No. 806,431. PATENTED DEC. 5, 1905.

R. RUSSELL.

GRADING AND DITCHING MACHINE.

APPLICATION FILED JULY 25, 1904.

4 SHEETS—SHEET 1.

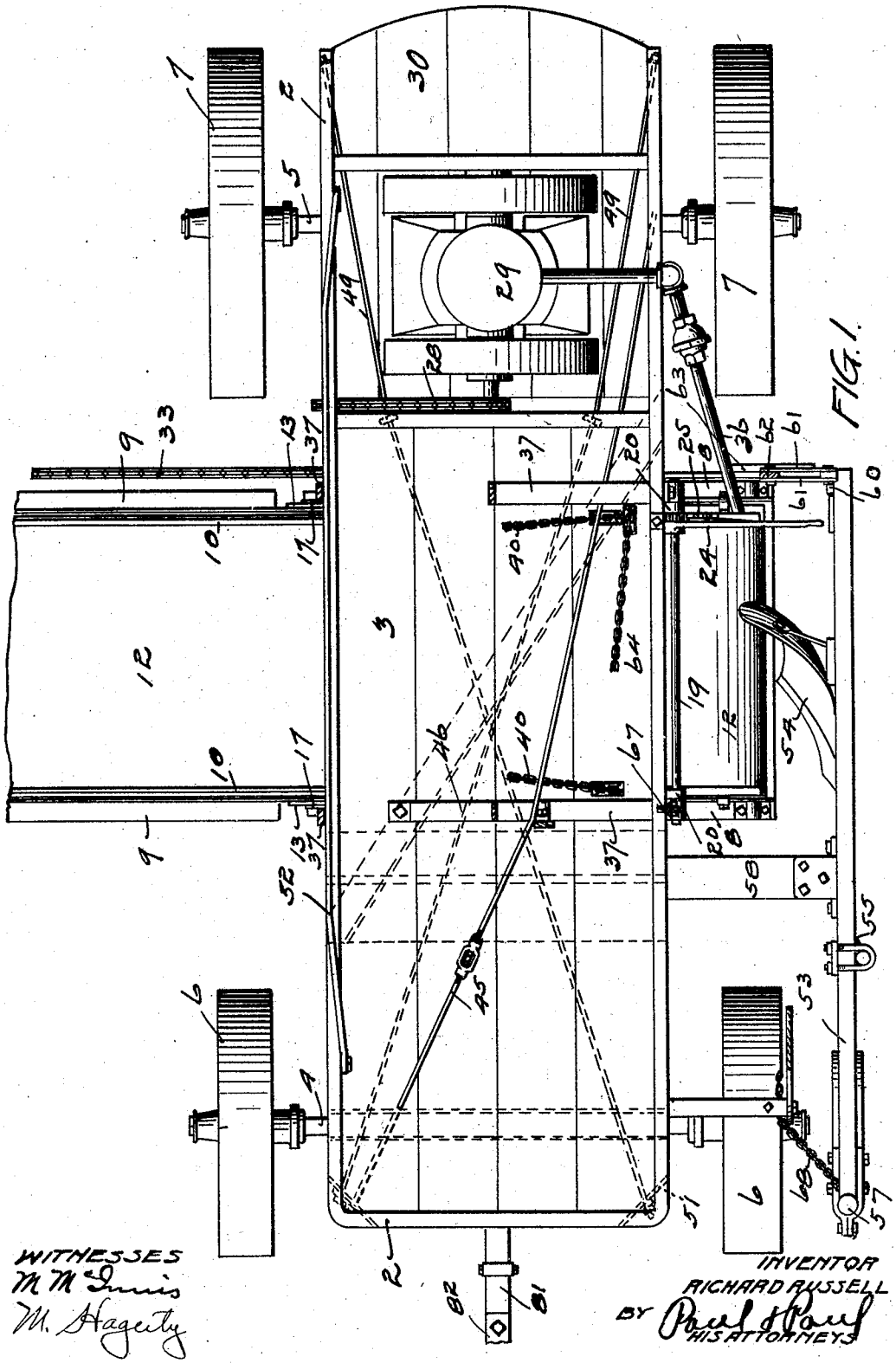


FIG. 1.

WITNESSES
M M Innis
M. Hagerty

INVENTOR
RICHARD RUSSELL
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HIS ATTORNEYS

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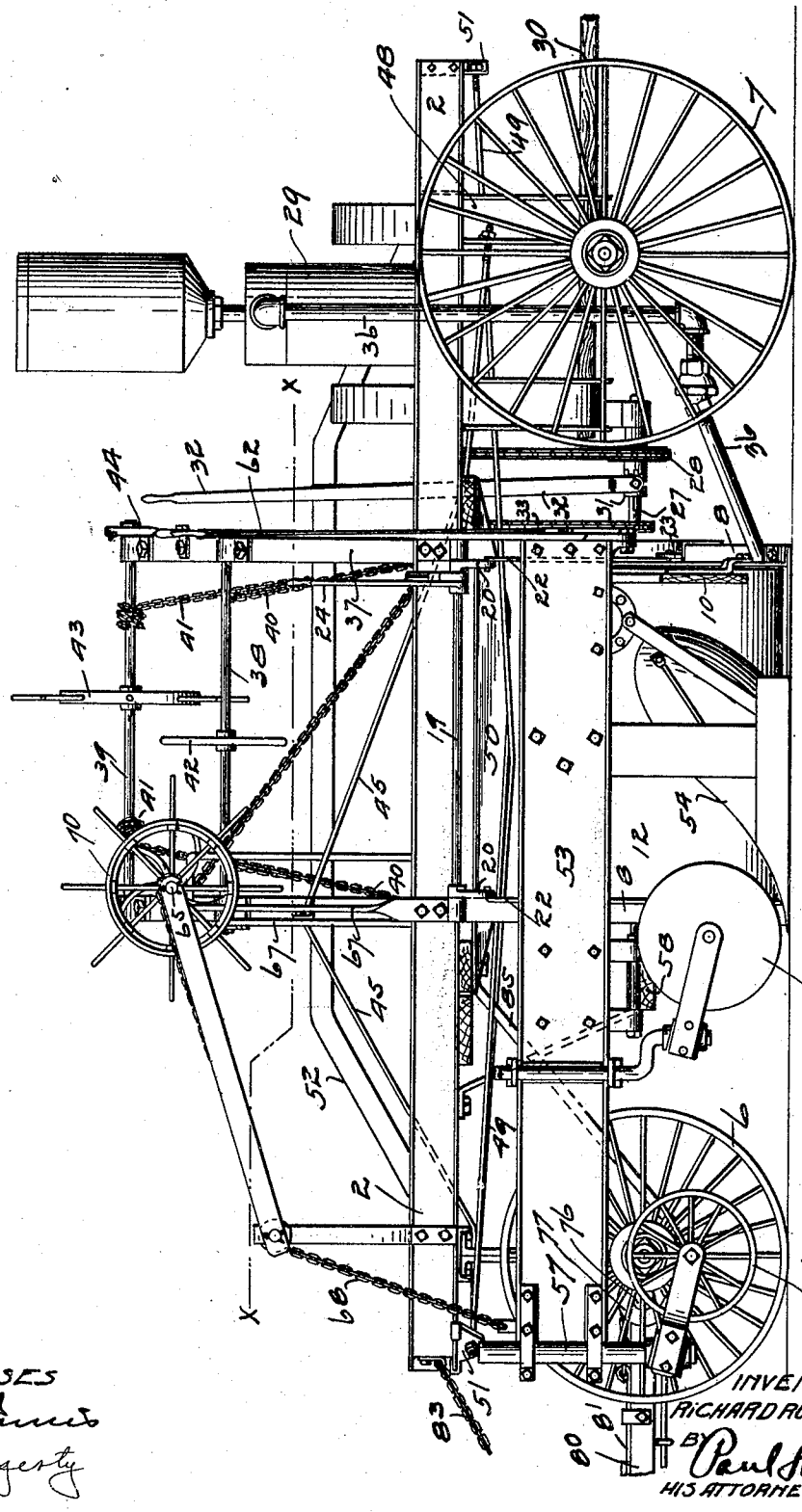


FIG. 2.

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4 SHEETS—SHEET 3.

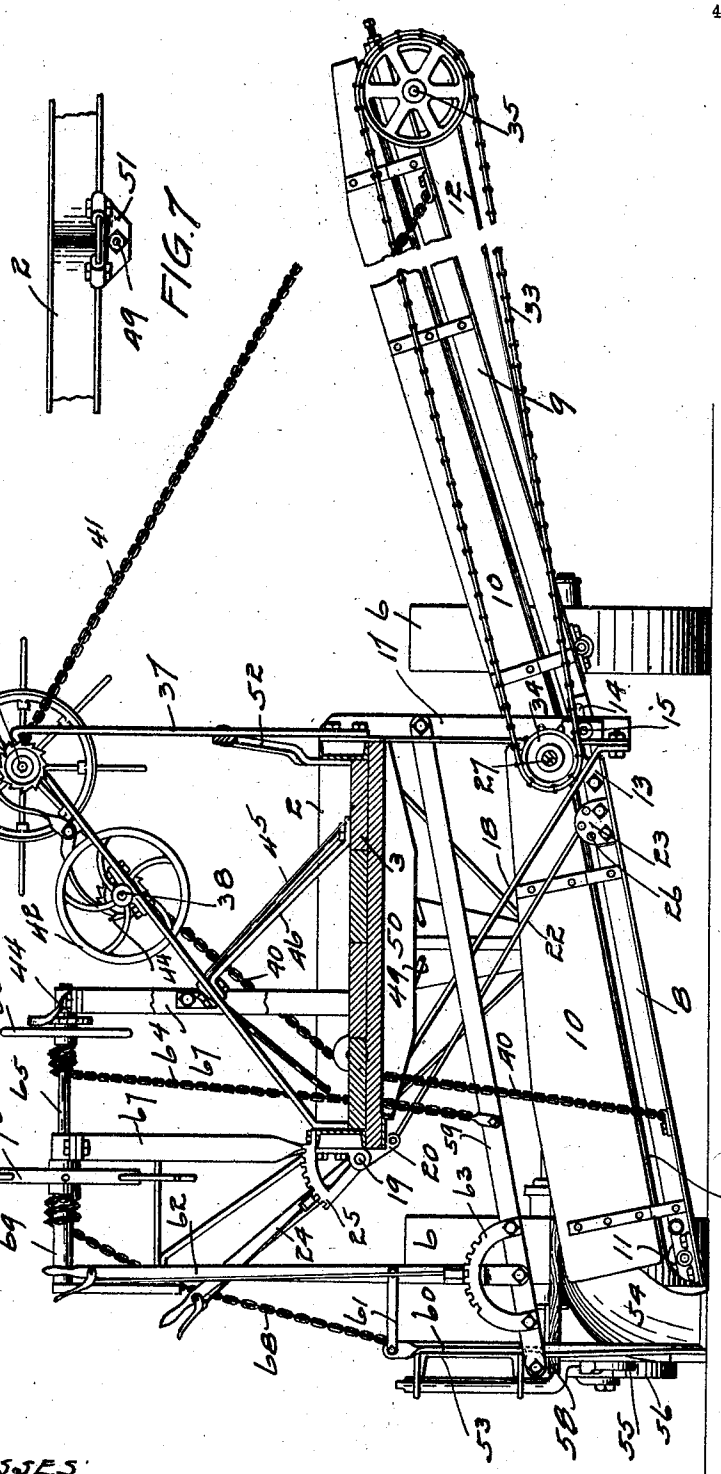


FIG. 3



FIG. 1

WITNESSES:
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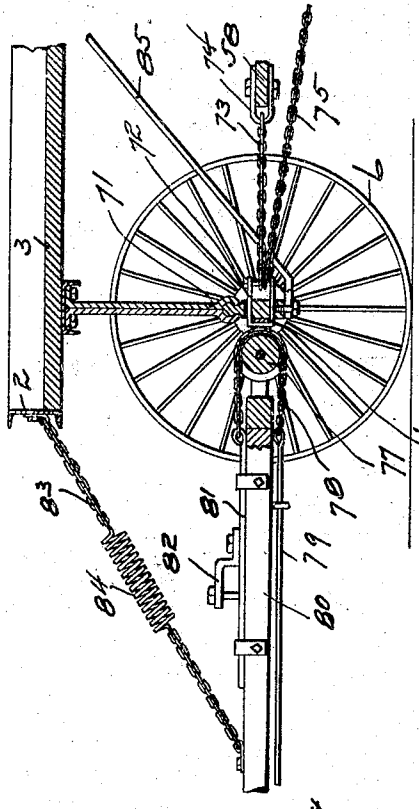


FIG. 5.

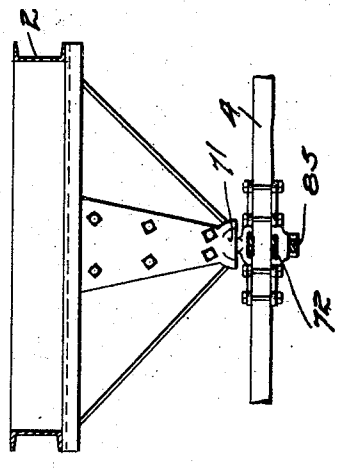


FIG. 6.

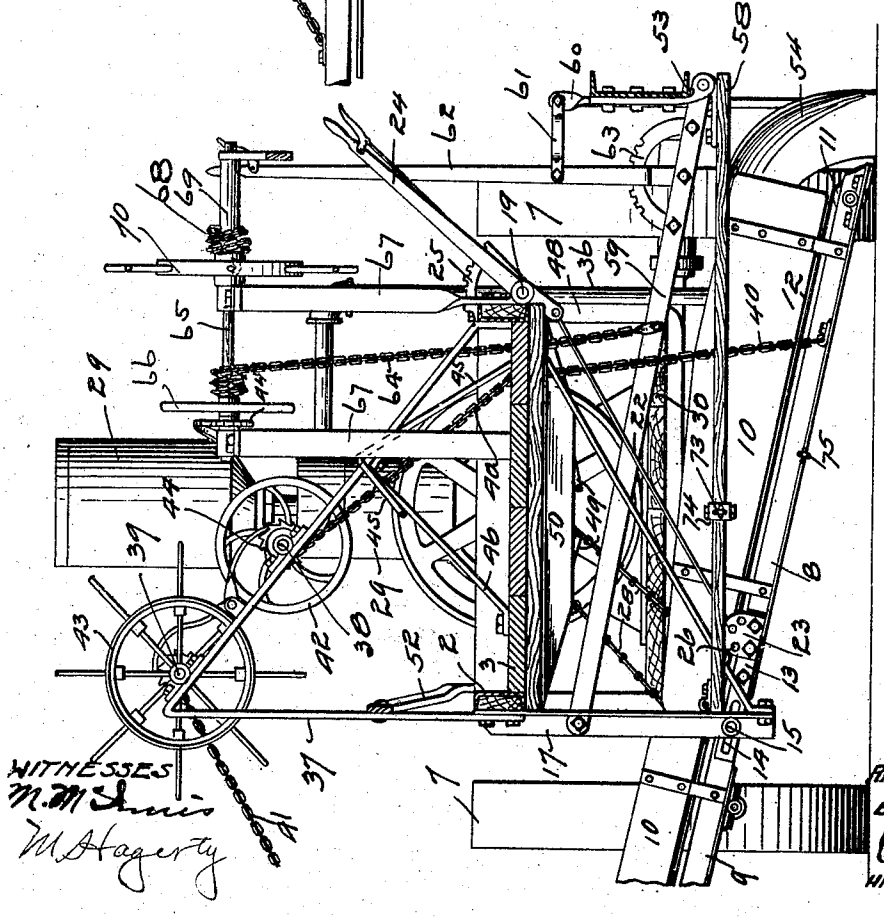


FIG. 4.

WITNESSES

M. M. Lewis

M. Hagerty

INVENTOR

RICHARD RUSSELL

BY Paul & Paul

HIS ATTORNEYS

# UNITED STATES PATENT OFFICE.

RICHARD RUSSELL, OF STEPHEN, MINNESOTA.

## GRADING AND DITCHING MACHINE.

No. 806,431. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed July 25, 1904. Serial No. 217,915.

*To all whom it may concern:*

Be it known that I, RICHARD RUSSELL, of Stephen, Marshall county, Minnesota, have invented certain new and useful Improvements in Ditching and Grading Machines, of which the following is a specification.

My invention relates to grading-machines of the type employing a plow and a side-delivery conveyer operating in connection therewith.

The object of my invention is to provide an easy-running machine having the motor-power for the operating mechanism carried by the machine-frame.

A further object is to provide a machine which can be easily and quickly adjusted to adapt it to the character of the soil where it is used.

A further object is to provide a ditching and grading machine of comparatively simple construction and one that will be very strong and durable.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a horizontal section on the line *x x* of Fig. 2. Fig. 2 is a side elevation. Fig. 3 is a vertical transverse section looking toward the front end of the machine. Fig. 4 is a similar view looking toward the rear end of the machine. Fig. 5 is a detail sectional view showing an evener mechanism connected with the draft-pole. Fig. 6 is a detail of the mechanism supporting the front end of the machine-frame on the forward axle. Fig. 7 is a detail of the means for attaching the ends of the truss-rods to the machine-frame.

In the drawings, 2 represents a frame, preferably of channel-bars on account of their strength and rigidity, provided with a platform 3 and forward and rear axles 4 and 5, having wheels 6 and 7. Beneath the frame and arranged transversely thereof is a carrier-frame composed of two sections—an inner section 8 and an outer section 9—both provided with side boards 10 and with rollers 11, over which a carrier-belt 12 passes. The inner section is provided at one end with straps 13, that have slots 14, through which a shaft 15 passes, said shaft forming the pivot of the outer carrier-section and being provided with an antifriction-roller over which the carrier-belt passes. The shaft 15 is supported in hangers 17, provided with braces 18. The slots in the straps 13 allow the inner carrier-section to be moved lengthwise for the purpose of loosening the belt or taking up the slack therein, and to accomplish such movement I prefer to provide a shaft 19, having arms 20 connected by rods 22 with plates 23, that are secured to the sides of the carrier-section. A lever 24, mounted on the shaft 19 and operating over a toothed quadrant 25, allows the operator to easily and quickly adjust the inner section of the carrier-frame. To regulate the movement of the carrier-frame, I prefer to provide a series of holes 26 in the plates 23, wherein the rods 22 are adjustable, the operator slipping the ends of the rods out of one hole and adjusting them in others to regulate the travel of the frame for a certain movement of the operating-lever.

A shaft 27 is suspended below the machine-frame, driven by a belt 28 from an engine 29, preferably of the gasolene type, arranged upon a platform 30, that rests upon the rear axle below the machine-frame. A clutch mechanism 31, operated by a lever 32, is provided for the purpose of connecting or disconnecting the operating mechanism with the engine. A belt 33 connects a sprocket 34 on the shaft 27 with a shaft 35, around which the outer portion of the carrier-belt passes and from which power is derived to drive the said belt. I prefer to support the engine below the level of the machine-frame and comparatively near the ground for the purpose of making the machine more stable and with less tendency to tilt or topple over in passing over rough ground. The exhaust-pipe 36 from the engine is extended down and carried in between the upper and lower sections of the carrier-belt, and the discharge from the exhaust serves to keep the dirt from accumulating between the sections of the belt, being carried around the roller 11. This manner of utilizing the exhaust I regard as a very important feature of my invention, as considerable annoyance and delay are experienced by the operators of these machines through the accumulation of dirt between the belt-rollers, causing the belt to run hard and sometimes stopping it altogether.

Upon the machine-frame I provide brackets 37, supporting shafts 38 and 39, that are connected by chains 40 and 41 with the inner and outer sections of the carrier-frame. Operating-wheels 42 and 43 are provided on said shafts, having suitable ratchet mechanisms

44, and by manipulating these wheels the operator can raise or lower the receiving and the discharge end of the carrier-belt and adapt it for the character of the ground where the machine is used.

Considerable difficulty is frequently experienced in operating machines of this kind through the weight of the outer carrier-section tilting the machine-frame and throwing the platform out of a horizontal position and making it difficult to handle the plow and operate it with the best results. I therefore provide a truss-rod 45, that extends from the forward right-hand corner of the machine-frame back over a brace 46 to the rear left-hand corner of the machine near the engine, where it is secured to one of the hangers 48 that supports the engine-platform 30. This truss-rod serves to transmit the weight of the outer carrier-section from the forward right-hand corner of the machine, which is usually subjected to a very heavy strain, to the rear left-hand corner, where the weight of the engine will aid materially in holding the platform to its proper level. The strain of the truss-rod 45 on the machine-frame is counteracted very largely by means of truss-rods 49, which extend diagonally beneath the frame from one corner to another under and across each other just beneath a casting 50, that is bolted to the under side of the machine-frame near the middle thereof. The ends of the rods 49 are secured to castings 51, that are bolted to the flanges of the channel-bars, of which the frame is composed, as shown in Fig. 7.

A brace-bar 52 extends lengthwise of the machine-frame and is secured to the brackets 37 and serves to brace and strengthen them when subjected to the strain of the loaded carrier-frame.

On the left-hand side of the machine I provide a plow-beam 53, carrying a plow 54 and a wheel-colter 55 and an ordinary guiding-wheel 56, supported on a pivot 57. A bar 58 is pivotally connected at one end to one of the hangers 17 and at its other end has a pivotal connection with the beam 53, limiting the lateral movement of said beam and allowing it to be tilted back and forth to vary the vertical angle of the plow with respect to the soil. A bar 59 is pivoted at one end to one of the hangers and at its other end is pivoted to a strap 60, secured to the plow-beam and pivotally connected at its upper end by a link 61 with a lever 62, pivoted on the bar 59 and arranged to operate over a quadrant 63. The movement of this lever back and forth over the quadrant will serve to tilt the plow-beam and vary the angle of the plow in the ground. A chain 64 connects a bar 59 with the shaft 65, having an operating-wheel 66 and mounted in standards 67, and a similar chain 68 connects the forward end of the plow-beam with a sleeve 69, loosely mounted on the shaft 65 and having an operating-wheel 70.

The forward end of the frame has a bearing 71 on the forward axle, and a clevis 72, mounted on said axle, is connected by a chain 73 with a similar clevis 74 on the cross-bar 58, and a chain 75 connects the said clevises with the inner carrier-section 8. A clevis 76 passes through the clevis 72 and carries a pulley 77, over which a chain 78 passes to a rod 79 on the under side of a pole 80 and to a sliding bar 81 on the upper side of said pole. A draft connection 82 is provided on the bar 81, to which the rear team is connected, while the leaders are attached to the rod 79. The chain 78 moves back and forth over the pulley, acting as an evener to distribute the strain between the draft-beams. A chain 83, having a spring 84, connects the forward end of the machine-frame with the pole. A bracing-strap 85 extends from the under side of the forward axle near the clevis 72 to the middle portion of the machine-platform.

The operation of the machine is as follows: The plow having been adjusted at the proper height from the ground and the proper angle with respect to the work, the carrier-belt is set in motion and the team started to move the machine over the ground to be ditched or graded. The exhaust-blast from the engine will prevent the accumulation of dirt between the upper and lower sections of the carrier-belt, and the connection of the plow cross-bars and the carrier-frame with the forward axle will insure the plow and carrier being held in their proper position while at work. The weight of the excavated material on the outer end of the carrier will be transmitted through the overhead truss-rods to the rear end of the machine, where the weight of the engine will serve to hold the machine-frame at the proper level. At any time while at work the carrier-frame and plow may be readjusted to suit the condition of the soil where the machine is used.

I claim as my invention—

1. The combination, with a wheeled frame, of a side-delivery carrier supported beneath the same, a plow arranged near the receiving end of said carrier, a gas-engine operatively connected with said carrier, and a pipe leading from the exhaust of said engine and terminating between the upper and lower sections of said carrier near its receiving end, for the purpose specified.

2. The combination, with a wheeled frame, of a side-delivery carrier arranged beneath the same, a plow, a gas-engine supported above the rear axle, and a truss-rod extending diagonally from the forward end of said frame to the rear end of the same near said engine and being arched over the middle portion of said frame, for the purpose specified.

3. The combination, with a wheeled frame, of a side-delivery carrier, a plow near the receiving side of said carrier, an arched truss-rod extending diagonally of said frame above

the same, truss-rods connecting the diagonally opposite corners of said frame on the under side thereof, and a bearing interposed between said under truss-rods near their point of intersection and said frame.

4. In a machine of the class described, the combination, with a channel-bar frame having suitable axles and supporting-wheels, of truss-rods extending diagonally of said frame beneath the same, and castings engaging the flanges of said channel-bars at the corners of the frame and to which castings the ends of said truss-rods are secured, substantially as described.

5. The combination, with a frame having forward and rear axles and wheels therefor, of a side-delivery carrier operating beneath said frame, a plow, a platform resting upon the rear axle below said frame, hangers whereon said platform is suspended, and a gas-engine resting upon said platform and having operative connections with said carrier.

6. The combination, with a wheeled frame and the hangers depending therefrom, of a carrier-frame composed of two sections the outer being hinged on said hangers and the inner section having a sliding support thereon, a belt operating over said sections, a rock-shaft having arms, rods connecting said arms with said inner section, and an operating-lever for said shaft.

7. The combination, of a wheeled frame and a side-delivery carrier composed of an inner and an outer section, hangers depending from said frame, a shaft mounted in said hangers and whereon the outer carrier-section is hinged, straps secured to said inner section and having slots to receive said shaft and slide thereon, a carrier-belt operating over said sections, and mechanism for moving said inner section lengthwise to loosen or tighten the belt.

8. The combination, with a wheeled frame, of a side-delivery carrier, a hanger depending from said frame, a plow having a suitable beam, bars pivotally connecting said plow-beam and said hanger, and an operating-lever mounted on said bars and having a pivotal connection with said beam, for the purpose specified.

9. The combination, with a wheeled frame, of a side-delivery carrier, bars 58 and 59 pivotally connecting the plow-beam with said frame, a lever 62 pivoted on said bar 59, a strap 60 extending from the under side of said beam to a point above the same, and a link connecting said strap with said lever.

10. In a grading-machine, the combination, with a suitable frame, of a carrier, a gas-engine mounted on said frame, and a pipe leading from the exhaust of said engine and terminating between the upper and lower sections of said carrier, for the purpose specified.

11. The combination, with a frame, of a side-delivery carrier arranged to extend laterally beyond the frame on one side, means for weighting down one end of said frame to counterbalance the weight of the outer end of the carrier, and means for distributing throughout said frame the strain arising from the weight of the outer end of the carrier, substantially as described.

12. The combination, with a wheeled frame, of a side-delivery carrier arranged to extend laterally beyond said frame on one side, an engine supported on the rear of said frame and connected with said carrier, and a truss-rod connecting the forward corner of said frame contiguous to said carrier with the rear corner on the opposite side of the machine, substantially as described.

13. The combination, with a frame having suitable wheels, of a side-delivery carrier arranged to extend laterally beyond said frame on one side, and a truss-rod arranged to distribute over said frame the strain arising from the weight of the outer end of the carrier.

14. The combination, with a frame, of a side-delivery carrier, a truss-rod connecting the diagonally opposite corners of said frame on the upper side, and truss-rods connecting the diagonally opposite corners of said frame on the under side, substantially as described.

15. The combination, with a frame, of a side-delivery carrier, castings mounted on said frame at the corners thereof and truss-rods provided on the under side of said frame and having their ends attached to said castings and crossing one another at a point near the middle of said frame, substantially as described.

16. The combination, with a frame, of a side-delivery carrier, a plow, a platform supported above the rear axle, and a gas-engine resting upon said platform and operatively connected with said carrier, substantially as described.

17. The combination, with a frame, of a side-delivery carrier composed of two sections with a sliding connection between them, a rock-shaft mounted in said frame, means connecting said rock-shaft with said inner sliding section, an operating-lever for said shaft, and a plow arranged near the receiving side of said carrier.

18. The combination, with a wheeled frame, of a side-delivery carrier, a plow and beam at one end of said carrier, hangers depending from said frame on the opposite side thereof from said plow, bars pivotally connected at one end to said hangers and at the other end to said beam, and means for tilting said beam and plow.

19. The combination, with a wheeled frame, of a side-delivery carrier provided beneath the same, a plow near the receiving end of said carrier, bars pivotally connecting said plow with said frame, chains connected with said plow and one of said bars, and means for winding up said chains to raise or lower said bars and vary the adjustment of said plow.

20. In a grading-machine, the combination, with a frame, of a side-delivery carrier and plow, brackets 37 mounted on said frame, an arched bar 52 extending lengthwise of said frame and connecting said brackets, shafts 38 and 39 mounted in bearings on said brackets, and chains connecting said shafts and the receiving and discharge ends respectively of said carrier.

21. The combination, with a wheeled frame, of a side-delivery carrier suspended beneath the same, a plow-beam and a plow, a bar having a pivotal connection with said frame and with said beam, standards mounted on said frame, a shaft carried thereby, chains connecting said shaft with bar and with the forward end of said plow-beam, and means for winding up or unwinding said chains independently of one another.

22. The combination, with a wheeled frame, of a side-delivery carrier composed of pivotally-connected sections, triangular brackets mounted on said frame transversely thereof, a brace-bar extending lengthwise of said frame and connecting said brackets, shafts supported in bearings on said brackets one above the level of the other and extending lengthwise of said frame, and flexible connections between said shafts and the hinged sections respectively of said carrier, substantially as described.

23. The combination, with an axle, of a clevis connection therewith and provided with an antifriction-wheel, a draft-pole, a sliding bar thereon having a draft connection for attachment with the rear team, a draft-rod on the opposite side of the pole from said sliding bar for attachment to the leaders, and a flexible connection passing around said wheel and attached to said bar and said rod, substantially as described.

24. The combination, with a frame, of a channel cross-bar secured thereon, a forward axle and wheels, a standard resting at its lower end upon said axle and bolted at its upper end to said frame between the flanges of said channel-bar, and brace-rods connecting the lower end of said standard with said frame, substantially as described.

25. The combination, with a wheeled frame provided with a suitable platform, of a side-delivery carrier supported beneath said platform, a plow, mechanism mounted on said platform for raising or lowering said carrier and said plow, and a motor operatively connected with said carrier and supported below the level of said platform, for the purpose specified.

26. The combination, with a frame, of a side-delivery carrier, a plow, a platform supported below the level of said frame, and a motor mounted on said platform and operatively connected with said carrier.

In witness whereof I have hereunto set my hand this 7th day of July, 1904.

RICHARD RUSSELL.

In presence of—
M. HAGERTY,
RICHARD PAUL.