

March 11, 1958

C. A. CARTER  
SIDEWALK FINE GRADERS

2,825,984

Filed June 14, 1954

2 Sheets-Sheet 1

Fig. 1

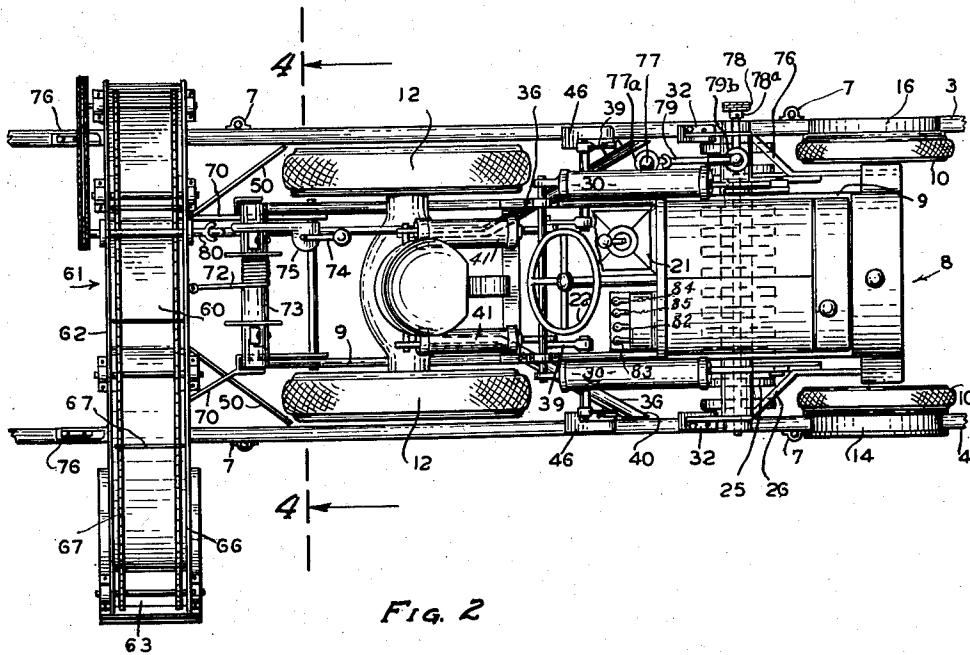
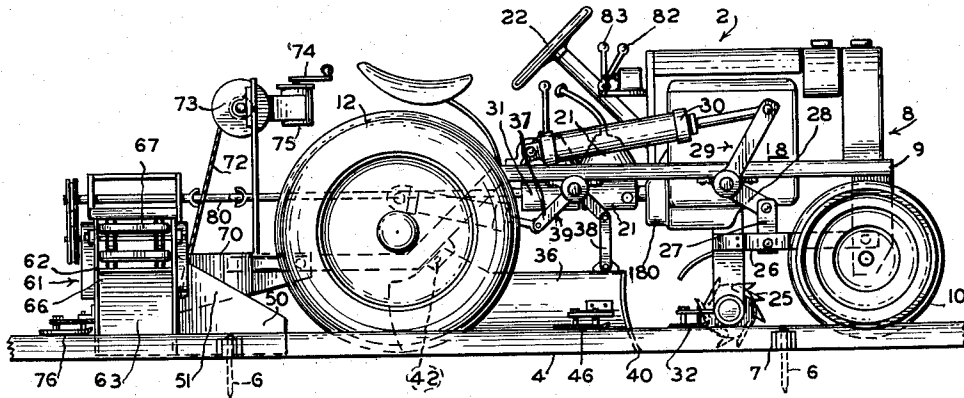


Fig. 2

INVENTOR.  
CHARLES A. CARTER.  
BY Scott L. Nowiel  
ATTORNEY.

March 11, 1958

C. A. CARTER  
SIDEWALK FINE GRADERS

2,825,984

Filed June 14, 1954

2 Sheets-Sheet 2

Fig. 3

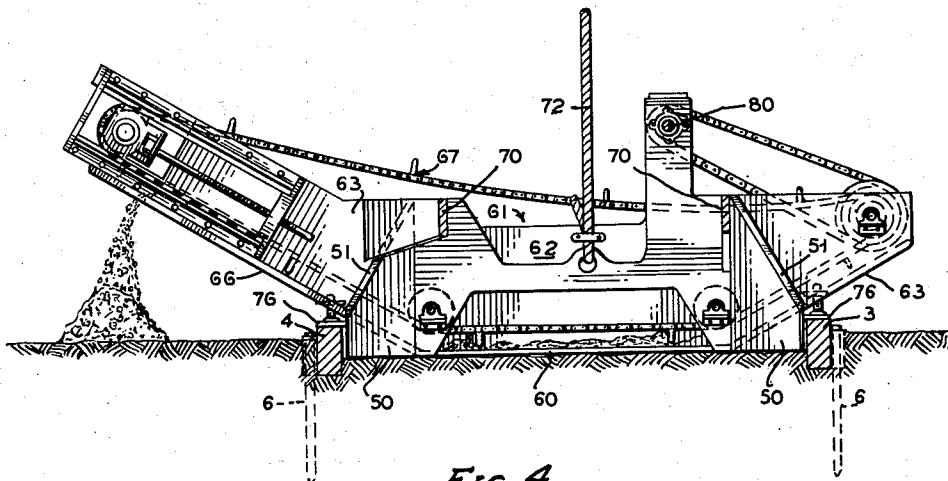
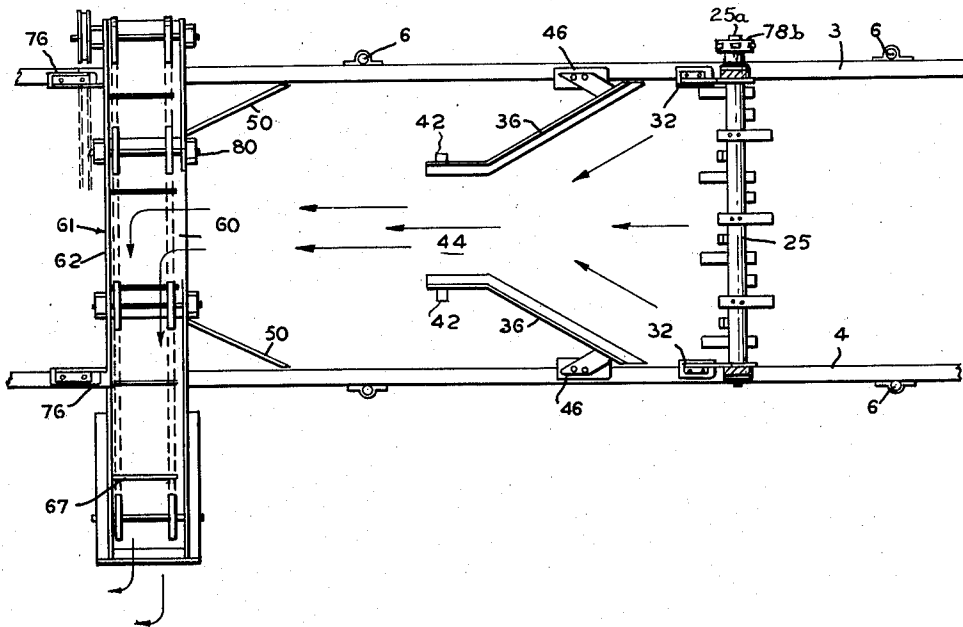


Fig. 4

INVENTOR.  
CHARLES A. CARTER.  
BY *Scott L. Nowiel*  
ATTORNEY

1

2,825,984

**SIDEWALK FINE GRADERS**

Charles A. Carter, Phoenix, Ariz.

Application June 14, 1954, Serial No. 436,613

5 Claims. (Cl. 37-108)

This invention concerns a sidewalk fine grader machine for grading the earth between steel edge forms laid down on grade to provide sides for pouring-forms for concrete sidewalks.

One of the objects of this invention is to provide a self-propelled fine grader machine which will run on and be guided by the edge forms which provide the sides of concrete sidewalk forms and which will mechanically cut and remove earth between said forms which is above grade and fill areas below grade and leave the earth between said forms at a grade determined and controlled by the grade of said steel edge forms.

Another object of the invention is to provide a fine grader machine which will run along steel forms which have been placed in parallel position to provide the sides of a sidewalk pouring form and have been placed on a definite horizontal grade, which will work the earth between said forms so that high spots above grade are cut down and low spots are filled and all excess dirt is removed from between said form sides and deposited at one side thereof as the machine travels along the length of said form rails.

Another object of the invention is to provide a self-propelled four wheeled tractive machine having front wheels which will be guided by and run on parallel steel form sides which are set up to determine the width and height of a cement sidewalk which is to be poured therebetween; said machine being arranged so that only light pressure is brought to bear on said rails so as not to disturb the grade levelling thereof while the main weight of the machine rests on rear traction wheels that run on the earth between and adjacent to said form rails; said machine having a rotary earth scarifying device which will loosen all earth above grade, and intermediate grader blades which will remove excess loosened earth to a central furrow and a rear blade associated with a transversely operating conveyor which will remove the excess earth from between the rails and deposit it at one side of the area included between said forms.

I attain the foregoing objects by means of the mechanism, apparatus, parts, and combination of parts shown in the accompanying drawings in which—

Figure 1 is a side elevation of a fine grader machine embodying my invention;

Figure 2 is a plan view thereof;

Figure 3 is a plan view of the earth moving parts of the machine shown without the supporting mechanism above them; and

Figure 4 is a front elevation of the rear scraper and transverse conveyor mechanism, as viewed from a section plane taken substantially on line 4-4, Figure 2.

Similar numerals refer to similar parts in the several views.

The fine grader machine is indicated generally by numeral 2, and in use is run on steel forms 3 and 4 which are set up on each side of the area on which a cement sidewalk is to be poured. These forms are held in posi-

2

tion by spikes 6 attached by means of clamps 7 and are set to a definite horizontal grade and laid parallel to each other.

The machine is supported in part by these steel forms 5 which act as rails for its front wheels, and includes a body 8 having a frame 9 with steerable wheels 10 at its front, and traction wheels 12 at its rear. The front wheels 10 are spaced to have a tread which is slightly less than the distance between the forms 3 and 4. On the outer 10 faces of these wheels there are steel rims which run on forms 3 and 4 as though they were rails. Forms 3 and 4 may be considered rails as herein concerned. The right hand rim 14 has two flanges and acts as a transverse guide for the machine, while the left hand rim 16 has an inner flange only and a sufficient width to provide tolerance for slight irregularities in the parallelism of the rails. The rear wheels 12 support most of the weight of the machine and have a tread width which permits them to run just within rails 3 and 4.

An engine 18 is positioned in the forepart of frame 9 and connected through gearing in gear box 21 and transmission box 31 and an automatic clutch to the rear wheels 12, to make the machine self-propelled. The front wheels 10 are steerable when the rims are 25 not running on rails 3 and 4 by means of a conventional steering wheel 22.

Beneath the front portion of the machine frame there is a rotary toothed earth scarifier and crusher 25 which is horizontally and transversely journaled on a sub-frame having right and left lateral members 26 hinged 30 to the forepart of the frame at their fore-ends and supported at the rear by links 27 attached to the lower arms 28 of bell cranks 29 which are controlled by hydraulic cylinders 30. In addition to the above mentioned supports there are shoes 32 which run on the top 35 of the steel forms and act as auxiliary supports and as height gauges to assure that the scarifier and crusher will operate on the grade desired.

Behind the scarifier and crusher 25 and approximately 40 in the center of the frame there are left and right intermediate windrow forming blades 36. These are supported beneath frame 9 on links 38 and bell cranks 39 at the front so that their forwardly positioned cutting edges 40 may be vertically adjusted by hydraulic cylinders 41 having piston rods connected to arms 37 of bell cranks 39. These blades are pivotally supported 45 at their rear ends by pins 42 which are provided on frame 9. The leading cutting edges of these blades extend rearwardly and inwardly so that all earth above grade including that loosened by the scarifier and crusher is moved centrally of the area between forms 3 and 4 into a windrow 44. They are partially supported, and their cutting height gauged by shoes 46 which run on 50 forms 3 and 4.

Just to the rear of driving wheels 12 there are inwardly and rearwardly angularly slanting blades 50 which have upwardly extending lateral flanges 51. These blades are angularly positioned and shaped so that they remove earth 60 which may be lodged adjacent to the inner faces of the steel forms, and work it towards the center of the rear levelling blade 60 of which they form a part. This central rear levelling blade is supported on a steel box-like structure 61 which acts in the manner of a scoop and has 65 a back 62 and sides 63. Blade 60 forms the bottom of this box and its front or cutting edge determines the final grade for the earth in the central portion of the area between the forms. The earth moved by blades 36 toward the center of the space between the forms 3 and 4, as a windrow, is scooped into box 61 by the forward movement of the machine 2. Also earth moved by angular blades 50 is received into box 61 in the same way.

3

All earth accumulating in box 61 is moved laterally in a chute 66 by a belt scraper 67.

Box 61 and its blade 60 as well as blades 50 are supported on lateral extension bars 70 which are hinged at their forward ends to the rear of frame 9. The vertical position of this box assembly is adjusted by a cable 72 which is wound on a drum 73 by manually operated crank 74, and controlled by non-reversible gearing in gear box 75. Its height is gauged by sliding shoes 76 at its rear, which also partially support its weight.

Oil under pressure to operate control cylinders 30 and 41 is furnished by a pump 80 driven by the engine 18 and is controlled by means of valves 82 and 83 to operate cylinders 30, and cylinders 41, respectively. A power take-off shaft 77 from the transmission box 21 drives the earth scarifier and crusher 25 through gear box 77a, shaft 79, gearing in box 79b, and chain 78 running over sprockets 78a, and 78b (Figure 3) on earth crusher and scarifier 25a, in the same direction as wheels 10 and 12 and turns at a speed of approximately 250 revolutions per minute, which gives its cutting teeth a much higher peripheral speed than that of wheels 12, at an operating speed of approximately 5 miles per hour.

A second power takeoff shaft 80 from the transmission gear box 31 drives the belt scraper 67 which operates in chute 66 which is at the rear of the machine.

Controls 84 and 85 are provided for independent operation of both the earth scarifier and crusher 25 and the scraper chain 67 power takeoff through clutches (not shown) within gear boxes 21 and 31, respectively. This control operates by means of hydraulic servo controls.

In use the grader vehicle 2 may be moved under its own power where desired. In doing this the rear grader box 61 is raised by hand controls; the windrow blades are raised by cylinders 41; and the rotary scarifier and crusher by cylinders 30. A sidewalk site is started by laying out the side lines and placing the edge forms 3 and 4 on the side lines securing them by stakes 6, and blocking them to grade. The grader 2 is then run between these forms with the rims 14 and 16 of the front wheels running on the forms as though they were rails, and the rear driving wheels 12 running just within the forms. The scarifier and crusher is then lowered to the grade desired and its lowermost position controlled by shoes 32. The windrow blades 36 are similarly positioned, and the blade 60 and blades 50 on box 61 are likewise positioned with their respective shoes riding on the tops of the edge forms. The scarifier and crusher 25 is then operated and the chain belt scraper 67 started while the grader 2 is driven forward. The scarifier and crusher then loosens the earth between the forms to grade, the windrow blades level the earth to grade and move the excess to the center windrow. The blade 60 scoops up this excess into box 61 and the chain scraper belt moves the excess earth through chute 66 to one side of the forms. The blades 50 resmooth the earth where the wheels 12 have left tracks. The earth between the forms is thereby graded smooth and is ready for the pour.

The foregoing description and explanation is considered to be exemplary, and many modifications and substitutions may be made which would, nevertheless remain within the spirit of the invention.

I claim:

1. A fine grader for leveling the earth between parallel steel sidewalk edge forms to grade consisting of a self-propelled vehicle having a body frame, a motor in said frame, steerable front wheels at the front of said frame having flanged rims running on said edge forms as rails, rear driving wheels journaled on the rear of said frame driven by said motor, said driving wheels running closely adjacent the inner faces of said forms, a transverse rotary earth scarifier and crusher loosening earth between said forms as said grader moves forward, said scarifier and crusher being supported on a horizontal shaft journaled on a support hinged at its front and to said body frame,

4

and disposed beneath the fore part of said body frame and being vertically adjustable as to cut by hydraulic means, rearwardly and inwardly extending windrow forming scraper blades hingedly supported beneath and on each side of said body frame and vertically adjustable by hydraulic means to vary their depth of cut, said blades leveling lateral portions of the earth between said rails and moving excess earth centrally of said rails in the form of a windrow as said grader moves forward, a scoop hinged on the rear of said body frame and vertically adjustable relative thereto, said scoop having a central leveling bottom blade, and laterally positioned forwardly and outwardly slanting blades positioned to the rear of said driving wheels, said blades smoothing earth over which said driving wheels pass and moving excess earth centrally toward said scoop, a laterally extending chute attached to one side of said scoop and a chain scraper driven by said motor moving earth from said scoop and depositing it laterally beyond said graded area.

2. A fine grader for leveling the earth between parallel steel sidewalk edge forms to grade consisting of a self-propelled vehicle having a body frame, a motor in said frame, steerable front wheels with flanged rims running on said edge form as rails to steer said vehicle, rear driving wheels driven by said motor, said wheels running on the earth closely adjacent the inner faces of said forms, a transverse rotary earth scarifier and crusher loosening earth between said forms as said grader moves forward, said scarifier and crusher being supported on a frame hinged at its front end to the body frame and disposed beneath the fore part of said body frame and vertically adjustable to vary the depth of cut of said scarifier by hydraulic means, shoes on said cutter frame running on said rails gauging the depth of cut of said earth scarifier and crusher, rearwardly and inwardly extending windrow forming scraper blades hingedly supported beneath and on each side of said body frame and vertically adjustable by hydraulic means to vary their depth of cut, shoes on said blades for partial support and gauging the depth of cut of said blades; said blades leveling lateral portions of the earth between said rails and moving excess earth centrally of said rails in the form of a windrow as said grader moves forward, a scoop hinged on the rear of said body frame and vertically adjustable relative thereto, said scoop having shoes running on said forms to afford partial support and gauge the vertical position of said scoop, a central leveling bottom blade on the front edge of said scoop, said blade being centrally disposed on said scoop to the rear of said driving wheels, laterally positioned forwardly and outwardly slanting blades on the lateral portions of said scoop, disposed to the rear of said driving wheels and levelling earth over which said wheels pass, a laterally extending chute on one side of said scoop, and a chain scraper driven by said motor moving earth from said scoop and chute and depositing it laterally beyond said graded area.

3. A fine grader for levelling earth between parallel sidewalk edge forms, consisting of a self-propelled vehicle having a body including a frame, an engine for propulsion thereof mounted in said frame, front wheels on the front portion of said frame having tires for travel on the earth and having lateral flanged rims running on said edge forms as rails and guiding said vehicle, and driving wheels operated by said engine and disposed on the rear of said frame to run within and adjacent to said edge forms for propulsion of said vehicle along the ground, a transverse vertically adjustable power driven rotary earth scarifier and crusher mounted on a frame below and hinged to the front of said vehicle body frame, and vertically adjustable thereon for loosening and crushing earth between said forms, angularly disposed windrow blades supported beneath said body frame moving earth between said forms inwardly from each form to a central windrow, a scoop having supporting members hinged to the rear of said vehicle frame including a centrally positioned bottom levelling blade receiving earth from between said forms

5

including the earth from said windrow, and lateral levelling blades extending forwardly and laterally from said levelling blade on said scoop and disposed to the rear of said driving wheels, said lateral leveling blades being adapted to smooth earth over which said driving wheels have passed and move it centrally of said forms in front of said scoop levelling blade, a chute extending laterally from said scoop, a chain scraper, operating in said scoop and chute driven by said engine, removing earth from said scoop and chute and depositing it laterally of said forms. 10

4. In a sidewalk fine grader, as described in claim 3, an operator's seat on said frame, and manually operated controlling means adjacent said seat for raising and lowering said scarifier and crusher, and said windrow forming blades, by hydraulic and mechanical means, and means for steering said vehicle when said front wheels are not running on said forms as rails. 15

5. A fine grader for levelling earth between parallel sidewalk edge forms, consisting of a self-propelled vehicle having a body including a frame, an engine for propulsion thereof mounted in said frame, front wheels on the front portion of said frame having tires for travel on the earth and having lateral flanged rims running on said edge forms as rails and guiding said vehicle, and driving wheels operated by said engine and disposed on the rear of said frame adapted to track within said edge forms, a trans-

6

verse rotary earth scarifier and crusher operating transversely of said frame and vertically adjustable therein relative to the ground on which said driving wheels run, angularly disposed windrow blades supported beneath said body frame rearward of said scarifier for moving earth loosened by said scarifier inwardly from said edge forms, a scoop hinged to the rear of said frame having a centrally positioned bottom leveling blade to receive earth centrally disposed between said edge forms, and laterally positioned levelling wing blades disposed on said scoop and adapted to move earth centrally from said edge forms rearwardly of said driving wheels and direct said earth toward the levelling blade of said scoop, a chute extending laterally from said scoop, and a chain scraper operating in said scoop and chute driven by said engine. 15

## References Cited in the file of this patent

## UNITED STATES PATENTS

20	1,849,754	Darrow	Mar. 15, 1932
	1,883,667	Flynn	Oct. 18, 1932
	1,920,319	Regenhardt	Aug. 1, 1933
	2,135,307	Keator	Nov. 1, 1938
	2,186,059	Baker	Jan. 9, 1940
25	2,416,401	Meisenburg	Feb. 25, 1947