Nov. 24, 1925.

1,562,842

H. P. MILNE ET AL.

SNOW PLOW AND LOADER

Filed July 5, 1923

5 Sheets--Sheet 1

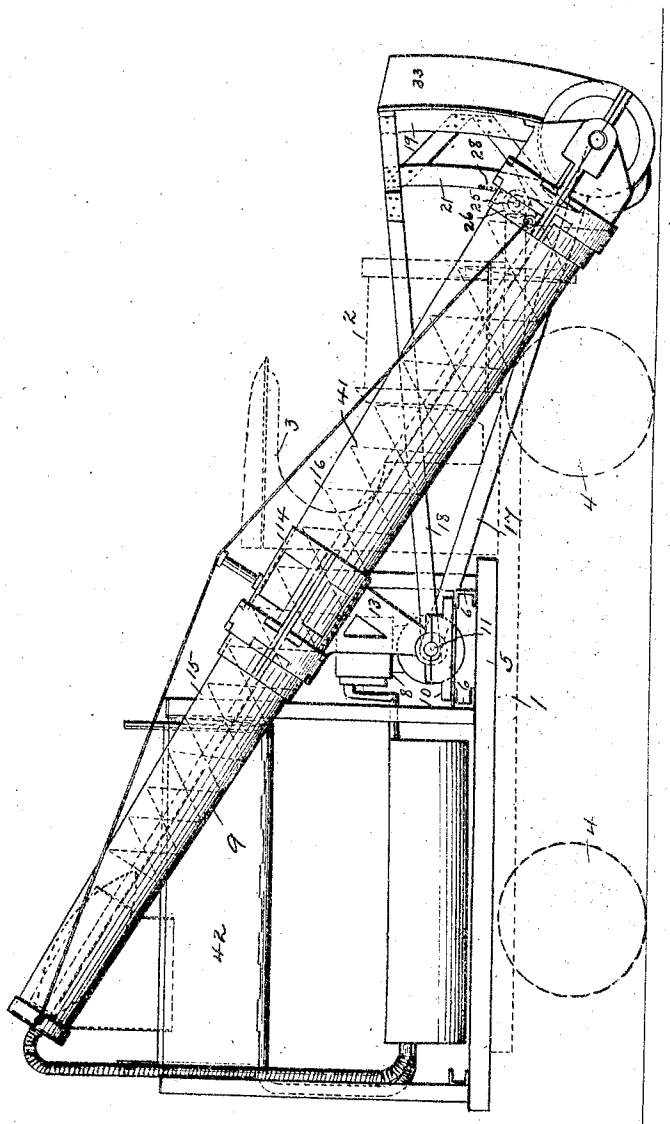


Fig. 1.

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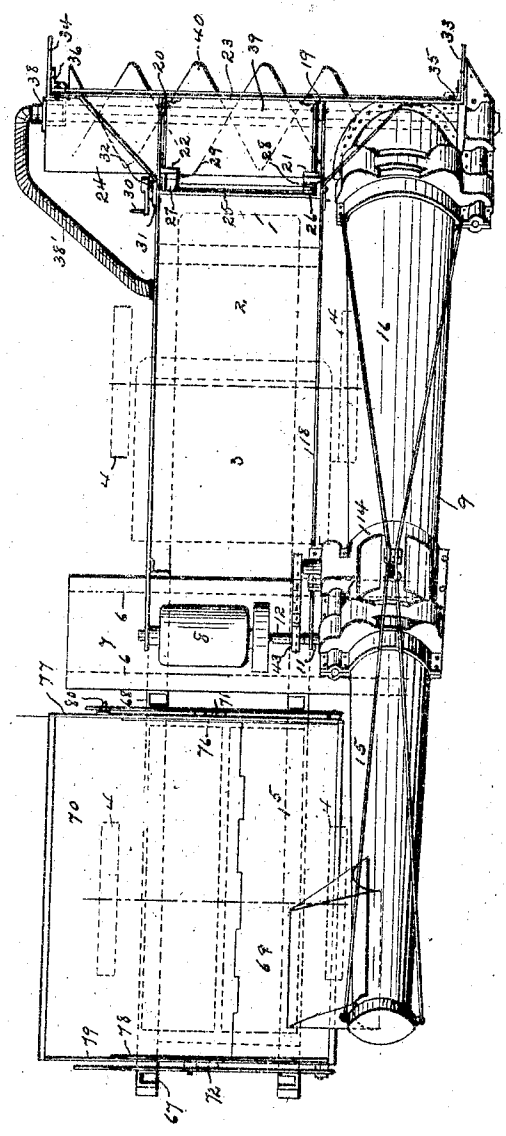


Fig. 2.

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Fig. 3.

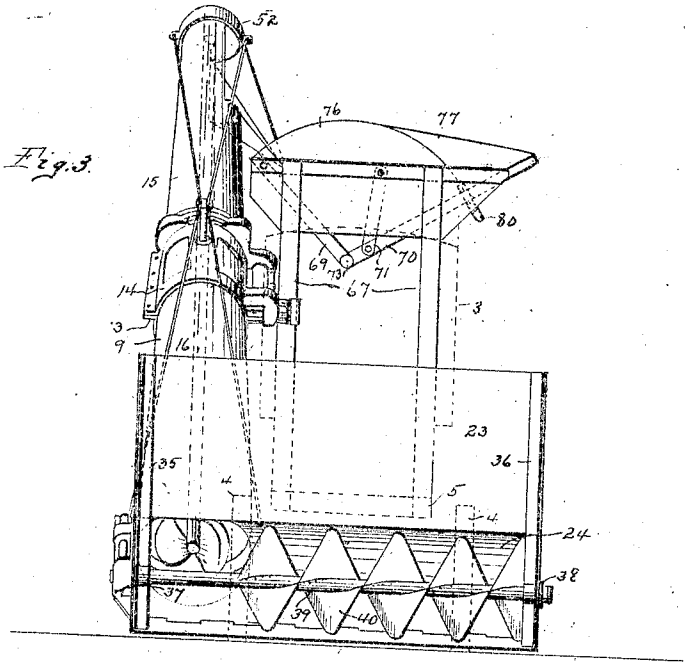
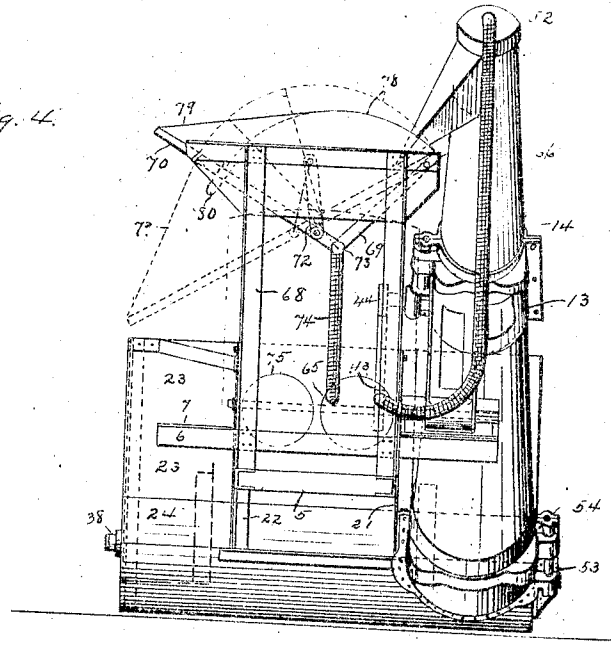


Fig. 4.



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SNOW PLOW AND LOADER

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Fig. 6

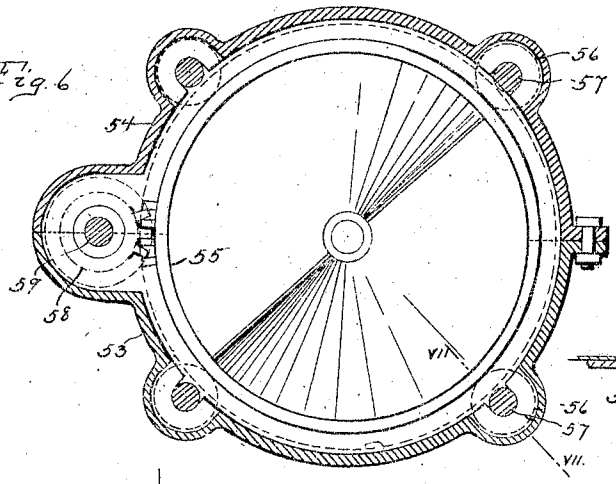


Fig. 7

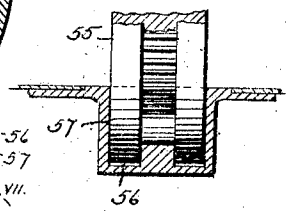
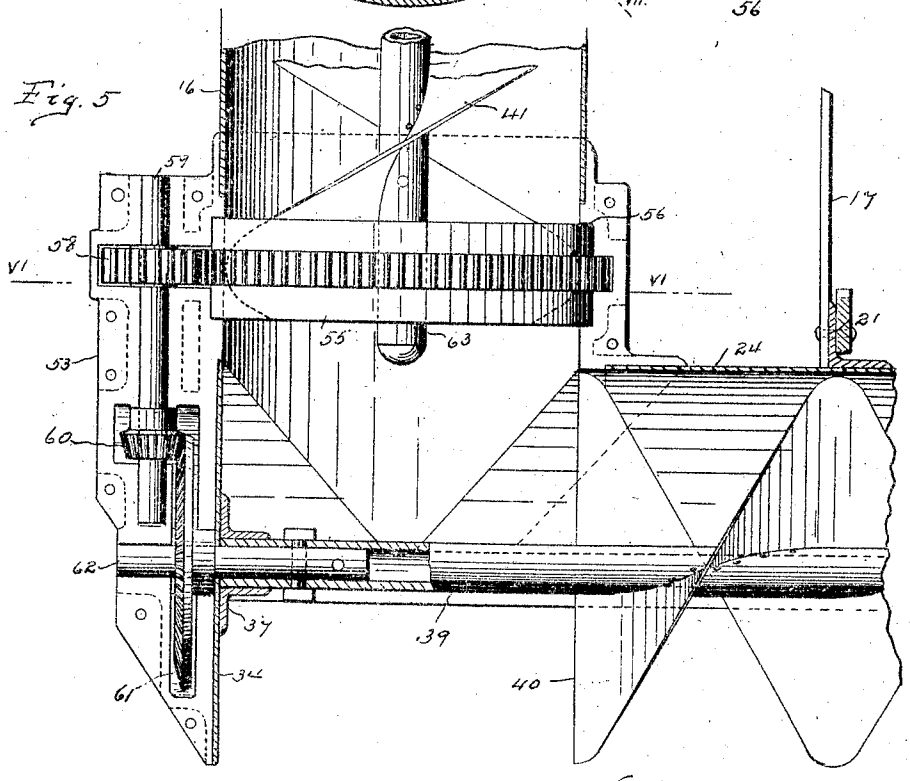


Fig. 5



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Nov. 24, 1925. 1,562,842

H. P. MILNE ET AL

SNOW PLOW AND LOADER

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Fig. 8

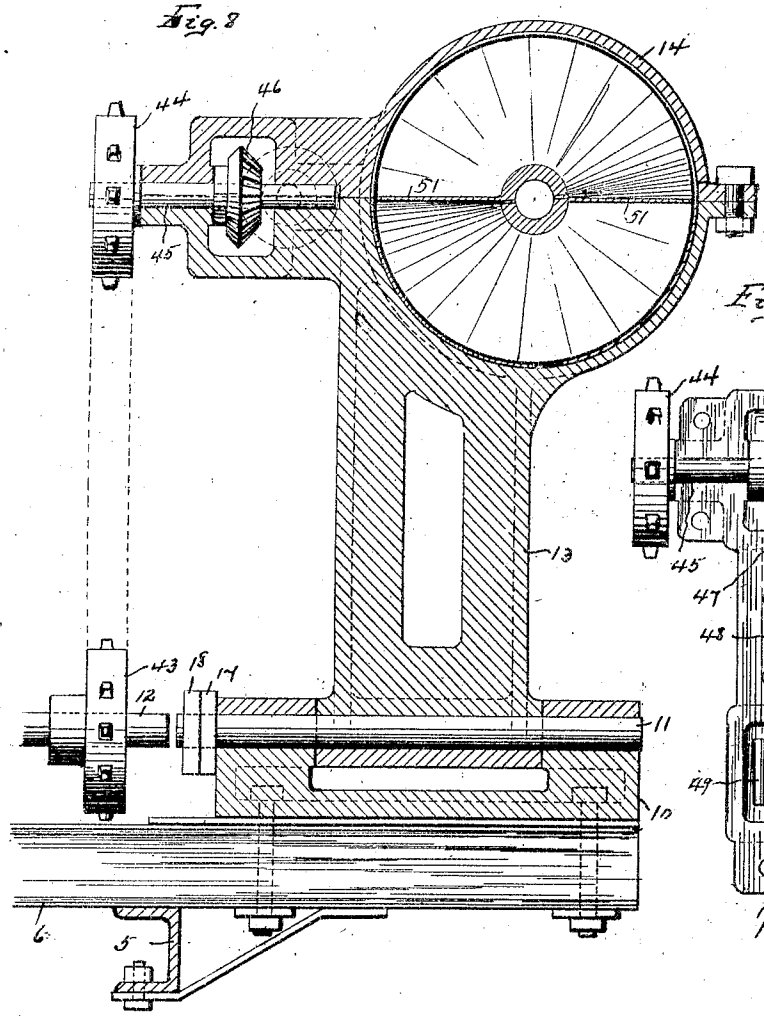


Fig. 9

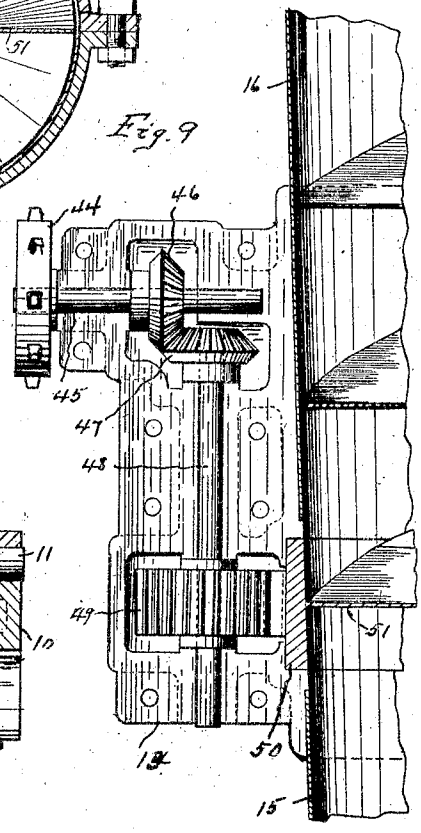
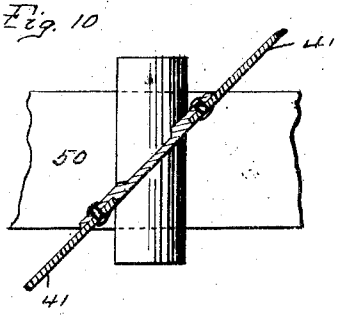


Fig. 10



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Patented Nov. 24, 1925. 1,562,842

UNITED STATES PATENT OFFICE.

HARRY P. MILNE AND LOUIS M. SANDERS, OF EAST ORANGE, NEW JERSEY; LOUIS M. SANDERS, JR., ADMINISTRATOR OF SAID SANDERS.

SNOW PLOW AND LOADER.

Application filed July 5, 1923. Serial No. 648,432.

To all whom it may concern:

Be it known that we, HARRY P. MILNE and LOUIS M. SANDERS, citizens of the United States, and residents of the city of East Orange, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Snow Plows and Loaders, as set forth in the annexed specification.

In the prior application of Gustave Ochs, Ser. No. 511,464, filed October 29, 1921, a snow plow is described and claimed which has proven very efficient in actual practice for the purpose of clearing roadways of accumulated snow, and for banking it upon the side of the roadway. This disposition of the snow is quite satisfactory for country roads, where the banks of snow thus placed form no material obstruction to the traffic. However, in cities and densely populated sections, it is the common practice to load the snow in wagons and cart the same away to some convenient dumping place. The snow must be gathered up and shoveled into the wagons, and the time and expense required for the purpose is very great.

It is the purpose of our present improvement to slightly modify the construction of the said Ochs snow plow, and add thereto means for picking up the snow, storing it in a dump hopper upon the truck from which it is dumped directly into wagons from time to time as the hopper is filled. Changes also have been made in the mounting of the plow upon the truck, whereby a standard truck may be utilized for the purpose of mounting the plow and loader thereon in such a manner as to permit of its ready removal therefrom, so that the truck may be used for other purposes.

Another important feature of our improvement consists in the self-dumping hopper, the parts of which are so balanced that by releasing a retaining catch, the overweight of the load in the hopper will cause it to dump, and when completely empty, to right itself automatically.

Other features of improvement will be fully set forth in the following specification, in connection with the accompanying drawings wherein—

Fig. 1 is a side elevation of our improved plow and loader, mounted upon the standard automobile truck, (the latter shown in dotted lines).

Fig. 2 is a plan view of the same.

Figs. 3 and 4 are respectively front and rear end elevations.

Fig. 5 is a plan view, partly in section of the connections between the horizontal and inclined conveyors, with the upper enclosing casting removed to show the gear plan.

Fig. 6 is a section on line VI—VI of Fig. 5.

Fig. 7 is a section on line VII—VII of Fig. 6.

Fig. 8 is a section on line VIII—VIII of Fig. 1.

Fig. 9 is a fractional plan, partly in section on line IX—IX of Fig. 8, with the upper enclosing casting removed to show the gear plan.

Fig. 10 is a section on line X—X of Fig. 8, showing the method of connecting the conveyor blade to the inclined spoke of the driving gear.

Similar reference characters refer to like parts throughout the specification and drawings.

The truck upon which our improved plow and loader is to be mounted may be of the standard or of any preferred type. As shown in dotted lines in the several figures the standard type is illustrated diagrammatically, with the chassis 1, hood 2, and cab 3, supported upon the wheels 4. Mounted upon the platform or chassis 1 in the rear of the cab 3 is a supplemental frame or chassis 5, bolted or otherwise secured in place. Upon this frame 5 is a pair of cross beams 6, 6, which extend over the side of the chassis to a distance sufficient upon the left hand side to afford a platform 7 upon which the operator may stand. The engine for driving the conveyors is mounted upon the beams 6, 6 at 8 with its driving shaft at right angles to the axis of the chassis 1. The other ends of the beams 6, 6 extend beyond the right hand side of the chassis to a distance sufficient to afford a support for the inclined conveyor 9. Upon the ends of the beams 6, 6, the bearing casting 10 is bolted, as shown in Fig. 8, said casting having mounted therein the shaft 11 in exact alignment with but independent of the engine shaft 12. Upon the shaft 11 is the cast supporting frame 13, the upper part of which forms a tubular support for the tubular conveyor 9, and also for the driving connections the details of which will be disclosed later. The up-

per part of the casting 13 is made in a separate section 14, clamped to the lower part 13, so as to permit the insertion of the two sheet metal tubular sections of the conveyor as 15, 16, and firmly hold them in place as shown. Pivoted upon the inner end of the shaft 11 and extending forward beyond the front end of the chassis 1 are the two struts 17, 18; similar struts extend forwardly from the outer end of the engine shaft 12, and upon the forward ends of these struts is rigidly secured the frame-work of the plow, the structure being such that the entire plow may swing up and down about the two shafts 11, 12 as a center. The plow body is made up of commercial shapes, and consists of the pairs of angle irons 19, 20 and 21, 22, lattice braced together as shown and curved into the arc of a circle of which the shafts 11, 12 are the center. The two angle irons 19, 20 have their lower ends bent into arcs of circles extending rearwardly and riveted to the lower ends of the angle irons 21, 22. The sheet metal apron 23, of a size to completely span across the front of the chassis 1 and extend for a considerable distance beyond, is riveted to the angle irons 19, 20, following the contour thereof, so as to form a semi-cylindrical lower portion 24, within which the horizontal spiral conveyor is mounted to rotate. Upon the forward end of the chassis 1 is a laterally extending shaft, 25, provided with spur gears 26, 27 upon its ends to engage with arcuate racks 28, 29, rigidly secured respectively upon the angle irons 21, 22. A crank 30 is provided upon the end of the shaft 25, upon the turning of which, the entire plow structure may be elevated and lowered. In order to properly support the plow in any adjusted elevation position, a ratchet wheel 31 is mounted upon the shaft 25, with an engaging pawl 32 pivoted upon the end of the chassis 1.

The ends of the apron 23 are turned forwardly to form the lateral or end wings 33, 34, and in the angles thus formed the angle irons 35, 36 are riveted, with their lower ends extending across the axis of the semi-cylindrical portion 24, to form suitable supports for the bearings 37, 38 for the shaft 39 of the horizontal conveyor 40. This conveyor is of the double spiral type, as shown, and its wings or spirals extend from a point just within the apron wing 33 to a point considerably short of the opposite end of the shaft 39 (see Fig. 3).

The inclined conveyor tube 9 is rigidly connected at the lower end with the semi-cylindrical portion 24, with which it is in open communication, so that snow directly by the conveyor 40, to the opening in the apron portion 24 will find its way into the conveyor tube 9.

Within the tube 9 is a spiral conveyor 41, which, when driven will carry the accumulated snow from the lower end and discharge the same from the open upper end into a dumping hopper 42, which latter is mounted upon the rear of the supplemental chassis or frame 5, the details of which will be explained further on.

Power from the engine 8 is utilized for driving the conveyors 40, 41, and the means for communicating such power will now be explained. Upon the inner end of the engine shaft 12 is a sprocket wheel 43, from which the drive chain leads to another sprocket wheel 44 upon the short shaft 45 mounted in bearings in the castings 13, 14 as shown more clearly in Figs. 8 and 9. Upon the shaft 45 is a bevel gear 46 engaging a similar bevel gear 47 upon the shaft 48, which is also mounted in bearings formed in the castings 13, 14, and lies parallel with the axis of the conveyor tube 9. Upon the shaft 48 is a spur gear 49 in mesh with a large spur gear 50, the inner diameter of whose rim is substantially the same as that of the conveyor tube 9 at that point. The inner part of the castings 13, 14 is recessed so that when the two castings are separated, the gear 50 may be placed in the recess and afterward the castings may be bolted together. Roller bearings are provided for the gear 50, but since their details are the same as those of a similar gear at the lower end of the tube 9, an explanation of the latter is deemed sufficient. The spokes 51 of the gear 50 are what are known as of the "propeller or fan type" and are of the same pitch as the spiral of the conveyor 41, so that when the sections of said conveyor are connected up to the spokes of the gear on each side, as shown in Fig. 10, the united structure constitutes substantially a continuous spiral from end to end, and the gear connections described form a compact and substantially enclosed driving structure. The upper end of the shaft of the conveyor 41 is carried in a bearing of the usual type in the end or cap casting 52. The tube sections 15, 16 are clamped between the sections 13, 14, and as shown, the entire tube structure is tapered from end to end. The conveyor 41 is correspondingly tapered, and is of a diameter to run smoothly within the tube without actual contact therewith.

As above described, the lower end of the conveyor tube 9 is rigidly connected to the end of the cylindrical portion 24 of the apron 23. The connection is made by means of a two-part casting 53, 54, which is made to serve as a bearing for the lower end of the conveyor 41 and also as a housing for the gear train between the conveyor 40 and 41.

The parts or sections 53, 54 are recessed to receive the large "fan-spoked" gear wheel 55, in substantially the same manner as de-

scribed in connection with the gear 50. Recesses 56 are provided in each of the sections to receive the rollers 57 which bear upon the flat flange-like face of the gear wheel as shown, so as to center it within the open interior of the casting, and form therewith substantially a continuation of the conveyor tube. Meshing with the gear 55 is a spur pinion 58 upon the shaft 59, which latter is mounted in bearings in the sections 53, 54. Upon the forward end of the shaft 59 is a bevel gear 60, in mesh with a similar gear 61 upon the shaft 62, which latter is mounted in bearings in the sections 53, 54, and extends through the apron wing 34, where it is connected to the adjacent end of the shaft 39 of the conveyor 40. The lower end of the shaft of the conveyor 41 is coupled to the hub 63 of the gear wheel 55, and the wings of said conveyor are also connected to the fan-like spokes of said gearwheel, in substantially the same manner as that described above in connection with the gear 50, its spokes 51 and the spiral of the conveyor 41, and substantially shown in Fig. 10.

From the foregoing, it will be seen that when the engine 8 is in operation, the two conveyors 40, 41 will be driven by the gear connections described, and that if the truck advances into fallen snow in the roadway such snow will be gathered up and conveyed by the conveyor 40 to the opening in the lower part of the apron 24, from which it will be carried by the conveyor 41 to the upper end of the tube 9, whence it is discharged into the hopper.

In order to render the snow more compact, and more easily handled, the exhaust of the truck motor is led through the flexible tube 38′ to the free end of the hollow conveyor shaft 39, and said shaft is provided with numerous perforations along the conveyor wings, from which the hot exhaust gases escape into direct contact with the moving snow; likewise the exhaust of the engine 8 is led into a sort of muffler tank 65, from which the flexible tube 66 leads up to and is connected with the bearing in the cap 52, and thence the exhaust gases from the tank are discharged into the upper end of the hollow shaft of the conveyor 41. The constant discharge of the hot gases into direct contact with the snow as it is being carried along by the conveyors serves the double purpose of making the snow "pack" and prevents freezing, but it also reduces the bulk of the snow as it advances through the conveyor tube 9. It is thus possible to taper the tube so that its upper diameter may be one half or even less, than its lower diameter.

The receiving hopper is of the self-dumping type, that is when empty its wings are so balanced that it will close automatically, but when filled the outboard wing sustains the bulk of the load and when tripped, will tilt in such a manner as to form with the other wing, an inclined plane from which the load readily slides into a waiting wagon drawn along side the truck. In order to properly support the hopper, a stanchion 67, made of commercial steel shapes, is erected upon the frame or chassis 5, immediately at the rear of the engine 8, and a like stanchion 68 is erected at the extreme end of said frame. These stanchions are bolted or riveted to the frame and form a permanent and rigid part of the structure. Between these stanchions the hopper wing 69 is pivotally hung at its upper edge in quite close proximity to the discharge end of the tube 9. To the lower edge of the hopper wing 69, the other hopper wing 70 is hinged with its free edge extending considerably beyond the side of the truck. The wing 70 is supported by a pair of links 71, 72, the upper ends of which are respectively pivoted to the upper edges of the stanchions 67, 68 and their lower ends are pivoted to the ends of the wing 70 at points a short distance away from the hinge, so that the greater part of the wing is outboard. The hinge pintle 73 by which the wings 69, 70 are hinged together is tubular and contains numerous perforations throughout its length; its rear end is connected by the flexible tube 74 with the muffler or exhaust tank 65. The wings 69, 70 are made of sheet metal with their walls separated and stiffened by small channel bars, so as to be in effect, hollow chambers into which the hot exhaust gases may escape through the perforated pintle 73. The upper walls of the wings 69, 70 also have numerous perforations for the escape of the gases into direct contact with the accumulating snow within the hopper; the result being not only the constant melting of the snow and consequent reduction of its bulk, but the forming of a film of water all over the inner walls of the hopper, so that on dumping, the snow will readily and quickly slide therefrom.

The necessary elevation of the hopper, in order to give the requisite "fall" in dumping, leaves ample space beneath it for the exhaust tank 65, and also for a large capacity fuel tank 75, from which both the truck engine and the engine 8 are supplied. In addition, of course the usual tank for supplying fuel to the truck engine may be carried in the customary place beneath the driver's seat in the cab.

The ends of the hopper are formed of sheet metal cut in quadrant form as at 76, 77, 78, 79, one pair of which is riveted to the ends of each hopper wing, in such a manner as to overlap when the hopper is closed, and open up "scissors like" but still overlap on dumping. This arrangement forms a

very efficient method of preventing the end spilling of the snow from the hopper either when filling or on dumping. The small spring catch 80 is mounted upon the stanchion 67 in position to snap under the wing 70 when the hopper closes after dumping, and is in convenient position for the operator standing on the platform 7 to "pull" when the hopper is filled so that the overweight of the load may dump the hopper.

The plow and loader as described is readily detachable from the truck chassis, and stored when not in use, so that the truck may be used for other purposes. The entire structure with the exception of the few castings and the gear trains, is made up of commercial shapes of rolled steel, and is therefore of very low original cost. It is easy to manipulate and its use in clearing city streets dispenses with much hand labor.

We claim:—

1. In a snow plow and loader, the combination of a self-propelled vehicle with a plow body supported upon the forward end of said vehicle, struts extending from the rear of said plow body, and pivotal connections for the rear ends of said struts mounted upon said vehicle, whereby said plow body may be elevated and lowered about said pivotal connections as a center.

2. In a snow plow and loader, the combination with a self-propelled wheeled vehicle, of a detachable frame mounted thereon, laterally extending aligned shafts mounted upon said frame, forwardly extending struts mounted upon said shafts and a plow body rigidly connected to the forward ends of said struts and located at the front of said vehicle, with means upon said vehicle for raising and lowering said plow body relative to said vehicle.

3. In a snow plow and loader, the combination with a self-propelled vehicle, of a frame detachably mounted thereon, laterally disposed aligned shafts mounted upon said frame, forwardly extending struts mounted upon said shafts, a plow body rigidly secured to the forward ends of said struts, rack and pinion mechanism respectively upon said vehicle and plow body for elevating said plow body with respect to said vehicle, and a power driven worm conveyor mounted upon said plow body for laterally directing snow or other granulated material from in front of said plow body.

4. In a snow plow and loader, the combination of a motor driven vehicle, of a frame detachably mounted thereon, horizontal shafts laterally aligned upon said frame, a plow body at the forward end of said vehicle, a strut upon each side of said vehicle connecting said plow body with said shafts respectively, and means connecting said plow body with the front end of said vehicle for elevating said plow body with respect to said vehicle and about said shafts as a center.

5. In a snow plow and loader, the combination with a motor driven vehicle, of a frame detachably mounted thereon, horizontal shafts laterally aligned upon said frame, a plow body located at the front end of said vehicle, a strut upon each side of said vehicle connecting said plow body with said shafts, a power driven worm conveyor mounted upon the lower part of said plow body, and means upon the front end of said vehicle for adjustably elevating said plow body and conveyor about said shafts as a center.

6. In a snow plow and loader, the combination of a plow body comprising a substantially vertical plane sheet metal apron having its lower end rearwardly curved into a semi-cylinder, an upwardly inclined rearwardly extending conveyor tube in open communication with one end of said semi-cylinder, and power driven conveyors respectively in said semi-cylinder and in said tube, whereby snow or other granulated material is laterally directed by the conveyor in said semi-cylinder and finally discharged from the upper rear end of said tube conveyor.

7. In a snow plow and loader, the combination with a motor driven vehicle, a plow body adapted to be supported at the front end of said vehicle, an upwardly inclined rearwardly extending conveyor tube connected to one end of said plow body, a strut upon each side of said vehicle extending to a point midway of the length of said vehicle and pivotally supported thereat and rigidly connected to the rear side of said plow body, and means upon the front end of said vehicle for adjustably elevating said plow body and tube as a unitary structure about the pivotal rear ends of said struts as a center.

8. In a snow plow and loader, the combination with a motor driven vehicle, of a frame detachably mounted upon said vehicle, a plow body adjustably supported at the front end of said vehicle, a strut upon each side of said vehicle, each strut being pivoted upon said frame and having its forward end rigidly connected to said plow body, and means upon said vehicle for adjusting the elevation of said plow body with respect to the vehicle front and about the rear ends of said struts as a center.

9. In a snow plow and loader, the combination with a motor driven vehicle of a frame mounted upon said vehicle, a plow body supported upon the front end of said vehicle, struts upon the sides of said vehicle pivoted at their rear ends upon said frame and connected at their forward ends to said plow body, and means upon said vehicle and plow body for elevating the latter about the pivotal ends of said struts as a center, a conveyor tube connected to the rear side of said

plow body and extending rearwardly and upwardly therefrom, and power driven means upon the lower part of said plow body and within said tube for directing snow laterally of said plow body and through said tube to be discharged from the rear end thereof.

10. In a snow plow and loader, the combination with a motor driven vehicle, of a frame mounted thereon, a dumping hopper and an engine respectively upon said frame, forwardly extending struts pivoted at the engine shaft axis, a plow body rigidly secured at the forward ends of said struts, a conveyor tube connected to said plow body and extending rearwardly and upwardly therefrom with its discharge end above said hopper, and conveyors mounted respectively upon said plow body and within said tube, and means for driving said conveyors from said engine to convey granulated material from the ground level to said hopper.

11. In a snow plow and loader, the combination of a power driven vehicle with, an engine and a dumping hopper supported upon said frame, a plow body having a conveyor mounted upon the lower part thereof located at the forward end of said vehicle, a conveyor tube having its discharge end extended above said hopper and its lower end connected to said plow body, a conveyor within said tube, said conveyors both being driven from said engine, for directing snow laterally across the front of said plow body and through said tube to said hopper.

12. In a snow plow and loader, the combination with a power driven vehicle, of a frame mounted thereon, a dumping hopper and an engine mounted thereon, a plow body adjustably mounted at the front end of said vehicle, a conveyor tube leading from said plow body to and above said hopper, conveyors respectively upon the lower part of said plow body and within said tube gear connections for driving said conveyors from said engine, and means for discharging the exhaust gases from said engine through said conveyors, and to said hopper, whereby snow may be directed across the front of said plow body and through said tube into said hopper in compressed and compacted form.

13. In a snow plow and loader, the combination with a motor driven vehicle, a detachable frame supported upon said vehicle, an engine and a dumping hopper mounted upon said frame, a plow body consisting of a substantially vertical plane upper part and a semi-cylindrical lower part, adjustably supported at the front end of said vehicle, a conveyor tube secured to one end of and in open communication with the semi-cylindrical part of said plow body and extending rearwardly therefrom with the discharge end thereof above said hopper, worm conveyors respectively within said semi-cylindrical part of said plow body and within said tube, gear connections between said engine and said tube conveyor and between the adjacent ends of said conveyors, and means for conducting the exhaust gases from said engine to said hopper and to said conveyors, whereby snow upon a roadway may be directed by said conveyors through said tube into said hopper, and its bulk progressively reduced by contact with said exhaust gases.

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