of roads and streets and my object is to furnish a mechanism wherewith the hard surface of roads and streets may be cut, disintegrated and pulverized, shaped into a perfectly formed crown and smoothed longitudinally and which may be cheaply constructed, durable, efficient in operation and easily operated and controlled. This I accomplish by the peculiar construction, novel combination and adaptation of parts hereinafter particularly described and specifically pointed out in the claims hereunto annexed, reference being had to the drawings, for a better comprehension hereof, in which:—

Figure 1, represents a left hand side elevation of my improved road surfacing grader. Fig. 2, is a plan view of the cutter frame, grader frame, and tamping rollers detached from the supporting main frame, and controlling mechanism taken on line A, A, Fig. 1. Fig. 3, is a top plan view of the main frame, supporting wheels and controlling mechanism. Fig. 4, is a detached detail perspective view of a portion of the cutter frame showing its construction and the method of securing the cutter or scarifier teeth therein. Fig. 5, is a detail sectional view of the grader holder and its frame taken vertically on a line B, B, drawn laterally across said frame in Fig. 2 and having the grader blade arranged at right angles athwart the said grader frame. Fig. 6, is a vertical sectional side elevation taken on line C, C, Fig. 2, showing the detail construction of the double hinge connection between the cutter and grader frames. Fig. 7, is a rear elevation of the rear axle and wheels and shows the tamping rollers in various positions on uneven ground also the attachment wherewith additional weight may be thrust on said rollers when desired. Fig. 8, is a cross sectional view through line D, D, Fig. 1 showing the control hand wheels, shaft, ratchets, rack and pinion wherewith the cutter frame and grader are operated and controlled. Fig. 9, is a detached view of the stop for the cutter frame rack, and Fig. 10, is a detail side view of the ratchet wheel and pawl for regulating the rear of the grader blade.

Similar letters and figures of reference indicate corresponding parts in the several views.

Broadly, my invention comprises a long main frame supported on bearing wheels with an A shaped cutter frame, carrying a series of cutters arranged on each side thereof, suspended from bell-crank levers arranged athwart said main frame, to the rear of the cutter frame, a grader frame is arranged, and attached by a double hinge, and a grader is pivoted beneath said grader frame and is reversibly adjustable. To the rear of the said grader frame, a series of independently journaled tamping rollers is hinged, adaptable to receive the weight of the rear end of the main frame. Adjusting and control wheels are journaled on a cross shaft supported on standards near the rear of the main frame, one of which has a rack and pinion connection with the bell-crank levers to control and adjust the cutter frame and the other operates to wind chains on its shaft to vertically control the rear of the grader frame and its rollers.

Particularly described, the longitudinal frame members 1 are supported in front by a bolster 2 accompanied by a tie or distance piece 3, rigidly attached thereto, and the rear ends are maintained in position and supported by angle braces 4 attached, as shown in Fig. 1, to said frame members and resting on the rear axle 11, to which they are secured by yokes 5.

The front bolster may be made more rigid by braces 6. A cross member 7 is attached to the man frame members 1, for the purpose of more rigidity, from which a craft-chain guide 8 (hereinafter more particularly described) depends at an angle, to take the king-bolt 9 which maintains the front axle 10 in place beneath the bolster 2. Lateral

and corner braces may be attached to the main frame where necessary to stiffen the same but these I have purposely not shown in order not to complicate and confuse the drawings.

At a suitable distance from the front end of the main frame members 1, I arrange a single bell-crank lever athwart the said main frame, said bell-crank lever comprising a shaft member 12, journaled in bearings 13 on the main frame members, a short, horizontally disposed, lever member 14 extending rearwardly from said member 12, central laterally of said main frame, and a long vertically disposed member 15, secured rigidly to said shaft member 12 a little to one side of the center laterally of said main frame. A double bell-crank lever member 15 similarly located but having two horizontally disposed members 14 arranged one at either end of the shaft member 12, as shown in Fig. 3, is similarly journaled in bearings 13 a suitable distance rearwardly of the single bell-crank lever on the main frame. These bell-crank levers are designed to support and control the A shaped cutter frame by means of hangers or links 16, one at each corner of said frame, together with hand wheels, etc., hereinafter described.

The cutter frame is of A shape, arranged with the angular point in front, as shown in Fig. 2, and is composed of a series of tooth holding sections arranged on each side and backed and strengthened by a member of strong cross section, braced in lateral position by a cross member.

The tooth holding sections 18 are formed, as more particularly shown in Fig. 4, with a vertical recess 17 having shoulders 19 into which the tooth 20 is placed with its front and rear edges adapted to impinge against said shoulders 19.

The body 21 of the tooth holding sections 18, by reason of their peculiar form, is parallel with the line of travel. The tooth 20 is held in position in the recess 17 by a tooth clamping bar 22 which is bolted across the face of the body 21 of the tooth holding section by bolts engaging said body 21 and each end of said bar 22. One end of said bar 22 has the side cut away forming a slot 25, engaging one of the bolts as 23 which facilitates removal when desired, while the other end of said bar is pierced and thrust over the other bolt as 24. As will be seen, by tightening the nuts of the bolts 23 and 24, the bar 22 will tightly impinge upon the shank of the tooth 20 and hold it rigidly in position, while loosening the nuts of said bolts 23 and 24 allows the bar 22, by reason of the slot or recess 25, to drop away from the tooth shank and hang as shown at X Fig. 4, thus allowing free access to and removal of the tooth 20, which has its lower or cutting end bent forward presenting a chisel point to the surface, angularly to the line of travel. With particular reference to Figs. 2 and 4, the tooth sections 18, beginning at the point of the A frame in front, range in steps rearwardly and laterally thus bringing the teeth behind each other in regular order. This arrangement of the teeth in this class of machinery is very essential for the reason that the surface of the road bed is sometimes very hard to penetrate and great power is required to cut the same and when thus arranged the front teeth cut and tear up a groove from the sides of which it is much easier for the succeeding teeth to each cut a portion, than when they are arranged in rows and a large number of teeth engage solid, unbroken ground at the same time. These tooth sections 18 may be formed integral, or separate from one another and rigidly secured together, and have a strengthening member 26 rigidly secured on the inner or rear side of said sections 18, the more to stiffen the whole frame against shocks. A bar 27 is rigidly secured athwart the rear of the frame to maintain its lateral equilibrium. The hangers or links 16 are flexibly attached, one at each of the three corners of the frame, from which it is suspended. An adjustable depth gage is arranged at the front of said cutter frame and comprises two turn-buckles 28, arranged, one on each side of the main frame members 1 to which the upper end is attached by flexible links 29. Said turn-buckles have their lower ends brought together, thus forming a V, where they are attached by links 30 to the front end of the cutter frame. These turn-buckles serve two purposes: first, by adjustment, the depth to which the teeth may enter the surface of the roadway may be regulated, second, lateral motion of said cutter frame is controlled.

To the rear of, and attached to, the cutter frame, I arrange a grader having a frame and reversing circle. This grader frame comprises longitudinal members 31 laterally and angularly braced by the members 32 in front and has a central cross member 33 rigidly secured athwart said longitudinal members 31, the same being adapted to take a king-bolt 34. A semi-circle 35 of heavy cross section, having its ends 36 dropped and adapted to receive a grader blade 37 of any approved pattern, has a cross member 38 rigidly attached thereto, as shown in Fig. 2. This cross member 38 is adapted to receive the king-bolt 34 upon which the said semi-circle 35 is adapted to pivot.

At a suitable distance both forwardly and rearwardly of the cross member 33, I locate cross members 39, each similar to the other, by U bolts 40. These members 39 are located beneath the members 31 to which they are rigidly secured.

At each end of the cross members 39 I lo-

cate and rigidly attach, by means of the said U bolts 40, a plate 41, each having a corner extending away from said member 39 in such a manner that a horizontal slot is formed between the same and the longitudinal frame member 31, into which, said slot, the ends of the cross member 38, when adjusted angularly, will rest, thus vertically supporting the same and relieving the king-bolt 34 of undue strain. Two of these plates 41 have holes therein to correspond with similar holes in the ends of said cross member 38 into which a pin 42 is inserted whereby said grader-blade 37 is maintained in angularity. As shown by dotted lines Fig. 2, the angle of the grader-blade 37 may be reversed by removing the pin 42, throwing the blade pivotally on the king-bolt 34 and inserting the said pin 42 into the coinciding holes in the end of the cross member 38 and plate 41, aforesaid.

If it is desired to arrange the grader-blade 37 at right angles athwart its frame, I provide angle plates 43 rigidly to the inside of each of the outside frame members 31 as shown in Fig. 5, and corresponding offset plates 44 rigidly to the cross member 38 at a suitable point thereon, for the purpose of supporting the weight of the said grader-blade and thus relieving the king-bolt 34 of abnormal strain. The semi-circle 35 has its rear quadrantal section supported by a yoke 45 secured to the under side of the central longitudinal frame member 31 and embracing the said semi-circle. The grader frame 31—32—33—39 and its accouterments are supported, adjusted and controlled at its front end by, preferably, two double hinges, arranged, one on either side, and comprising the hinge member 46 having an eye arranged in each end thereof and having an adjusting set-screw 50, vertically inclined, inserted at a suitable point therein. One end is bifurcated, as shown in Fig. 2, and adapted to embrace the forward end of the outside frame members 31, which has a hole therein to receive a bolt or pin 47 inserted in the eye of the hinge member 46. The other end is inserted between the lips of a hinge socket 48 which is rigidly secured to, and near the rear end of, the cutter frame and is provided with holes therein to receive a pin or bolt 49 adapted to engage the eye of the hinge member 46. The set-screw 50 is adapted to engage the cross bar 27 of the cutter frame and, as will be seen, by screwing or unscrewing the said screw 50 the vertical position of the front end of the grader frame may be regulated with relation to the vertical position of the cutter frame, and its teeth.

The rear end of the grader frame is regulated and controlled by vertically disposed chains or other flexible agents 51 having one end secured to a cross member 52 rigidly attached to the rear end of said grader frame, as more particularly shown in Figs. 1 and 8. These chains are adapted to wind up on a drum 53 suitably mounted on a shaft 54 to which a hand wheel 55 is rigidly secured at a suitable and convenient point thereon. This shaft 54 is journaled in suitable bearings in vertically disposed standards 56 secured to the longitudinal members 1 of the main frame, and has a ratchet wheel 57 rigidly attached thereon, which is adapted to be engaged by a ratchet pawl 58 pivoted on one of the standards 56 in a manner to allow its free end to freely come in contact with the teeth of the ratchet wheel.

The shaft 54 has a hand wheel 59 of suitable design and similar functions to that of the hand wheel 55, loosely inserted thereon, said wheel 59 having a pinion 64 rigidly attached thereto, as shown in Fig. 8, for the purpose of engaging a cog-rack 60. This cock-rack 60 is supported and maintained in mesh with the said pinion by a follower 61 which is journaled between and supported by a bifurcated standard 62 having one end, which extends upwardly, pierced and inserted over the shaft 54 and the lower end rigidly secured to a cross member 63 attached athwart the main frame members between the standards 56. This bifurcated standard 62 is designed to support the follower 61 and maintain the cog-rack 60 in lateral position beneath the pinion 64. The follower 61 has its journal bearing 65 extended to receive a lateral brace 66, attached to one of the standards 56, also a longitudinal brace 67 which is attached to a cross member 68 rigidly secured athwart the main frame members 1 at a suitable point thereon. The cog-rack 60 has its front end extended forwardly where it engages the lever member 15 of the rear bell-crank lever by means of a fork or bifurcated end 69. A link member 70 joins the lever member 15 of the two bell-crank levers thus causing them to move in unison.

I provide a stop for the cog-rack 60, calculated to maintain the same in rigid position in either direction, comprising a dog or pawl 71 having an eye, adapted to receive the shaft 54, and a bifurcated free end 72, adapted to engage the teeth of the said cog-rack 60, the same being reversible as shown in dotted lines Fig. 9, for the purpose as will be shown.

A tongue 73 of any approved form is attached to the front axle 10 in the customary manner and draft is applied through the medium of a chain or other flexible agent 74 which passes through the guide 8 and is attached to the front end of the cutter frame by the clevis 75 and pin 76. The feature of applying the power directly to the cutter frame and its appendages is essential but this may be accomplished by different forms of mechanism such as a "gooseneck," etc.,

hence I do not confine myself to the particular form of applying power above described.

At the rear of the grader frame 31—39, I provide two braces 77, as shown in Figs. 1 and 2, having their front ends flexibly attached to the said frame members 31 distanced as shown and having their rear ends converging to a point near the center of the frot side of the rear axle 11 where they are flexibly hinged to said axle by protruding lugs 78. These braces 77 have a two-fold function; that of maintaining the lateral stability of the position of the grader frame and that of propelling the main frame and its supporting wheels. Thus the main frame and particularly the front axle and bolster, are relieved from the excessive shocks and strains due to the power necessary to propel a machine of this class.

Following the grader frame, I provide a serial tamping roller, comprising independent individual rotatable disk members 85 journaled in independent vertically operative frames 79 that are hinged on a common shaft 80. The disk members 85 I have here shown with square peripheral faces but a convex curved peripheral face may be used. This shaft 80 may be secured in position in any desired manner, either to the main frame or the grader frame, the latter method being here shown in Figs. 1 and 2. This method comprises two or more of the frame members 79 extending forwardly and upwardly at an angle where they are pivotally attached to the grader frame members 31 at 81 by a rod or bolts 82.

If it is desired to maintain the rollers all on a horizontal level laterally, the same may be journaled on a common axis extending the entire width of the roller frames 79, thus causing the said rollers to operate in unison instead of independently.

The frames 79 are composed of two members spaced by a member 83 and rigidly secured together leaving the rear end formed into a fork into which the rotatable disk member is inserted and suitably journaled. The forked rear ends of the said frames 79 are formed into scrapers 84 of the form shown in Figs. 1 and 2 for the purpose of preventing the disks from gumming up with sticky mud or other adhesive material operated upon.

I provide an attachment for placing additional weight on the tamping rollers, comprising a lever shaft 86 journaled on the angle braces 4, as shown in Figs. 1 and 7, and provided with a hand lever 87 extending upwardly, to a convenient point, where it is provided with a suitable locking mechanism 88 for the purpose of maintaining the same in any desired position.

The lever shaft 86 is provided with short arms or eccentrics 89 which receive links 90, pivotally, and a flat bar 91 has these links 90 rigidly attached thereto, as shown in Fig. 7.

The operator's platform 92 is located on the rear of the main frame. 93 represents side guides for maintaining the roller frames 79 in lateral position. 94 represents the driver's seat mounted on the seat springs 95 secured to the standards 96 attached to the main frame members 1 at the front end thereof, and 97 represents the foot rest attached to said standards 96.

The adjustment, mode of operation, control and resultant action of my improved road surfacing grader, is as follows:—The teeth 20 are all adjusted in the recesses 17 until their lower or cutting points are brought to an exact horizontal level and the bars 22 are then tightly impinged upon the shanks of said teeth by means of the bolts and nuts 23 and 24. The grader blade 37 is arranged at the angle desired and maintained thereat by the pin 42. The front end of the grader frame, being hinged to the rear end of the cutter frame, raises and lowers with the same, and the relative vertical relation of the front end of the grader blade 37 to the cutting points of the teeth, is regulated and adjusted by means of the set-screws 50 in the double hinge member 46, while the rear end of the said grader blade is vertically controlled by the chains 51, windlass 53 and hand wheel 55. By the use of the hand wheel 59 and the connecting pinion, cog-rack, levers and links 64, 60, 15, and 16, respectively, the operator regulates the vertical position of the cutter frame so that the points of the teeth operate to engage the high spots in a road surface, reducing that high portion of the same to a loose condition, when the grader blade, being so adjusted, engages the loose dirt and distributes the same into the lower portions and holes where needed and the tamping rollers 85, following, rolls and tamps the so distributed earth until it becomes of a uniform density and texture throughout, the same being accomplished by reason of the said rollers being individually hinged and independently operative to drop into and press the dirt into the holes with a uniform pressure by which a surface of uniform density is obtained, a necessary element to the stability of road surfaces. The rollers 85 may, where desired, have their weight augmented by throwing the hand lever 87 rearwardly thus throwing the eccentrics and links downwardly causing the bar 91 to impinge upon the roller frames 79—83 thus bringing the total weight of the rear end of the entire machine to bear on the tamping rollers.

The dog or pawl 71—72, when adjusted on one side of the shaft 54, engages the cog-rack 60 to maintain the cutter frame in elevated position and when reversed, as shown in

dotted lines Fig. 9, the same operates to maintain said cutter frame in depressed position. By adjusting the turn-buckles 28 and chains 30 they act as a depth gage to which the teeth may cut, at the same time affording protection against the lateral movement of the cutter frame.

The grader blade is designed and intended to move only the dirt loosened by the teeth and is allowed to raise over hard portions of the road surface, not sufficiently cut, which is made possible by the double hinge member 46.

I have described my improved road surfacing grader as in the drawings shown, but in many features the specific form of the individual parts and many of the connections may be rearranged without departing from the spirit of my invention and many minor parts such as braces and the like, that may be added to give more rigidity to the construction, are here purposely omitted for the purpose of clearness in the drawings. These things may be added or removed while the operative mechanism is in no way affected thereby.

I am well aware that scarifiers or road surface cutters have been made combining a leveling agent and roller in connection, consequently I do not claim these features broadly, but,

What I do claim as new and desire to secure by Letters Patent is:—

1. A machine for the continuous, succeeding and complete process of cutting, leveling, grading and tamping roadways comprising a gang or serial cutter or scarifier, vertically controllable and adjustably suspended beneath a main frame which is supported on suitable bearing wheels, a grader arranged on a suitable frame which is flexibly connected to the rear of the cutter or scarifier, together with a serial tamping roller flexibly connected to the rear of the grader frame and means for regulating and controlling said cutter or scarifier and grader and its frame independently.

2. An apparatus, by which the continuous process of treating or making roadways, by cutting, disintegrating and pulverizing the surface, leveling, grading and tamping the same, may be accomplished, comprising a main frame mounted on bearing wheels, a series of cutters adjustably secured in a cutter frame suspended beneath the main frame, a grader adjustably secured to a grader frame which is flexibly attached to the rear end of the cutter frame, a serial tamping roller flexibly connected to the rear of said grader frame and grader and an appliance whereby draft may be directed to the cutter frame exclusively and independently of the main frame.

3. An apparatus for cutting, leveling, grading and tamping or rolling roadways or land, supported on a main frame and bearing wheels, comprising a cutting or scarifying member, a grader blade carried beneath a frame, to which it is pivotally and reversibly attached, said grader frame hinged to the rear of the cutter frame, by an adjustable double hinge member, a series of tamping roller members journaled in independent frames which are arranged laterally beneath the rear axle of the main frame supporting wheels and hinged at one end to the said grader frame, and means for the independent vertical control of the cutters and grader.

4. An apparatus, by which the continuous process of treating or working roadways, by cutting, disintegrating and pulverizing the surface, leveling and grading the same, may be accomplished, comprising a main frame mounted on bearing wheels, a series of cutters adjustably secured in a cutter frame suspended beneath the main frame, a grader adjustably secured to a grader frame which is flexibly attached to the rear end of the cutter frame, and an appliance whereby draft may be directed to the cutter frame exclusively and independently of the main frame.

5. A machine for the continuous, succeeding and complete process of cutting, leveling, and grading roadways comprising a main frame mounted on bearing wheels, a series of cutters adjustably secured in a cutter frame suspended beneath the main frame, a grader adjustably secured to a grader frame which is flexibly attached to the rear end of the cutter frame, means for the vertical control of the said cutter and grader frames independently of each other, and an appliance whereby draft may be directed to the cutter frame exclusively and independently of the main frame.

6. In a machine of the class described, comprising a main frame and bearing wheels, a cutter or scarifier frame and grader frame hinged together and each vertically controllable independently of the other, the cutter frame adapted to carry a series of teeth, the grader frame carrying a grader angularly and reversibly adjustable, and serial tamping roller hinged to the rear of the grader frame in independent frames in a manner so that each roller member is independent of the remainder.

7. In a machine of the class described wherein a cutter or scarifier frame is hinged to a grader frame, a double hinge comprising a body flexibly connected at one end to the said cutter or scarifier frame and having its other end flexibly secured to the grader frame and having an adjusting screw inserted therein and engaging the scarifier frame whereby the relative elevation of the said cutter or scarifier frame and grader frame may be adjusted.

8. In a machine of the class described, a wheel supported main frame, a scarifier and a grader frame hinged together and a controlling mechanism therefor comprising bell-cranks acting in unison and journaled on the said main frame and having link connections to and supporting the said scarifier, a link between the members of said bell-cranks, a cog-rack connected at one end to said bell-cranks and having its free end resting on a roller guide, a hand wheel, having a pinion engaging said cog-rack, and loosely journaled on a suitable shaft which is journaled in standards rigidly attached to the said main frame, a second hand wheel rigidly secured to the said shaft, flexible members secured at one end to the said grader frame and having their other ends wound upon drums on said shaft and means for maintaining said hand wheels in adjusted positions substantially as described.

9. In a machine of the class described, the combination with a main frame mounted on bearing wheels and having a scarifier and grader frame suspended thereunder, of a controlling mechanism comprising standards erected from said main frame members, a shaft journaled in said standards, two hand wheels mounted on said shaft, one rigidly attached and the other turnable thereon, drums arranged on either end of said shaft, flexible agents windable on said drums and communicating with said grader frame, a pinion attached to one of said hand wheels and adaptable to engage a cog-rack, said cog-rack resting on and supported by a roller suitably journaled in the said standards and adapted to communicate motion to double bell-cranks journaled on the main frame, said bell-cranks, link members attached to said bell-cranks and to said scarifier, a stop pawl, (as 71—72) flexibly secured to the shaft, aforesaid, and adapted to engage the said cog-rack in either direction.

10. An apparatus, by which the continuous process of treating or making roadways, by cutting, disintegrating and pulverizing the surface, leveling, grading and tamping the same, may be accomplished, comprising a main frame mounted on bearing wheels, a series of cutters adjustably secured to a cutter frame suspended beneath said main frame, a grader adjustably secured to a grader frame which is flexibly attached to the rear end of the cutter frame, a serial tamping roller flexibly connected to the rear of said grader frame and grader, each roller and its frame hinged independently of each other and an appliance whereby draft may be directed to the cutter frame exclusively and independently of the main frame.

In witness whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

MOLBRY HAYNES.

Witnesses:
W. J. WARD,
C. J. COLYAR.