March 23, 1943. W. H. LEWIS 2,314,358

ASPHALT FINISHER AND SPREADER

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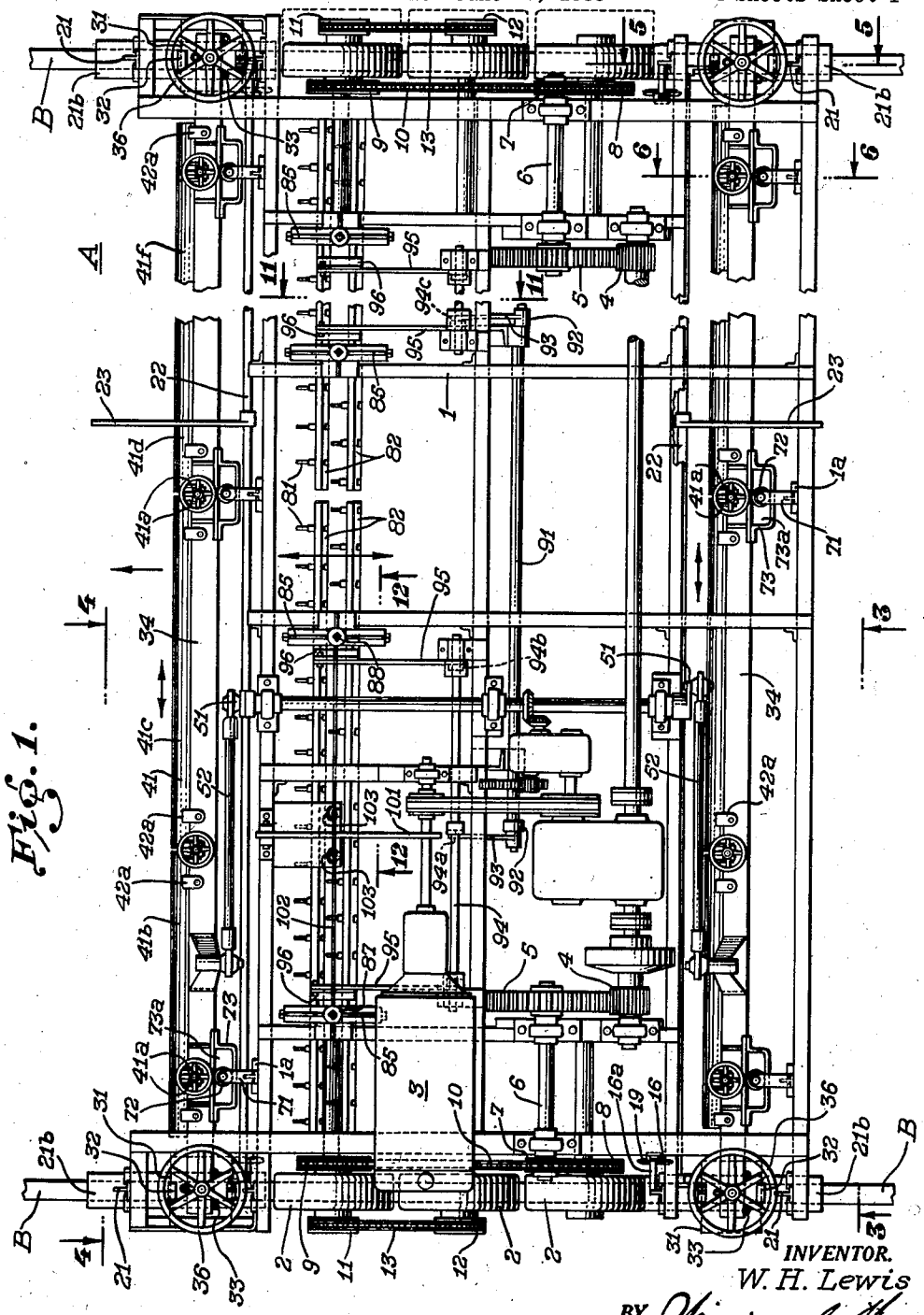


Fig. 1.

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Fig. 2.

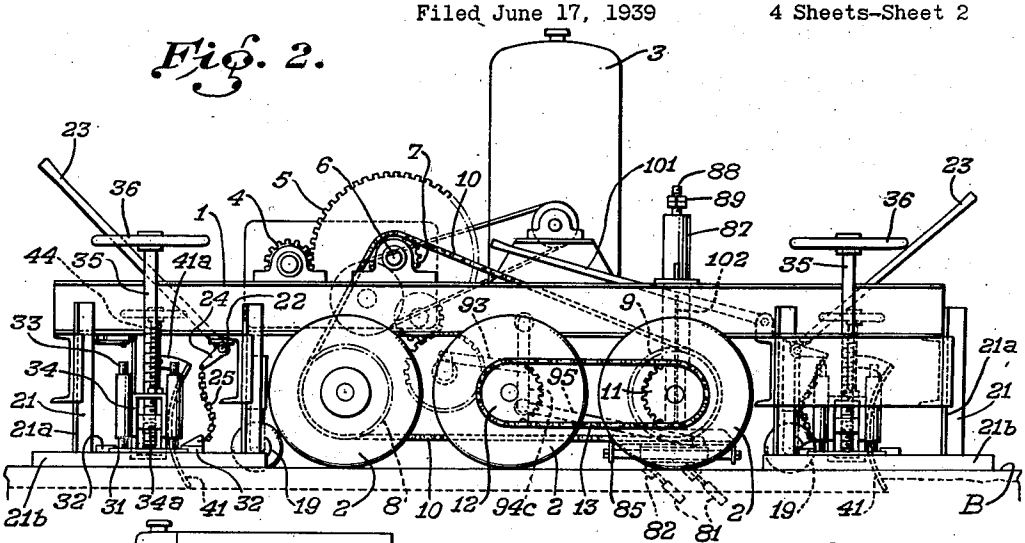
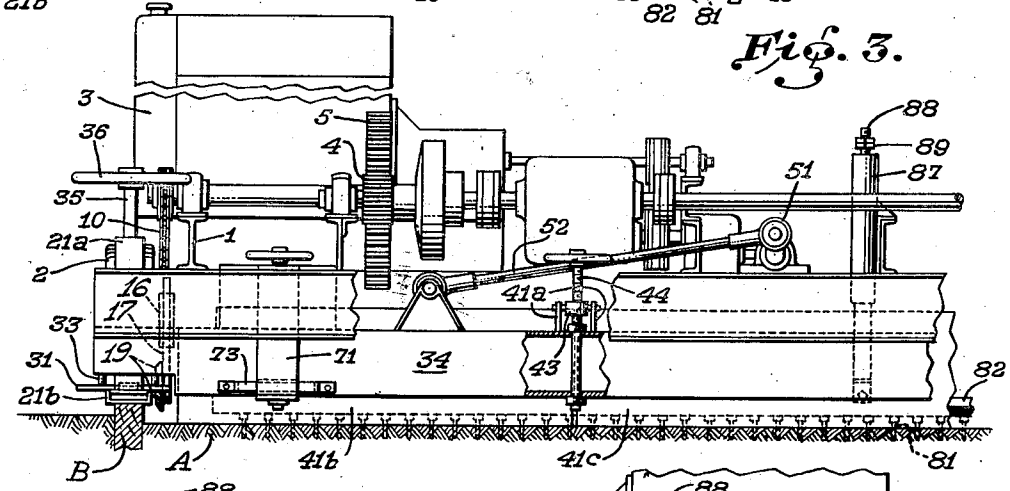


Fig. 3.



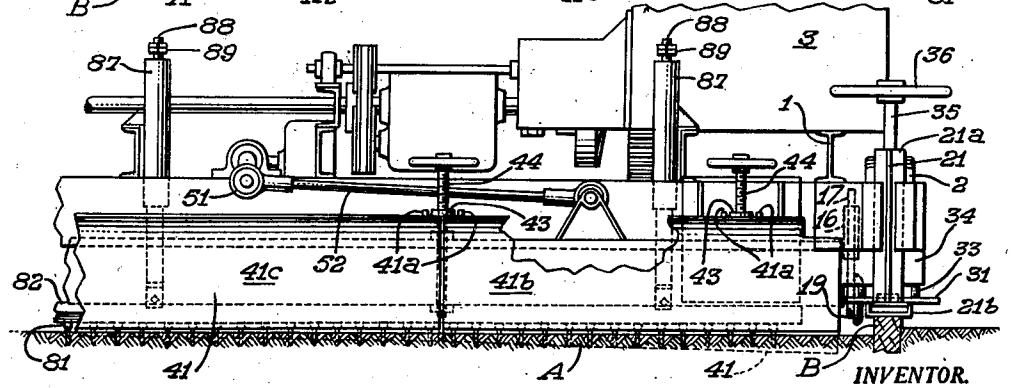


Fig. 4.

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ASPHALT FINISHER AND SPREADER

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Fig. 5.

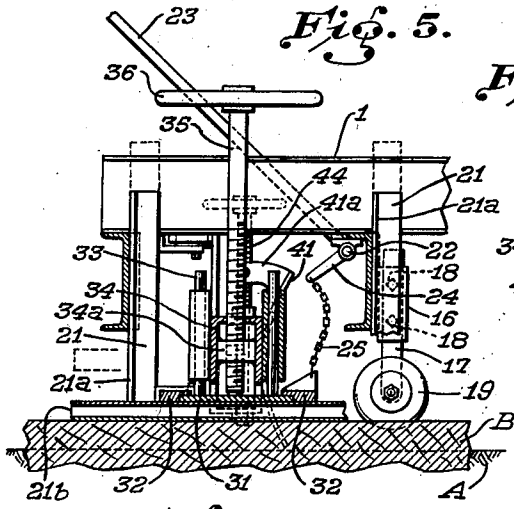


Fig. 6.

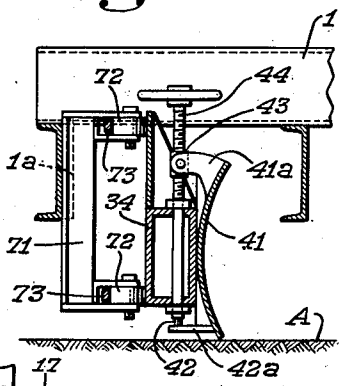


Fig. 7.

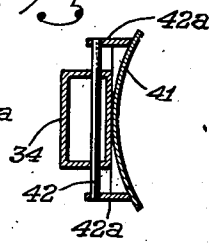


Fig. 10.

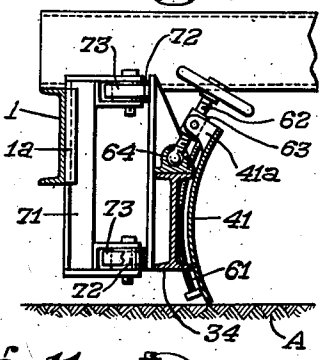


Fig. 11.

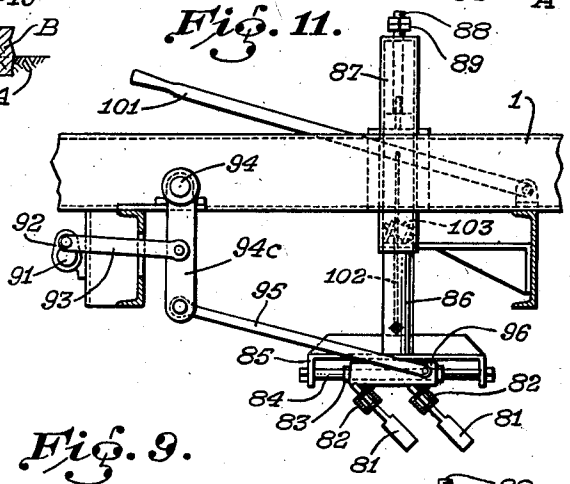


Fig. 9.

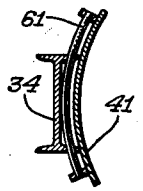


Fig. 12.

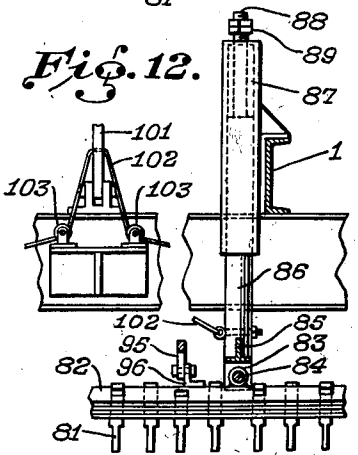


Fig. 13.

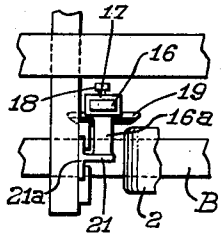
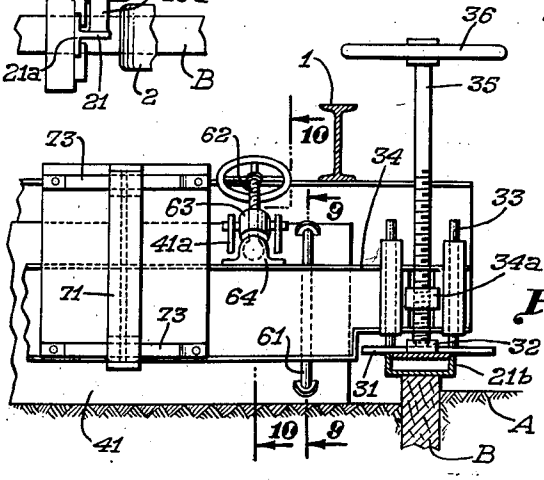


Fig. 8.



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Fig. 14.

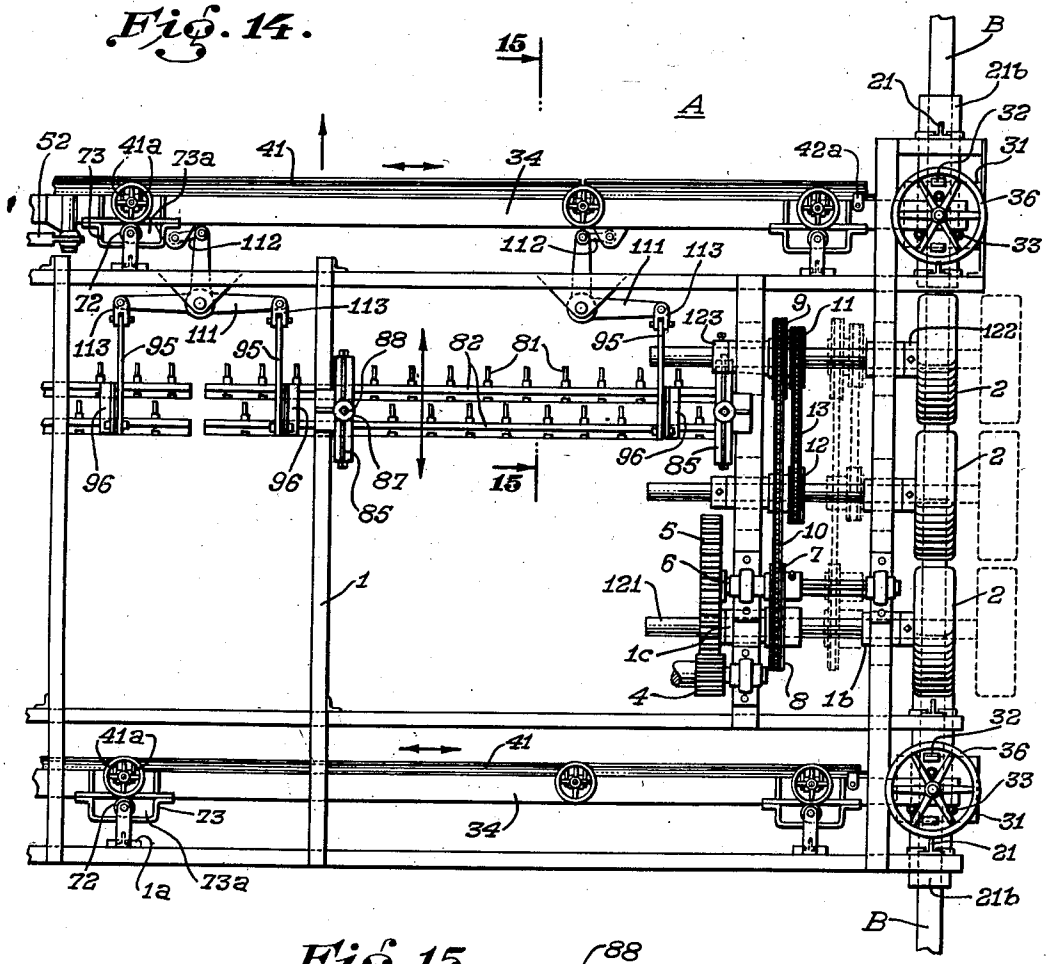
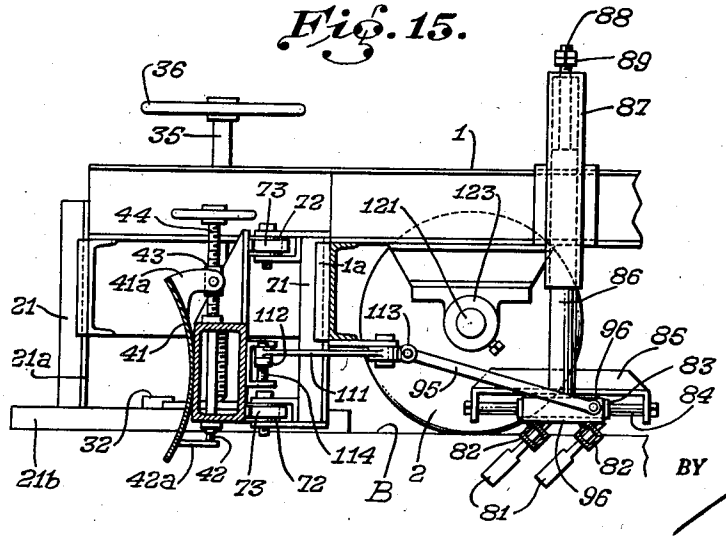


Fig. 15.



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Patented Mar. 23, 1943 2,314,358

UNITED STATES PATENT OFFICE

2,314,358

ASPHALT FINISHER AND SPREADER

William Hurst Lewis, Los Angeles, Calif.

Application June 17, 1939, Serial No. 279,684

27 Claims. (Cl. 94—44)

My invention relates to road and similar machinery, and particularly to spreaders and finishers for asphalt, and the like.

One of the principal objects of this invention is to provide a machine of this class in which a series of grader plates are employed, and which may be adjusted relative to each other to give the desired camber or crown to road material to be assumed by the finished road, and a machine of this class in which the grader plates, which have been so adjusted, may be raised or lowered as a unit or units to finish the several layers of road material, comprising the completed road, to such camber or crown.

Another object of this invention is to provide novel, simple, and efficient means for adjusting several grader plates to said position relative to each other, and to raise, to various levels, the grader plates which have been so adjusted, and further to provide a simple structure whereby all of the grader plates may be easily raised out of the way so that the machine may be readily transported from place to place.

Another very important object of this invention is to provide a concave grader plate whereby, as the machine is moved along the road bed, the excess asphalt removed from the surface is rolled over in such a manner that large stones do not remain on top but are mixed with the other material, and also so that no asphalt will remain at the top long enough to get cold and unsuitable for further use.

A further object of this invention is to provide a novel and simple means for either adjusting the curved grader plate vertically, or adjusting the same in alinement with the curvature at the front side of said plate.

A still further object of this invention is to provide a novel and simple means for agitating or mixing, and raking the asphalt, and the like, in front of grader plates so as to facilitate the grading operation, and further to provide such agitating or mixing and raking means between forward and following grader plates.

An object also of this invention is to provide novel means of operating the agitating and raking means forwardly and backwardly, independently of the movement of the machine, and in such a manner that the same effectiveness is provided irrespective of the vertical position or adjustment of the agitators.

Still another object of this invention is to provide novel means of synchronously operating the grader plates with the agitating and raking means, or operating one of them with or by the other.

With these and other objects in view as will appear hereinafter, I have devised a novel machine for spreading road or other material, and for finishing the surfaces thereof, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of references thereon, which form a part of this application, in which:

Fig. 1 is a fragmentary plan view of an asphalt spreader and finisher, embodying various features of my invention in their preferred form;

Fig. 2 is a side elevation thereof;

Figs. 3 and 4 are, respectively, rear and front elevations of the portion at one side of the longitudinal median line of my machine, the views being taken, respectively, at 3—3 and 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional elevation taken through 5—5 of Fig. 1, showing the supporting, guiding, and raising means for the grading mechanism;

Fig. 6 is an enlarged sectional elevation thereof, taken through 6—6 of Fig. 1, showing the individual raising means for the grader plates;

Fig. 7 is an enlarged sectional elevation showing the movable mounting of the grader plate on the main supporting beam;

Fig. 8 is an enlarged rear elevation of one lateral portion of my machine, showing a slightly modified construction of the supporting and adjusting means of the grader plate;

Figs. 9 and 10 are transverse sections taken, respectively, through 9—9 and 10—10 of Fig. 8;

Fig. 11 is an enlarged transverse section taken through 11—11 of Fig. 1, showing the construction, mounting, and operating mechanism of the agitating and raking means;

Fig. 12 is an enlarged sectional elevation of the agitating and raking means, taken through 12—12 of Fig. 1;

Fig. 13 is an enlarged fragmentary plan view, showing the mounting of one of the flange or guide wheels for the traction wheels;

Fig. 14 is a fragmentary plan view of my machine in a slightly modified form of construction; and,

Fig. 15 is an enlarged transverse sectional elevation taken through 14—14 of Fig. 14.

In the construction of roads, made of concrete, asphalt, or the like, the boad bed A, as shown in Fig. 1, is lined or limited at the opposite sides by header boards B, which determine the top or road

surface. If a second or subsequent strip of road is made, the completed portion may provide the form or liner for one side of the strip while a header board may be provided at the other side. My material spreader and finishing machine, when used for road construction, is designed to rest and to run upon the headers or the finished road surface.

My machine, as illustrated in the drawings, is carried on a carriage 1 having a plurality of supporting wheels 2 at the opposite sides, which wheels support the machine on the header boards. The machine is propelled by power units 3 which operates a shaft 6 through gears 4 and 5. On the shaft 6 is a sprocket 7 which drives sprockets 8 and 9 through a chain 10. The sprockets 8 and 9 are coaxial with and drive two of the wheel at one side of the carriage. A sprocket 11 is connected to and is coaxial with the sprocket 9, and drives, through a chain 13, the sprocket 12 which is mounted on another wheel.

The power unit is preferably arranged at one side of the carriage so that the latter may be readily enlarged or extended laterally.

At the four corners of the carriage are floating U-shaped frames 21, the legs 21[a] of which are of T-shaped cross-section and are vertically slidable in T-slots at the front sides of transverse frame members of the carriage 1. The cross portions of said U-shaped frames form skid rails 21[b] in line with the wheels at the opposite sides of the carriage. These skid rails are positioned respectively in front of the front wheels and behind the rear wheels. These floating frames 21 support the whole grader plate mechanism on the header boards, and thus provide secondary carriages or a secondary carriage means for the grader plate mechanism, as will be described hereafter.

On the forward and rear portions of the carriage are transverse rock shafts 22 which may be manually rotated by levers 23. These shafts have arms 24 at their opposite ends, and the ends of the arms 24 are connected to the median portions of the skid rails by flexible connectors, such as chains 25. Thus, the skid plates, and therefore the grader plate mechanism, may be raised free of the header plates or boards and the whole grader plate mechanism, is borne by the wheels so that the whole machine may be readily conveyed from place to place.

The wheels 2 are not equipped with flanges to guide the wheels, but I have provided separate flange means for this purpose, which consists of a flange wheel at each corner of the carriage 1. But these flange wheels are preferably carried by the frames 21.

On each frame 21 of the secondary carriage means is provided a tubular vertical guide 16 of preferably rectangular cross-section, one being located in front of each of the front supporting wheels 2, and another behind each of the rear wheels 2. In each of these tubular guides is slidably mounted a long slide 17 which is held in a vertically adjusted position by any suitable means, such as set screws 18. At the outer side of the lower end of each slide is a wheel 19. These wheels serve as guide flanges for the supporting or traction wheels, for guiding the wheels with respect to the header boards. These flanges wheels are spaced slightly from the inner sides of the wheels, and are mounted normally to assume positions about one inch below the top of the header boards.

Thus the wheels are mounted so as to be raised clear of the header boards by the frame 21 when the skid rails 21[b] are raised free of the same header boards.

It will be here particularly noted that the long vertical slides may be adjusted a considerable distance vertically so that the flange or guide wheels 19 may be manually and separately lowered into guiding position when the frames 21, and consequently the grader plates 41 hereinafter to be described, are raised.

The guide wheels 19 and skid rails 21[b] are also adjustable relative to each other, by reason of the set screws 18, so that they may be shifted out of alignment.

On each of the skid rails is reciprocally mounted a skid shoe 31, these shoes being movable transversely with respect to the longitudinal extent of the machine. These shoes consist of plates which are retained in position against the upper faces of the rails and guided thereon by means of clips 32. These skid shoes are provided with upwardly extending guide rods 33 on which are slidably mounted, in a vertical direction, the end portions of the grader plate supporting beam 34, there being provided one supporting beam at the front and one at the rear portions of the machine, one skid shoe being provided at each end of each beam. At the latter ends of the beams are provided vertical lift screws 35 which extend through threaded portions 34[a] on the beams. The lower ends of the screws 35 engage the skid shoes, and the upper ends are provided with hand wheels 36 for operating these screws and thereby raising the beams to the desired positions above the skid shoes.

At the front sides of the grader plate supporting beams are positioned the grader plates 41. There is preferably provided a plurality of such plates, designated 41[b], [c], [d], and [f] in Fig. 1, in each grader plate unit. The plates of each unit are positioned end to end and extend across the whole of the machine between the skid shoes. However, the end grader plates are spaced from the skid rails a sufficient distance so that the grader plates do not engage such rails when the plates are reciprocated transversely of the machine.

The plates are concave at their front sides so that, as they are moved along the road bed which is to be finished, the excess material of the road bed is rolled over and over forwardly, forcing the larger aggregate or stones to mix with or remain mixed with the asphalt, to provide a smooth and uniform finish. Such construction of the grader plates, causing such rolling action of the material, maintains a substantially uniform temperature of the excess material removed, with that of the finished bed, so that the former is suitable for continuous reuse.

These concave grader plates are provided at their back sides with vertical guide rods 42 which guide the grader plates vertically on and with respect to the supporting beam 34. The plates are provided at their upper portions with lugs 41[a], the end plates being provided at the ends with double lugs, while the other ends are provided with single lugs, as shown. Between the double lugs of the end plates and between adjacent lugs of the ends of adjacent plates, are located nuts 43, these nuts being provided with oppositely extending trunnions which extend through a pair of said lugs. An adjusting screw 44 is rotatably mounted in the supporting beam 34 for each nut carried by each pair of lugs,

these screws being rotatable in the beam, and threaded above the beam. The threaded portion extends through the nut 43; thus, the nut 43 is raised as the screw 44 is operated. Thus, it will be seen that the outer ends of the end grader plates, as well as the adjacent ends of the other plates, may be separately adjusted in a vertical direction. To facilitate the adjustment, as mentioned, the trunnions of the nuts 43 are loosely fitted in the lugs 41a.

The upper and lower ends of the guide rods 42 are rigidly secured to the grader plates 41 by lugs or ear 42a which extend backwardly from the upper and lower portions of the grader plates, there being provided one pair near each end of each plate. In order to facilitate vertical adjustment of one end of a plate relative to the other, the guide rods 42 extend loosely through the beam, preferably through slightly elongated slots therein. However, one end of one guide rod of each grader plate is relatively fixed laterally so as fixedly to locate each grader plate in a lateral direction and still permit tilting or angular adjustment.

In this manner the lower edges of the grader plates may be adjusted angularly with respect to each other so as to assume or conform substantially to the desired camber or crown of the road bed or to the desired road surface. With such arrangements also, the grader plates may be raised or lowered for finishing different layers of road material in conformity to the ultimate camber or crown of the road.

The grader plates, in each of the grader plate units, are reciprocated transversely with respect to the machine by a separate crank 51, one of which is connected to each end of the power unit 3, and by a connecting rod 52 which connects the crank to the grader plate supporting beam 34.

In Figs. 9 and 10 I have shown curved guide rods 61 at the back side of the grader plate, (two for each plate) and have shown these guide rods mounted in the supporting beam 34 in such a manner that, as each grader plate is adjusted transversely, it is forced to assume an adjusted position in conformity to its curvature. Such adjusting means is provided by an adjusting screw 62 at each end of the plate, which screw extends through a pivoted nut 63, mounted between lugs 41a at the upper edge of the grader plate. The lower end of the screw 62 has a ball and socket connection 64 with the upper end of the supporting beam 34. With this manner of adjustment, the angularity of the lower portion of the grader plate with respect to the road bed may be readily changed.

The grader plates and grader plate supporting beam is prevented from rocking forwardly and backwardly about a horizontal axis, by means of roller shackles. These shackles consist primarily of U-shaped yokes 71, the cross portions of which are reciprocally mounted in a vertical direction on the frame 1, and which are provided with rollers 72 at the ends of the legs of the yoke. These rollers are positioned to move in transverse slots 73a provided in brackets 73 at the rear side of and adjacent each end portion, and intermediate the ends, of the supporting beam, the slots being arranged in vertically spaced horizontal planes. The slots 73a allow the transverse reciprocation of the beams, while the vertically slidable movement of the yokes at 1a allows the supporting beams to be raised and lowered as desired.

The mixing or agitating and raking means of my machine is located between the front and rear grading plates or plate units and preferably immediately behind the forward ones. This agitating means is preferably coextensive with the grading plates so as to agitate or stir up all of the road material, or the like, in front of the rear grading plates.

The agitating means itself consist preferably of a multiplicity of fingers, tangs or prongs 81 which extend outwardly from rod supports 82. There is preferably a pair of closely positioned rod supports at each side of the machine, the pairs of rods being positioned end to end. The tangs or prongs extend downwardly and forwardly at an angle of approximately 45°, and preferably below the level of the lower edges of the grading plates. The tangs or prongs on one rod support are preferably staggered with respect to those on the adjacent rod support.

These rod supports are mounted on slides 83 which are reciprocally mounted, longitudinally with respect to the axis of the machine, on rods 84 which are carried by frames 85. These frames have upwardly extending tubes 86 which slide in tubes 87 on the frame 1. The frames 85 may be raised or lowered, that is located vertically, by means of screws 88 extending upwardly from the tubes 86, and provided with nuts 89 at their upper ends, which serve as stops against the upper ends of the tubes 87.

The slides are reciprocated on the rods by means of a reciprocating mechanism actuated by the power unit 3. This is effected by a shaft 91 geared to the power unit. At the opposite ends of the shaft 91 are provided cranks 92 which are connected, by links 93, to the free ends of arms 94a which are secured to and depend from rock shafts 94 which are mounted on the frame of the carriage 1. At the opposite ends of the rock shafts are provided arms 94b, which are longer than the arms 94a. The lower free ends of the arms 94b are connected, by a link 95, to one of the rod supports 82, or to a slide 83 which carries the rod supports, or other member 96 mounted on the rod supports 82, as shown. There is preferably one of such reciprocating devices for each end of each pair of rod supports.

If desired, the arms 94a and 94b may be combined into one arm 94c, as shown in Fig. 11.

The whole of the agitating and raking mechanism may be raised quickly from its low position, as in the case of the grader plates, by means of a lever 101 mounted in a convenient position on the frame of the carriage. There may be a separate lever for each set of agitating and raking fingers. The lower portion of the lever is connected, by cables 102, to each end of the rod supports, the cables extending over pulleys 103. Shifting of the levers 101 into opposite positions will either lower or raise the agitating or raking means. Suitable quadrant or other means, not shown, may be provided for holding the lever 101 in the desired shifted position.

The grader plates 41 and supporting beams 34, shown in Figs. 14 and 15, may be reciprocated transversely by means similar to that shown in Fig. 1. But the agitating and raking means may be reciprocated, longitudinally of the machine, directly by one of the beams 34. This connection may consist of a bellcrank 111 (one for each pair of finger rod supports 82), one arm of which is connected by a link 112 to the back of the front beam 34, and the other arm of which is connected by a shackle 113 to the link 95, which

in turn is connected to the bracket 96 mentioned above. Because of the vertical adjustment of the beam, the link 112 may be connected to the beam by means of a vertical pivot rod 114, so that the beam may be freely raised and lowered with respect to the link 112. Thus, a longitudinally reciprocating motion is imparted to the agitating and raking means.

It will be here noted that, instead of a longitudinal reciprocating movement of the agitating and raking fingers, they may be readily moved transversely of the carriage by the use of a straight lever (not shown) instead of the bell-crank lever 111.

The lateral adjustment or extension of the supporting or traction wheels 2 (as shown by dotted lines in Figs. 1 and 14), with respect to the skid rails 21b, referred to above, and as shown best in Fig. 14, may be effected by the mounting of the wheels 2 on large axles 121 which may be adjusted longitudinally in bearings 1b and 1c of the carriage frame. The sprockets 8, 9, 11, and 12 are rigidly secured to and are adjustable with the respective shafts upon which they are mounted. The sprocket 7, however, is keyed to but slidably mounted on the shaft 6. In order to fix the axles 121 against endwise movement, I have provided collars 122 and 123 on the axles, which may be secured to the shafts after the desired adjustment is made.

Though I have shown and described a particular construction, combination, and arrangement of parts and portions, and certain modification thereof, I do not wish to be limited to the same, but desire to include in the scope of my invention, the construction, combination, and arrangement, substantially as set forth in the appended claims.

I claim:

1. In a machine of the class described, carriage means, a grader plate unit mounted on the carriage means and comprising a plurality of separate grader plates positioned substantially end to end, means for adjusting said unit vertically with respect to the carriage means, and other means at the opposite ends of the plates for adjusting said plates vertically, and also angularly in a substantially vertical plane, for varying the angular relation of the lower edges of the separate plates with respect to each other.

2. In a machine of the class described, carriage means, a grader plate unit mounted on the carriage means and comprising a plurality of separate grader plates positioned substantially end to end, said plates being concave at their front faces, means for adjusting said unit vertically with respect to the carriage means, and other means at the opposite ends of the plates for adjusting said plates vertically and also angularly in a substantially vertical direction, for varying the angular relation of the lower edges of the separate plates with respect to each other.

3. In a machine of the class described, carriage means, a grader plate supporting beam positioned transversely of the carriage means, means for vertically adjusting the ends of the beam relative to the carriage means, a plurality of separate grader plates positioned end to end in substantial alignment, and means at the opposite ends of the plates for variously adjusting said plates vertically and also angularly, in a substantially vertical direction, on said supporting beam.

4. In a machine of the class described, carriage means, a grader plate supporting beam positioned transversely of the carriage means, means for vertically adjusting the beam on the carriage means, a plurality of grader plates at the front side of said supporting beam, the front faces of said plates being concave vertically, said plates being positioned end to end, and means at the opposite ends of the plates for adjusting said plates various distances vertically, and also angularly, in a substantially vertical direction, on said beam, for obtaining a substantially crowned lower edge of the adjacently positioned plates.

5. In a machine of the class described, a carriage, a power unit thereon, a grader plate supporting means at the opposite sides of the carriage, skid shoes mounted on said supporting means in such a manner as to reciprocate transversely with respect to the carriage, grader plate means, means at the opposite ends of the grader plate means for supporting the same in various adjusted vertical positions on the shoes, and means connecting the grader plate means to the power unit for reciprocating the former.

6. In a machine of the class described, a carriage, a power unit thereon, skids at the opposite sides of the carriage, skid shoes reciprocally mounted on said skids transversely with respect to the carriage, grader plate means, means at the opposite ends of the grader plate means for supporting the same in various adjusted vertical positions on the shoes, and means connecting the grader plate means to the power unit for reciprocating the former transversely with respect to the carriage.

7. In a machine of the class described, a carriage, grader plate supporting means at the opposite sides of the carriage, a grader plate unit comprising a plurality of separate substantially straight grader plates positioned end to end in substantial alignment with each other and transversely with respect to the carriage, means for vertically adjusting the grader plate unit relative to the supporting means for supporting the plates in various vertical positions thereon, and means for separately adjusting the adjacent grader plates vertically and relative to each other for varying the general curvature of the lower edges of the plates with respect to each other.

8. In a machine of the class described, a carriage, skids at the opposite sides of the carriage, skid shoes reciprocally mounted on said skids transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the machine, means for vertically adjusting the beam relative to the shoes, a plurality of long grader plates positioned end to end, and means for supporting the opposite ends of each plate in vertically adjusted positions on the beam.

9. In a machine of the class described, a carriage, skids at the opposite sides of the carriage, skid shoes mounted in such a manner as to reciprocate transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the carriage, means for vertically adjusting the beam relative to the shoes, a plurality of grader plates positioned end to end in front of the beam, and means for supporting the opposite ends of the plates in vertically adjusted positions on the beam.

10. In a machine of the class described, a carriage, skids at the opposite sides of the carriage, skid shoes reciprocally mounted on said skids transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the carriage, means for vertically adjusting the beam relative to the shoes, a plurality of long grader plates positioned end to end in front of

the beam, means for supporting the opposite ends of each plate in vertically adjusted positions on the beam, and means for vertically guiding the plates on the beam to maintain their determined operative positions.

11. In a machine of the class described, a wheeled carriage, a pair of floating frames vertically shiftable thereon, a skid rail at the bottom of each frame for supporting the latter on the same surface on which the wheels of the carriage are adapted to be supported, means on the carriage for raising the skid rails free of said surface, skid shoes reciprocally mounted on said rails transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the carriage, means for vertically adjusting the beam relative to the shoes, a plurality of long grader plates positioned end to end in front of the beam, means for supporting the opposite ends of each plate in vertically adjusted positions on the beam, and means for vertically guiding the plates on the beam to maintain their determined operative positions.

12. In a machine of the class described, a wheeled carriage, a pair of skid rails vertically shiftable thereon and adapted to be supported on the same surface on which the wheels of the carriage are adapted to be supported, manually operated means on the carriage for raising the skid rails free of said surface, skid shoes reciprocally mounted on said rails transversely with respect to the carriage, and grader plate means adjustably supported in a vertical direction at its opposite ends on said shoes.

13. In a machine of the class described, a carriage, grader plate supporting means carried at the opposite sides of the carriage, a grader plate unit, comprising a plurality of separate substantially straight grader plates, reciprocally mounted on the supporting means, said plates being positioned end to end in substantial alignment with each other and transversely with respect to the carriage, means for adjusting adjacent grader plates vertically with respect to the supporting means and also vertically relative to each other, for varying the angular relation of the plates with respect to each other, and means on the carriage for longitudinally reciprocating the plates with respect to the carriage.

14. In a machine of the class described, carriage means, a grader plate supporting beam positioned transversely of the carriage means, means for vertically adjusting the ends of the beam relative to the carriage means, a plurality of separate grader plates at the front side of said supporting beam, the front faces of said plates being concave vertically, and said plates being positioned end to end, means for supporting said plates to slide on and transversely with respect to the beam and in a curved path substantially parallel to the vertical curvatures of the plates, and means for adjusting the plates in said curved path on said supporting means.

15. In a machine of the class described, a carriage, grader plate supporting means vertically shiftable on the carriage, a supporting beam reciprocally mounted on the supporting means transversely with respect to the carriage, means for vertically adjusting the beam relative to the supporting means, means for reciprocating the beam transversely of the carriage, guide and roller means for guiding the transverse reciprocation of the beam, the latter means being mounted to slide vertically on the carriage and connected to the back side of the beam so as to allow horizontal reciprocation of the latter, the guide and roller means connecting the carriage and beam, the latter means having vertically spaced rollers to prevent rocking of the beam about a horizontal axis with respect to the carriage, and a grader plate on the beam.

16. In a machine of the class described, a carriage, a frame means vertically shiftable thereon, skid rails at the bottom of the frame, a supporting beam reciprocally mounted on the skid rails transversely with respect to the carriage, means for vertically adjusting the beam relative to the skid rails, means for reciprocating the beam transversely with respect to the carriage, guide and roller means for guiding the transverse reciprocation of the beam relative to the carriage, the latter means being mounted to slide vertically on the carriage and connected to the back side of the beam so as to allow horizontal reciprocation of the latter, the guide and roller means connecting the carriage and the beam, the latter means having vertically spaced rollers to prevent rocking of the beam about a horizontal axis with respect to the carriage, and a grader plate on the beam.

17. In a machine of the class described, a carriage, a frame means vertically shiftable thereon, skid rails at the bottom of the frame means for supporting the latter on the surface supporting the carriage, a supporting beam reciprocally mounted on the skid rails transversely with respect to the carriage, means for vertically adjusting the beam relative to the skid rails, means for reciprocating the beam transversely with respect to the carriage, guide and roller means for guiding the transverse reciprocation of the beam relative to the carriage, the latter means being mounted to slide vertically on the carriage and connected to the back side of the beam so as to allow horizontal reciprocation of the latter, the guide and roller means having vertically spaced rollers to prevent rocking of the beam about a horizontal axis, a grader plate positioned in front of the beam, and means for supporting the opposite ends of the plate in vertically adjusted positions on the beam.

18. In a machine of the class described, a carriage, skids at the opposite sides of the carriage, skid shoes reciprocally mounted on said skids transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the carriage, means for vertically adjusting the beam relative to the shoes, guide and roller means for guiding the transverse reciprocation of the beam relative to the frame and to prevent forward and backward oscillation of the beam, a plurality of long grader plates positioned end to end in front of the beam, means for supporting the opposite ends of each plate in vertically adjusted positions on the beam, and means for vertically guiding the plates on the beam, to maintain their determined operative positions.

19. In a machine of the class described, a wheeled carriage, a pair of floating frames vertically shiftable thereon, a skid rail at the bottom of each frame for supporting the latter on the same surface on which the wheels of the carriage are adapted to be supported, means on the carriage for raising the skid rails free of said surface, skid shoes reciprocally mounted on said rails transversely with respect to the carriage, a supporting beam mounted on the shoes transversely of the carriage, means for vertically adjusting the beam relative to the shoes, guide and roller means for guiding the transverse reciprocation

of the beam relative to the frame and to prevent forward and backward oscillation of the frame, a plurality of long grader plates positioned end to end in front of the beam, means for supporting the ends of each plate in vertically adjusted positions on the beam, and means for vertically guiding the plates on the beam to maintain their determined operative positions.

20. In a machine of the class described, a frame, axles extending transversely of the machine and extensible longitudinally with the outer ends thereof beyond the sides of the frame, traction wheels at the outer ends of the axles, means for fixing the longitudinal adjustment of the axles with the wheels at various distances outwardly from the frame, an axially fixed drive shaft, and sprocket and chain means connecting the drive shaft to the axles.

21. In a machine of the class described, a carriage, longitudinally extensible revoluble axles at one side of the carriage, traction wheels at the outer ends of the axles, means for fixing the longitudinal adjustment of the axles, sprockets fixed on the axles and adjustable longitudinally therewith, a drive shaft having a drive sprocket longitudinally adjustable thereon, and flexible drive means connecting the sprockets.

22. In a machine of the class described, a carriage, grader plate supporting means at the opposite sides of the front and rear portions of the carriage, grader plate units at the front and rear portions of the carriage and reciprocally mounted on the supporting means at said front and rear portions of the carriage, a power unit on the carriage, means connecting the grader plate units to the power unit for reciprocating the latter transversely with respect to the carriage, a plurality of guides located between the front and rear grader plate units, means for vertically adjusting said guides, agitators mounted to slide on the guides, said agitators extending normally to a lower level than the grader plate units, and means connecting the power unit to the agitators for reciprocating the latter on said guides.

23. In a machine of the class described, a wheeled carriage, a power unit thereon, pairs of floating frames vertically shiftable thereon, one pair at the front and one at the rear end of the machine, a skid rail at the bottom of each frame for supporting the latter on the same surface on which the wheels of the carriage are adapted to be supported, means on the carriage for separately raising the skid rails at the front and rear of the machine free of said surface, grader plate means mounted on the front and rear of the machine and supported at each end by one of said skid rails, means connecting the grader plate means to the power unit for reciprocating the latter transversely with respect to the carriage, a plurality of guides located between the front and rear grader plate means, means for vertically adjusting the latter, agitators mounted to slide on the guides, said agitators extending normally to a lower level than the grader plate means, and means connecting the power unit to the agitators for reciprocating the same on said guides.

24. In a machine of the class described, a wheeled carriage, a power unit thereon, pairs of floating frames vertically shiftable thereon, one pair at the front and one at the rear end of the machine, supporting means at the bottom of each frame for supporting the latter on the same surface on which the wheels of the carriage are adapted to be supported, means on the carriage for separately raising the supporting means at the front and rear of the machine free of said surface, grader plate means mounted on the front and rear of the machine and supported at each end by one of said supporting means, means for connecting the grader plate means to the power unit for reciprocating the latter transversely with respect to the carriage, a plurality of longitudinally extending guides located between the front and rear grader plate means, means for vertically adjusting the latter, agitators extending crosswise of the machine and mounted to slide on the guides longitudinally with respect to the machine, said agitators extending normally to a lower level than the grader plate means, and means connecting the power unit to the agitators for reciprocating the same on said guides.

25. In a machine of the class described, a carriage having traction wheels at its opposite sides, a frame vertically adjustable on the carriage and provided with flange guide wheels inwardly from said traction wheels, said flange guide wheels being mounted on axes parallel to the traction wheels and capable of being adjusted from positions above the traction portions of the traction wheels to positions below the same.

26. In a machine of the class described, a carriage, a grader plate means mounted on the carriage, a plurality of longitudinally extending guides mounted on the carriage and located in front of said plate means, means for vertically adjusting the guides relative to the carriage, and agitators extending crosswise of the machine and mounted to slide on the guides longitudinally with respect to the machine, said agitators having downwardly extending fingers.

27. In a machine of the class described, a carriage, grader plate means mounted on the carriage, means for reciprocating the same transversely of the carriage, agitators extending crosswise of the machine, means connecting the agitators to the grader plate means for reciprocating the former with the latter, and means for raising the agitators and grader plate means with respect to the carriage.

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