

May 30, 1939.

F. E. ARNDT

2,160,376

ROAD PLANER

Filed April 22, 1936

4 Sheets-Sheet 1

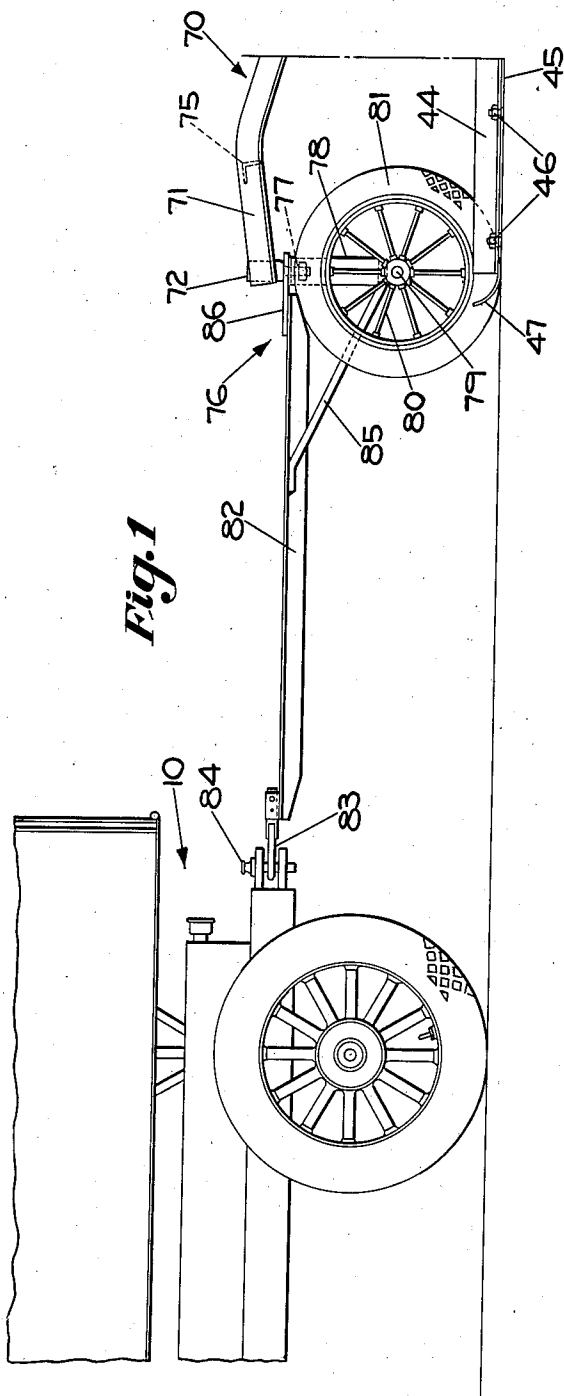


Fig. 1

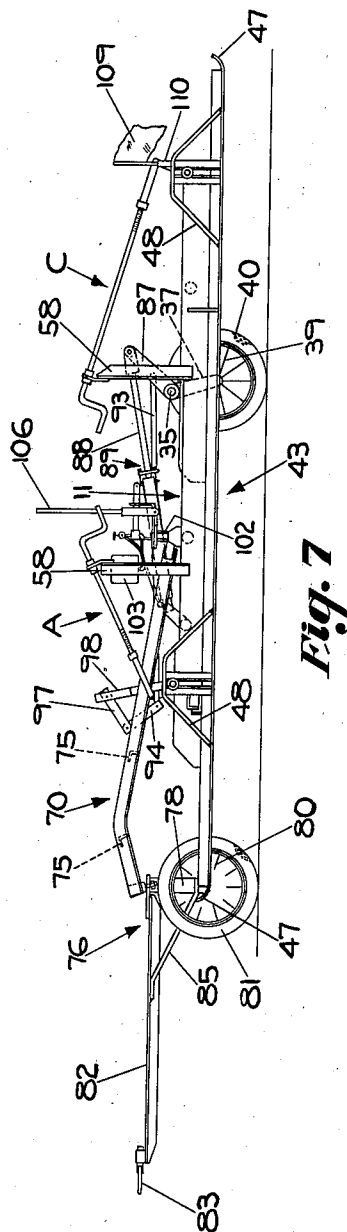


Fig. 7

INVENTOR:
FRANKLIN E. ARNDT,
By
Chas. M. Nissen,
ATT'Y.

May 30, 1939.

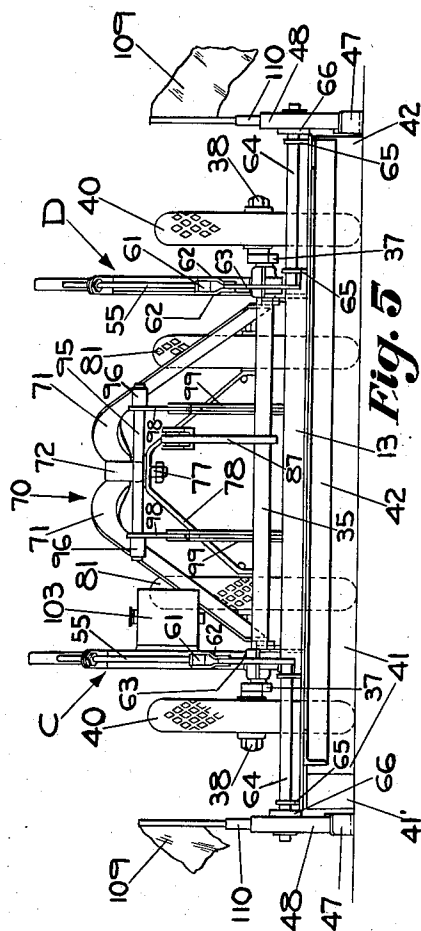
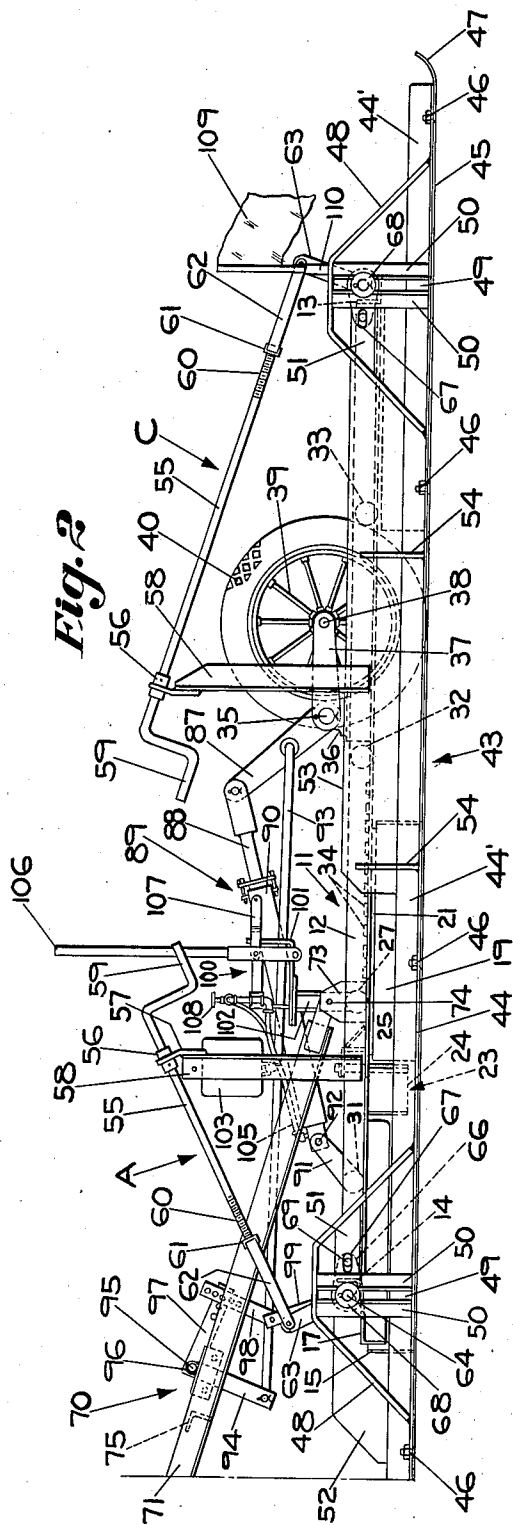
F. E. ARNDT

2,160,376

ROAD PLANER

Filed April 22, 1936

4 Sheets-Sheet 2



INVENTOR:
FRANKLIN E. ARNDT,
By
Chas. M. Nissen,
ATT'Y.

May 30, 1939.

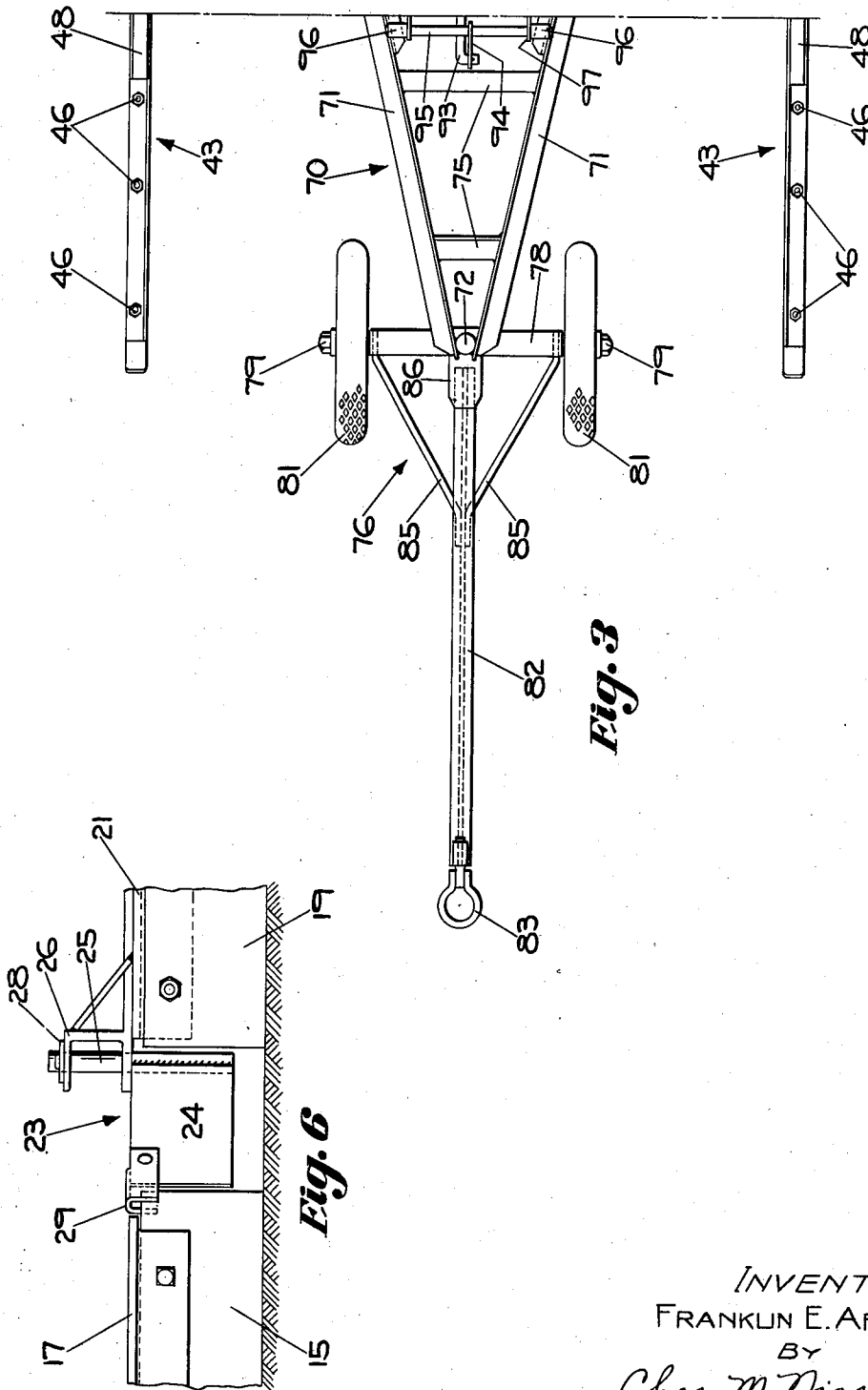
F. E. ARNDT

2,160,376

ROAD PLANER

Filed April 22, 1936

4 Sheets-Sheet 3



May 30, 1939.

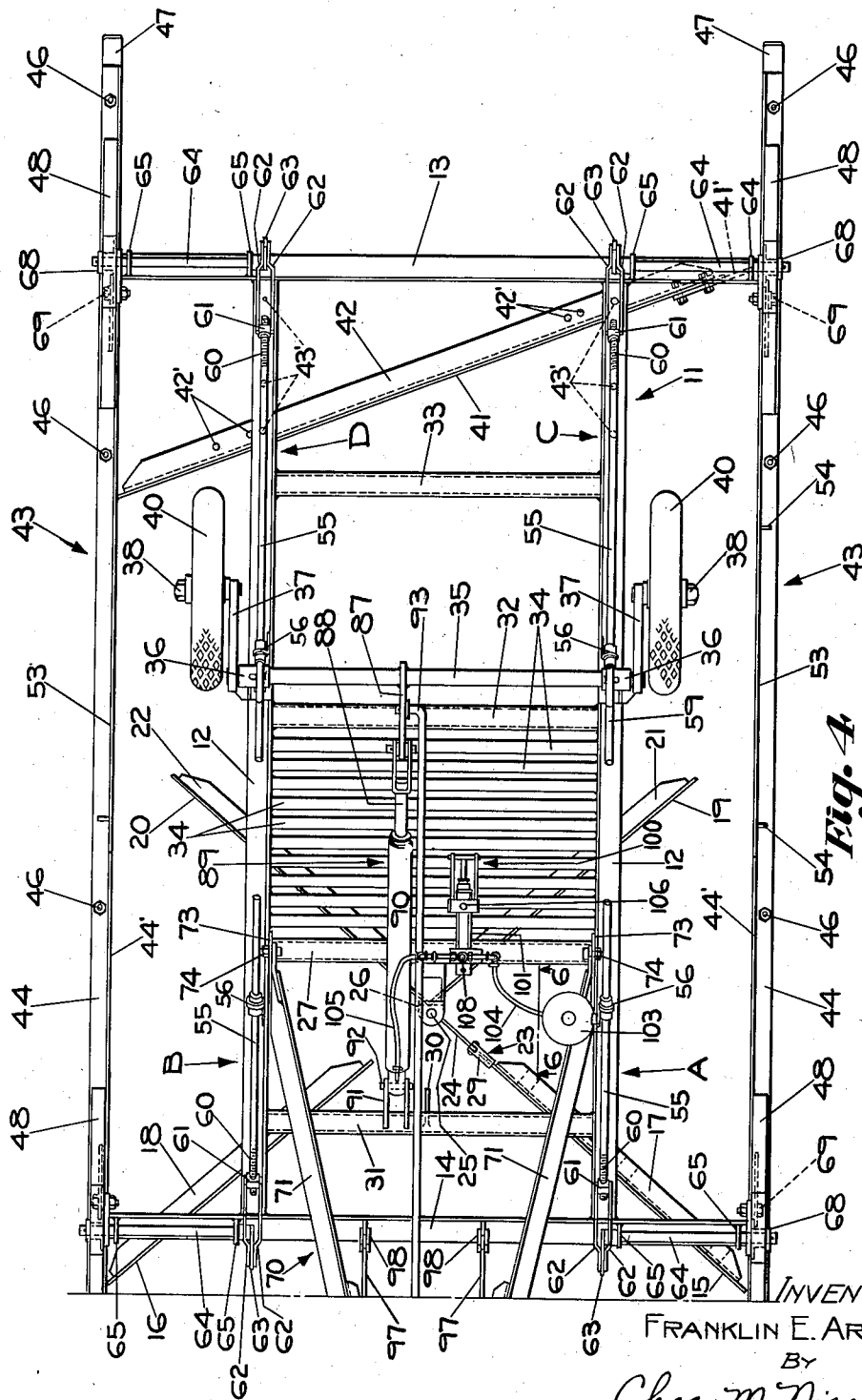
F. E. ARNDT

2,160,376

ROAD PLANER

Filed April 22, 1936

4 Sheets-Sheet 4



INVENTOR:
FRANKLIN E. ARNDT,
By
Chas. M. Nissen,
ATT'Y.

UNITED STATES PATENT OFFICE

2,160,376

ROAD PLANER

Franklin E. Arndt, Galion, Ohio, assignor to
Galion Iron Works and Manufacturing Com-
pany, a corporation of Ohio

Application April 22, 1936, Serial No. 75,747

17 Claims. (Cl. 37—150)

This invention relates to a road planer, and one of its objects is the provision at a relatively low cost of a light and durable road planer which will be efficient in operation and capable of being maintained at a relatively low cost.

Another object of the invention is to simplify the construction of a road planer highly efficient in operation with all the controls conveniently located and arranged for one-man operation.

A further object of the invention is to economize in the cost of construction of an improved road planer and reduce the operating cost thereof.

Another object of the invention is the provision of an improved and efficient road planer embodying wheels to support the machine for transportation but including spaced-apart elongated runners adapted to be let down to the road surface to support the planer unit for operation independently of the up and down movements of the wheels over irregularities along the roadway.

Another object of the invention is to provide a road planer in which the rear strike-off blade is positioned back of the rear wheels thereby leaving a completely finished road surface devoid of any wheel imprints thereon.

Still another object of the invention is to provide a road planer with a pair of lateral runners of such lengths as to maintain the planer level and to provide for relative adjustment between the runners and the frame of said planer.

Another object of the invention is to provide a planer of the above type with a three position valve whereby material which has been sheared off by forward blades can be directed to different paths to be distributed by the planer in a leveling operation.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings,

Figs. 1 and 2, placed end to end, show a side elevational view of the device of my invention coupled to the rear end of a tow truck;

Figs. 3 and 4, placed end to end, show a plan view of the device of my invention;

Fig. 5 is a rear end elevational view of the device of my invention;

Fig. 6 is an enlarged detail view of the control valve comprising a feature of my invention and taken on the line 6—6 of Fig. 4 looking in the direction of the arrows; and

Fig. 7 is a side elevational view of the device of my invention shown in a transporting position.

Referring particularly to Figs. 1 and 2 of the

drawings, there is seen a road planer comprising my invention which is coupled to the rear end of a truck 10 by which it may be dragged along a road surface either in the performance of a road planing or leveling operation or merely in being transported from one working location to another. As illustrated in said Figs. 1 and 2, the planer is in a working position. The structure of the road planer can be seen from Figs. 1, 2, 3, 4 and 5 and comprises a main frame 11 formed by a pair of spaced longitudinally extending angle members 12, 12 which are rigidly attached as by welding to a pair of transversely extending angle members 13 and 14, the angle member 13 being at the rear of the main frame and the angle member 14 at the front thereof. As best seen in Fig. 4 of the drawings, the angle members 13 and 14 extend laterally beyond the angle members 12.

Rigidly attached to the front portion of the main frame 11 and extending downwardly therefrom and forming a V with an open apex, is a pair of front blades 15 and 16 which are attached to the main frame 11 by angle members 17 and 18 respectively. The blades 15 and 16 will be removably attached to the angle members 17 and 18 respectively as by appropriate nuts and bolts, not shown, while the angle members 17 and 18 will be rigidly attached to the angle members 12 and 14 of the main frame as by welding. The function of the two front blades 15 and 16 will be to shave and shear off ridges and high places on the road surface and to mix and carry the material to the center of the scraper where it will be distributed by a gate or valve hereinafter described in more detail.

Positioned substantially intermediate the main frame 11 and to the rear of the blades 15 and 16 is a pair of V-shaped blades 19 and 20 which are removably attached to angle members 21 and 22 as by nuts and bolts, not shown, which angle members 21 and 22 will be rigidly attached to the main frame 11. The blades 19 and 20 diverge outwardly from the apex toward the rear of the planer and thus will tend to deflect material towards the outer edges of the planer which is encountered thereby.

As best illustrated in Fig. 6 of the drawings, a gate or valve 23 is provided adjacent the apex of the V formed by the blades 19 and 20. This gate comprises a vertical plate 24 rigidly attached at one end to a pivot shaft 25 pivoted along a vertical axis to a bracket 26 which may be rigidly attached to a cross pipe 27 (see Fig. 4) of the main frame 11. Appropriate cotter pin and

washer means 28 may be provided for removably retaining the pivot shaft 25 on the bracket 26. The plate 24 may have a depth slightly less than the depth of the blades 15, 16, 19 and 20 to permit
 5 a small amount of material to pass thereunder regardless of its position of adjustment. The plate 24 also carries a pivoted U-shaped latch 29 which may co-operate selectively with extensions of the blades 15, 16, or with a centrally positioned
 10 plate 30 (see Fig. 4) carried by another cross pipe 31 of the main frame 11.

It will be obvious that the function of the gate or valve 23 is to determine the division or direction of flow of the main portion of the material which is loosened and mixed by the scrapers 15 and 16. For example, in the position illustrated in Fig. 4 of the drawings, most of said material will be directed to be acted upon by the blade 20 and moved laterally to the right side
 20 of the machine viewed from the rear end in the direction of travel. If the gate or valve 23 is adjusted with the latch 29 in co-operation with the central plate 30, then the material will be divided substantially equally between the two
 25 blades 19 and 20. By associating the latch 29 with the blades 16 most of the material will be directed to the blade 19. As was previously mentioned, however, since the plate 24 has its bottom positioned above the bottoms of the blades
 30 15, 16, 19 and 20, all of the material will not be directed to a single blade 19 or 20 at any time. It will be obvious, of course, that due to the removability of the blades 15, 16, 19 and 20 from the respective angles 17, 18, 21 and 22, said blades
 35 may be individually renewed as desired.

In addition to the elements previously described, the main frame 11 includes two transversely extending cross pipes 32 and 33 which are rigidly attached at their ends to the angle members 12, 12 as by welding to provide a more
 40 rigid main frame 11. Also extending transversely between the angle members 12, 12 and rigidly attached thereto at their ends and positioned between the cross pipes 27 and 32 is a plurality of
 45 flat bars 34 which provide a grating or platform upon which an operator may stand. Said bars will also lend rigidity to the main frame 11.

At a position to the rear of the cross pipe 32 and extending transversely of the main frame 11 and above the angle members 12, 12 thereof, is a shaft 35 which is pivotally attached to the angle members 12, 12 by journal boxes 36, 36. At each end of said shaft 35 is provided a rigidly
 50 attached arm 37 on the free end of which is mounted a wheel axle 38 carrying a wheel 39 which is preferably provided with a pneumatic tire 40. As will be described more in detail hereinafter, the axis of the wheel axle 38 may be vertically adjusted with respect to
 55 the main frame 11, thereby to raise the main frame and all of the blades carried thereby, as well as the runners, from the road surface or to lower them into operating relation therewith.

It is to be noted that the blades 19 and 20
 65 have their rear ends projecting laterally beyond the path of the tires 40. As a consequence, any windrows which may be formed by said blades 19 and 20 will be positioned laterally of said tires 40, and such windrows will be eliminated by the
 70 strike-off blade 41.

Also carried by the main frame 11 and positioned rearwardly of the tires 40 and extending laterally beyond said tires and laterally beyond the extremities of the blades 19 and 20 is the
 75 rear strike-off blade 41 which is removably at-

tached as by nuts and bolts, not shown, to an angularly disposed transversely extending angle member 42 which is adjustably attached, as by nuts and bolts to the bottoms of the angle members 12, 12 of the main frame 11. Said strike-off blade 41 is preferably of such length that
 5 when it is in a plane transverse to the axis of the main frame 11 it will have its outer edges contacting with the inner upright flanges 44' of angle members 44 of runners 43, hereinafter described in more detail. Angular adjustment of the plane of said blade 41 relative to the mentioned transverse plane is provided by apertures
 10 42' in the angle member 42 and apertures 43' in the horizontal flanges of angle members 12. It will thus be evident that blade 41 may be inclined in either direction to direct excess material toward the road center or toward the road side, when in operation.

It will be evident that when the blade 41 is
 20 inclined it will need to be of greater length to contact both runners 43. I therefore provide a removable extension 41' to provide for this needed increase in length. Said extension may be removed when not necessary, as when the blade
 25 41 is in a transverse plane. If desired, it may be omitted to form an outlet for windrow material inside of the adjacent runner 43 when the strike-off blade 41 acts to eliminate the windrows from
 30 blades 19 and 20.

It will be evident that in the operation of the device any windrows formed by the deflecting blades 19 and 20 will be distributed over the road surface by the rear strike-off blade 41. Said strike-off blade will also tend to leave a completely level road surface behind it entirely devoid of any wheel imprints.

It is to be noted that the forward ends of the blades 15 and 16 also extend to and contact the inner upright flanges 44' of angle members 44, while the front ends of blades 19 and 20 are spaced therefrom, permitting excess material from said latter blades to form windrows as above mentioned.

It is also to be noted that the V arrangement
 45 of the blades 15 and 16 and of the blades 19 and 20 tends to hold the machine on its course due to the balancing of lateral forces, thus preventing any tendency for side drift of the device even when working on a dry hard road surface.

In order to maintain the main frame 11 in a substantially level position at all times and to prevent its following any irregularities in the surface of the road being scraped, I provide a pair of long longitudinally extending runners or
 50 straight edges 43, 43 one at each side of the device. The structure of both of said runners 43 will be the same and thus a description of one will suffice for both. Each of said runners comprises a longitudinally extending angle member
 55 44 having an upright inner flange 44' and a bottom horizontal flange which is provided on its bottom surface with removable runner soles 45 which are removably attached as by nuts and bolts 46. The runner soles 45 are provided with
 60 upwardly curved ends 47 both forwardly and rearwardly thereof. Said soles 45 may be either one piece or a plurality of pieces as desired.

Adjacent both the forward end and the rear end of each runner 43 I provide an inverted generally U-shaped bracket 48 the ends of which are welded to the angle member 44. A guideway
 70 49 formed by a pair of spaced angle members 50, 50, rigidly attached to the bracket 48 and to the angle member 44, is provided for a purpose

which will be described more in detail hereinafter. Extending between one of the angle members 50 and one leg of the bracket 48 I also provide a rigid plate 51 provided with an elongated slot 67, the function of which will also be described more in detail hereinafter.

Adjacent the forward end of each runner 43 I also provide a removable material deflecting plate 52 which contacts the forward end of blade 15 or 16 and operates to prevent material which may build up in front of the blade 15 or 16 from flowing laterally over the angle members 44. Also adjacent the central and rear portion of each runner 43 I provide a removable baffle plate 53 which rests on the flange 44' of runner 43 and may be held in position by ribs 54. The baffle plates 53 are for the purpose of preventing any surplus material which may tend to form in windrows following the blades 19 and 20 from spilling laterally over the angle members 44, and thus insuring the even distribution thereof all over the entire road surface by the rear strike-off blade 41.

To provide an adjustable connection between each of the runners 43 and the main frame 11 whereby said main frame may be supported by said runners and whereby the slope and elevation of each runner may be adjusted with respect to said main frame, I provide four adjustable interconnecting means designated generally by the letters A, B, C and D. In view of the fact that the structure of all of the interconnecting means A, B, C and D are substantially alike, a description of that of interconnecting means A will suffice for all. Said interconnecting means comprises a shaft 55 supported by a bushing 56 in a bracket 57 carried by upstanding angle member 58 rigidly attached to an angle member 12 of the main frame 11. The bushing 56 provides for a free rotation of the shaft 55 while preventing longitudinal movement thereof. One end of the shaft 55 is provided with a crank 59 whereby said shaft may be rotated by an operator, and the other end thereof is threaded as seen at 60 to telescope with an internally threaded nut 61 carried between a pair of spaced rods 62, 62 (see Fig. 2), which rods 62, 62 provide a connecting link to a lever 63 rigidly attached to one end of a shaft 64 carried by brackets 65, 65 at one end of the angle member 14, which shaft 64 carries at its outer end an arm 66 having a pin or bolt 69 at its outer end. The shaft 64 also extends through the forward guideway 49 of the runner 43 which was previously described. A cotter pin and washer 68 is provided to maintain the runner 43 on the shaft 64 but to permit said runner to move vertically with respect thereto as determined by the guideway 49. The slot 67 co-operates with bolt 69 carried by the arm 66. It will thus be seen that by turning the crank 59 the effective length of the shaft 55 may be adjustably determined. As a consequence the shaft 64 will be rotated either clockwise or counterclockwise depending upon whether the effective length of the shaft 55 is reduced or increased, thereby rotating the arm 66 in a clockwise or counterclockwise direction. If the arm 66 rotates in a clockwise direction about the axis of shaft 64, it will move the bolt 69 downwardly which will carry the plate 51 downwardly with those parts which are rigidly attached thereto including the guideway angle members 50 and the bracket 48, or, in other words, the front portion of the runner 43.

Due to the similar construction of the four adjustable interconnecting means A, B, C and D,

it will be manifest that each of the runners 43 may be vertically adjusted with respect to the main frame 11 at each end thereof. As a consequence, the slope of each runner 43 may be adjusted and its elevation with respect to the main frame 11 may also be adjusted. It is thus possible to vary the operating effect of the blades 15, 16, 19, 20 and 41 as they slide over the road surface. The depth of cut and the extent of crowning may thus be adjusted.

In order to provide for the pulling of the scraper along the road either while performing a scraping operation or for transportation and also to co-operate with the rear wheels 39 to lift the scraper from the road surface for transportation purposes, I provide a main drawbar 70 comprising a pair of angle members 71 which are rigidly attached to a pivot block 72 at their forward ends and which are pivotally attached to plates 73 rigid with the angle members 12 of the main frame 11 at their rear ends, as by nuts and bolts 74. Appropriate reinforcing cross angles 75 may be provided between the angle members 71.

The pivot block 72 is pivotally attached to a forward pony truck 76 by a downwardly extending neck portion 77. The pony truck 76 comprises a transversely extending inverted U-shaped member 78 carrying the axles 79 upon which are rotatably mounted wheels 80 provided with pneumatic tires 81. Extending forwardly from the U-shaped member 78 is a tongue 82 provided with an eye-coupler 83 adapted to be coupled by coupling unit 84 to the towing truck 10. Braces 85 are provided between the tongue 82 and the U-shaped member 78. The neck portion 77 of the pivot block 72 carries a nut and extends through a somewhat enlarged aperture in a plate 86 which connects the tongue 82 and the U-shaped member 78, thereby providing a universal connection between said pony truck 76 and the main drawbar 70.

As is illustrated in Fig. 7 of the drawings, the scraper may be elevated into a transporting position in which it will be supported by the pony truck 76 and the rear wheels 39 provided with the tires 40. To effect the elevation of said scraper into said transporting position and also to lower it from said transporting position into a road scraping position, I provide mechanism now to be described. The previously mentioned shaft 35 which is effective to operate the raising and lowering of the wheels 39 upon rotation thereof, is provided with an operating lever 87 to the upper free end of which is pivotally attached a link of adjustable length comprising a piston rod 88 of a piston type hydraulic jack or motor 89 having a cylinder 90 pivoted at one end to a rigid bracket 91 by a pin 92, said bracket 91 being rigidly attached to the cross pipe 31 of the main frame 11.

Extending forwardly from the lever 87 and pivotally attached thereto is an operating rod 93 which is pivotally attached to a lever arm 94 which arm in turn is rigidly attached to a cross-shaft 95 carried by appropriate bearing boxes 96 on the main drawbar 70. Rigidly attached to said shaft 95 and near the ends thereof are a pair of lever arms 97, 97 which are adjustably attached to a lost motion linkage mechanism comprising a pair of pivotally attached links 98 and 99. Each link 98 is pivotally and adjustably attached to a lever arm 97 and each link 99 is pivotally attached at one end to a link 98 and at the other end to the transverse angle member 14 of the main frame 11. Said linkage mechanism 98, 99 is provided whereby a lost motion

connection in one direction of movement will be effected between the levers 97 and the transverse angle member 14 of the main frame 11, thus permitting the drawbar 70 to pivot freely under the influence of pony truck 76 in moving over an irregular road surface.

It will be evident that upon expansion of the jack or motor 89 with a consequent outward movement of the piston rod 88 thereof, the shaft 35 will rotate in a clockwise direction thereby moving the wheels 39 with tires 40 downwardly to elevate the rear portion of the main frame 11 and all of those parts carried thereby, including the runners 43, 43. At the same time, the operating rod 93 will move rearwardly under the influence of the lever 87 to rotate the shaft 95 carried by the main drawbar 70 in a counter-clockwise direction. This will swing the levers 97 in a counter-clockwise direction—first to straighten out the lost motion link mechanism provided by links 98 and 99, and then to elevate the front end of the main frame 11 due to the fact that said front end will be drawn toward the main drawbar 70. This, of course, will cause the main drawbar 70 to pivot about the axis of bolts 74 and will cause some tilting of the neck portion 77 of the block 72 in the previously mentioned enlarged aperture in plate 86. It is thus evident that the main frame 11 and the runners 43, 43 as well as all parts rigid with said main frame will be elevated in parallelism to a transporting position as illustrated in Fig. 7.

To operate the hydraulic jack or motor 89 I provide a hydraulic pump 100 which may be carried upon a bracket 101 supported upon a pedestal 102 carried by said main frame 11. An oil reservoir 103 carried on an upstanding angle member 58 will be provided for the pump 100 and will have a feed conduit 104 leading to said pump. An output conduit 105 will be provided between the pump 100 and one end of the cylinder 90 of the jack or motor 89. Operating mechanism for the pump 100 will take the form of a handle 106 and a linkage mechanism 107 which is attached to the piston of said pump 100. It will be obvious that by oscillating the handle 106 fluid may be extracted from the reservoir 103 by the pump 100 and fed to the jack or motor 89 thereby to expand it. To release or contract the jack or motor 89 I provide a by-pass hand operated valve 108 which when opened, connects the feed conduit 104 and the output conduit 105, thus allowing oil under pressure in the cylinder 90 to flow back into the oil reservoir 103. It will, of course, be obvious that when the by-pass valve 108 is closed the fluid will have to pass through the pump 100 as determined by the usual check valves thereof.

It is thus evident that an operator standing on the platform provided by the flat bars 34, may operate the pump handle 106 to control the elevation or lowering of the main frame 11 and the blades carried thereby and in addition said operator may by means of the cranks 59 (control the elevation and slope of the runners 43 with respect to said main frame 11. If desired, the main frame may be so adjusted that a varied amount of the weight of the scraper will be carried by the tires 40 and 81; thus variably determining the scraping action of the blades of said road planer.

It may also be mentioned that in addition to the elements previously described, a pair of signal flags 109 may be carried in appropriate

sockets 110 at the rear of the planer and at each side thereof.

In the operation of the device to perform a road planing function, the mechanism will be towed by a truck 10 with the runners 43 lowered into road engaging position either to support the entire weight of the planer or only a portion thereof as determined by the operation of the jack 89. The blades 15 and 16 which extend substantially the complete width of the planer and to the extreme lateral position as determined by the runners 43, will shave and shear off ridges and high places on the road surface and mix and carry the material to the center of the planer. The material will then be divided as determined by the gate or valve 23 and distributed between the blades 19 and 20. The blades 19 and 20 will effectively distribute the material over the road surface and tend to fill any low places. Any excess material will flow laterally of the rear ends of the blades 19 and 20 and form windrows outside of the paths of rear tires 40. This material will be prevented from flowing over the angle members 44 of the runners 43 by the baffle or side plates 53 and will be evenly distributed over the complete road surface by the rear strike-off blade 41 which is positioned rearwardly of the wheels 39. The blades 15, 16, 19, 20 and 41 will be in full view of the operator who may adjust the runners 43 by the operating means A, B, C or D, or may adjust the jack or motor 89 to produce a desired result.

It is thus obvious that a very small and light, though thoroughly satisfactory, device has been provided for planing and leveling a road surface which may be either of dirt, gravel, or macadam.

The towing vehicle shown at the left-hand portion of Fig. 1 may be a self-propelled dumping truck, and crushed stone or other road building material may be permitted to flow gradually therefrom onto the roadway while the machine shown in Figs. 3 and 4 is being towed along the roadway. The distance between the runners 43, 43 is sufficiently greater than the distance between the sides of the dumping truck body, to insure confining the dumped material between the runners, in which event the elongated runners 43, 43 and the vertical baffle plates 53, 53 (Fig. 2) thereon, act as lateral straight edgers to limit the spreading of material along predetermined lines.

It should also be noted that the inner frame comprising the end transverse members 13, 14 has rigidly connected thereto the diagonal spreading and cutting blades 15, 16, 19, 20, and while the front blades 15, 16 and the ends of the strike-off blade 41, extend to the runners 43, 43, the latter are connected to the outer ends of the end transverse members 13, 14 and not to the cutting blades. This is important because of the desirability to provide adjustments between the outer ends of the transverse members 13, 14 and the runners 43, 43. That is to say, by rigidly connecting the scraper blades to the main frame, they may be varied in elevation and inclination transversely of the roadway by the adjustments between the end frame and the end portions of the runners.

While hereinbefore the connections at 69 have been described as being in the form of bolts, it should be understood that pins may be used instead, because the nut and screw elements 60, 61 may be relied on to hold the runner at adjusted elevation after being adjusted by the turning of the corresponding handle 59. As may be seen by

referring to Figs. 3 and 4, one handle 59 may be provided for each individual adjustment at the four corners of the main frame unit. If bolts 69 are employed, they may be tightened after the adjustments have been made, to serve as additional means to hold the runners in adjusted positions relative to the main or supporting frame. It will be noted, however, that when the runners are secured in adjusted positions, they will be rigidly connected to the main frame so that during operation the diagonal cutting blades, the strike-off cutting blade 41 and the spaced runners are all rigidly connected together to constitute a straight edge guided unit. The depth of cut and the crowning of the roadway is regulated by the aforesaid corner adjustments. By reason of the elongation of the side runners 43, over the full length of the supporting frame up to the axle of the front wheels as shown in Fig. 1 and even beyond the rear transverse member 13 as shown in Fig. 4, irregularities in the roadway such as depressions or humps, will not affect the desired regulation of the cutting, spreading and leveling operations. In other words, the cutting blades are supported and gauged along the roadway by the runners independently of the wheels 39 and 80.

If desired, the support of the machine during operation may be distributed to the wheels, particularly where only depressions in the roadway are to be encountered. In that event, whenever a wheel tends to enter a depression, the position of the cutting blade relative to the road surface will not be disturbed because the runners are already in position to prevent any downward movement of the cutting blades. In fact, the runners will hold up the rear wheels and prevent them from riding down into depressions. The front wheels may enter depressions but the result will be only the bending of the knees or knuckles at 98, 99 without affecting the continuous riding of the front ends of the runners 43, 43 along straight lines.

During operation of the planer to level or crown the road in accordance with the previous adjustments made at the four corners of the main or supporting frame, the diagonal blades 15, 16, 19, 20 co-operate to spread the material over the roadway, and the strike-off blade 41 finishes the operation. Inasmuch as this strike-off blade is back of the rear wheels, it will be impossible for such rear wheels to leave imprints in the finished surface. This feature is especially desirable when working on black top or re-surface material.

The rear strike-off blade 41 extends to the full width of the machine and is adjustable to a number of positions so as to deflect material to either side of the machine. This blade in making the final distribution also maintains the crown of the roadway. Preferably the angle of the strike-off blade 41 relative to the line of draft of the machine should be such as to maintain in front of it sufficient surplus material to finish filling depressions partially filled by the second pair of blades 19, 20. As above explained, when the planer moves along the roadway, the elongated side runners may be relied on as straight edgers at the lateral limits of the spread material. As the front diagonal blades 15, 16 shear off the ridges in high places on the roadway, the material is mixed and carried to the central gateway where the valve 24 is located. This valve has three positions. In its central position it divides the flow of material equally to the blades

19, 20. As shown in Fig. 6, material may flow under the gate 24 when either in the full line position shown in Fig. 4 or when in its opposite position. In its full line position shown in Fig. 4, more material will be delivered to the blade 20 than to the blade 19. In crowning operations it may be desirable to deflect most of the material along the blade 20 toward the center of the roadway, assuming that the left-hand straight edger 43, looking forward toward the front end of the machine, is at the left-hand edge of the roadway. To assure these desired operations, it is preferred to set the rear wheels no lower than as shown in Figs. 2 and 5. Then the runners or edgers will, throughout their entire lengths, remain in contact with the roadway during all planing operations, while the front wheels are free to ride up and down all humps and depressions without any effect on the rigid planer unit, there being freedom of pivotal movement of the main drawbar 70 on the pivot 74, by reason of the freedom of flexure afforded by the lost motion connection or free knuckles 98, 99. As shown by the holes in the ends of the links 97, 98, these two links may be adjustably connected together. Preferably the links 97, 98 and 99 are flat metal bars so that the connections between the drawbar 70 and the main frame 11 may effectually resist relative lateral movement between the drawbar 70 and the frame 11. That is to say, the pivotal connection at 74 co-operates with the connections between the front end of the main frame and the intermediate portion of the supplemental frame or main drawbar 70 to maintain efficient steering connections between the hauling vehicle and the straight edged side runners.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

1. In a road working apparatus, the combination with a main frame, of a pair of adjustable longitudinally extending runners carried thereby, said runners having guide means at each end formed with vertical slots, adjusting means at each runner end comprising rock shafts carried by said main frame and extending through said slots, arms on said shafts for adjusting said runners, and sliding pin means interconnecting the free ends of said arms and said runners whereby said runners may be adjusted in elevation by rotation of said rock shafts.

2. A road working machine comprising a main frame having scraper blades mounted thereon, a drawbar frame pivoted at its rear end to said main frame intermediate the ends of the latter, said drawbar frame extending forwardly from said main frame and provided with carrying wheels, and mechanism connected between said drawbar frame and the front end portion of said main frame to effect movement of the scraper blades into and out of engagement with the roadway, said last-named mechanism comprising a knuckle-joint composed of pivoted links affording lost motion when the scrapers engage the ground and the said wheels travel along irregularities in the roadway, such knuckle-joint being straightened out to form a hanger when the scrapers are elevated off the roadway.

3. A road planer comprising a main frame, scraping means carried by said frame, wheels for the rear portion of said frame, means for adjusting the connections between said wheels and such rear portion of said frame to effect variation in elevation of the rear portion of the main frame relative to the road surface, a pony truck, a draw-bar pivotally connected at its front end to said pony truck and at its rear end to said frame intermediate the ends of the latter, elevating connections between the forward portion of said main frame and said drawbar intermediate the ends of the latter, said elevating connections comprising flat links knuckle jointed in position to knee forwardly when said scraping means engages the road surface and said pony truck rides over irregularities in the roadway, said elevating connections serving also to co-operate with the pivotal connection between the drawbar and the main frame to resist lateral movements of the drawbar relatively to said main frame, and means for operating said elevating connections to elevate the front portion of the main frame away from the road surface.

4. In a road working machine, the combination with a frame, of spaced-apart runners at the sides of said frame, a pair of laterally inclined scraper blades carried at the front end portion of said frame converging toward the frame center, pair of diverging scraper blades carried by said frame behind the first-named blades and extending at their rear ends to points in spaced relation to said runners to permit spreading of material rearwardly of said last-named blades and near said runners while the latter act as edgers in regard to such spread material, a strike-off blade extending laterally of said frame and spaced rearwardly from the lateral rear ends of said second mentioned pair of blades in position to connect the inner sides of said runners, and upright baffle plates mounted on those portions of the runners adjacent the rear ends of said second pair of blades and extending rearwardly to the ends of said strike-off blade to confine the spread material edged as aforesaid between the runners for striking off by said strike-off blade.

5. In a road making machine, the combination with a supporting frame, of parallel spaced-apart elongated runners connected to the sides of said frame, planing and spreading mechanism carried by said frame between said runners, a strike-off blade having a length approximately equal to the transverse space between said runners, mechanism for holding said strike-off blade in various positions of adjustment between said runners including a diagonal position with one end of said strike-off blade in engagement with the inside face of one of said runners, and an extension plate connected to the other end of said strike-off blade to close the gap between the other end of said strike-off blade and the adjacent runner.

6. In a road making machine, the combination with a supporting frame, of an elongated runner connected to one side of said frame, planing and spreading mechanism comprising a diagonal scraper blade adapted to spread material toward said runner in a windrow adjacent thereto, and a strike-off blade mounted on said frame for adjustment relative thereto to various diagonal positions with one end of the strike-off blade always in engagement with said runner.

7. In a road making machine, the combination with a supporting frame, of spaced-apart elongated parallel runners connected to the sides of

said frame, planing and spreading mechanism carried by said frame and comprising a pair of spaced-apart converging scraper blades in advance and spaced from a pair of connected diverging scraper blades, a gate movable to positions to direct most of the material from the advance blades to a selected one of the connected blades to cause the formation of a windrow along the inside face of one of said runners, a strike-off blade equal in length to the space between said runners and adapted to be carried at right angles to said runners while fitting between the same, with the ends in engagement with said runners, means for holding said strike-off blade in adjusted diagonal position with one end in engagement with the runner along which such windrow is formed, and a removable extension plate between the other end of said strike-off blade and the adjacent runner.

8. In a road planer and material spreader, the combination with a supporting frame, of planing and spreader scraper blades mounted thereon, spaced-apart elongated parallel runners extending along the sides of said frame in spaced relation thereto, rigid right angle straight lateral extensions from said frame for connecting said runners thereto, and mechanism comprising a rock shaft individual to each lateral extension for adjusting the relative elevation of the runner and frame adjacent to each extension.

9. In a road planer and material spreader, the combination with a supporting frame comprising spaced side members, of an operator's station between said side members, lateral extensions from the ends of said frame, elongated runners at the outer ends of said extensions and extending the full length of the machine in spaced relation to said side members, mechanism between each extension and the adjacent runner for adjusting the elevation of the adjacent corner of the supporting frame relative to the road surface, and means adapted to be actuated from said operator's station for operating each elevating mechanism individually.

10. In a road working machine, the combination with a supporting frame, of road working mechanism carried thereby, a drawbar frame pivoted at its rear end to said supporting frame intermediate the ends of the latter, wheels for supporting the front end of said drawbar frame, and connections comprising knuckle-jointed mechanism between said supporting frame and said drawbar frame intermediate the ends of the latter, said knuckle-jointed mechanism including pivotally connected links serving to co-operate with said pivotal connection between the rear end of said drawbar frame and said supporting frame to resist lateral movement of the front end of the drawbar frame relatively to said supporting frame while being freely flexible for free up and down movements of said drawbar frame relatively to said supporting frame during movement of said wheels over irregularities in the roadway.

11. In a road planer, the combination with a supporting frame, of runners for supporting said frame for dragging over the roadway, planing mechanism carried by said frame, front and rear supporting wheels for said frame, a drawbar frame between the front wheels and said supporting frame, and means for elevating the runners from the roadway comprising a hanger composed of flat plate links pivotally connected on horizontal axes and serving to resist lateral swerving of the drawbar frame while forming a

forwardly extending flexible knee to permit freedom of vertical movement of the forward end of the drawbar frame with the runners engaging the ground.

5 12. In a road working machine, the combination with a supporting frame, of earth working means carried thereby, rear supporting wheels for said frame, a front steering wheel unit, a drawbar frame pivotally connected at its rear end to
10 said supporting frame intermediate the ends of the latter and at its forward end to said steering wheel unit, elevating mechanism connected to the rear wheels, elevating mechanism between said drawbar frame and said supporting frame be-
15 neath the drawbar frame, a connection between said elevating devices to secure simultaneous operation of both, means comprising a fluid-pressure motor connected between said supporting frame and one of said elevating mechanisms to
20 secure operation of both simultaneously by reason of said connection, and means for controlling said motor to effect lowering of all portions of the supporting frame by gravity and thereby adjust the earth working means relative to the
25 ground surface.

13. In a road working machine, the combination with a main frame, of planing and spreading blades carried thereby, a supplemental frame pivoted at its rear end on a transverse axis to said
30 main frame intermediate the ends of the latter, a steering wheel unit at the front end of said supplemental frame, rear supporting wheels for said main frame, means connected to said rear wheels and to said supplemental frame for ad-
35 justing the elevation of the main frame along vertical lines, side runners adjustably connected to said main frame, and means connected between said main frame and said runners for adjusting the main frame by tilting the same trans-
40 versely and longitudinally and thereby adjust the planing and spreading blades relative to the road surface while supported by said runners independently of said rear wheels.

14. In a leveling and spreading machine, the
45 combination with a portable frame, of means comprising front and rear wheels for supporting said frame, leveling and spreading mechanism carried by said frame and comprising a transverse blade rearwardly of the rear wheels, elon-
50 gated runners on opposite sides of said frame and each extending along the entire length of said frame longitudinally thereof with the said transverse blade between the same, and means
55 for adjusting the elevation and transverse inclination of the rear end of said frame relative to said runners to effect adjustment of the elevation and inclination of said transverse blade relative to the road surface.

15. In a road planer and spreader, the combi-
60 nation with a supporting frame, of a pair of laterally inclined scraper and spreader blades con-

verging toward the center of said frame and having their inner ends spaced apart, a pair of connected scraper and spreader blades diverging rearwardly and spaced rearwardly from said first-mentioned blades, a valve deflector pivoted to the
5 juncture of said second-mentioned pair of blades in position to be swung into alinement with either blade of the first-mentioned pair of blades, a vertical retaining abutment plate on said frame
10 between the blades of the first-mentioned pair of blades, and a U-shaped latch pivoted to the top forward edge of said valve deflector in position to fit over the rear top edge of either of said
15 first-mentioned pair of blades or over the rear top edge of the said abutment plate to hold the valve deflector in alinement with either spaced-apart rearwardly converging plate or to hold the valve
20 connected to the frame between the rear ends of such converging plates and spaced therefrom.

16. In a road working machine, the combina-
20 tion with a supporting frame, of planing and spreading mechanism carried thereby, a pair of elongated longitudinal ground engaging runners connected to said frame outside of and spaced laterally from the path of travel of the spread-
25 ing mechanism in position to act as edgers for the spread material, said runners extending the full length of the frame, a pony truck, means for pivotally hitching the pony truck to said frame to pull the frame along the roadway while said run-
30 ners are in ground engaging position, the pony truck being free to ride up and down over irregularities in the roadway while said runners maintain the planing and spreading mechanism at an approximate uniform level, and knuckle-jointed
35 mechanism adapted to co-operate with said hitching means to resist lateral swerving of the pony truck relatively to said frame during travel of the machine along the roadway.

17. In a ground leveling and spreading ma-
40 chine, the combination with a portable frame, of leveling and spreading mechanism carried thereby to move bodily therewith, mechanism connected between ground engaging wheels and said frame for adjusting the elevation of the frame
45 together with the leveling and spreading mechanism bodily and equally at the front and rear portions thereof relative to the road surface, an elongated ground engaging runner extending
50 along one side of said frame to reach substantially the full length thereof, and a plurality of spaced-apart devices operable from a single operator's station for adjusting the elevation of said runner relative to the road surface when the runner is up off the ground and for adjusting the
55 height of the adjacent side of said frame relative to the road surface when the runner is in supporting contact with the ground and thereby adjust the transverse tilting of the leveling and spreading mechanism.

FRANKLIN E. ARNDT.