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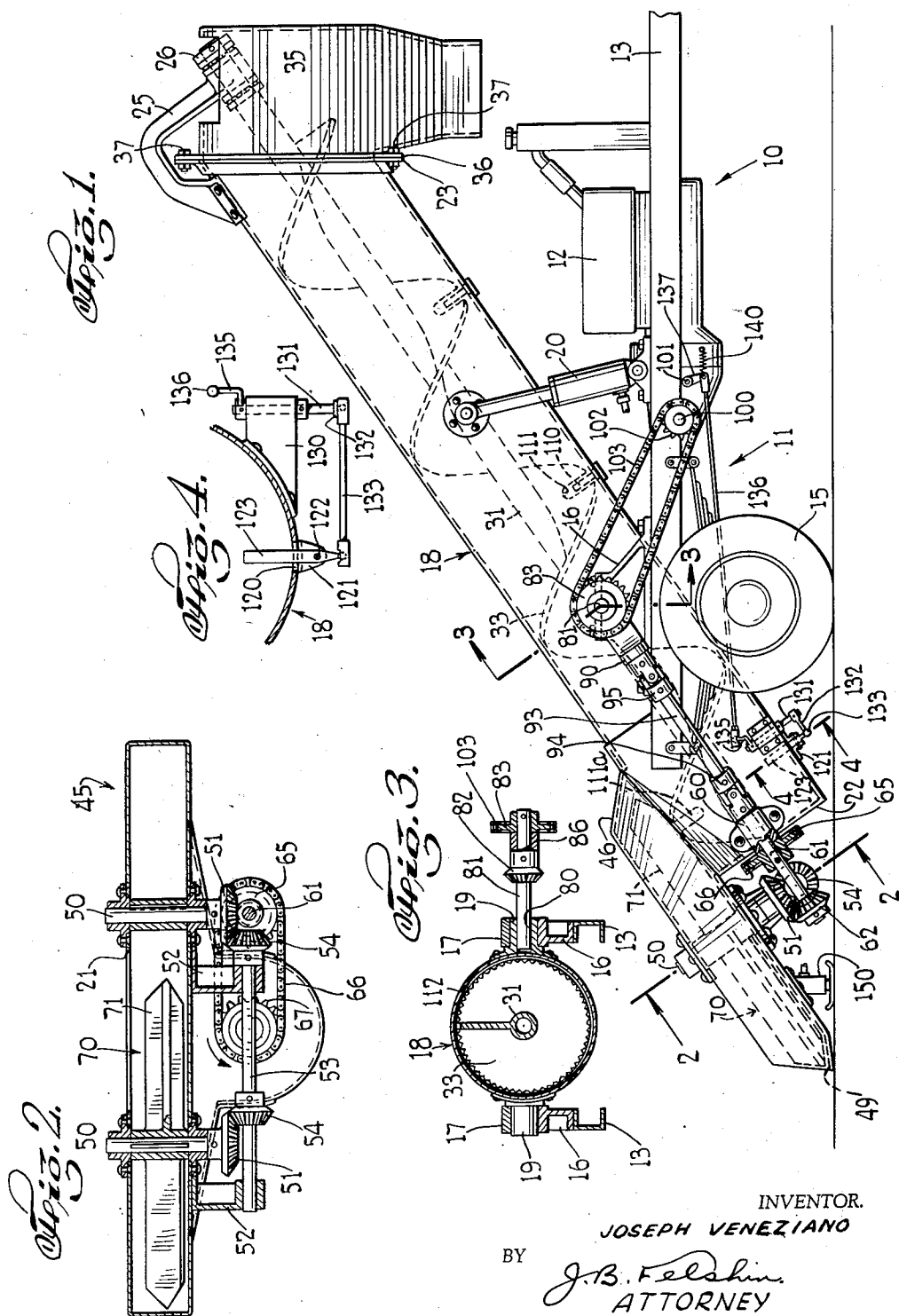
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SNOW REMOVAL DEVICE

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SNOW REMOVAL DEVICE

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8 Claims. (Cl. 37-45)

This invention relates to snow removal devices. It is particularly directed to a vehicle provided with means for removing snow from the street and loading it onto another vehicle to transport the snow for dumping.

An object of this invention is to provide a snow removal device of the character described, comprising a vehicle carrying a longitudinal tube pivoted transversely medially the ends thereof and containing a worm to convey snow upwardly within the tube to a chute at its upper end so that the snow may be guided by the chute onto another vehicle, said device further comprising a pair of fan like members provided with overlapping blades rotating in opposite directions to move snow from the street into an opening at the lower end of the tube.

Yet a further object of this invention is to provide in a device of the character described, a worm within the tube having at its lower end serrations on the edges thereof to facilitate breaking up of the snow or ice fed to the lower end of the tube, the tube being furthermore provided with longitudinally spaced, radial pins, and the worm being formed with slots through which the pins pass, as the worm rotates, to keep ice or hard snow in motion through the tube, and thus to prevent the worm from getting clogged.

Yet a further object of this invention is to provide means to stop rotation of the worm and rotary blades, should a piece of metal or other substance enter the lower end of the tube.

Still a further object of this invention is to provide in a device of the character described, a common drive means for rotating the tube and rotating the blades, said drive means permitting rotation of the tube about its transverse pivotal axis.

Yet another object of this invention is to provide a compact and durable device of the character described, which shall be relatively inexpensive to manufacture, which shall be smooth and positive in operation, and yet practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a side elevational view of a snow removal device embodying the invention;

Fig. 2 is a cross-sectional view taken on line 2-2 of Fig. 1;

Fig. 3 is a cross-sectional view taken on line 3-3 of Fig. 1;

Fig. 4 is a cross-sectional view taken on line 4-4 of Fig. 1;

Fig. 5 is a top plan view of a device embodying the invention, with parts broken away and in cross-section;

Fig. 6 is a cross-sectional view taken on line 6-6 of Fig. 5; and

Fig. 7 is an upper end view of the chute and worm tube.

Referring now in detail to the drawings, 10 designates a snow removal device, embodying the invention. The same comprises a truck or vehicle 11 provided with a gasoline engine 12, or other motive means for operating the snow loading means, to be described hereinafter. The vehicle 11 comprises a frame 13 supported on wheels 15. The engine 12 is mounted on the frame 13, preferably between the front and rear wheels of the vehicle.

Mounted on the frame 13, are a pair of spaced brackets 16 formed with horizontally aligned bearings 17. Pivotaly supported on the bearings 17 is a longitudinal worm tube 18, to the sides of which are fixed pivot pins or brackets 19 journaled within the bearings 17. The brackets 19 are located medially the end of the tube 18. Interconnecting the frame 13, and a portion of the tube located above the brackets 19, are hydraulic jacks 20 for swinging the tube 18 about its pivotal axis. The hydraulic jacks 20 may be of any suitable well known construction.

Tube 18 is formed with an opening 21 adjacent its lower end and at the top side thereof. At the lower end of tube 18 is an end wall 22. The upper end of tube 18 is open, said open end of the tube being formed with a flange 23 located in a plane inclined to the axis of the tube. Thus, when the tube is in snow loading position, the flange 23 is substantially in vertical position, as shown in Fig. 1 of the drawings. Fixed to the upper end of the tube 18 is a bracket 25 carrying a thrust bearing 26 located axially of the tube 18. The lower end wall 22 of the tube is formed with a central bearing 30. Mounted on and between the bearings 30 and 26 is an axial shaft 31 passing through the tube 18, and carrying a worm blade 33.

At the upper end of tube 18, is a chute 35 formed with a flange 36 contacting flange 23.

The chute 35 is adapted to be rotated relatively to flange 23 and fixed thereto by means of bolts 37, passing through registering slots 38 in the contacting flanges 23, 36. It will be noted that the chute 35 has an opening 40 at the top thereof through which the bracket 25 passes.

Fixed to the lower end of tube 18 is a casing 45 communicating with the opening 21 at the lower end of the tube 18. The casing 45 comprises a substantially semi-annular wall 46, top wall portions 47 extending rearwardly from wall 46, and a bottom wall or shovel or apron portion 48 inclined downwardly and rearwardly from tube 18. Wall portions 47 are parallel to wall portion 48. The wall portion 48 however extends further than the wall portions. The lower or rear edge 49 of wall 48 is adapted to contact the ground, so that snow may be shoved or moved up said wall into the hole or opening 21 in tube 18.

Mounted on and between walls 46 and 47 on each side of the opening 21 are parallel, transverse rotary shafts 50 each carrying at its lower end a bevel gear 51. Attached to the wall 48 and depending therefrom, are brackets 52 carrying a rotary transverse, horizontal shaft 53 carrying bevel gears 54 meshing with the bevel gears 51.

Mounted on one side of tube 18, adjacent the lower end thereof, is a bearing 60 in which is rotatably mounted a shaft 61 carrying a bevel gear 62 meshing with the adjacent bevel gears 51. On shaft 61 is also a sprocket wheel 65, connected by sprocket chain 66 to a sprocket wheel 67 on shaft 31 which carries the worm 33.

It will now be understood that rotation of shaft 61 will cause rotation of the worm 33 in a direction to carry the snow upwardly in the tube 18, and at the same time, causes rotation of shafts 50 in opposite directions.

Within the casing 45, and rotatably mounted on shafts 50 and keyed thereto, are fan like members 70, each provided with a pair of blades 71. It will be noted that the blades overlap and when members 70 are rotated in the directions of the arrows of Fig. 5, snow will be moved into the opening 21 to the lower end of the tube 18. Blades 71 will move in such direction when worm 33 rotates to push the snow up the tube.

Means is provided for rotating the shaft 61. To this end, one of the pivot brackets 19 which is fixed to the tube 18, is formed with an axial opening 80, and journaled therein is a shaft 81 carrying a bevel gear 82, and a sprocket wheel 83. Fixed to the tube 18, is a bracket 85, formed with a bearing 86, supporting shaft 81 and located between the bevel gear 82, and the sprocket wheel 83. Said bevel gear and sprocket wheel are fixed to the shaft 81 on opposite sides of the bearing 86.

Bracket 85 further carries a bearing 90 at right angles to the bearing 86. Journaled in the bearing 90 is a shaft 91 carrying a bevel gear 92 meshing with the bevel gear 82. Shaft 91 is interconnected to shaft 61 by a connecting rod 93 having universal connections 94 and 95 at the ends thereof with said shafts.

On the frame 13 is a shaft 100 adapted to be rotated by the engine 12, and connected thereto through a clutch which may be operated by rotation of a shaft 101 on the frame. On shaft 100 is a sprocket wheel 102 connected by a sprocket chain 103 to the sprocket wheel 83. Thus, when the motor 12 is operating and the clutch connects the motor or engine to the shaft 75

100, both the worm blade and the fan members will rotate. It will be noted that the tube 18 may be rotated about its pivotal axis without affecting the driving gear for the worm or fan members.

Means is provided to break up pieces of ice or hard snow within the worm tube. To this end, there is fixed to the bottom of the tube a plurality of inwardly extending radial pins 110, the worm blade being formed with slots 111, through which the pins pass as the worm rotates. The lower end of the worm blade may be formed with teeth or serrations 112, to help break up the snow and ice.

Means is provided to release the clutch if pieces of ice too hard to be broken up get into the tube 18. To this end, tube 18 is formed with an opening 120 at the bottom thereof, and adjacent the lower or rear end thereof. Extending downwardly from the tube 18 on opposite sides of the opening 120 are ears 121 carrying a transverse pin 122. Pivoted to the pin 122 is a lever 123 projecting upwardly into tube 18. Fixed to the tube 18 is a bracket 130 carrying a rotary shaft 131 disposed at right angles to the axis of the tube 18. On one end of shaft 131 is an arm 132 connected by a link 133 to the lower end of the pin 123, below the pivot pin 122.

Fixed to the opposite end of shaft 131 is an arm 135 connected by a link 136 to an arm 137 fixed to the clutch shaft 101. A coil tension spring 140 connects arm 137 with a fixed part of the arm, to retain the clutch in operating position. Should a particularly hard piece of ice get into the tube and swing the lever or pin 123 about its pivotal axis 122, such action will cause rotation of shaft 131 and through link 136, rotation of the clutch shaft 101 to disconnect the engine from the driving gear for the worm and fan members. The worm blade is formed with a slot 111a to permit the upper end of lever 123 to pass as the worm rotates.

Fixed to the underside of the casing 45 is a skid jack 150 of any suitable construction, to support the lower end of the tube 18 and casing 45.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

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

1. A snow removal device comprising a vehicle, an elongated longitudinal tube pivoted to the vehicle about a horizontal axis, disposed medially the ends of the tube, an axial shaft within the tube, a worm blade carried by said shaft, a casing at the lower end of the tube, adapted to receive snow from the street, a pair of rotary fan like members on said casing, said fan like members having overlapping blades, means interconnecting said fan like members and worm blades for simultaneously rotating the same, a shaft at said horizontal axis, means to rotate said last shaft, means to operatively connect said last shaft to said first means, and means including a member within said tube to render

the means for rotating said last shaft inoperative.

2. A snow removal device comprising a vehicle, an elongated longitudinal tube pivoted to the vehicle about a horizontal axis, disposed mediate-ly the ends of the tube, an axial shaft with-
in the tube, a worm blade carried by said shaft, a casing at the lower end of the tube, adapted to receive snow from the street, a pair of rotary fan like members on said casing, said fan like members having overlapping blades, means for simultaneously rotating said fan like members and worm blade, a plurality of radial pins fixed to said tube, and said worm blade being formed with slots to by-pass said pins, said worm blade having serrations at an edge thereof, and a chute at the upper end of said tube extending to one side thereof, said chute having an opening at the top thereof, and a bracket fixed to said tube and passing through the opening in said chute and having means to journal one end of said axial shaft.

3. A snow removal device comprising a vehicle, an engine on said vehicle, an elongated longitudinal tube pivotally mounted on said vehicle about a transverse horizontal axis disposed mediate-ly the ends of the tube, a worm blade rotatably mounted within said tube, means operated by the engine, including a clutch, for driving said worm blade, a movable member within said tube, and means controlled by said movable member to operate the clutch to disconnect the engine from the driving means for the worm blade.

4. A device of the character described, comprising a vehicle having a frame, a pair of brackets on said frame formed with horizontally aligned bearings, a longitudinal tube pivoted mediate-ly the ends thereof on said bearings, means to rotate the tube relative to said frame, a shaft rotatably mounted within said tube, a worm blade on said shaft, a casing at the lower end of said tube communicating with said tube, a pair of fan like members within said casing for moving snow from the street through the casing into the tube, means to connect said fan like members for simultaneous rotation in opposite directions, means operatively connected to said engine for simultaneously rotating the worm shaft and fan like members, and means projecting into said tube to disconnect the engine from said rotating means.

5. A device of the character described, comprising a vehicle having a frame, a pair of brackets on said frame formed with horizontally aligned bearings, a longitudinal tube pivoted mediate-ly the ends thereof on said bearings, means to rotate the tube relative to said frame, a shaft rotatably mounted within said tube, a worm blade on said shaft, a casing at the lower end of said tube communicating with said tube, a pair of fan like members within said casing for moving snow from the street through the casing into the tube, means to connect said fan like members for simultaneous rotation in opposite directions, means operatively connected to said engine for simultaneously rotating the worm shaft and fan like members, means projecting into said tube to disconnect the engine from said rotating means.

6. In combination, an elongated tube, a worm blade rotatably mounted within said tube, means to pivot said tube about a transverse axis pass-

ing through the axis of the tube, a shaft rotatably mounted at the pivotal axis of said tube, means for rotating said shaft, a bevel gear on said shaft, a second shaft journaled for rotation about an axis perpendicular to the first shaft, a bevel gear on the second shaft meshing with the first bevel gear, a third shaft mounted for rotation about an axis parallel to the axis of the tube, and located externally of said tube, and parallel to the second shaft, a connecting rod interconnecting the second and third shafts by universal connections, a sprocket wheel on the third shaft, a sprocket wheel fixed for rotation with said worm blade, and a sprocket chain interconnecting said sprocket wheels.

7. In combination, an elongated tube, a worm blade rotatably mounted within said tube, means to pivot said tube about a transverse axis passing through the axis of the tube, a shaft rotatably mounted at the pivotal axis of said tube, means for rotating said shaft, a bevel gear on said shaft, a second shaft journaled for rotation about an axis perpendicular to the first shaft, a bevel gear on the second shaft meshing with the first bevel gear, a third shaft mounted for rotation about an axis parallel to the axis of the tube, and located externally of said tube, and parallel to the second shaft, a connecting rod interconnecting the second and third shafts by universal connections, a sprocket wheel on the third shaft, a sprocket wheel fixed for rotation with said worm blade, a sprocket chain interconnecting said sprocket wheels, said tube having an opening adjacent one end, a casing fixed to said end of said tube, and communicating with said opening, a pair of members mounted in said casing for rotation about parallel axes, and having blades adapted to overlap, means to connect said members for rotation in opposite directions, and means on the third shaft to rotate said last mentioned means.

8. In combination, an elongated tube, a worm blade rotatably mounted within said tube, means to pivot said tube about a transverse axis passing through the axis of the tube, a shaft rotatably mounted at the pivotal axis of said tube, means for rotating said shaft, a bevel gear on said shaft, a second shaft journaled for rotation about an axis perpendicular to the first shaft, a bevel gear on the second shaft meshing with the first bevel gear, a third shaft mounted for rotation about an axis parallel to the axis of the tube, and located externally of said tube, and parallel to the second shaft, a connecting rod interconnecting the second and third shafts by universal connections, a sprocket wheel on the third shaft, a sprocket wheel fixed for rotation with said worm blade, a sprocket chain interconnecting said sprocket wheels, said tube having an opening adjacent one end, a casing fixed to said end of said tube, and communicating with said opening, a pair of members mounted in said casing for rotation about parallel axes, and having blades adapted to overlap, means to connect said members for rotation in opposite directions, means on the third shaft to rotate said last mentioned means, and means in the tube to render the means for rotating said first shaft inoperative.

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