

Sept. 15, 1936.

J. H. MOSEL

2,054,436

APPARATUS FOR BUILDING ROADS

Filed Nov. 15, 1934

3 Sheets-Sheet 1

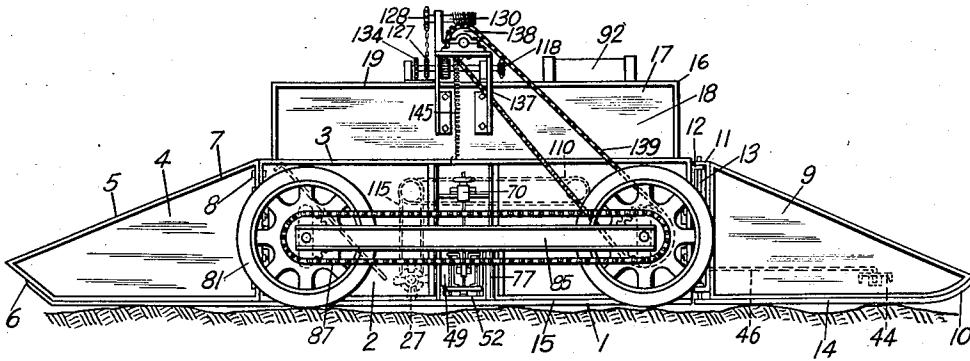


Fig. 1

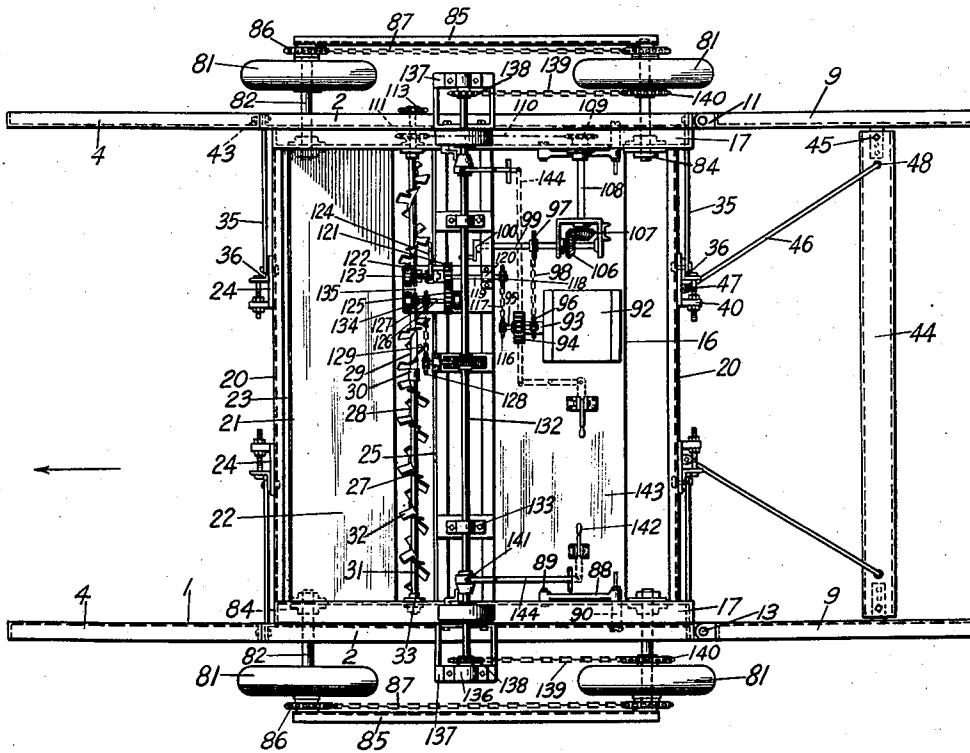


Fig. 2

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3 Sheets-Sheet 2

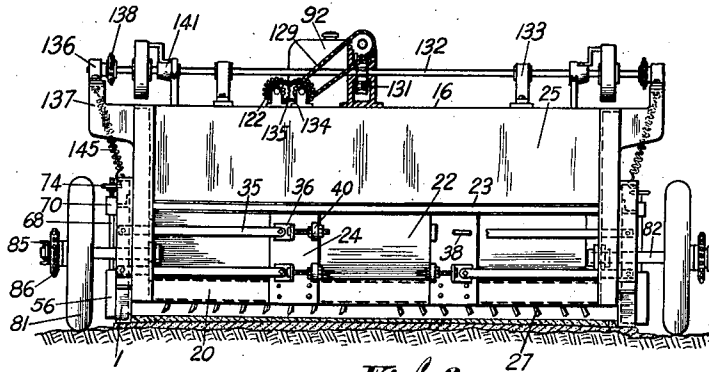


Fig. 3

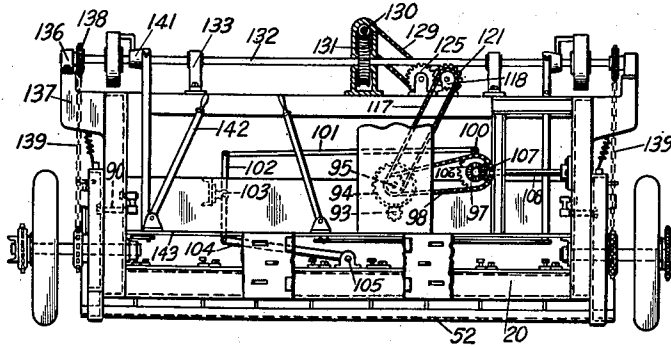


Fig. 4

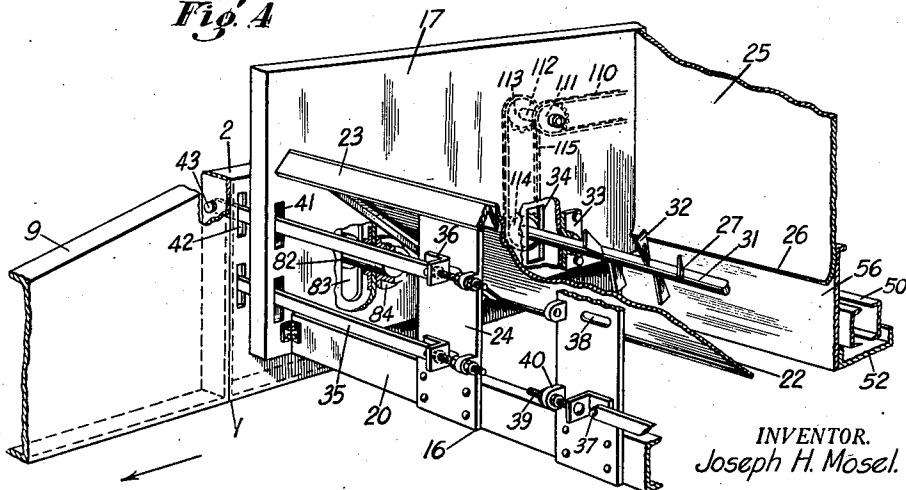


Fig. 5

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3 Sheets-Sheet 3

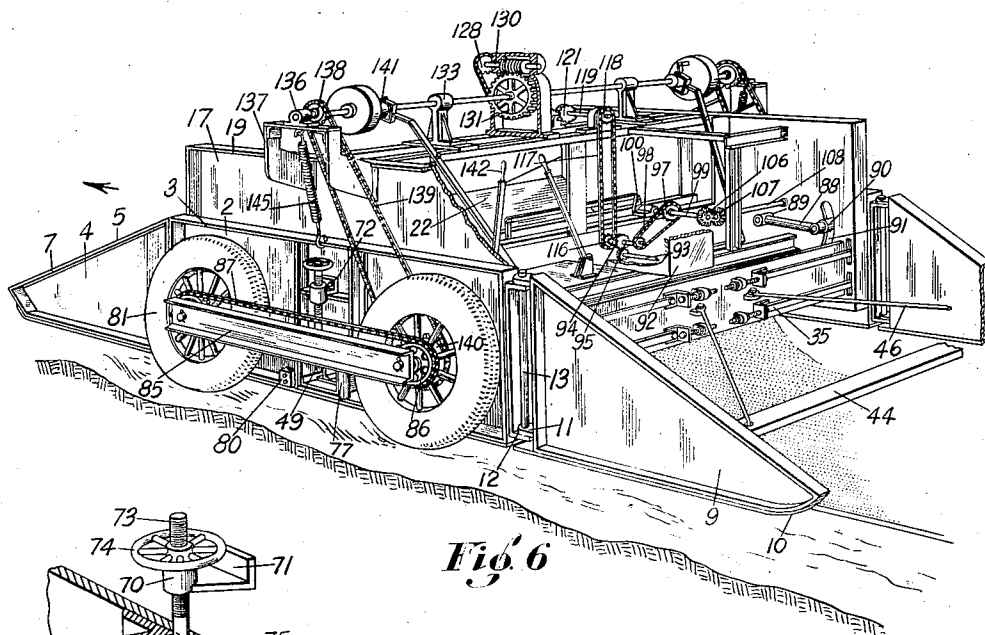


Fig. 6

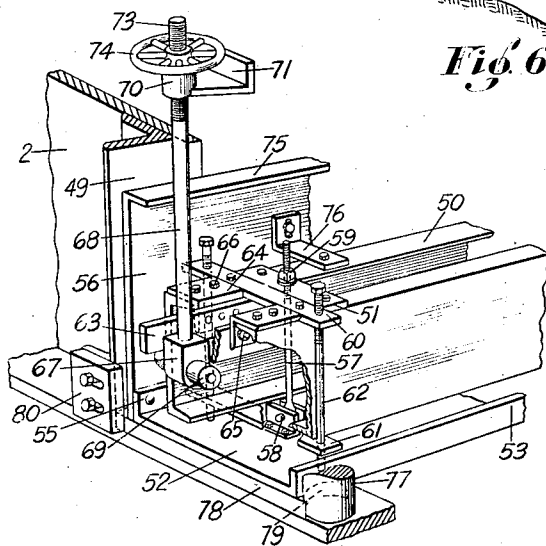


Fig. 7

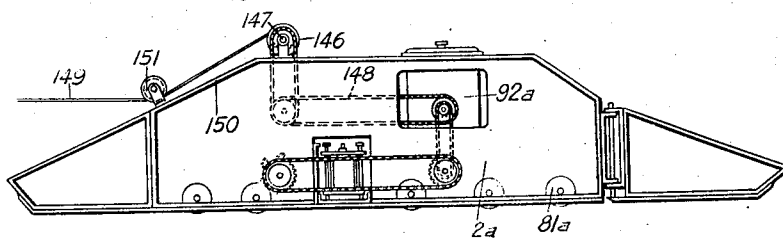


Fig. 8

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UNITED STATES PATENT OFFICE

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APPARATUS FOR BUILDING ROADS

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Application November 15, 1934, Serial No. 753,210

25 Claims. (Cl. 94—46)

My invention relates to apparatus for building roads. It has to do, more specifically, with apparatus which is adapted to receive asphalt or other bitumen material and to spread it across a surface to be treated, forming therefrom a layer or slab of the desired thickness and contour and having straight edges. However, there are certain features of my invention not necessarily limited to the spreading of asphalt or other bitumen materials.

In the past, there have been several machines devised for this purpose. However, these prior art devices are not entirely satisfactory in operation. This type of machine is sometimes used for spreading asphalt or other material over an old roadbed or over a roughly graded or other rough surface. The prior art machines which have been used for this purpose are of such a type that any irregularities in the surface being covered are reflected and greatly exaggerated in the surface produced by a machine of this type. Thus, it is practically impossible to produce, with the prior art machines, a surface which is even and which does not have a large number of raised and depressed portions, unless the surface which is being covered is already finished evenly. Another disadvantage of some of these prior art machines resides in the fact that it is necessary to employ side forms upon which the machine operates and which limit the spreading of the material in order to produce a surface with straight edges. It is obvious that these side forms are expensive and also require a large amount of labor and expense to install them. Still another disadvantage of these prior art machines resides in the fact that they are not provided with suitable means for efficiently spreading sticky asphalt or other sticky materials. Furthermore, these prior art machines are usually of such a type that they are difficult to guide and keep on their proper course.

One of the objects of my invention is to provide apparatus of the type indicated which will receive asphalt or other bitumen material and which will spread such material across the surface to be treated in a very efficient manner and form therefrom a layer or slab of the desired thickness and contour and having straight edges.

Another object of my invention is to provide a device of the type indicated which will form the

layer or slab with straight edges without the use of side forms which are set along the edges of the surface to be covered.

Another object of my invention is to provide apparatus of the type indicated which is particularly adaptable to the spreading of material over an old roadbed or over a roughly graded or other rough surface, the apparatus being of such a type that the irregularities in the surface being covered will not be reflected in the surface produced by the machine and, consequently, the machine will produce a surface which is very even and which will not be "wavy".

Another object of my invention is to provide apparatus of the type indicated which is provided with spreading means of such a nature that it will efficiently spread asphalt or other sticky material across the surface being treated.

Another object of my invention is to provide apparatus of the type indicated which is of such a nature that it may be readily guided and kept along its proper course.

In its preferred form my invention contemplates the provision of apparatus of the type indicated, comprising an outer unit which includes a pair of runners which are adapted to be drawn along the surface to be covered and which also serve as side forms for limiting spreading of the material on the surface to be covered thereby producing straight edges on the layer or slab produced. These runners are of considerable length and, consequently, even though they do operate along a rough surface, the effect of the raised portions and depressions, in the surface being covered, thereon, will be negligible. Within the runners a second unit is disposed and this unit is so associated with the runner unit that it may float up and down without having any effect whatsoever on the runner unit. This second unit has mounted thereon, a hopper extending across the surface to be covered and being adapted to receive the asphalt or other material. At the lower end of this hopper a spreading member is mounted which will spread the material across the surface to be covered in both directions and will compact it against the runner members which will serve as side forms. I also provide a screed member which will level off the material spread by the spreading member to the desired thickness and contour. This screed member is

mounted on the runner unit, inasmuch as such unit is not affected to any material extent by the raised portions and depressions in the surface being covered. Consequently, even though the surface on which the machine operates is rough, the surface produced by the machine will be very even. I also provide suitable traction means for propelling the machine along the surface to be covered. Furthermore, I provide means whereby it is possible to guide the machine and to keep it on its proper course.

The preferred embodiment of my invention is illustrated in the accompanying drawings, wherein similar characters of reference designate corresponding parts, and wherein:

Figure 1 is a side elevation of a road-building apparatus made in accordance with the principles of my invention.

Figure 2 is a plan view of the apparatus shown in Figure 1.

Figure 3 is a view in elevation of the front end of my machine.

Figure 4 is a view similar to Figure 3 but of the rear end of my machine.

Figure 5 is a detail in perspective, partly broken away, of a portion of my machine, showing a portion of the hopper, spreader, screed member and one of the runner members.

Figure 6 is a perspective view of my machine.

Figure 7 is a detail in perspective, partly broken away, of a portion of the screed unit of my machine and associated parts.

Figure 8 is a side elevation of a modified form of my machine.

The outer or runner unit

With reference to the drawings, and particularly to Figures 1, 2, and 6, I have shown my apparatus as comprising a pair of runner members 1, one of which is disposed at each side of the machine. These runner members are adapted to slide along the surface to be covered by the material spread by the machine.

These runner members are quite heavy and are made of metal. Each of the runner members includes a middle section 2 which is of substantially rectangular shape and which is of considerable length. This section 2 comprises a body portion which has a peripheral flange 3 extending entirely along its edge and projecting outwardly therefrom. To the forward end of this section 2, a section 4 is secured. This section is preferably of the shape indicated, having its upper edge downwardly and forwardly inclined as at 5. The forward portion of the lower edge is upwardly and forwardly inclined at 6. Thus, there will be no danger of the forward end of this section 4 digging into the surface being covered. This section 4 is also provided with a peripheral flange 7, similar to flange 3, and projecting outwardly therefrom. The flange at the rear side of the section 4 is preferably rigidly bolted to the flange 3 at the forward side of section 2, as indicated at 8.

The rear end of section 2 of the runner member has another section 9 pivotally secured thereto. This section 9 is practically identical with section 4 but has a rearwardly and upwardly curved lower edge 10. The section 9 has a pair of lug members 11 disposed on the forward end thereof which overlap a pair of lug members 12 formed on the rear end of the section 2. A rod 13 passes through aligning openings in the lugs 11 and 12, and pivotally secures them together. Thus, it will be obvious that the section 9 may be swung

laterally into or out of alignment with the section 2. A runner plate 14 is suitably fastened to the lower edge of the section 9, extending the entire length thereof. A second runner plate 15 is suitably fastened to the lower edge of section 2 and section 4 and extends from the forward end of section 4 to the rear end of section 2. These runner plates are of substantial width so that they will readily slide over the surface upon which they operate and will not dig thereinto. The sections 9 are pivotally connected to the sections 2 to facilitate movement of the machine around curves, as will appear more clearly later. Further, the runner member at one side of the machine is tied to the runner member at the other side of the machine in a manner which will be described subsequently.

The inner or spreading unit

Within the runners 1 a second unit 16 is disposed which may float up and down without having any effect whatsoever on the unit of which the runner members 1 form a part. This unit 16 consists of a pair of side members 17, each of which is composed of a body portion 18 comprising a plate of metal which has a peripheral flange 19 extending outwardly therefrom. These side members 17 are disposed within the runner members 1 and are slightly spaced therefrom so that they may move up and down without interference with the runner members. The side members 17 are of considerably greater height than the sections 2 of the runner members 1 and extend from a point close to the lower edge of the runner members to a point a considerable distance above the upper edge of the sections 2 of the runner members. They are of practically the same length as the sections 2. The side members 17 are secured together by transversely extending beams 20. One of these beams is disposed at the forward ends of these side members 17 and the other at the rear ends thereof (Figure 2). Thus, the side members 17 are rigidly tied together.

Adjacent the forward ends of the side members 17, a material-receiving hopper 21 is formed. This hopper is adapted to receive the material to be spread and extends transversely for the entire width of the machine. The forward wall of this hopper is formed by a plate member 22, which extends transversely of the machine and which has its ends suitably secured to the inner surfaces of side members 17. (Figures 2 and 5.) This plate member is inclined forwardly and upwardly as shown. The upper and forward edge of the plate member 22 is strengthened by an angle member 23 and this angle member is braced by a pair of vertically extending plates 24 having their upper ends suitably secured thereto and having their lower ends riveted to the transversely extending beam 20 at the rear end of the unit 16. The rear wall of this hopper 21 is formed by a transversely extending plate 25 which has its ends suitably secured to the inner surfaces of members 17. This plate 25 extends substantially vertically and has its lower edge curved slightly forwardly, as indicated at 26. The plate 25, however, does not extend down as far as the plate 22. Thus, it will be apparent that a hopper member is formed which has a wide mouth at its upper end and the walls of which converge to form a comparatively narrow opening in the bottom thereof.

In the bottom of the hopper 21, a material-spreading member 27 is disposed. This spreading

member 27 extends transversely of the machine for the entire length of the hopper. It is mounted below the lower edge of plate 25 and substantially even with the lower edge of plate 22. The spreading member 27 preferably embodies two sections 28 and 29, which have their inner ends secured together as at 30 (Figure 2). Each of these sections embodies a shaft 31, having a plurality of narrow blades 32 secured thereon. These blades 32 are arranged helically on the shaft 31. The blades on the section 28 are arranged to feed the material towards one side of the machine while the blades on the other section 29 are arranged to feed the material in an opposite direction towards the opposite side of the machine. Thus, when the spreading member is rotated, the material will be spread in opposite directions and will be compacted against the side forms formed by the runner members 1. I have found that by employing narrow blades, as illustrated, asphalt and other sticky materials may be very efficiently spread. By using a plurality of small blades instead of continuous screw blades, less power is required to rotate the spreading member and the sticky asphalt or other material does not readily collect on the blades.

The outer ends of shaft 31 of the spreading member are mounted in bearing members 33 disposed at the lower edges of the side members 17. The spreading member is so mounted that the blades thereof will extend down below the lower edges of these side members 17 (Figures 3 and 5) and will consequently compact the material against the inner surfaces of members 2. The outer ends of the shaft 31 are rotatably mounted in these bearing members 33. One end of this shaft 31 projects through bearing 33 and outwardly from the member 17 and then extends through a vertical slot 34 formed in the section 2 of one of the runner members 1. Thus, when the inner unit 16 floats up and down and, consequently, the spreading member 27 moves up and down, the end of shaft 31 will merely move up and down in slot 34.

The inner floating unit 16 is tied to the outer runner unit in the following manner and in such a way that the inner unit will be permitted to float up and down without affecting the outer unit at all. To tie these two units together at the forward end of the inner unit 16, I provide a plurality of tie rods 35 (Figure 5). A pair of these tie rods is provided for connecting the runner member 1 at one side of the machine to the inner unit 16 and a second pair is provided for connecting the runner member at the opposite side of the machine to the inner floating unit 16.

Each of these tie rods 35 has its inner end pivotally connected to an L-shaped bracket member 36 by means of a bolt 37. The bolt 37 also passes through a slot 38 formed in the upstanding plate 24 in order that the bracket member 36 will be slidably mounted on the plate 24. The projecting portion of bracket member 36 has a bolt 39 passing through an opening formed therein. This bolt 39 is adjustably mounted in a lug 40 formed on the outer surface of plate 24 in line with slot 38. By adjusting this bolt and nut mechanism 39, the position of the bracket 36 along slot 38 may be changed.

The outer end of each of the tie rods 35 projects out through a slot 41 formed in the side member 17. The tie rod then extends through a corresponding slot 42 formed in the section 2 of the runner member 1 adjacent its forward edge. The outer end of the tie rod 35 is piv-

otally connected to the outwardly projecting flange on the runner member as indicated at 43.

It will be apparent from this that the inner unit 16 at its forward end is connected to the outer runner unit by the tie rods 35 in such a manner that the inner unit can float up and down without affecting the outer runner unit. When the inner unit floats up and down, both ends of the tie rods will pivot around their pivot points and the rods will move vertically in the slots 41 and 42. Furthermore, the brackets 36 may be adjusted along plates 24 to keep the runner members vertical and to maintain them in their proper positions relative to the side members 17 of the unit 16.

The rear end of the unit 16 is tied to the outer runner unit in practically an identical manner by means of the tie rods 35 (Figure 6). The only difference in this instance is that the bracket members 36 are mounted directly on the transverse beam 20 at the rear end of the inner floating unit 16. The L-shaped brackets 36, in this instance, are slidably mounted on this beam 20.

As previously stated, the section 9 at the rear end of each of the runner members 1 may be swung laterally relative to the section 2 when desired. However, in order to normally prevent swinging of the sections 9 out of alignment with the sections 2, I provide the structure illustrated in Figures 2 and 6. This structure comprises a beam 44 extending transversely and having its outer ends pivotally connected to the inner surface of the sections 9 as indicated at 45. This beam 44 serves to connect the sections 9 together and maintain them in parallel relation even when they are swung out of alignment with the sections 2. I further provide a pair of rods 46 which have their inner ends pivotally connected to the beam 20 as indicated at 47, adjacent the middle of the beam 20. These rods extend outwardly at an angle and have their forward ends bent downwardly at right angles, the downwardly bent portions being adapted to fit into openings 48 adjacent the ends of the beam 44. It will be apparent that when the rods are in the position indicated in Figures 2 and 6, the sections 9 will be rigidly held in position and cannot move out of alignment with the sections 2. However, if the outer ends of these rods are lifted so as to remove their bent portions from the openings 48, swinging of the sections 9 out of alignment with the sections 2 will be permitted.

The two runner units may be spaced farther apart or closer together by adjustment of bolt and nut mechanisms 39 at the inner ends of tie rods 35 and adjustment of the connections 45 at the ends of beam 44. This adjustment is desirable, in some instances, as when a levelling-off course is first laid over a rough graded surface or rough surface of an old road and then a finishing course is laid. After the levelling-off course is laid, the runners may be adjusted closer together so that they will run on the edges of the levelling-off course, the machine then laying a finishing course which is slightly narrower than the first course.

The screed unit

As previously indicated, it is very important to have a machine of this type made in such a manner that irregularities in the surface being covered will not be reflected in the surface produced by this machine. I provide a screed member which levels off the surface of the material spread by my machine and which makes the layer of the

desired thickness and contour. This screed is so mounted that it will not be affected by irregularities in the surface being covered and over which the machine passes: As previously stated, the runner members 1 pass over the rough surface to be covered but since they are of such great length, the irregularities in the surface do not affect the outer runner unit to any material extent. Therefore, it is desirable to have the screed unit, which determines the contour and thickness of the road or, in other words, produces the finished surface, mounted on the outer runner unit.

The screed unit is best shown in Figures 5 and 7. This screed unit has its outer ends extending through openings 49, one of which is formed in each section 2 of the runner members 1, substantially midway between the ends of the section 2 and at a location behind the beater and spreading member 27. This screed unit embodies a pair of transversely extending beams 50 which extend for the entire width of the machine and project through the openings 49. These beams may be tied together by bars of metal 51 riveted on the upper edge thereof at suitably spaced intervals.

The screed proper is formed by a bottom plate member 52, which has a vertically extending flange 53 disposed at right angles thereto. The flange 53 is at the rear side of the plate member 52 and the forward edge of this plate 52 is upturned as indicated at 55. This upturned portion 55 is bolted or riveted to the lower edge of a plate 56 which is of substantial height and forms the forward wall of the screed member. The screed proper, comprising plates 52 and 56, is tied to the transverse beam members 50 by means of a plurality of tie rods 57, these rods being disposed at intervals along the beams 50. Each of these rods has its lower end pivotally connected to the inner surface of plate 52 as indicated at 58. The upper ends of these rods pass through openings in the bars 51 disposed along the upper edge of the beams 50. By adjusting nuts 59 which are threaded on the upper ends of these rods above the bars 51, the rods may be independently adjusted vertically in order to put the desired crown in the screed proper.

Adjacent each of the bars 51, which are disposed on the beams 50, another bar 60 is disposed, which is riveted to the beams 50 and which projects outwardly from each beam. A similar bar 61 is disposed in alignment with each of these bars 60 and is similarly secured to the lower edges of the beams 50. A thrust bolt 62 is threaded into an opening in the projecting portion of the bar 60 and through a corresponding opening in the projecting portion of the other bar 61. One of these bolts is disposed at each side of the unit formed by the two beams 50. The screed proper, comprising plates 52 and 56, is tied to the beams 50 by means of the tie rods 57 as previously explained. It is tied to the beams 50 in such a manner that the plate 52 thereof will be spaced a slight distance below the lower edges of beams 50. The thrust bolts 62 project below the bar 61 and contact with the inner surface of plate 52.

Although I only show one of the units, consisting of bars 60 and 61 and thrust bolts 62, and one of the units, consisting of bar 51 and rod 57, in Figure 7, it will be understood from Figure 4 that a plurality of each of these units is disposed at intervals along the beams 50. By adjusting the various rods 57, disposed along the screed unit, the plate member 52 may be crowned in any predetermined manner to produce a sur-

face of the desired contour. By means of the thrust bolt 62, the forward edge of plate 52 may be caused to be in line with the rear edge thereof, or the plate may be tilted with its forward edge raised so that it will not only level off the material spread by the machine, but will exert a downward thrust thereon, compacting the material. Because of the fact that the lower ends of tie rods 57 are pivotally connected to the plate 52, it may be tilted as desired. This will be accomplished by adjusting the bolts 62 at the rear side of the screed unit downwardly farther than the corresponding bolts at the forward side thereof.

The screed unit is suspended from the outer runner unit in such a manner that it may be reciprocated transversely thereof. For this purpose, each of the beams 50 is provided at each end thereof with an outwardly projecting bar 63. Each of these bars is bolted to an inverted L-shaped bracket 64, as indicated at 65. The brackets 64 are bolted to the upper edges of beams 50, as at 66. The pair of bars 63 at each end of the screed unit straddle a block member 67 formed on the lower end of a vertically extending rod or shaft 62. This block 67 has rotatably mounted thereon a pair of rollers 69. The bars 63 will rest on these rollers 69. Each of the rods 68 extends up through a bearing member 70, disposed on the outer end of a bracket 71 which is bolted or riveted to the section 2 of the runner member 1, as indicated at 72. The upper end of the rod 68 is threaded as at 73. A hand-wheel 74 is threaded thereon above bearing member 70. It will be understood that by operating the hand-wheel 74, the corresponding end of the screed unit may be raised. Thus, either or both ends of the screed unit may be raised or lowered. It will also be apparent that the screed unit may be reciprocated transversely of the machine, by means to be described, and that this reciprocation will be permitted because the bars 63 will merely ride back and forth on the rollers 69.

The upper edge of plate 56 is preferably turned rearwardly at right angles at 75 for strengthening such plate. In order to further strengthen the plate, a plurality of L-shaped brackets 76 may be employed. These brackets will be disposed at spaced intervals and the vertical portions thereof will be connected to plate 56 by pin and slot connections, as shown in Figure 7, and the horizontal portions thereof will be bolted or riveted to the upper edge of the forwardmost beam 50. Because the brackets 76 are connected to plate 56 by the pin and slot connections, the adjustments of plate 52 will be permitted.

As previously stated, the screed unit extends into openings 49 formed in the sections 2 of the runner members 1. In order to permit easy reciprocation of the screed member transversely of the machine, without generation of an undesirable amount of friction between the rear surface 53 of the screed proper and the rear wall of opening 49, I provide idler rollers 77 at the rear sides of the openings 49. These idlers are suitably mounted so that they may easily rotate and preferably extend the entire height of openings 49. It will be understood that when the forward side of the screed member contacts with the material being spread, it would exert a rear thrust on the screed member and if the rollers 77 were not provided, it might develop so much friction between the rear side of the screed member and the rear walls of openings 49 as to pre-

vent transverse reciprocation of the screed member. However, these rollers 77 prevent this.

As previously described, each end of the screed unit may be adjusted to its desired height. The thickness of the layer of material spread, will be determined by the vertical position of the screed unit. Therefore, it is desirable to provide one or more shim members 78 at each end of the screed unit below the lower surface thereof, to accurately gauge the height to which the screed member is adjusted. Each of these shim members has an open mouth 79 at forward end which fits around roller 77. Thus, this end of the shim member will be held in place. The other end of the shim member will be held in place by an adjustable block 80, which may be adjusted to slightly overlap the shim member but not to interfere with reciprocation of the screed unit. When the machine is operating, the screed unit is adjusted vertically to such a height that the lower surface thereof will be very slightly spaced above the shim member or in contact therewith.

It will be clear from Figure 5 that the plate 25 which forms the forward wall of the material-receiving hopper overlaps the front plate 56 of the screed member. These plates are always in overlapping relation to each other. The plate member 25 will not interfere with vertical adjustment of the screed member.

The traction or propelling means

The traction or propelling means is shown clearly in Figures 1 to 6, inclusive. As illustrated in these figures, this traction or propelling means comprises a pair of wheel members 81, disposed on each side of the machine. These wheel members are disposed outside of the runner members 1 and are adapted to operate on the rough graded or other roughly finished surface for an old road-bed outside of the area to be covered by the machine. Thus, the wheels will not operate on the surface produced by the machine and mar such surface.

The wheel members 81 preferably have pneumatic tires of large cross-sectional area mounted thereon in order to obtain satisfactory traction. Each of the wheels 81 is rotatably mounted on the outer end of an axle member 82. Each of these axle members passes inwardly through a vertical slot 83 (Figure 5) which is of considerable length and which is formed in the section 2 of the runner member. The inner end of the axle is keyed in a bearing member 84, mounted on the side member 17 of the inner unit 16. The axles are of sufficient length to permit lateral adjustment of the runners. The axle members 82 on each side of the machine are rigidly tied together by a longitudinally extending beam 85. A sprocket 86 is rigidly fastened to the wheel member 81 so that it will rotate therewith. The two sprocket members 86 of each pair of wheels are operably connected together by a sprocket chain 87. Thus, when one of the pair of wheels rotates, the other wheel thereof will rotate.

It will be apparent from this that the wheels will contact with the surface outside of the area to be covered. They will operate on the rough surface and will follow the contour thereof. Because they operate over the irregularities of the rough surface, they will move bodily up and down. This up and down movement will cause the inner floating unit 16 to move up and down but will not affect the runner members, and, consequently, the screed members, since the axle members 82 are free to move vertically in the slots 83 formed in the sections 2 of the runner members.

In order to prevent friction between the edges of slots 83 and the axle members 84, which might interfere with the floating action of the inner unit 16 relative to the outer runner unit, I provide the following structure: This structure embodies a link member 88 (Figure 6), which has its rear end pivotally connected to the inner surface of the side member 17 as at 89. The forward end of this link 88 is provided with a roller 90, extending at right angles thereto and suitably mounted thereon. This roller 90 extends through an arcuate slot 91 formed in the member 17. The outer end of this roller 90 is secured to the inner surface of the section 2 of the runner members.

It will be apparent that when the traction wheels 81 are driven they will move the inner unit 16 along and, because of the links 88 and rollers 90, the outer runner unit will be moved along therewith, without having the axles 82 contact with the edges of slots 23. The links 88 will exert a pull on the runner unit which will drag it along with the inner unit 16 and the entire machine will be propelled along the surface being covered and without developing friction between axles 82 and the edges of slots 83, thereby interfering with the floating action of unit 16, relative to the outer runner unit.

The driving mechanism

The driving mechanism comprises a power unit 92, which is disposed at the rear side of the unit 16 substantially midway between the sides thereof. This power unit may be of any suitable type but is preferably an internal combustion engine. It has a projecting driveshaft 93 (Figure 6) which has a gear on its outer end that meshes with a gear 94, mounted at the middle of a shaft 95. This shaft 95 has a sprocket mounted at each end thereof. The shaft 95 is rotatably supported in a suitable manner. The sprocket 96 at the rear end of this shaft is connected to a sprocket 97 by means of a sprocket chain 98. The sprocket 97 is keyed on a horizontally extending shaft 99, which is rotatably mounted in a suitable manner. The forward end of this shaft 99 has a crank arm 100 keyed thereon. This crank arm 100 is pivotally connected to a horizontally extending link 101 (Figure 4) which has its opposite end pivotally connected to a vertical link 102. The vertical link 102 is pivoted as at 103 and its lower end is pivotally connected to a substantially horizontally extending link 104 which is in turn pivotally connected to the upper end of the screed unit, as indicated at 105. Thus, when shaft 99 is rotated by the power unit 92, the screed unit will be reciprocated back and forth transversely of the machine.

The shaft 99 is also adapted to drive the spreading member 27. Thus, the rear end of the shaft is provided with a bevel gear 106 which meshes with a bevel gear 107 keyed on the outer end of a shaft 108 which is rotatably mounted in suitable bearings. The shaft 108 passes outwardly through the side member 17 and its outer end has a sprocket 109 keyed thereon. This sprocket 109 is disposed between member 17 and the section 2 of the runner member (Figure 2). The sprocket 109 is connected by means of a chain 110, to a sprocket 111 which is keyed on the inner end of a sub-shaft 112 (Figure 5). The shaft 112 is rotatably mounted on member 17 and has a second sprocket 113 keyed on its outer end. This sprocket 113 drives a sprocket 114 through the medium of a sprocket chain 115. The

sprocket 114 is keyed on the outer end of the shaft 31 of the spreading member 27. Thus, the power unit, through the medium of the mechanism just described, will rotate the spreading member 27 and will simultaneously cause reciprocation of the screed member.

The power unit 92 also drives the traction means or propelling means for my machine. Thus, the sprocket 116 at the forward end of the shaft 95 (Figures 2 and 6), drives a sprocket chain 117 which extends upwardly around a sprocket 118. The sprocket 118 is keyed on the rear end of a shaft 119 which is rotatably mounted in a suitable manner in bearing members 120. Substantially midway between its ends this shaft 119 has a large gear 121 loosely thereon. At its forward end it has a sprocket 122 loosely mounted thereon. The member 121 and the member 122 normally do not rotate with the shaft 119. However, each of these members has a jaw which may be engaged by a jaw clutch member 123. By operation of lever 124 the jaw clutch may be operated to cause either gear 121 to rotate with the shaft or sprocket 122 to rotate therewith. The gear 121 meshes with a similar gear 125 which is keyed on a shaft 126 which is rotatably mounted. This shaft 126 has a sprocket 127 keyed thereon which drives a sprocket 128 through the medium of a sprocket chain 129. The sprocket 128 is keyed on the outer end of a worm-shaft 130 (Figure 6) which meshes with a worm-gear 131. The wormgear 131 is keyed on a transversely extending shaft 132 which is rotatably mounted in bearing members 133. The forward end of shaft 126 (Figure 2) has a sprocket 134 keyed thereon. This sprocket is operatively connected to the sprocket 122 by means of a chain 135.

It will be apparent that when the jaw clutch 123 causes the gear 121 to rotate with shaft 119 but does not cause sprocket 122 to rotate therewith, the shaft 126 will also rotate but in an opposite direction and will permit rotation of sprocket 122 in an opposite direction to the rotation of shaft 119. This will cause the shaft 132 to rotate in a certain direction through the medium of the connecting-mechanism described and will drive the traction wheels 81, through the medium of mechanism to be described, in a direction to propel the machine forwardly. If the clutch 123 is operated to cause sprocket 122 to rotate with shaft 119 and to permit gear 121 to idle thereon, the shaft 126 will be driven in the same direction of rotation as the shaft 119 or in a direction opposite to that in which it was previously driven. Therefore, the shaft 132 will be driven in an opposite direction of rotation and the traction wheels 81 will be driven in such a direction that the machine will be propelled rearwardly, as will be later more fully described.

The outer ends of shaft 132 are mounted in bearing members 136 which are mounted on outwardly projecting supporting structures 137, projecting from the outer surface of each side member 17, a substantial distance and disposed adjacent the upper edge thereof. Adjacent each outer end of the shaft 132, a sprocket 138 is keyed. This sprocket drives a chain 139 which passes around a sprocket 140, fastened to the rear wheel 81 in such a manner as to rotate therewith. Thus, rotation of shaft 132 drives the traction wheels at each side of the machine. Interposed in the shaft 132 adjacent each end thereof is a clutch member 141 of a suitable type. These clutch members are operated by handle members 142

disposed on a platform 143 mounted at the rear of the unit 16 and on one side thereof. These handles 142 are connected by suitable linkage mechanism 144 to the clutches. These clutches operate independently of each other.

Thus, it will be apparent that the clutch member 141 at one end of the shaft may be disengaged so that the traction wheels at one side of the machine will not operate while the clutch at the opposite side of the machine may be operative, to cause the traction wheels at that side of the machine to operate. Thus, the traction means at either side of the machine may be operated without operating the traction means at the other side of the machine. Because of this, the machine may be readily turned when desired and maintained on its proper course. Both of the clutches 141 may be rendered inoperative so that neither of the traction means will operate. The machine may be readily turned, if it is moving forwardly or if it is moving rearwardly.

The supporting structures 137 have secured thereto, the upper ends of coil springs 145. These tensioned coil springs have their lower ends connected to the sections 2 of the runner members 1. They serve to exert a lifting force on the runner unit in order to prevent the development of too much friction as the runners slide along the surface upon which they operate.

The operation of the machine

When the machine is to be operated, the screed member is first adjusted to its proper vertical position to produce a layer of material of the desired thickness. It is also adjusted to produce the desired crown on the surface produced by the machine.

The driving mechanism is then operated to cause the spreading and beating member 27 to rotate in the proper direction and to cause reciprocation of the screed unit. The hopper member is then filled with hot asphalt or other material to be spread. The traction wheels are then driven by the mechanism described and the machine is propelled forwardly in the direction indicated by the arrows in the drawing.

The spreading member 27 spreads the material which passes downwardly in the hopper therearound across the surface to be covered in opposite directions. Because it embodies a plurality of small spaced blades it will also beat the material and break it up. It compacts the material against the surface being covered and also against the side forms which are formed by the runner members 1. Thus, the machine will produce a layer of material with straight edges. The material spread by the spreading member 27 is leveled off to the proper thickness and contour by the screed unit disposed behind the spreading member 27. Thus, a layer of material of desired thickness and contour is produced.

Although the traction wheels might operate on a rough surface, the irregularities of such surface will not be reflected in the surface produced by the screed member. This is due to the fact that the traction wheels are mounted on the inner unit 16 which may float up and down, relative to the outer runner unit consisting mainly of the runner members 1. The screed member is mounted on the runner members which are of comparatively great length and which will pass over the rough surface and will not follow the depressions and bumps of such surface. Thus, the surface produced by my machine will be very level and even and devoid of depressions and bumps. Although

the spreading member 27 will move up and down, this will not affect the finished surface, since the screed member is the member which ultimately levels off or finishes the surface of the layer 5 formed by my machine.

The runner members 1 extend behind the spreading member 27 and the screed member a considerable distance and, consequently, these members will cooperate with the edges of the 10 layer of material already spread in maintaining the machine on its course. However, if the machine tends to leave its course, the traction wheels at the proper side of the machine may be rotated without operating the traction wheels on 15 the other side of the machine and in this manner the machine may be steered along its proper course. As previously stated, ordinarily the sections 9 of the runner members will be in alignment with the sections 2. However, they may be 20 swung laterally to either side out of alignment with the sections 2, when desired, to facilitate passage of the machine around curves or corners. The runner members 1 are of such a type that they will merely slide over the rough surface and will 25 not dig into such surface.

In Figure 8, I have illustrated more or less diagrammatically a machine which is identical with that previously described with the exception that 30 different means is provided for propelling it along the surface to be covered. In this instance, a series of small supporting wheels or rollers 81a are provided but the traction drive to the supporting wheels is eliminated. The propelling 35 mechanism constitutes a drum member 146 which is keyed on a shaft 147, this shaft being driven from the power unit 92a through the sprocket and chain drive indicated generally by the numeral 148. One of these drum members only is shown, but it will be apparent that a drum member is 40 mounted at each side of the machine on each of the sections 2a. A cable 149 is adapted to wind on the drum member 146 and has its inner ends suitably fastened thereto. This cable passes downwardly along the inclined upper edge 150 of the 45 section 2a and underneath an idler pulley 151 rotatably mounted thereon. The outer ends of the pair of cables 149 will be connected to stakes or other structures disposed adjacent the edges of the surface to be covered and located a substantial 50 distance ahead of the machine.

In propelling this machine along the surface to be covered, the two drum members will be rotated at the same rate of speed. This will cause 55 the cables 149 to wind on the drum members 146. Winding of the cables 146 on the drum members will cause the machine to be pulled along towards the members to which the outer ends of the cables 149 are connected.

It will be understood from the preceding description that I have provided a machine having 60 many advantageous features, most of which have been specifically pointed out and others of which will be apparent. This machine is particularly adaptable for spreading asphalt or other bitumen material over an old roadbed, a rough graded surface or other rough surface, although it is not 65 necessarily limited thereto. One of the main advantages of this machine consists in the fact that the irregularities in the surface being covered will not be reflected to any material extent in the 70 surface of the layer of material produced by this machine. This machine will produce a layer or slab of material of the desired thickness and contour and having straight edges. Furthermore, it 75 will not be necessary to use side forms set along

the edges of the surface being covered, since the runner members forming a part of the machine serve as side forms. Also, the spreading and beating member of my machine is of such a nature 5 that it is particularly suitable for spreading asphalt or other sticky materials. Another advantage of my machine, resides in the fact that it may be easily guided and therefore kept on its proper course. Furthermore, one man alone may operate this machine in a very efficient manner. 10 Many other advantages will appear from the preceding description, the drawings and the appended claims.

By the term "screed member" used in the following claims, I intend to cover any member 15 which is used for leveling off the material to the desired thickness and contour, such as a strike-off plate and other equivalent members.

Having thus described my invention, what I claim is: 20

1. A machine of the type described comprising a runner unit, a screed member mounted on said runner unit in such a manner that it may be reciprocated transversely thereof, means for vertically adjusting said screed member, means for 25 adjusting said screed member to produce the desired crown on the surface produced by the machine, means for tilting the lower surface of said screed member, a spreading unit, means for tying both of said units together, the spreading unit 30 being tied to said runner unit in such a manner that it may float up and down relative thereto.

2. A machine of the type described comprising a runner unit embodying a plurality of runners, a screed member carried by said runners, a spreading 35 unit including a material receiving hopper, said spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, and means for preventing substantial relative lateral movement 40 between said units during the floating action.

3. A machine of the type described comprising a runner unit embodying a plurality of runners, a screed member carried by said runners, 45 a spreading unit including a material-receiving hopper, a rotatable spreading member for spreading the material across the surface to be covered disposed at the lower end of said hopper, said spreading unit being tied to said runner unit in 50 such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, and means for preventing substantial relative lateral movement between said units during the floating 55 action.

4. A machine of the type described comprising a runner unit embodying a plurality of runners, a screed member carried by said runners, a 60 spreading unit including a rotatable spreading member for spreading the material across the surface to be covered, said spreading member comprising a plurality of narrow blades helically arranged, and means for tying said runner unit to said spreading unit in such a manner that the 65 spreading unit may float up and down relative to said runner unit during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units. 70

5. A machine of the type described comprising a runner unit embodying a plurality of runners, a screed member carried by said runners, a 65 spreading unit including a rotatable spreading member for spreading the material across the 75

surface to be covered, said spreading member comprising a plurality of narrow blades helically arranged and including two sections, one of which feeds the material towards the right and the other towards the left, and means for tying said runner unit to said spreading unit in such a manner that the spreading unit may float up and down relative to said runner unit during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

6. A machine of the type described, comprising a runner unit, embodying a pair of runners, a screed member carried by said runners, a spreading unit, means for tying said spreading unit to said runner unit in such a manner that it may automatically float up and down relative thereto during movement of the machine over the surface to be covered, traction and propelling means mounted on said spreading unit and adapted to operate outside of the inner surfaces of said runners, the traction and propelling means being so mounted that they float up and down with said spreading unit, and means for driving the traction and propelling means at one side of the machine without affecting the traction and propelling means at the opposite side of the machine.

7. A machine of the type described, comprising an outer unit, a screed member mounted on said outer unit, an inner spreading unit, and means for tying said inner unit to said outer unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

8. A machine of the type described, comprising a runner unit, embodying a pair of runners, traction and propelling means for moving said runner unit along the surface to be covered, said traction and propelling means operating outside of the inner surfaces of said runners and being mounted in such a manner that they may float up and down without affecting said runner unit during movement of the machine over the surface to be covered, and means for preventing substantial relative lateral movement between said traction and propelling means and said runner unit during the floating action.

9. A machine of the type described, comprising an outer unit, a screed member mounted on said outer unit, an inner spreading unit, means for tying said inner unit to said outer unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units, and means for propelling the machine along the surface to be covered.

10. A machine of the type described, comprising an outer unit, a screed member carried by said outer unit, an inner spreading unit, means for tying said inner unit to said outer unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units, and means for propelling the machine along the surface to be covered, said means comprising a pair of drum members mounted on the machine, cables having their inner ends secured to said drum members and their outer ends secured to members disposed ahead of the machine, and means for rotating said drum members to cause the cables to wind thereon.

11. A machine of the type described comprising a runner unit embodying a plurality of runners, a screed member carried by said runner unit, a spreading unit, traction means carried by said spreading unit and operating outside of the inner surfaces of the runners, means for tying said runner unit to said spreading unit in such a manner that the spreading unit may float up and down relative to the runner unit, said means including springs tied to said spreading unit and said runner unit for reducing the friction developed by said runners in sliding along.

12. A machine of the type described comprising a runner unit including a plurality of runners, a screed member carried by said runners, a spreading unit carrying traction members which operate outside the inner surfaces of said runners, and means for tying both of said units together in such a manner that they may float up and down relative to each other during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

13. A machine of the type described comprising an outer runner unit embodying a pair of parallel runners extending longitudinally of the machine and being of considerable length, said runners being adapted to slide over the surface to be covered and being adapted to serve as side forms to shape the edge of the layer of material produced by the machine, a screed member carried by the runners, said screed member extending transversely of the runners and being disposed substantially at right angles thereto at a point substantially midway between the forward and rear ends of said runners, means for vertically adjusting said screed member relative to said runners, a spreading unit, said spreading unit including a hopper arranged directly in front of said screed member, a rotatable spreading member disposed in said hopper and adapted to feed the material in the hopper laterally of the surface to be covered, traction and propelling means carried by said spreading unit and operating outside of the inner surfaces of the runners so that they will not operate on the layer of material produced by the machine, means for tying said runner unit to said spreading unit in such a manner that the spreading unit may float up and down relatively to the runner unit during movement of the machine along the surface to be covered, said means including springs tied to said spreading unit and said runner unit for reducing the friction developed by said runners in sliding along the surface to be covered.

14. A machine of the type described comprising a runner unit embodying a pair of parallel runners extending longitudinally of the machine and being of considerable length, said runners being adapted to slide over the surface to be covered and being adapted to serve as side forms to shape the edge of the layer of material produced by the machine, a screed member carried by the runners, said screed member extending transversely of the runners and being disposed substantially at right angles thereto at a point intermediate the forward and rear ends of said runners, a spreading unit, said spreading unit including a hopper arranged directly in front of said screed member, a rotatable spreading member disposed at the bottom of said hopper and adapted to feed the material laterally of the surface to be covered, traction and propelling means carried by said spreading unit and operating outside of the inner surfaces of the runners so that

they will not operate on the layer of material produced by the machine, and means for tying said runner unit to said spreading unit in such a manner that the spreading unit may float up and down relative to the runner unit during movement of the machine along the surface to be covered, said means preventing substantial relative lateral movement between said units.

15. A machine of the type described comprising a runner unit embodying a pair of parallel runners extending longitudinally of the machine and being of considerable length, said runners being adapted to slide along the surface to be covered and being adapted to serve as side forms to shape the edge of the layer of material produced by the machine, a screed member carried by the runners, said screed member extending transversely of the runners and being disposed substantially at right angles thereto at a point intermediate the forward and rear ends of said runners, a spreading unit, traction means carried by said spreading unit and operating outside of the inner surfaces of the runners so that they will not operate on the layer of material produced by the machine, and means for tying said runner unit to said spreading unit in such a manner that the spreading unit may float up and down relative to the runner units during movement of the machine along the surface to be covered, said means preventing substantial relative lateral movement between said units.

16. A machine of the type described comprising a runner unit embodying parallel runners extending longitudinally of the machine and being of considerable length, said runners being adapted to slide along the surface to be covered, a screed member carried by the runners, said screed member extending transversely of the runners and being disposed substantially at right angles thereto at a point intermediate the forward and rear ends of said runners, and a spreading unit tied to said runner unit in such a manner that it may float up and down relative to the runner unit during movement of the machine along the surface to be covered, and means for preventing substantial relative lateral movement between said units during the floating action.

17. A machine of the type described comprising a runner unit embodying a plurality of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners, a spreading unit, means for tying both of said units together, said spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

18. A machine of the type described comprising a runner unit embodying a plurality of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners in such a manner that it may be reciprocated transversely thereof, a spreading unit, means for tying both of said units together, the spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

19. A machine of the type described comprising a runner unit embodying a plurality of runners,

said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners in such a manner that it may be reciprocated transversely thereof, means for reciprocating said screed member, means for vertically adjusting said screed member relative to said runners, a spreading unit, means for tying both of said units together, the spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

20. A machine of the type described comprising a runner unit embodying a plurality of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners in such a manner that it may be reciprocated transversely thereof, means for vertically adjusting said screed member relative to said runners, means for adjusting said screed member to produce the desired crown on the surface produced by the machine, a spreading unit, means for tying both of said units together, the spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

21. A machine of the type described comprising a runner unit embodying a plurality of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners, a spreading unit including a rotatable spreading member for spreading the material across the surface to be covered, said spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, and means for preventing substantial relative lateral movement between said units during the floating action.

22. A machine of the type described comprising a runner unit embodying a pair of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners, a spreading unit, means for tying said spreading unit to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units, and traction means disposed outside of the inner surfaces of said runners.

23. A machine of the type described comprising a runner unit embodying a pair of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners, a spreading unit, means for tying said spreading unit to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units, and traction means mounted on said spreading unit and being disposed outside of the inner surfaces of said runners.

24. A machine for forming a layer or slab from material without setting forms along the edge

thereof comprising a runner unit embodying a plurality of runners, said runners being adapted to slide along the surface to be covered and being adapted to serve as side forms to shape the edges of the layer or slab of material produced by the machine, a screed member carried by said runners, a spreading unit, means for tying both of said units together, said spreading unit being tied to said runner unit in such a manner that it may float up and down relative thereto during movement of the machine over the surface to be covered, said means preventing substantial relative lateral movement between said units.

25. A machine of the type described comprising a runner unit embodying a plurality of runners, said runners being of considerable length and being adapted to slide along the surface to be covered, a screed member carried by said runners, a second unit carried by traction means which operate outside of the inner surfaces of said runners, and means for tying both of said units together in such a manner that they may float up and down relative to each other during movement of the machine along the surface to be covered, said means preventing substantial relative lateral movement between said units.

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DISCLAIMER

2,054,436.—*Joseph H. Mosel*, Columbus, Ohio. APPARATUS FOR BUILDING ROADS.
Patent dated September 15, 1936. Disclaimer filed May 15, 1939, by the
assignee, *The Jaeger Machine Company*.

Hereby enters this disclaimer to claims 7, 16, 17, and 24 in said specification.
[*Official Gazette June 6, 1939.*]