March 12, 1935. A. F. REIS 1,994,437

MACHINE FOR LEVELING AND SHAPING ROADS

Filed Nov. 18, 1931 4 Sheets-Sheet 1

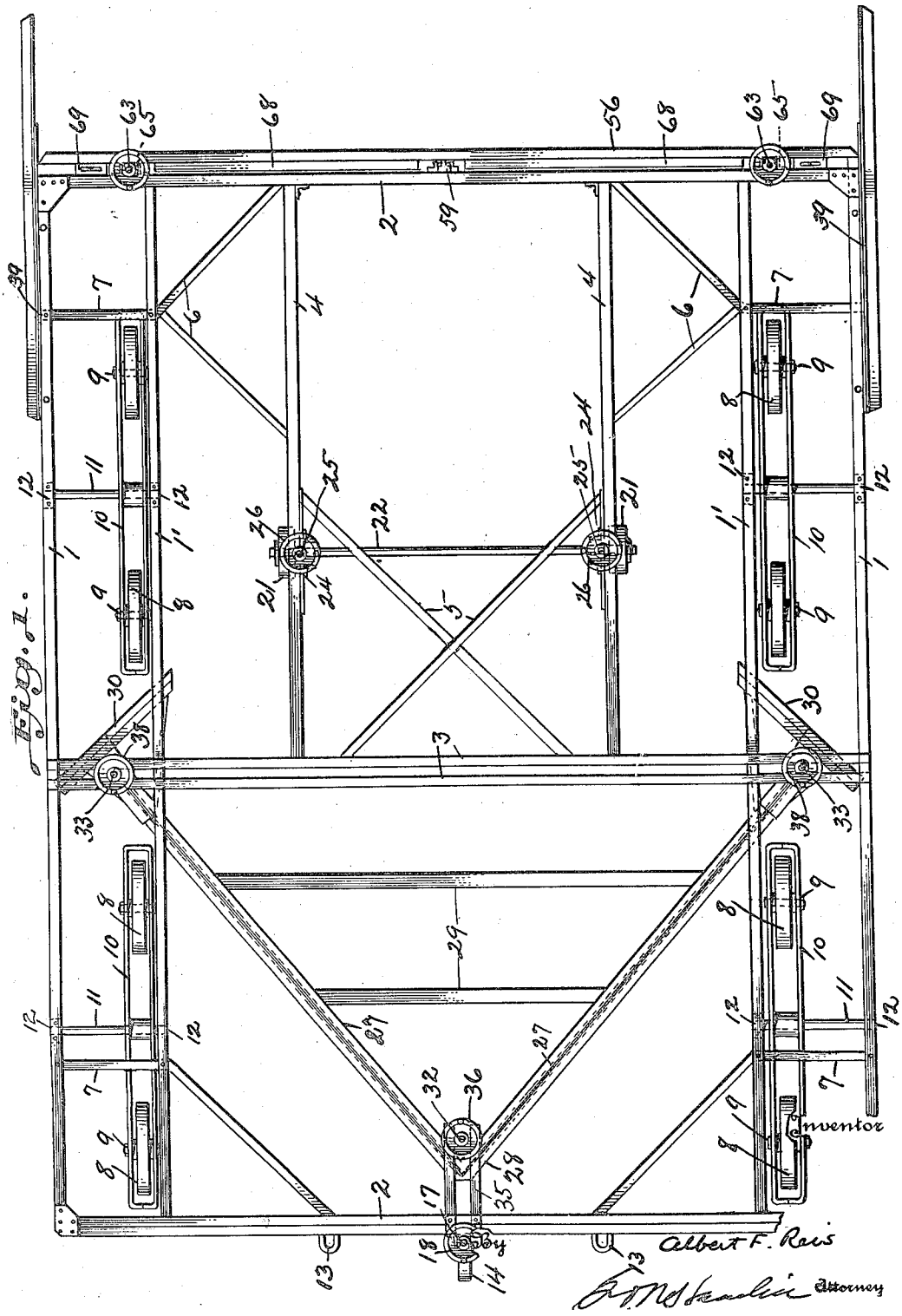


Fig. 1.

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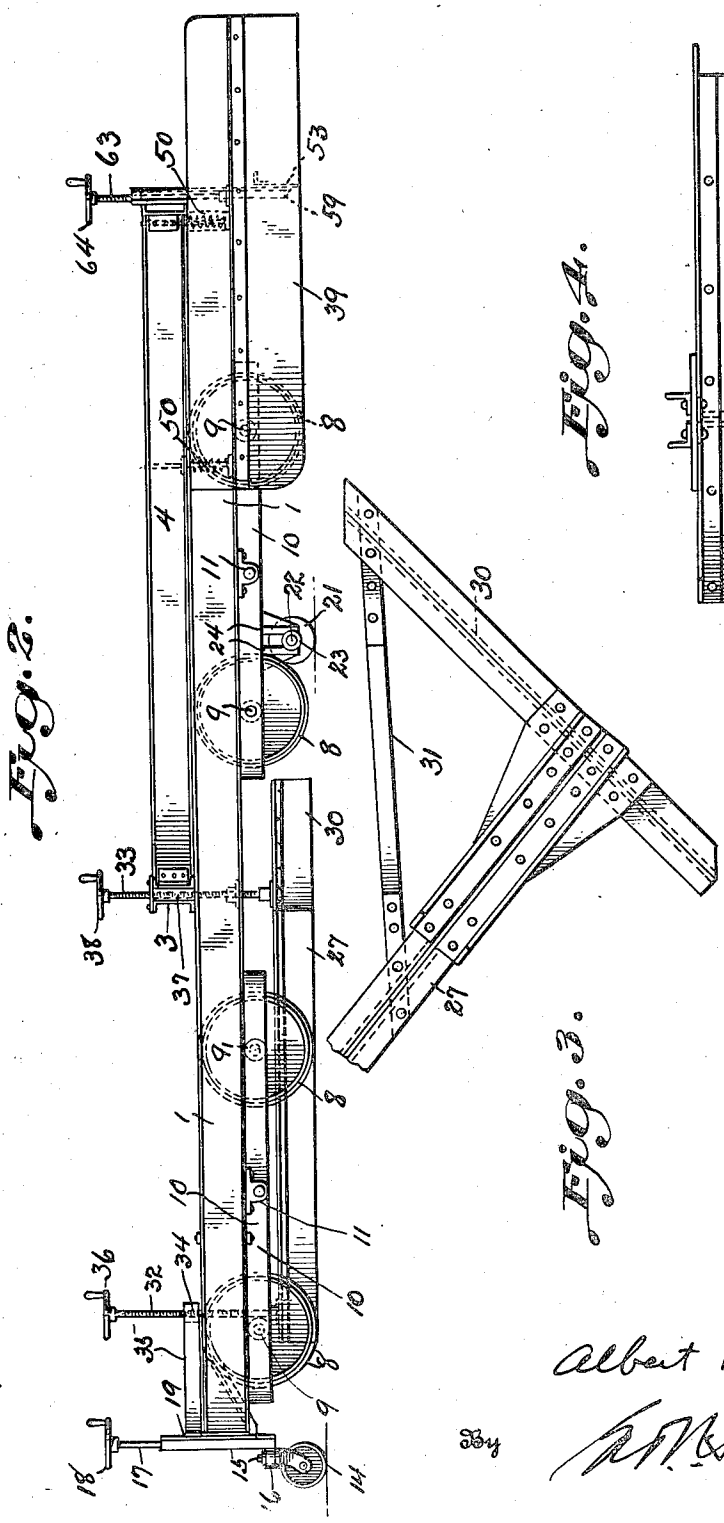


Fig. 2.

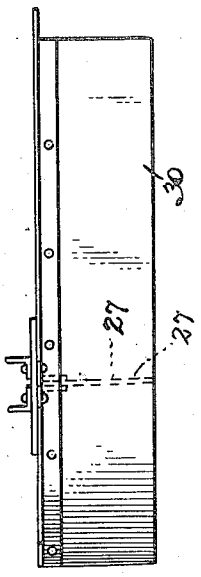


Fig. 4.

Fig. 3.

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MACHINE FOR LEVELING AND SHAPING ROADS

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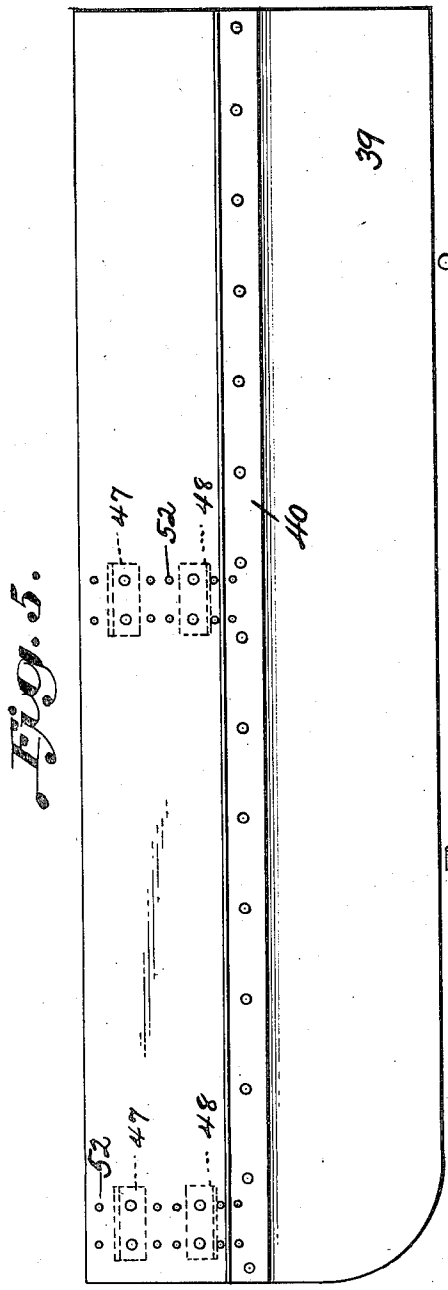


Fig. 5.

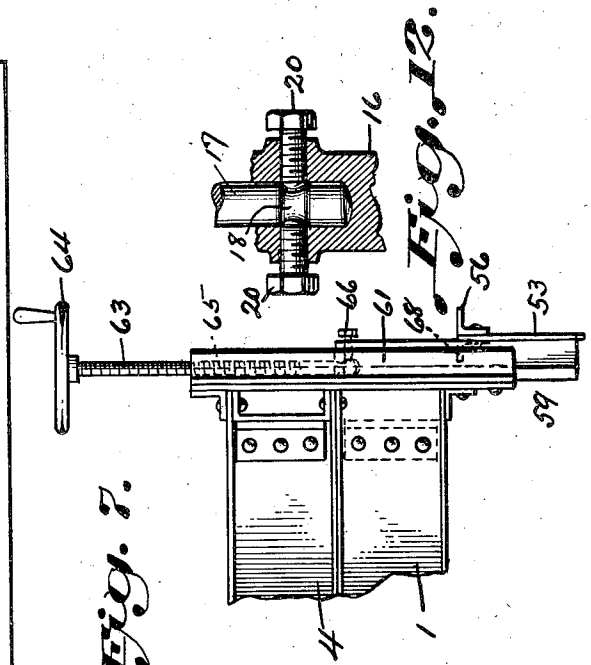


Fig. 12.

Fig. 7.

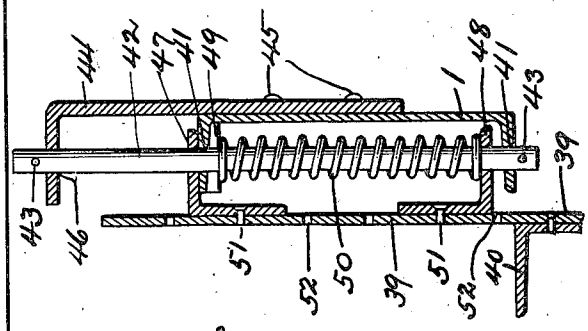


Fig. 6.

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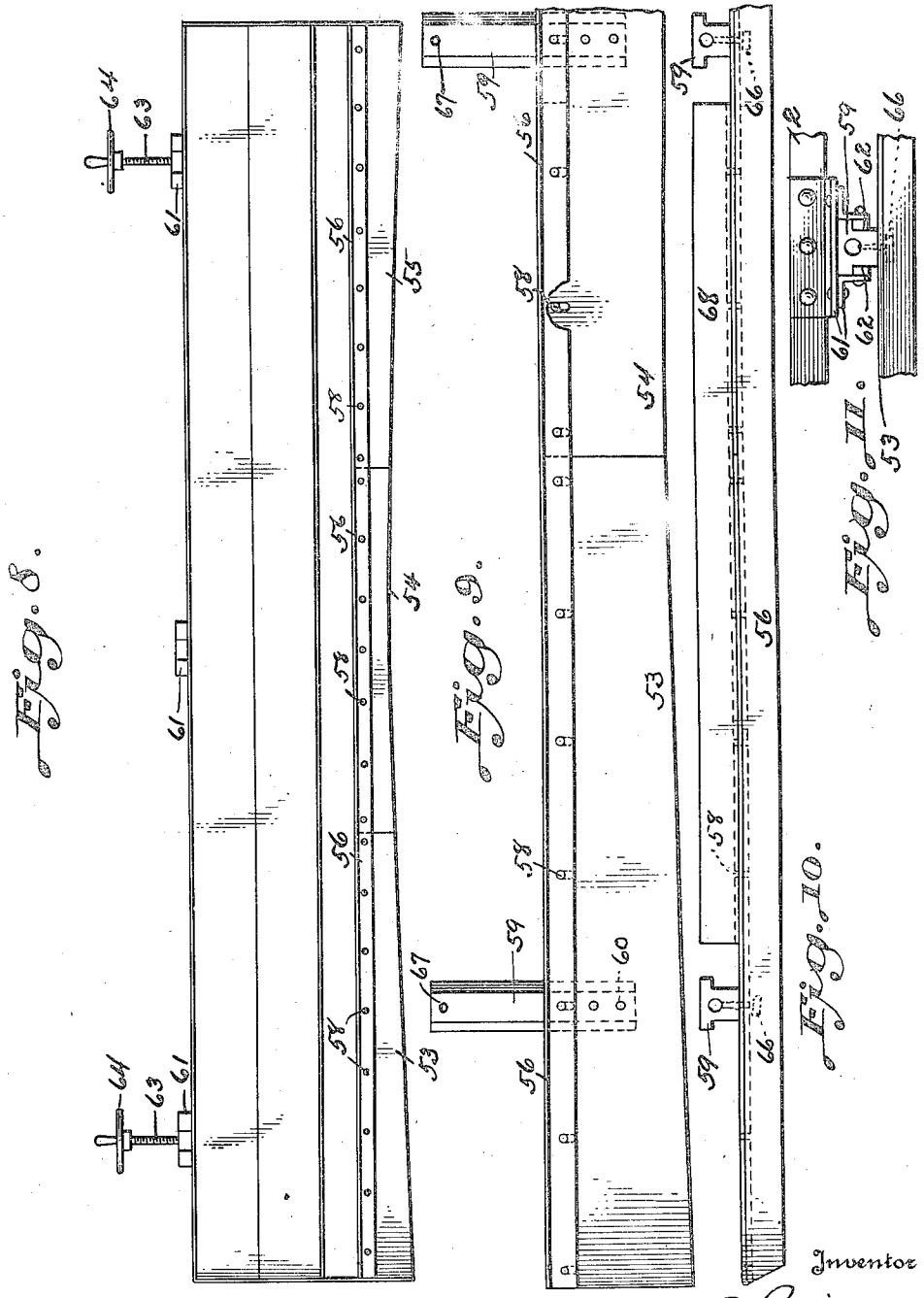


Fig. 8.

Fig. 9.

Fig. 11.

Fig. 10.

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UNITED STATES PATENT OFFICE

1,994,437

MACHINE FOR LEVELING AND SHAPING ROADS

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Application November 18, 1931, Serial No. 575,876

12 Claims. (Cl. 94—44)

This invention relates to a machine for leveling and shaping mixed-in-place or premixed bituminous roads.

Mixed-in-place or premixed bituminous roads are laid or spread on a suitable foundation or sub-base and then rolled down. In this class of road, as the bituminous material constitutes the top of the road, it is desirable to evenly level and regularly shape the material to bring about a substantially uniform thickness in the finished road, with a minimum of bituminous material, so that the cost of construction will be no greater than necessary and wear caused by traffic will be as evenly distributed as may be possible in a road of this character.

My invention is particularly adapted to level and shape the mixed-in-place or premixed bituminous top layer of a road on a foundation or sub-base and it is also adapted to shape the base of a road in the event that the base thereof is constructed of a bituminous mix.

The invention has, among its various objects, the provision, in a machine for leveling and shaping mixed-in-place or premixed bituminous roads, of: first, elevating ground or supporting wheels by which the machine may be supported when being moved from place to place or turned around; second, automatically adjustable wheels which travel on the roadway and support the machine when it is used to level and shape the bituminous material, whereby irregularities in the finished road will be reduced to a minimum even though depressions or high spots may exist in the sub-base; third, forwardly converging spreading blades which initially act on the bituminous material deposited on the crown or center of the sub-base and initially spread or generally distribute the material; fourth, a unitary combination of converging spreading blades and heel blades unitarily adjustable upwardly or downwardly which track from the outside of the roadway toward the center thereof the excess material, uniformly spread the material to the same depth and form a uniform grade for the rear ones of the previously mentioned automatically adjustable supporting wheels to travel on as the machine advances; fifth, side blades which serve as side forms to determine the width of the bituminous roadway being laid and insure straight edges for the roadway being laid, these blades being adapted to travel on the sub-base and automatically adjust themselves vertically through a relatively wide range regardless of the differences in elevation existing along the edge of the roadway and that on which the supporting wheels are travelling; sixth, a rear cross-wise arranged blade which may be set to determine the cross-contour of the finished roadway and which is bodily adjustable up and down and has independent sections which may be individually adjusted; seventh, adjustable mountings for the converging blades and the heel blades whereby they may be raised or lowered as may be desired to meet conditions encountered; eighth, the combination of the various improved features and constructions hereinbefore outlined, and those constructional features and combinations not previously outlined but which are hereinafter described and are shown in the drawings.

In the accompanying drawings:

Figure 1 is a plan view of the complete machine;

Fig. 2 is a side elevation thereof, the blades being raised and the supporting ground wheels lowered to illustrate how the machine may be moved from place to place or turned around when not used for road building;

Fig. 3 is a detail plan view showing the relationship of the converging blade to a heel blade;

Fig. 4 is a rear elevation of a heel blade by itself;

Fig. 5 is a side elevation of a side blade by itself, its spring mountings being omitted;

Fig. 6 is a detail vertical section through one of the side blades and one of the spring mountings therefor, certain parts being broken away;

Fig. 7 is a detail side elevation of one of the elevating devices for the cross-blade;

Fig. 8 is a rear elevation of the machine showing the rear cross-blade;

Fig. 9 is a rear elevation of the sectional cross-blade by itself, with its adjusting slides attached;

Fig. 10 is a plan view thereof;

Fig. 11 is a detail plan view of one of the adjusting means for the rear cross-blade; and

Fig. 12 is a detail view showing the swivel mounting for the jack-screws used for the front caster wheel and the converging and heel blades.

The frame is of rectangular shape, having longitudinal channel beams or bars 1 and front and rear channel beams or bars 2, the rear one of which surmounts and is bolted to the side beams 1. The longitudinal channel beams or bars 1 are arranged in pairs, of which the inner bars are designated 1'.

A double channel cross beam or bar 3 surmounts the beams or bars 1, 1' and is bolted to them. This double cross beam or bar 3, combined with the double longitudinal beams or bars 1, 1', provides a frame which is very rigid and has no tendency to weave, thus insuring even treatment of the bituminous material on the roadway.

To further strengthen the frame, longitudinally disposed channel beams or bars 4 run from the cross beam 3 to the rear cross beam 2. Preferably, crossed braces 5 connect the beams 3 and 4, and braces 6 connect the beams 1' to the beams 4. The braces 5 and 6 may be of strap or flat stock.

The longitudinal beams 1, 1' are connected to-

gether by strap braces 7. Braces 7' connect beams 1', 2.

The frame is provided with improved ground wheels which are normally used to support it as it travels along the sub-base or foundation of the road to effect the spreading and leveling of the bituminous material by the blades which are hereinafter described.

The supporting or ground wheels 8 are arranged in pairs mounted on axles 9 carried by frames 10 which are mounted to rock up and down on a shaft 11, in each instance, secured to, or mounted in, blocks or bearings 12, respectively carried by the beams 1, 1'. The frames 10, being rockably mounted intermediate their ends and the respective wheels 8 being carried by the frames on opposite sides of the shaft or axis 11, and there being four sets or pairs of wheels, if any wheel encounters a pocket or depression in the sub-base or foundation of the roadway on which the bituminous top is being laid by the machine, no inequality will result in the vertical depth of the bituminous layer because the remaining wheel of the given pair will remain on the level part of the sub-base and thus the leveling action of the blades, which will be hereinafter described, will not be disturbed. By employing the rocking frames 10 and wheels 8, no necessity exists for using flanged wheels and side forms for such wheels to travel on.

At the front of the machine means, such as clevises 13, may be provided for the attachment of a cable or other device by which the machine may be drawn along the sub-base on which the bituminous top is being laid.

Carried by the front beam 2 is a caster wheel 14 which is swiveled at 15 in a frame 16 which may be raised or lowered and held where adjusted by a jack-screw 17 which is provided with a hand wheel 18.

The jack-screw is engaged with a screw thread in a boxing 19 and the lower end of the jack-screw is swiveled to the frame 16 in the manner shown in Fig. 12. The jack-screw has a circular groove 18 and the frame 16 carries screw bolts 20 whose rounded tips are received in the groove 18. The frame 16 being slidable up and down in the boxing 19, when the hand wheel 18 is turned, the caster wheel 14 is thereby elevated or depressed.

Normally, the caster wheel 14 is in raised position to permit the wheels 8 to travel on the roadway when the bituminous material is being laid thereon. If, however, the machine is to be moved from place to place without serving to lay the bituminous material, it is then desirable to elevate the wheels 8 and the blades (hereinafter described) so that the machine will travel freely or be turned around. The caster wheel 14 provides means whereby the front of the machine may be swung around but to support the machine in elevated position for the purpose described, there is also provided a pair of wheels 21 which are mounted on a cross shaft or axle 22 carried by boxes 23 which are slidable in vertical guides 24. Jack-screws 25 having connections such as shown in Fig. 12 with the boxes 23, are employed by raising or lowering the wheels 21.

When the machine is in use for road leveling and shaping, the wheels 14 and 21 are elevated so that they will clear the road materials being spread. When the machine is being moved from place to place or turned, the hand wheels 26, carried by the jack-screws 25, and the hand wheel 18, carried by the jack-screw 17, are turned to lower the wheels 14 and 21 into contact with the road for the purpose of supporting the machine. The three wheels 14, 21, 21 enable the machine to be more readily steered and turned than is possible with a four-wheel supporting arrangement.

For making the initial spread of the road building material, the converging blades 27, which are joined at 28 into V-shape, are provided. These blades are preferably connected by cross braces 29 so that they will be maintained in rigid relationship.

Connected to the rear ends or heels of the spreading blades 27 are heel blades 30 whose purpose is to drag toward the center of the roadway the excess bituminous material and to provide a uniform grade for the rear sets of wheels 8 to ride on. The blades 30 are rigidly connected to blades 27 in the manner shown in Fig. 3 and by the brace 31.

The blades 27 and 30 being unitary, may be raised or lowered, as a unit, by jack-screws 32, 33 located, respectively, at the apex of the blades 27 and at the heels thereof is the region where the blades 30 join the blades 27. The jack screw 32 is threaded through a box 34 carried by a small superposed frame 35 attached to the front cross beam 2 and said screw has a hand wheel 36 by which it may be turned. The lower end of the jack-screw 32 has a swiveled connection such as shown in Fig. 12 with the apex of the blades 27, whereby the front of said blades may be elevated.

The jack-screws 33 are engaged with screw threaded boxes 37, carried by the double cross beam 3 in advance of the rear sets of wheels 8. The lower ends of the jack-screws 33 are connected to the rear ends of the blades 27 by swivel joints such as shown in Fig. 12, enabling the rear ends of the blades 27 and the heel blades 30 to be adjusted upwardly or downwardly, as may be desired. The hand wheels 38, carried by the jack-screws 33, enable the said screws to be turned.

The rigid connection of the blades 27 with the heel blades 30 insures a uniform spreading of the material to the same thickness, subject to any desired up and down adjustment of the apex of the blades 27 by jack screw 32, and adjustment independently thereof of the heel blades 30 by jack screws 33. The aforesaid three-point adjustable suspension of blades 27 and 30, provides for all necessary adjustments without necessitating raising and lowering the entire spreading frame 27, 27, 30, 30 in order to adjust any given part thereof, for instance, the heel blades 30.

Disposed vertically alongside the rear parts of the side beams 1 are edge-forming blades 39, Figs. 1, 2 and 5, whose purpose is to ride on the sub-base of the road and to shape up the edges of the bituminous material being laid and leveled by the machine. The blades 39 are vertically movable in an automatic manner and are not raised and lowered by hand. These blades are stiffened by angle steel pieces 40, running lengthwise thereof and they are spring mounted and pressed downwardly by their springs for the foregoing purpose. One of the mountings for the blades 39 is shown in Fig. 6, in which the side beam appears at 1 as having holes 41 in its horizontal webs. Slidably mounted in the holes 41 is a suitably stiff pin 42 which carries cotters or cross-pins 43. The angle piece 44, which is riveted to the beam 1 at 45, has a hole 46 through which the upper end of the pin 42 slides. The cross-pins or cotters 43 prevent the pin 42 from becoming detached.

The blade 39 carries angle brackets 47, 48 respectively overlying the webs of the beam 1. Sur-

rounding the pin 42 and interposed between the lower angle bracket 48 and a suitable key 49 carried by pin 42, is an expansion coil spring 50, which presses the blade 39 downwardly so that it will ride on the sub-base of the road. This spring also permits the blade 39 to rise as far as necessary to conform to the sub-base of the road as the machine advances. Two of these spring pressure devices being provided for each blade 39, as shown in Fig. 2, the blade will move evenly up and down and each of the two blades 39 will be independent of the other of said blades.

The angle brackets 47, 48 may be set at different heights to space them apart the desired distance, by reason of bolts or fastenings 51, which may be applied to any of the holes 52 in the blade.

The machine being supported by the wheels 8, the edge-forming blades 39 are free to contact at all times with the sub-grade or sub-base regardless of the difference in elevation existing along the edge of the roadway and that on which the wheels 8 travel.

Across the rear of the machine extends a rear blade whose construction and adjustment appears in Figs. 7, 8, 9, 10 and 11. This blade, which is composed of independently adjustable sections 53, 54 and 55, all carried by a single angle bar 56; the bar 56 and the blade sections 53, 54, 55 constitute a unit which may be bodily raised and lowered as such by means appearing hereinafter. However, each of the blade sections 53, 54, 55 is independently adjustable up and down to set it at different positions, by the provision of slots 57 in the blade sections and bolts 58 extending through the angle bar 56 and through said slots. The lower edges of the blade sections 53, 54, 55 are curved or shaped so that they will, collectively, define the correct contour of the top of the road and will, therefore, shape and finish the spread bituminous material to provide the contour determined by the road builder. On the other hand, the composite blade comprising the sections 53, 54, 55 and the angle bar 56 may be bodily raised and lowered so that the depth of the bituminous material is susceptible of regulation.

To the respective blade sections 53, 54, 55, there are connected upright slides 59 which may be adjusted in relation to the said blade sections by virtue of being provided with holes 60 through which the bolts 58 pass. These slides 59 are movable up and down in boxes 61, Figs. 7 and 11, secured to the rear cross beam 2 of the frame. The boxes 61 enable the slides 59 to move up and down and prevent them from becoming detached by lateral displacement. To effectuate this purpose, the slides 59 are of T-shape, as shown in Fig. 10, and the boxes 61 have retainers 62 which cooperate with the heads of the said slides.

The outermost slides 59 are positively raised or lowered by jack-screws 63 which have hand wheels 64, Figs. 1, 2, 7, and 8, said screws being threaded through boxes 65 and having their lower ends such as shown at 13, Fig. 12, which are received in sockets in the upper end of the outermost slides 59 and having a swiveled connection with said slides by virtue of the tip of the screw 66 being received in the groove 18, said screw passing through a screw threaded hole 67, Fig. 9, in the upper ends of the said slides.

It is unnecessary to employ a jack-screw in connection with the central slide 59, as the rear blade can readily be adjusted up and down by using jack-screws in connection with the outermost slides 59.

Preferably, there will be provided supplemental angle strips 68 at the rear of the blades and opposite the angle strips 56, as shown in Figs. 1, 7 and 10, to strengthen the rear blade.

The spirit levels 69 may be provided near the ends of the rear blade so that it may be leveled.

What I claim is:

1. In a machine for leveling roads, the combination with a machine frame, of independent pairs of ground wheels, arranged respectively, at the forward and rearward parts of the machine frame on both sides thereof which are adapted for supporting said machine frame, each of said pairs of wheels being carried by a carrier rockably connected intermediate its ends to the machine frame and carrying said wheels on opposite sides of its rockable mounting, said ground wheels being adapted to travel on the roadway, converging leveling blades adjustably carried by said machine frame, for raising or lowering in relation thereto and to be retained where set, and heel blades carried by and movable with the said adjustable leveling blades, the aforesaid leveling blades and heel blades being arranged in advance of the rearward pairs of ground wheels and constituting a unitary structure capable of up and down adjustment as such, and independent adjusting means for the apex and heels of said converging leveling blades for effecting desired up and down adjustment and retention of said leveling blades and heel blades to prevent them from shifting from their set position, said heel blades serving to form a uniform grade on which the said rear pairs of wheels may travel.

2. In a machine for leveling roads, the combination with a machine frame, of independent pairs of ground wheels arranged, respectively, at the forward and rearward parts of the machine frame on both sides thereof which are adapted for supporting said machine frame, each of said pairs of wheels being carried by a carrier rockably connected intermediate its ends to the machine frame and carrying said wheels on opposite sides of its rockable mounting, converging blades carried by the machine frame for leveling the road material being laid, heel blades carried by the converging blades and disposed angularly in relation to said converging blades, the aforesaid blades being arranged for raising and lowering as a unit, and means carried by the machine frame for independently raising and lowering and for locking the apex of the converging blades, and independently raising and lowering and locking the respective heel blades.

3. In a machine for leveling roads, the combination with a machine frame, of leveling means carried by said frame, wheels adapted to support said machine frame on the roadway, and slidable side blades carried by the machine frame and rearwardly of the aforesaid leveling means for forming the edges of the road material being leveled by the machine, said blades being vertically adjustable to automatically conform to the contour of the edge of the roadway and in contact with the sub-grade or sub-base thereof regardless of the difference in elevation between the edge of the roadway and the surface on which the supporting wheels are travelling.

4. In a machine for leveling roads, the combination with a machine frame, of leveling means carried by said frame, wheels adapted to support said machine frame on the roadway, slidable side blades carried by the machine frame rearwardly of the aforesaid leveling means which are adapted to ride on the sub-base of the road and to form

the edges of the material previously leveled by the aforesaid leveling means, and spring-means co-operating with said side blades and adapted to press them downwardly and to cushion their upward movement, said side blades being vertically adjustable to automatically conform to the contour of the edge of the roadway and in contact with the sub-grade or sub-base thereof regardless of the difference in elevation between the edge of the roadway and the surface on which the supporting wheels are travelling.

5. In a machine for shaping roads, the combination with a machine frame, of a shaping blade supporting member arranged cross-wise of said frame, a shaping blade which comprises a plurality of independently vertically adjustable blade sections collectively adapted to define the contour of the road being shaped, said supporting member for said blade sections being common to all of them and to which said sections are independently adjustably connected, permitting each of said blade sections to be bodily adjusted up or down in relation to the supporting member without affecting the setting of any other blade section, slides carried by the shaping blade supporting member, and means carried by the machine frame adapted to independently raise and lower the supporting member and blade sections as a unit without disturbing the relationship of the sections or their adaptability for independent adjustment.

6. In a machine for leveling roads, the combination with a machine frame, of a plurality of independent pairs of ground wheels on each side of the machine frame for supporting said machine frame, each of said pairs of wheels being carried by a carrier rockably connected intermediate its ends to the machine frame and carrying said wheels on opposite sides of its rockable mounting, a forwardly extending unitary V-shaped stationary leveling blade at the front of the machine, whose apex points forwardly, and independent means adjustably suspending said frame at its apex and rear ends from said machine frame for independent raising or lowering of said apex and rear parts in relation to said frame and to be retained where set.

7. In a machine for leveling roads, the combination with a machine frame, of a plurality of independent pairs of ground wheels on each side of the machine frame for supporting said machine frame, each of said pairs of wheels being carried by a carrier rockably connected intermediate its ends to the machine frame and carrying said wheels on opposite sides of its rockable mounting, converging leveling blades adjustably carried by said machine frame and heel blades carried by said converging leveling blades, constituting a unitary leveling structure adapted to be raised or lowered in relation to the machine frame and to be retained where set, and independent adjusting means for the apex and heels of said converging leveling blades for effecting desired up and down adjustment and retention of said leveling blades and heel blades to prevent them from shifting from their said position during the operation of the machine and permitting any desired adjustment and setting of the corners of the leveling blades.

8. In a machine for leveling roads, the combination with a machine frame, of a unitary leveling blade structure at the front of the machine comprising forwardly converging leveling blades and heel blades carried by the rear ends of said converging blades, and independent adjusting screws for the forward apex and rear heels of said leveling structure, said screws suspending the leveling structure from the machine frame and providing means for adjusting said leveling structure up or down or tilting it as desired and maintaining it where set.

9. In a machine for leveling roads, the combination with a machine frame, leveling means carried thereby, and wheels adapted to support the said machine frame, of side blades carried by the machine frame rearwardly of said leveling means and mounted for up and down sliding movement, said side blades being adapted to ride on the sub-base of the road and to form the edges of the material after it has been leveled by the aforesaid leveling means, and means for cushioning the upward movement of said side blades and also maintaining them on the sub-base or grade.

10. In a machine for leveling roads, the combination with a machine frame, leveling means carried thereby, and wheels adapted to support the said machine frame, of side blades carried by the machine frame rearwardly of said leveling means and mounted for up and down sliding movement, said side blades being adapted to ride on the sub-base of the road and to form the edges of the material after it has been leveled by the aforesaid leveling means, spring means for pressing down and holding the side blades on the sub-base or grade and for cushioning their upward movement, and means for limiting the up and down movement of the side blades.

11. In a machine for shaping roads, the combination with a machine frame, and means carried thereby for leveling the material being laid, of a plurality of separate shaping blade sections suspended from the aforesaid machine frame in end to end relationship rearwardly of the aforesaid leveling means and crosswise of the machine as continuations of each other, thereby providing a blade extending as a single unit crosswise of the said frame, said blades at their lower parts collectively defining the contour of the road being shaped, and adjusting means for each blade section permitting each blade section to be independently adjusted up or down in relation to the other blade sections without disturbing them.

12. In a machine for shaping roads, the combination with a machine frame, and means carried thereby for leveling the material being laid, of a plurality of separate shaping blade sections suspended from the aforesaid machine frame in end to end relationship rearwardly of the aforesaid leveling means and crosswise of the machine as continuations of each other, thereby providing a blade extending as a single unit crosswise of the said frame, said blades at their lower parts collectively defining the contour of the road being shaped, adjusting means for each blade section permitting each blade section to be independently adjusted up or down in relation to the other blade sections without disturbing them, and means for adjusting all of the sections up or down as a unit without disturbing their independent setting or adaptability for individual adjustment.

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