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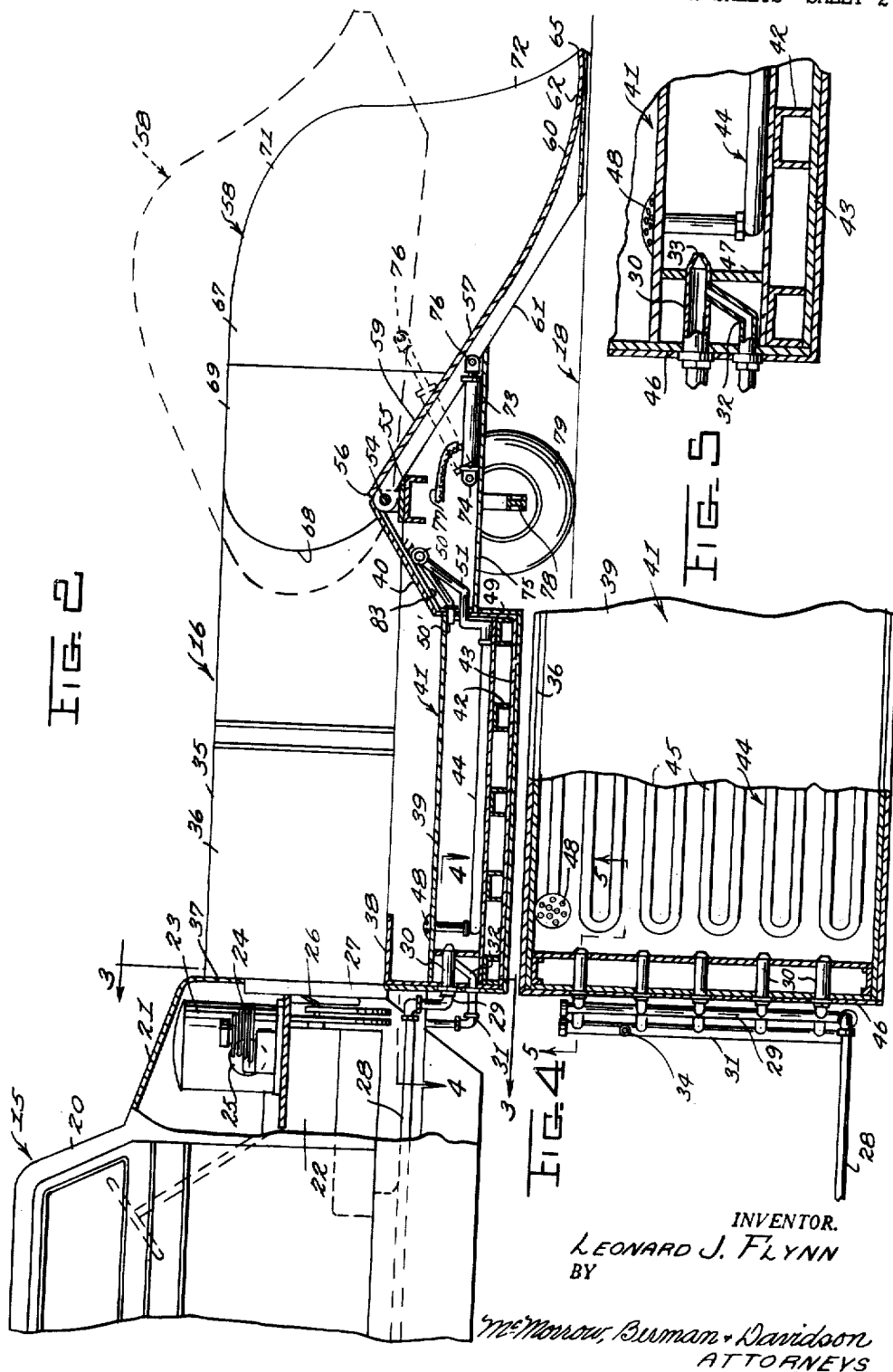
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SNOW MELTER AND VAPORIZER

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SNOW MELTER AND VAPORIZER

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This invention relates to improved power-operated snow-removal apparatus, and more particularly to novel combined snow-plowing and vaporizing apparatus adapted to clear paths along snow and/or ice-covered highways, railway tracks and the like, and through snowdrifts, by taking up the snow and ice and turning the same into vapor and discharging the vapor into the air.

The primary object of the invention is to provide apparatus of the above-indicated character which eliminates some of the more serious drawbacks of present snow-removal apparatus, such as depositing the plowed snow in banks along one or both sides of the path cleared, and in the case of apparatus involving melting of the snow, discharging the melted snow onto the ground, resulting in the formation of ice upon the ground.

Another important object of the invention is the provision of a snow-removal vehicle of improved and simplified construction and greater ease and economy of operation, which can be made in a rugged and serviceable form at relatively low cost.

Other important objects and advantageous features of the invention will be apparent from the following description and accompanying drawings, wherein, for present purposes of illustration only, a specific embodiment of the invention is set forth in detail.

In the drawings:

Figure 1 is a top plan view, with portions thereof broken away to show internal structure;

Figure 2 is a vertical longitudinal section taken on line 2—2 of Figure 1, showing the scoop in depressed operating position;

Figure 3 is a transverse vertical section taken on the line 3—3 of Figure 2;

Figure 4 is an enlarged fragmentary horizontal section taken on the line 4—4 of Figure 2;

Figure 5 is a further enlarged fragmentary vertical longitudinal section taken on the line 5—5 of Figure 4.

Referring in detail to the drawings, the illustrated apparatus comprises a longitudinally-elongated motor vehicle chassis including a rear part 15 and a forepart 16. The rear part 15 includes drive wheels 17 supporting the same upon the ground 18, a relatively large, rectangular burner fuel tank 19, at the rear, a driver's cab 20 in front of the tank 19, and a motor and pump compartment 21 in front of the cab 20, depressed below the window level of the cab.

The compartment 21 encloses a conventional engine 22 connected in a suitable manner (not shown) to the drive wheels 17, with a compressed

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air tank 23 at one side of the engine, and an air compressor 24 at the other side of the engine, including an electric driving motor 25 or other suitable driving connection with the engine 22. The cooling fan 26 of the engine 22 operates behind a screened radiator 27 in the front of the compartment 21.

A burner fuel supply pipe 28 leads forwardly along the right-hand side of the chassis from the tank 19 to the right-hand end of a header 29 extending horizontally across the lower part of the compartment 21, and has a plurality of burners consisting of jet nozzles 30 projecting forwardly therefrom at regularly-spaced intervals, the left-hand end of the header being closed.

Another header 31 having closed ends and positioned behind and below the header 29 has projecting forwardly therefrom compressed air ducts 32 connected as shown in Figure 5 with the lower parts of related ones of the burner jet nozzles 30. The forward ends of the nozzles 30 beyond the point of connection of the ducts 32 are tapered to relatively small orifices 33. The output line 34 of the pump or compressor 24 is connected to the compressed air tank 23 and the tank 23 is connected to the header 31 at a point intermediate its ends. Suitable means (not shown) may be provided for controlling the pressure and flow of compressed air to header 31 and hence to the burners 30, and the supply of liquid fuel, such as gasoline from the tank 19 to the burners. With fuel supplied to the burners 30 along with air under pressure and the resulting mixture of air and fuel ignited, flaming jets are projected forwardly from the burners.

The forepart 16 of the vehicle chassis comprises a rectangular, longitudinally-elongated snow and ice-melting hopper 35 having parallel-spaced side walls 36, 36 extending forwardly from the front wall 37 of the compartment 21, the hopper being open at its forward end. An abbreviated horizontal fire wall 38 extends across the lower part of the hopper 35 from the front wall 37 of the compartment 21, this fire wall being spaced upwardly from the generally horizontal bottom 39 of the hopper and extending between the side walls 36, 36. A rearwardly-declining bottom portion 40 reaches rearwardly from the open forward end of the hopper to the forward end of the bottom 39.

The hopper bottom 39 forms the top wall of the hot box 41 extending along and beneath the bottom 39 from end to end and side to side and having transverse channel braces or reinforcements 42 on its bottom 43, the braces acting as

spacers and supports for a liquefied snow and ice-vaporizing coil 44. The vaporizing coil 44 comprises a continuous pipe comprising longitudinally-arranged convolutions 45 uniformly laterally spaced between the sides of the hot box 41 below the level of the burner jet nozzles 30 and in line therewith, as shown in Figures 1 and 2. The burners 30 project forwardly through the back wall 46 of the hot box and forwardly through a transverse partition 47 into the interior of the hot box to the rear ends of the convolutions 45.

A screened water intake 48 is positioned through the hopper bottom 39, as in the left rear corner, as shown in Figure 1, and connects with the adjacent end of the vaporizing coil 44, the other end thereof being directed forwardly through the front wall 49, as shown in Figure 2. A horizontal exhaust header 50 extends transversely beneath the declining hopper bottom portion 40 and has one end thereof opening through the hot box front wall 49 intermediate its ends at 50'. An extension 51 on the said other end of the vaporizing coil 44 connects with the header 50 intermediate its ends, and the laterally-outwardly-projecting other end of the header 50 is supportedly connected to the lower end of a vertical exhaust pipe 52.

Hinged at 54 on a chassis cross-member 55 located at the elevated forward end of the declining hopper bottom portion 40 is the rear end 56 of the bottom 57 of the snow and ice scoop 58. The scoop bottom 57 has a substantially plane rearward portion 59 merging into a forwardly and upwardly-curved forward portion 60. The under side of the scoop bottom 57 has depending, laterally-spaced runners 61 which have angulated straight forward portions 62 arranged to run on the ground 18, as shown in Figure 2, in the depressed operating position of the scoop. As shown in Figure 1, the scoop bottom has parallel side edge portions 63, 63 positioned between the parallel hopper side walls 36, 36 at the forward end of the hopper 33; and forwardly-flaring side edge portions 64, 64 whereby the straight forward edge 65 of the scoop is substantially wider than the hopper 35. The forward portions of the runners 61 are flared with respect to each other like the forward part of the scoop, as indicated at 66 in Figure 1. The scoop 58 has side walls 67, 67 on the side edges which have vertically-curved rear ends 68 merging into straight upper edge portions 69 which align with the upper edges of the hopper side walls 36, 36 in the depressed position of the scoop. Forward edge portions on the scoop side walls curve downwardly at 71 and then forwardly at 72 to the forward edge 65 of the scoop bottom.

Means for elevating and depressing the scoop 58 comprises one or more hydraulic jacks 73 pivoted at one end at 74 on a chassis element 75 beneath the cross-member 55 and connected at its opposite end at 76 to a runner 61 on the hopper bottom. A hydraulic conduit 77 leads rearwardly from the jack 73 to suitable means (not shown) for operating the jack from the cab 20. The chassis forepart 16 is supported on an axle structure 78 including steerable wheels 79.

It will appear from the foregoing that with the scoop 58 depressed, with the vehicle in forward motion, and with the burners 30 in operation, snow and ice will be elevated from the ground 18 along the scoop and subside into the hopper 35 along the declining bottom portion 40 onto the hot box top 39 constituting the hopper bottom. The hot box being sufficiently hot, the snow

and/or ice will be quickly melted and the resulting water will flow through the drain or intake 48 into the vaporizing coil 44 and be immediately vaporized. The expansion of the vapor causes the same to move upwardly in the exhaust pipe 52 and discharge into the outside air through its upper open end. The expansion of the hot mixture of air and products of combustion and the forward movement thereof in the hot box by the jetting of the burner nozzles causes this hot mixture to pass out of the hot box into the exhaust header 50 and into the exhaust pipe 52, thereby increasing and accelerating the drawing off of water vapor from the vaporizing coil 44 and the discharge from the upper end of the exhaust pipe 52 of both the vapor and the products of combustion.

Screened cool air intakes 80 having forwardly-facing bells 81 located at opposite sides of the hot box 41 have conduits 82 opening through the side walls of the hot box at the rear end thereof to supply outside air to aid combustion within the hot box and to aid in the discharge of products of combustion from the hot box through the exhaust pipe 52.

A fire wall 83 covers the lower face of the bottom portion 40 and extends across the outer faces of the ends, sides and bottom of the hot box 41.

I claim:

1. A snow melter and vaporizer comprising an upstanding hopper for receiving snow to be melted, a closed hot box underlying and dependently supported from the lower end of said hopper, a plurality of burners extending through and supported in an end wall of said box and each having one end in communication with the interior of said box, a separate source of liquid fuel and of air under pressure connected to the other ends of said burners, a horizontally disposed vaporizing coil positioned within said box and exposed to the flames from said burners, means on one end of said coil and in communication with the bottom of said hopper for receiving the water as the snow is melted, an upstanding exhaust pipe exteriorly of said hopper and having one end connected to the other end of said vaporizing coil for conveying and discharging water vapor from said coil, the upper end of said exhaust pipe being in communication with the atmosphere, and conduit means leading from the interior of said firebox and to said exhaust pipe for conveying the products of combustion emitted from said burners into said exhaust pipe.

2. A snow melter and vaporizer comprising an upstanding hopper for receiving snow to be melted, a closed hot box underlying and dependently supported from the lower end of said hopper, a plurality of jet burners extending through and supported in an end wall of said box and each having the jet end in communication with the interior of said box, a separate source of liquid fuel and of air under pressure connected to the other ends of said burners, a horizontally disposed vaporizing coil positioned within said box and exposed to the flames emitted from said jet ends of said burners, a screened intake supported and in communication with the bottom of said hopper and connected to one end of said coil for receiving the water as the snow is melted, an upstanding exhaust pipe exteriorly of said hopper, conduit means connecting the other end of said coil to said exhaust pipe, the upper end of said exhaust pipe being in communication with the atmosphere, and further conduit means

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leading from the interior of said firebox and into said exhaust pipe for conveying the products of combustion emitted from said jet burners into said exhaust pipe.

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