

April 23, 1929.

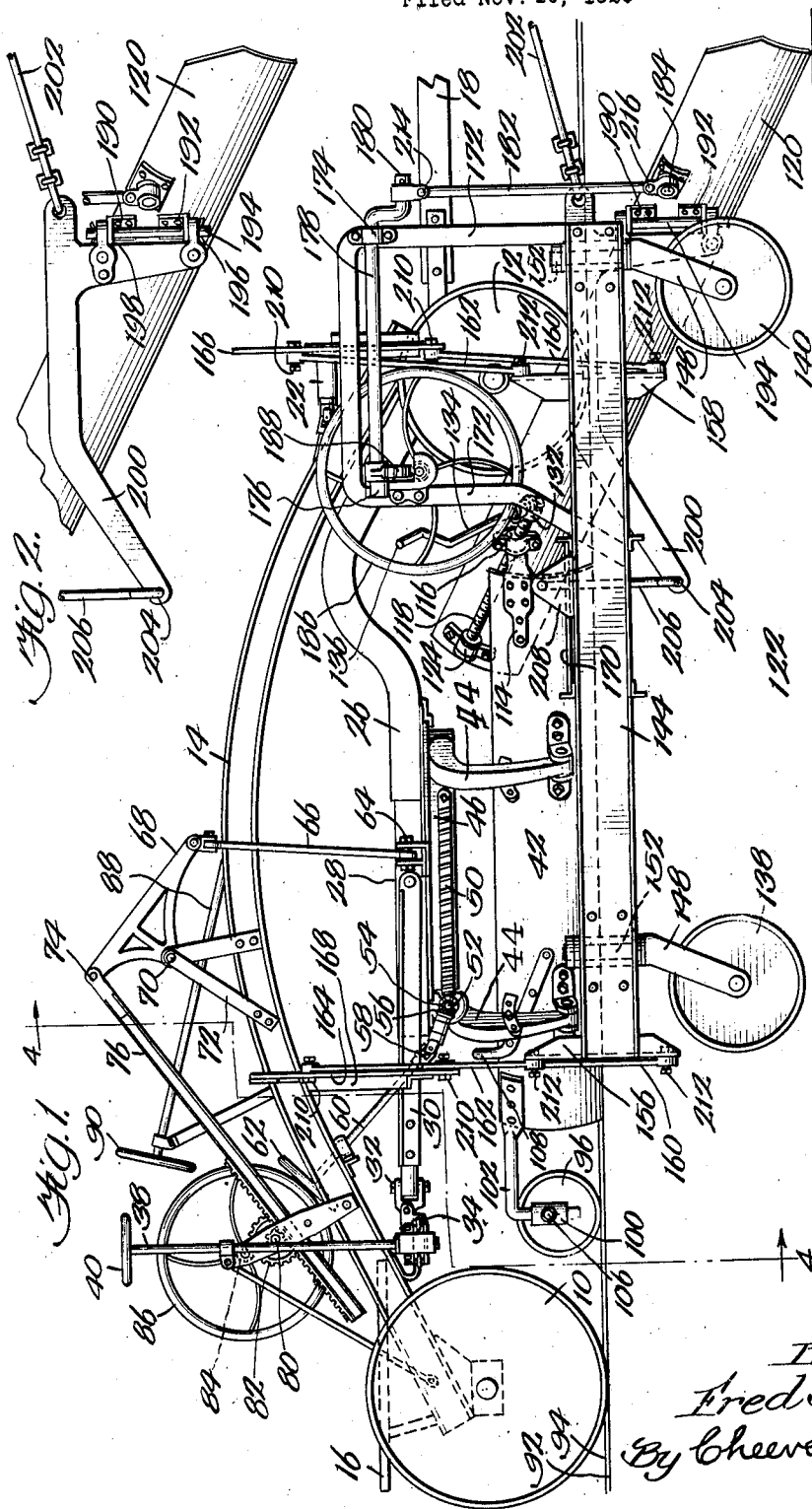
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SUPPLEMENTAL ROAD GRADER

Filed Nov. 10, 1926

3 Sheets-Sheet 1



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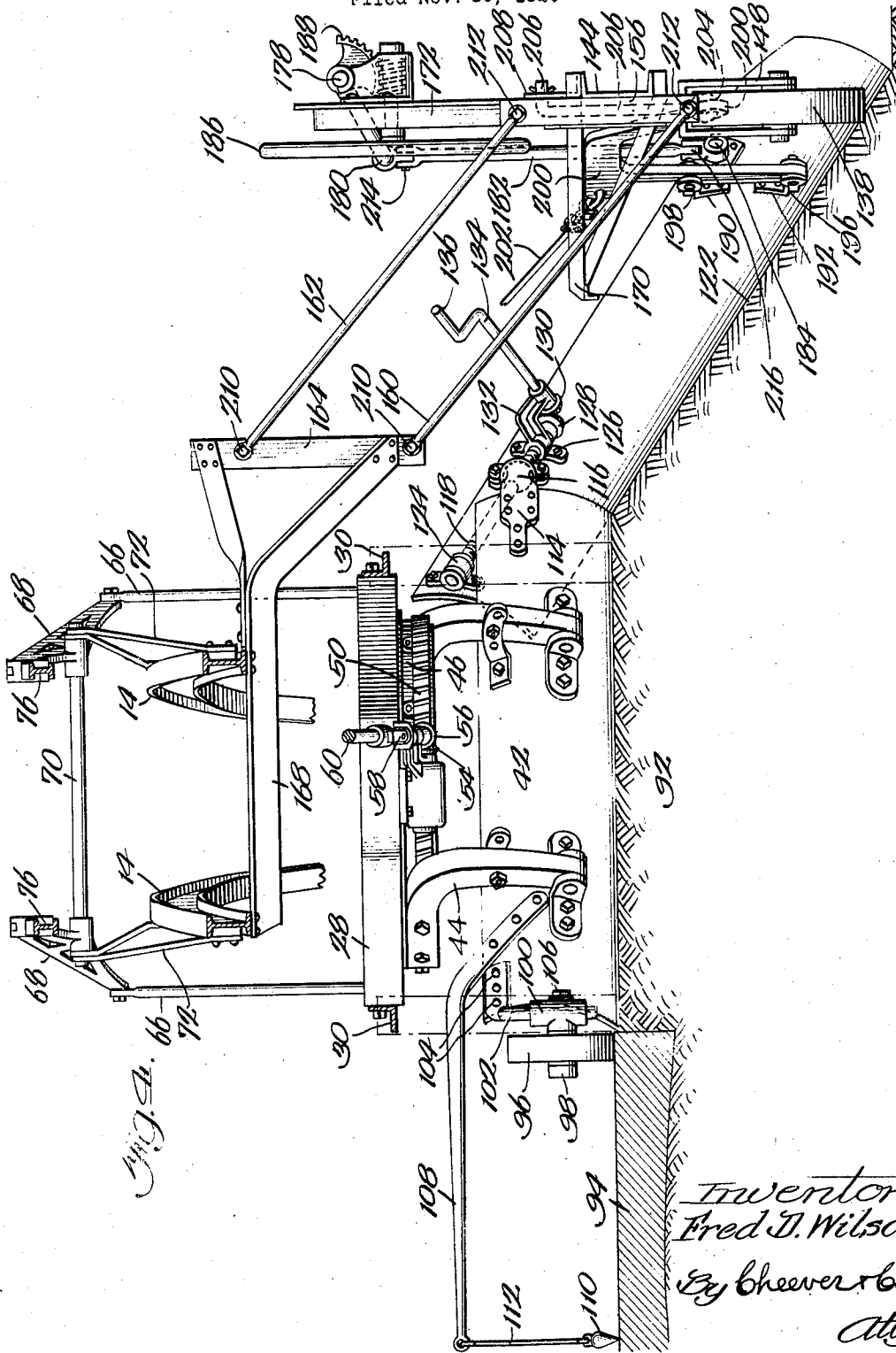
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UNITED STATES PATENT OFFICE.

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SUPPLEMENTAL ROAD GRADER.

Application filed November 10, 1926. Serial No. 147,401.

This invention relates to road graders, more particularly those sometimes called "bank sloping machines" in which the main or road scraping blade of the machine is 5 equipped at one end with a vertically, angularly adjustable blade capable of cutting surfaces which are angular with reference to the surface cut by the main blade. More particularly the invention is a machine for economically complying with requirements of various State highway departments relative to the construction of the earth shoulder at the sides of modern concrete highways which have hertofore required in large part at least 10 hand labor for the finishing operations, the expense sometimes running as high as \$850 per mile for the finishing alone, it being possible by the use of this machine to do said finishing without the use of hand labor.

The invention consists in mechanism capable of carrying out the foregoing and other objects which can be easily and comparatively cheaply made; which is highly efficient and otherwise satisfactory in operation and is not readily liable to get out of order. In some broad aspects, the invention 25 is an improvement upon the bank sloper of my prior application Serial Number 144,785, filed October 28, 1926.

More particularly the invention consists in detailed mechanism by which an inclined cutting blade may be pivotally and reciprocally attached to the main blade of a conventional road grader; in mechanism by which 30 the outer end of the inclined blade is supported by independent mechanism some distance to the side of a conventional main grader and in devices operable from a point near said outer end of the supplemental inclined blade, raising and lowering and otherwise adjusting the supplemental blade.

The invention further consists in numerous features and details of construction which will be hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals designate the same parts throughout the several views:

Figure 1 is a side elevation of a machine illustrating this invention in its preferred form.

Figure 2 is a side detail of a supporting lever mechanism on the irregular line 2—2 of Figure 3.

Figure 3 is a plan view of the mechanism 55 of Figure 1.

Figure 4 is a rear view of the mechanism of Figures 1 and 3 taken on the irregular line 4—4 of Figure 1.

The mechanism of this invention is applied 60 to a conventional form of grader including rear wheels 10, front wheels 12, connecting arched frame 14 equipped at the rear with an operator's station or platform 16, the whole being drawn over the ground by suitable 65 power not shown, attached to a draft tongue 18.

Conventionally pivoted at 22 on the front axle mechanism 24 of the machine and below the frame 14 is a horizontally swinging frame 70 26—28—30, whose rear end is conventionally attached through the link mechanism 32 to a horizontally disposed chain 34 passing over sprocket wheels 36 at opposite sides of the machine, one of which is conventionally oper- 75 able through a vertically disposed shaft 38 and hand wheel 40 located conveniently to the operator's station 16. By properly manipulating handwheel 40, the operator can in conventional manner move chain 34 crosswise of 80 the machine to swing the frame 26—28—30 about pivot 22 crosswise of the machine in a horizontal plane and thereby laterally vary the position of the main road working blade 42. This blade 42 is rigidly secured through 85 depending bracket arms 44 to a horizontally rotatable, conventional wheel 46 journaled on a part 48 of frame 26—28—30. This wheel 46 is provided on its rear circumference with a segmental worm gear 50 engaged 90 by a conventional worm not shown, located on shaft 52 back of bevel gear 54 appearing in Figure 1. This latter gear meshes with another bevel gear 56 driven through a universal joint 58 by a shaft 60 equipped at its 95 rear end with a hand wheel 62 within ready reach of the operator's station 16. The operator at said station 16 can by manipulating wheel 62 in the proper direction operate the gearing mechanism described to rotate wheel 100 46 in either direction as desired to change the angular, horizontal position of main blade

42. The universal joint 58 permits this operation of the blade 42 in all horizontal, lateral positions of the frame 26—28—30.

On each side of frame 26—28—30 is a horizontal pin or shaft 64 to which is pivotally attached an upwardly extending connecting rod 66. The upper end of each of these rods is pivotally connected to an independent bell crank lever 68 pivotally supported at 70 on a suitable bracket 72 extending upwardly from the frame 14. The opposite arm of bell crank 68 is pivotally connected at 74 to a downwardly inclined rod or rack 76 having at its lower end a rack 78 traversed by a pinion 80 operatable through gearing 82—84 by a hand wheel 86. As clearly shown in the drawing, there is one such hand wheel at each side of the machine adjacent to the operator's station 16 and, obviously, by manipulating said hand wheel 86, the operator at the station can raise or lower a selected one or both of the sides of the frame 26—30, thereby raising or lowering as desired either end of the main blade 42. The pivotal connections 64 heretofore referred to are conventionally such as to permit this adjustment in all lateral positions of the frame 26—30.

The front wheels 12 and the axle 24 therefore are conventionally rotatable in a horizontal plane for steering the machine through a conventionally connected, laterally extending shaft 88 conventionally operatable at the rear of the machine through manipulation of hand wheel 90 located at the operator's station.

The conventional grader, just described, is intended for work in the position shown in Figure 4 on earth bank 92 at the side of a modern cement road 94, it being the intention that the blade 42 shall bring the surface of earth bank 92 to substantially or a trifle below the surface of the cement pavement. In order to insure this desired result, the rear or left hand end of blade 42 as seen in Figure 4 is equipped with the depth gauge roller 96 adapted to travel upon the pavement edge. In the particular case here illustrated, this roller or wheel 96 is journaled on a suitable horizontal shaft 98 carried by and at right angles to a vertically disposed hub 100 telescopically enclosing a downwardly projecting bracket arm 102 rigidly secured to the adjacent end of blade 42 by any suitable means as for instance rivets 104. This hub 100 is selectively positionable along various points on bracket arm 102 by any suitable clamping mechanism exemplified by the nut 106. Adjustment of this nut mechanism 106 and consequently the hub 100 up and down bracket arm 102 changes the vertical position of depth gauge roller 96 with reference to blade 42 and thus determines the position of the left hand end of blade 42 with reference to the cement road or pavement 94.

In order to assist the operator in determining whether or not blade 42 is cutting the bank 92 at a proper level throughout the entire length of blade 42, said blade is equipped with a laterally extending bracket arm 108 carrying a depending plumb bob 110 located a substantial distance from wheel 94 above the cement pavement surface. This plumb bob 110 is suspended by a rod, chain, rope or other device 112 more or less adjustable as to length by conventional means not shown so that the operator can by adjusting the length of this member 112, consequently the height of plumb bob 110 with reference to the arm 108, predetermine exactly the angularity of blade 42 which is indicated when plumb bob 110 just touches the pavement surface as shown in Figure 4.

In the operation of the mechanism thus far described, the operator first manipulates the various controls before him on the station 16 to position blade 42 to cut the bank 92 exactly as desired and thereupon adjusts the height of depth gauge wheel 96 and/or the plumb bob supporting device 112 until in this position of blade 42, the plumb bob 110 just touches or very slightly clears the surface of cement pavement 94. Thereupon, during further work of the machine, the operator has only to manipulate his controls of blade 42 to maintain the plumb bob 110 in the pavement contact position shown and described to be sure that the blade 42 is making exactly the desired cut in bank 92 with reference to pavement 94.

The forward or right hand end of blade 42, as viewed in Figure 4, is equipped with a suitable bracket 114, having mounted thereon the universal ball joint nut 116 through which is threaded elongated screw shaft 118 extending longitudinally of and secured at its opposite ends to a supplemental inclined sloper blade 120 designed to cut a ditch or other inclined surface 122 extending downwardly from the upper surface of bank 92 which is cut by blade 42. This screw 118 located as shown at the rear end of blade 120 is detachably secured thereto by suitable brackets 124 and 126 provided for the purpose. Screw shaft 118 extends beyond bracket 126 and there carries a bevel gear 128 operatively meshing with another bevel gear 130 journaled in an L-arm of a suitable supporting bracket 132 rigid with bracket 126. Gear 130 is rotatable by a shaft 134 manually manipulatable by a hand crank 136. Manual rotation of this crank 136 is transmitted through gears 130 and 138 to shaft 118 with the result that it travels through ball nut 116 thereby reciprocating blade 120 in a line parallel to the axis of shaft 118 across the end of blade 42. Ball nut 116 is sufficiently loose so that the angularity of blade 120 with reference to blade 42 may be widely varied simultaneously

with this reciprocation of blade 120 with reference to blade 42 as well as when no such reciprocation is taking place.

The work for which the machine of this invention is designed requires such a long blade 120 that it is impractical to support its outer end from the main tractor frame and control it from the operator's station 16 as is shown, described and claimed in said before mentioned companion application, and the supporting of the outer end of blade 120 is therefore in this case accomplished through the agency of a supplemental truck or trolley running parallel to the main grader supported by wheels 138 and 140 traveling at or near the bottom of the inclined surface 122, cut by blade 120. Wheels 138 and 140 support a longitudinal frame 144. Each wheel is preferably but not necessarily carried in a caster-like mounting 148 journaled on a vertical pivot 152 in the frame 144. Rigidly secured to frame 144 at points conveniently adjacent to its opposite ends are vertically disposed brackets 156 and 158 each operatively connected by parallel rods 160 and 162 extending diagonally upward as shown in Figure 4, pivotally connected at their opposite ends to suitable brackets 164 and 166, respectively, carried by horizontal cross-frame members 168 attached to and extending from the adjacent side of frame 14. The brackets and parallel rods described constitute parallel link connections between the main grader and the supplemental truck or trolley so that in all vertical positions of the truck or trolley and consequently of blade 120 as hereafter described, the trolley is in a vertical position parallel to the main grader. Trolley frame 144 is equipped with a supplemental operator's station platform 170 which is, among other things, adjacent to a crank 136 heretofore described, so that an operator riding on said platform 170 can conveniently manipulate the crank to extend or retract blade 120 in the manner heretofore described.

Rising from the forward end of supplemental trolley frame 144 is an inverted U-shaped frame 172 providing near its top suitable bearings 174 and 176 for a horizontal shaft 178 carrying beyond bearing 174 a crank arm 180 from which depends a connecting rod 182 loosely, pivotally connected at 184 to the lower or forward end portion of blade 120. This shaft 178 and consequently crank arm 180 is rockable from the operator's supplemental station 170 by manipulation of a hand wheel 186 operatively connected to shaft 178 through conventional gearing 188. By turning hand wheel 186, the operator can, therefore, manipulate crank arm 180 to raise or lower blade 120 and consequently change its angularity with reference to blade 42.

Rigidly secured to blade 120 somewhat adjacent to the pivotal connection 184 of connecting rod 182 are hinge brackets 190 and 192

having journaled therein a vertical hinge pin-
tle 194 carrying other hinge brackets 196 and
198 rigidly secured to the draft gear lever 200
connected at its forward end to draft cable
202 leading to the tractor or other source of
power which is attached to the forward end
not shown of draft tongue 18 and compels the
main grader along the road. The rear end of
draft gear lever 200 is pivotally connected at
204 to a vertically extending rod 206 pivoted
at its upper end to a supplemental bracket
208 on the upper side of frame member 144.
The mounting, shown and described, permits
all desired movements of the blade 120 occa-
sioned by the operator's manipulation from
platform 170 of wheel 186 of crank arm 136.

In the complete operation of the mechanism
of this invention, two operators are provided,
one on platform 16, the other on platform
170. By manipulation of the proper hand
wheels before him, the operator on platform
station 16 steers the machine, raises or lowers
either end of blade 42, shifts the blade bodily
laterally of the main grader or changes the
angular position of blade 42 in a horizontal
plane with reference to the main grader and
the operator on platform 170 simultaneously
or successively as required manipulates crank
136 to angularly raise or lower the upper end
of blade 120 and manipulates wheel 186 to
raise or lower the forward or lower end of
blade 120. As any manipulation of blade 42
by the operator at station 16 necessarily af-
fects blade 120, it will be seen that the op-
erators can between them effect all desired pos-
sible adjustments of the two blades 42 and 120
to effect proper treatment of the earth bank
92 not only on its upper surface but on its in-
clined surface 122.

The four pivotal connections 210 and 212
at opposite ends of the links 160 and 162 are
quite loose so as to provide free vertical move-
ment for the supplemental truck mechanism
and also a limited longitudinal movement
with reference to the main grader as may be
required by the condition of material trav-
ersed by the wheels 138 and 140. From the
foregoing, it is apparent that the supple-
mental truck mechanism traverses the bottom
of the ditch or whatever is being formed by
blade 120 under the influence of gravity, viz:
its own weight, and whatever tendency there
is of the blade 120 to dig into the soil in front
of inclined surface 122.

The connecting rod 182 is provided inter-
mediate of its length with two pivot connec-
tions 214 and 216 so constructed and arranged
that longitudinal adjustment of blade 120
under control of crank 136 may take place in
all vertical positions of the outer end of the
blade 120 under the control of rod 182.

Having thus described my invention, what
I claim as new and desire to secure by Letters
Patent is:

1. In combination with a road grader hav-

ing a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, and a separate road traversing support for the outer end of the supplemental blade.

2. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground.

3. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, and means adjusting the angularity of the supplemental blade by changing the vertical position of its outer swinging end.

4. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground, and means adjusting the angularity of the supplemental blade by changing the vertical position of its outer swinging end.

5. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, and means adjusting the angularity of the supplemental blade by changing the position of its end adjacent the main road working blade.

6. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground, and means adjusting the angularity of the supplemental blade by changing the position of its end adjacent the main road working blade.

7. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement

in a vertical plane, manually operable means for so reciprocating the supplemental blade, and a separate road traversing support for the outer end of the supplemental blade.

8. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, manually operable means for so reciprocating the supplemental blade, and a separate road traversing support for the outer end of the supplemental blade, operable in all positions of the pivotally longitudinally adjustable connection between the two blades.

9. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, operable means for so reciprocating the supplemental blade, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground, and means adjusting the angularity of the supplemental blade by changing the vertical position of its outer swinging end, operable in all positions of the pivotally longitudinally adjustable connection between the two blades.

10. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, manually operable means for so reciprocating the supplemental blade, a separate road traversing support for the outer end of the supplemental blade, and means adjusting the angularity of the supplemental blade by changing the position of its adjacent end of the main road working blade, operable in all positions of the pivotally longitudinally adjustable connection between the two blades.

11. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, manually operable means for so reciprocating the supplemental blade, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground, and means adjusting the angularity of the supplemental blade by changing the position of its adjacent end of the main road working blade, operable in all positions of the pivotally longitudinally adjustable connection between the two blades.

the outer end of the supplemental blade, means causing the separate road traversing support to always move parallel to the main grader, said means permitting relative vertical movement between the grader and road traversing support.

23. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, said main grader and the separate support adapted to be pulled in unison along the ground, means causing the separate road traversing support to always move parallel to the main grader, and means permitting relative vertical movement between the grader and road traversing support.

24. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, manually operable means for so reciprocating the supplemental blade, a separate road traversing support for the outer end of the supplemental blade, and an operator's station on the road traversing sup-

port from which said manually operable means may be manipulated.

25. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally and reciprocally connected to one end of the road working blade for movement in a vertical plane, manually operable means for so reciprocating the supplemental blade, a separate road traversing support for the outer end of the supplemental blade, operable in all positions of the pivotally longitudinally adjustable connection between the two blades, an operator's station on the road traversing support from which said manually operable means may be manipulated, and from which station said vertical adjustment of the supplemental blade may be made.

26. In combination with a road grader having a main frame, supporting wheels and a road working blade, a supplemental blade pivotally connected to one end of the road working blade for movement in a vertical plane, a separate road traversing support for the outer end of the supplemental blade, and a depth gauge indicating mechanism at the opposite end of the main blade.

In witness whereof, I have hereunto subscribed my name.

FRED D. WILSON.