No. 810,477. PATENTED JAN. 23, 1906.

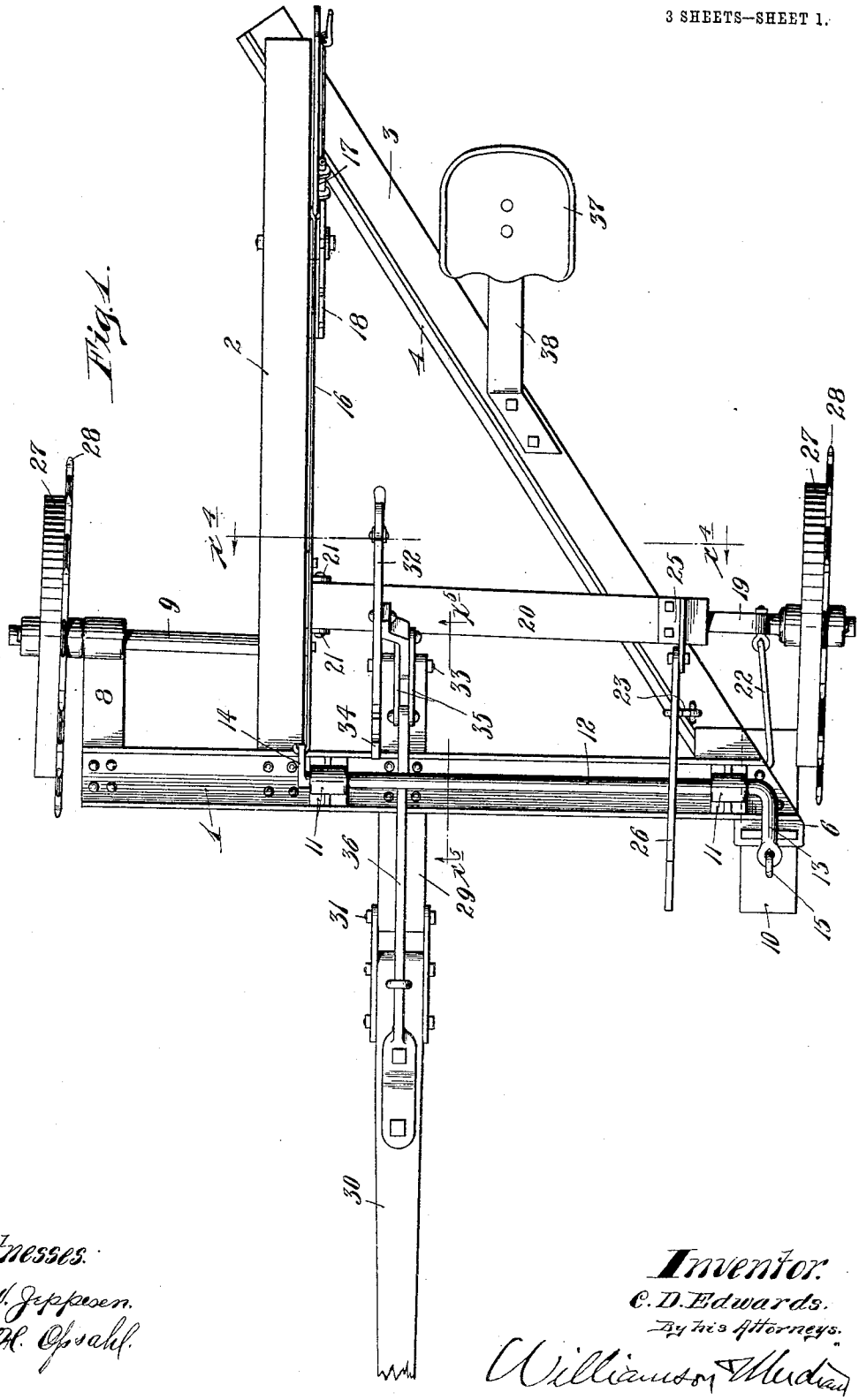
C. D. EDWARDS.

ROAD GRADER AND DITCHER.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
E. W. Jeppesen.
A. H. Ofsahl.

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3 SHEETS—SHEET 2.

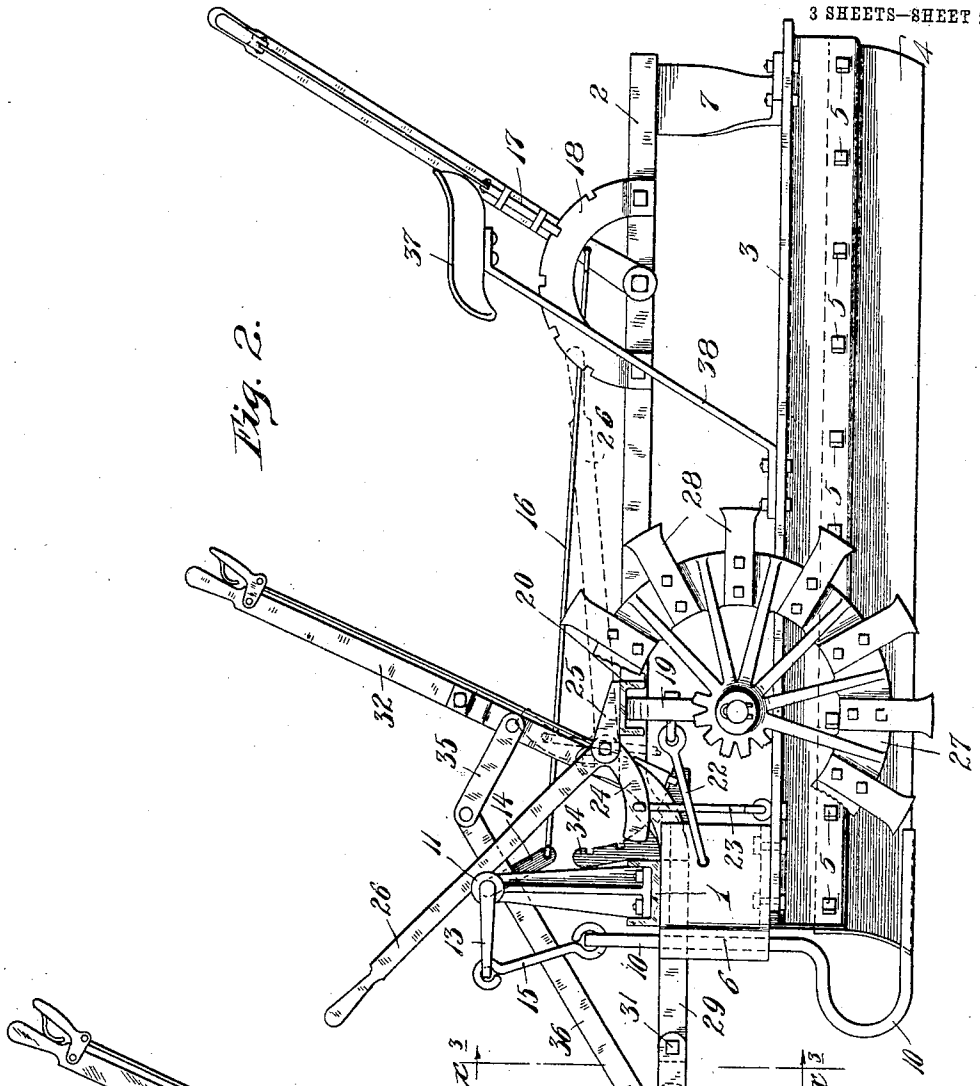

Fig. 2.

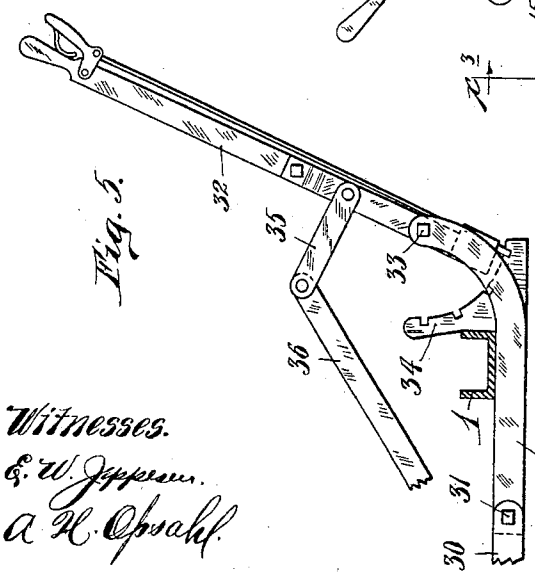

Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 3.

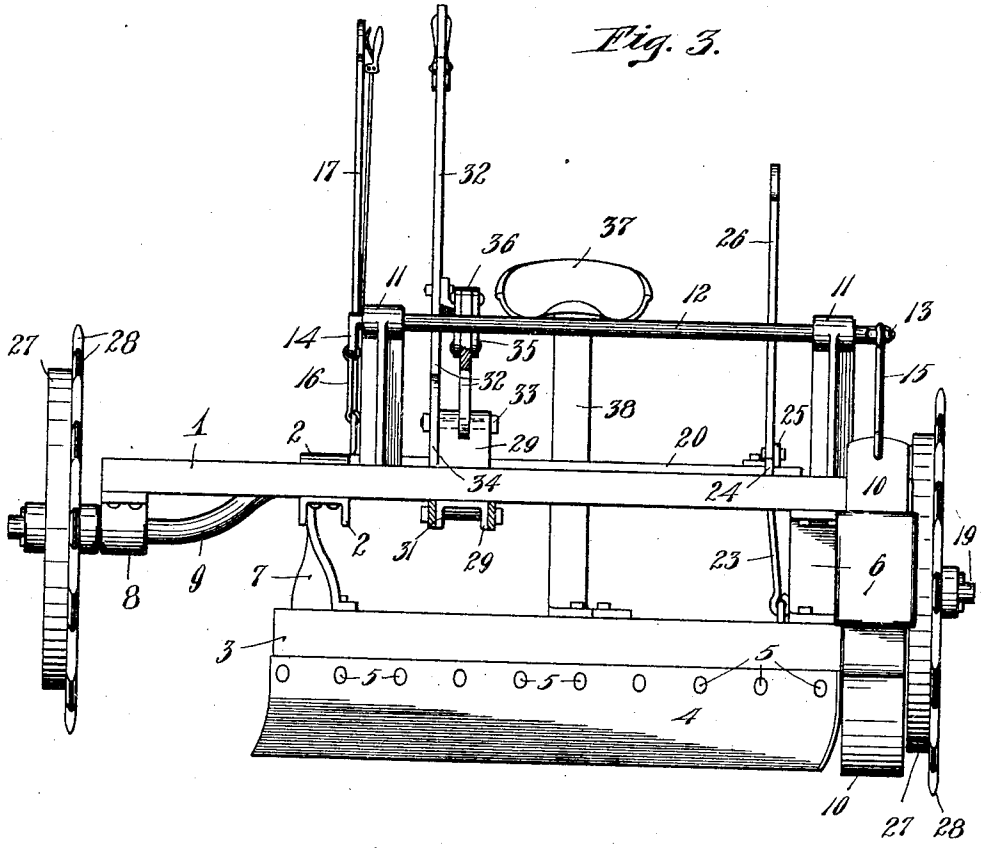
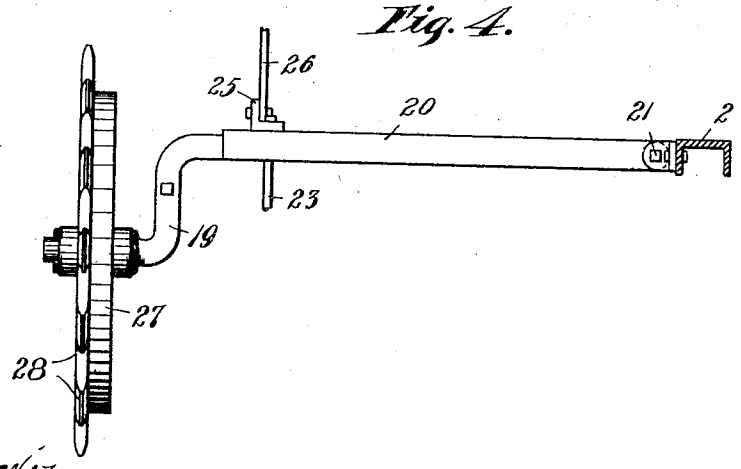


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES D. EDWARDS, OF ALBERT LEA, MINNESOTA.

ROAD GRADER AND DITCHER.

No. 810,477. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed June 24, 1905. Serial No. 266,865.

To all whom it may concern:

Be it known that I, CHARLES D. EDWARDS, a citizen of the United States, residing at Albert Lea, in the county of Freeborn and State of Minnesota, have invented certain new and useful Improvements in Road Graders and Ditchers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of machines usually designated as "road graders and ditchers," but which, as is well known, have a much more general utility than indicated by such designations, being equally serviceable for use in the construction of levees, windrows, and embankments and in leveling the surface of the ground and in doing similar work.

The objects of my invention, summarily stated, are as follows: to provide a light-draft grader which is capable of performing a large amount of work, which may be driven and easily handled by one person, which is adapted for use in all kinds of soil and under all conditions thereof, which is of simple construction and comparatively small cost, and which is strong, durable, and has no parts which are liable to get out of order.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The improved grader is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a plan view of the improved grader. Fig. 2 is a left side elevation of the grader, some parts being broken away. Fig. 3 is a front elevation of the grader, some parts being sectioned on the line x^3 x^3 of Fig. 2. Fig. 4 is a transverse vertical section taken on the line x^4 x^4 of Fig. 1, some parts being removed; and Fig. 5 is a vertical section taken on the line x^5 x^5 of Fig. 1.

The frame of the machine is preferably made up of three metal beams 1, 2, and 3, that are rigidly connected in the form of a right-angle triangle, the beam 1 being extended transversely of the machine at the front thereof, the beam 2 being extended from front to rear of the machine parallel to its line of movement, and the beam 3 being extended obliquely to the line of draft of the machine and at the proper angle to afford a support for a moldboard 4, which latter is, as shown, rigidly but detachably secured thereto by machine-screws 5. The obliquely-extended beam 3 extends in a lower plane than the beams 1 and 2. Hence a spacing-block 6 is interposed between and rigidly secured to the forward end of said beam 3 and the overlying end of the transverse beam 1, and for the same reason a spacing-bracket 7 is rigidly secured to the rear end of said beam 3 and to the overlying rear end of the beam 2. At its right-hand end the beam 1 projects beyond the beam 2, and to the extreme end thereof a rearwardly-projecting axle-supporting bracket 8 is rigidly secured. A short axle 9 is passed through the bracket 8, and at its inner end is rigidly secured the beam 2. The left-hand forward corner of the triangular frame of the machine is adapted to be supported by a shoe 10, the upturned portion of which is mounted to slide vertically through a suitable seat formed in the forwardly-projecting portion of the spacing-block 6.

Rigidly secured on the transverse beam 1 and projecting upward therefrom is a pair of bearings 11, in which is mounted a rock-shaft 12, having at its left-hand end a forwardly-projecting arm 13 and at its rear end a depending arm 14. The free end of the arm 13 is connected to the upper end of the shoe 10 by a link 15. The free end of the arm 14 is connected by a rod 16 to a latch-lever 17, pivoted to the beam 2 and arranged to coöperate with a notched latch-arch 18, rigidly secured to said beam 2.

A so-called "floating axle" 19 is hinged to the frame of the machine and preferably is rigidly secured directly to the free left-hand end of the heavy metal bar 20, the right-hand and inner end of which is hinged at 21 to the intermediate portion of the beam 2. A link 22 loosely connects the axle 19 to the spacing-block 6 and holds the same against movements from front to rear of the machine, while permitting the necessary vertical movements of said axle and the frame of the machine with respect to each other.

The forward end of the beam 3 is connected to the floating axle 19 by means of a toggle-acting connection made up of links 23 and 24, the former of which is pivotally connected to said beam 3 and the latter of which is, as shown, pivotally connected to the bearing-lug 25, rigidly secured on the axle extension-

bar 20. The link 24 constitutes a rigid foot extension of an operating-lever 26 and, as shown, is formed integral therewith.

Loosely journaled on each of the axles 9 and 19 is a "landside-wheel," so called, (indicated by the numeral 27.) These wheels 27 are provided with continuous peripheral faces and at one side are provided with radially-projecting thrust-resisting blades 28. The outer egdes of said blades 28 are sharpened, and the blades of the one wheel lie in a common plane, so that they make up a broken or interrupted peripheral flange. The novel features of construction involved in this improved wheel independent of its association with other parts is not herein claimed, for the reason that the same is the subject-matter of a companion application filed of even date herewith and entitled "Landside-wheels." For the purpose of this application it is, however, important to note that the thrust-resisting blades 28 are located on the pressure sides of the said wheels—that is, on those sides thereof that are pressed laterally against the soil when the machine is in operation. To illustrate, in the scraping action the pressure on the moldboard 4 would tend to force the entire machine toward the left with respect to a person following or riding on the machine. Hence the said blades 28 are applied on the left-hand sides of the said wheels. This arrangement causes the wheels to be self-clearing in their action—that is, causes the dirt to be forced laterally from the peripheries of the wheels instead of packing the same tightly in the angles between the peripheries of the wheels and the said blades, as would be the case under any other arrangements. It is also important to note that the said wheels are set to work in planes slightly at an angle to the direction of travel of the machine, so that they will cause the machine to tend to work toward the center of the road, and thus to offset or neutralize the tendency of the machine to crowd laterally in a reverse direction.

Rigidly secured to the intermediate portion of the beam 1, at a proper point for the application thereto of the pole, is a stub-bar 29, that projects both forward and rearward of said beam 1. The pole 30 is pivotally attached at 31 to the forward end of the bar 29. The rear end of the bar 29 is turned upward, and a latch-lever 32 is pivoted thereto at 33. The latch of this lever 32 coöperates with a notched lock-segment 34, which is rigidly secured directly to the rear end of the bar 29 and indirectly to the transverse beam 1. The intermediate portion of the lever 32 is connected by a short link 35 to the rear end of an upwardly-inclined arm 36, the forward end of which is rigidly secured to the rear end of the pole, so that it becomes, in fact, a rear-end extension of the pole.

The numeral 37 indicates a driver's seat secured by a spring-post 38 to a frame-beam 3. If desired, the shoe 10 may be supplanted in whole or in part by a wheel; but I have obtained the best results by the use of the flat-bottom shoe arranged as shown in the drawings.

Operation: When it is desired to throw the moldboard into an inoperative position, as is the case when the machine is to run idle from one place to another or when the machine is being turned around, the lever 26 is moved from the position indicated by full lines in Fig. 2 into the position indicated by dotted lines in said view. This arrangement of said lever throws the member 24 upward and backward beyond a dead-center, so that the toggle made up of the members 23 and 24 will then hold the moldboard 4, the shoe 10, and the triangular frame of the machine in an elevated position, and the weight thereof at the left-hand side of the machine will then be supported by the wheel 27, which is on the end of the floating axle 19. When the machine is to be thrown into action, the lever 26 is thrown forward, as shown by full lines in Fig. 2, and moldboard 4, shoe 10, and the frame of the machine will then be lowered. The depth of the cut which will be made by the forward portion of the moldboard 4 may be varied by vertical adjustments of the shoe 10, said adjustments of the shoe being accomplished by movements of the latch-lever 17 and intermediate connections already described. By movements of the latch-lever 32 the rear end of the pole extension 36 may be drawn nearer to or forced farther away from the rear end of the stub-bar 29, which is rigidly secured to the triangular frame of the machine and to which the said lever itself is pivoted. For instance, by forward movement of said lever 32 the said parts 36 and 29 will be forced farther apart, thereby throwing downward the rear end of the moldboard 4, while by a rearward movement of said lever 32 said parts 36 and 29 will be drawn closer together and the rear end of the moldboard 4 will be raised. By this means the moldboard may be set at any desired angle which may be required for the various kinds of work which it will be called upon to perform. Under such endwise-rocking movements of the moldboard 4 and the frame which carries it the weight of the said parts is taken on the shoe 10 and on the right-hand wheel 27 and the pivotal movement of the parts 36 and 29 takes place on the pivot 31. The weight of the driver on the seat 37 helps to hold the moldboard down to its work. The levers 17, 26, and 32, and especially said levers 17 and 32, stand within easy reach of the person on the seat 37. When the moldboard is drawn over the ground under the forward movement of the machine, the wheel on the floating axle 19 maintains engagement with the ground regardless of all irregularities in the road traveled by the said

wheel and by the said moldboard. By virtue of its pivotal connection 21, which permits free vertical movements of said axle 19, the said wheel mounted thereon is free to drop quickly into a rut or depression or to run over a knoll or sudden rise in the ground without at any time causing its blades 28 to lose contact with ground. The two wheels, with their blades, absolutely prevent sidewise crowding of the machine and positively hold the moldboard to its work, and they also hold the machine against horizontal oscillatory movements or side shuck.

In the specification and in certain of the claims one of the axles is referred to as "fixed" and as projecting from one side of the machine-frame, by which is meant that the said axle is held to move with the said frame irrespective of whether or not it is mounted to rotate with respect thereto.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a grading-machine, the combination with a frame and a moldboard applied thereto, of a fixed axle projecting from one side of said frame, a floating axle pivotally connected to said frame and projecting at the other side thereof, wheels on said axle, and connection between said floating axle and said frame, whereby the weight of that side of the frame may be thrown onto the wheel of said floating axle, at will, substantially as described.

2. The combination with a triangular frame and a moldboard applied to the oblique side thereof, of a fixed axle projecting from one side of said frame, a floating axle hinged to said frame and projecting at the other side thereof, and flanged ground-wheels on said axles, substantially as described.

3. The combination with a triangular frame and a moldboard applied to the oblique side thereof, of a shoe applied at one corner portion of said frame, means for raising and lowering the frame of said shoe, a fixed axle projecting at the other side of said frame, a floating axle hinged to said frame and projecting at the landside thereof, wheels mounted on said axles, and a connection between said frame and floating axle for throwing the weight of that side of the frame onto the wheel of said floating axle, substantially as described.

4. The combination with a triangular frame and a moldboard applied to the oblique side thereof, of a pole hinged to the forward portion of said frame, and means for raising and lowering the rear portion of said frame, to vary the position of said moldboard with respect to a horizontal plane, substantially as described.

5. The combination with a triangular frame and a moldboard applied to the oblique side thereof, of a pole pivoted to the forward portion of said frame, a shoe and a wheel supporting the forward portion of said frame, and a connection between said frame and said pole, for raising and lowering the rear portion of said frame and moldboard, with a rocking action on said shoe and wheel, substantially as described.

6. A grading-machine having a wheel arranged to resist side thrusts and mounted to move freely upward and downward with respect to its moldboard or scraper and without lifting the said moldboard or scraper from the ground, substantially as described.

7. In a grading-machine, the combination with a frame having a moldboard or scraper, of an axle extending across said moldboard, hinged at one end to said frame, and a wheel on the other end of said axle provided with projecting plates arranged to resist side thrusts, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES D. EDWARDS.

Witnesses:
C. B. KELLAR,
B. B. SKINNER.