A snow removal vehicle is described and it has an enclosed snow melting chamber provided with a plurality of high pressure steam jets which are connected to one or more steam generators. The enclosed snow melting chamber has a water collecting reservoir in a lower portion thereof below a bottom wall of the snow melting chamber. The bottom wall has passages to channel water from the snow melting chamber to the water collecting reservoir. The vehicle body has a front entry opening communicating with the snow melting chamber and an auger screw is mounted in the front entry opening to eject snow inside a forward end of the snow melting chamber. Snow propelling wheels are secured along at least a front end portion of the snow melting chamber to propel snow ejected from the auger along the snow melting chamber for contact by the high pressure steam to melt the snow. An outlet evacuating valve is provided to evacuate water collected in the water collecting reservoir. The vehicle may also be equipped with a hopper shute for use in a stationary mode to melt snow dumped in the shute.
SNOW REMOVAL VEHICLE

TECHNICAL FIELD

[0001] The present invention relates to a snow removal road vehicle using high pressure steam jets to melt the snow inside an enclosed snow melting chamber of the vehicle.

BACKGROUND ART

[0002] Snow removal vehicles or containers are known wherein snow is collected and dumped into a container which is provided with conduits through which hot gases flow and which are located close to a top end of these containers whereby snow positioned thereon will melt and the water accumulate at the bottom of the container. Baffle plates are provided so that only water can percolate down into the reservoir. A disadvantage of these is that the reservoirs are not displaceable and they are usually positioned in areas where large parking areas need to be maintained clear of snow. Snow removal vehicles with articulated buckets are required to transport the snow to the container. The container usually has a conduit which connects to the city sewer system to discharge water therefrom.

[0003] With reference to U.S. Pat. Nos. 4,785,561 and 5,588,231, it is also known to provide such containers on vehicles whereby to remove snow from streets and blow the snow into a container which contains boiler tubes. The boiler tubes, as shown in U.S. Pat. No. 4,785,561 melt the snow and water is evacuated from the vehicle. However, such snow melting systems have not been found satisfactory as they are too small and the conduit will clog up with snow rendering the vehicle’s function ineffective. For snow removal applications on streets, such a vehicle is not practical. Also, there are insufficient heating means to melt the snow faster than it is discharged within the chamber. U.S. Pat. No. 5,588,231 describes a similar system although the vehicle is much larger. It is also provided with a boiler and a heater pipe system to circulate hot water therein. A snow blower is used to feed snow into a feeder chute which is of very long length and which obviously would clog up with snow rendering the entire vehicle ineffective. This system is deemed to be inoperable because of its many deficiencies. Further, the melting hopper is too small and would prevent the vehicle from operating at convenient speeds.

SUMMARY OF INVENTION

[0004] It is a feature of the present invention to provide a snow removal vehicle which utilizes high pressure steam in an enclosed snow melting chamber of the vehicle to melt snow and wherein the water produced by the melted snow and condensed steam is collected in the snow melting chamber.

[0005] Another feature of the present invention is to provide a snow removal vehicle having an adjustable front entry opening to adjust the width of the path of the snow being removed from roads and wherein the snow is melted by contact with high pressure steam in an enclosed snow melting chamber of the vehicle, and the collected water in the chamber is drained therefrom into the public sewer system once the water collecting reservoir of the vehicle reaches a predetermined quantity.

[0006] Another feature of the present invention is to provide a snow removal vehicle which utilizes a single operator for its operation and reduces the amount of equipment normally required to clear snow from roads.

[0007] According to another feature of the present invention there is provided a snow removal vehicle wherein a hopper shute is removably securable to a frontal entry opening of the vehicle for guiding snow introduced from an open top end of the hopper shute to an auger screw permitting the vehicle to be used as a snow melting and transport vehicle.

[0008] According to the above features, from a broad aspect, the present invention provides a snow removal vehicle comprising a vehicle body having an enclosed snow melting chamber. The vehicle body is supported on traction means. An operator station is provided for an operator person. The vehicle body has an entry opening communicating with the snow melting chamber. Snow removal means is provided in the entry opening to eject snow inside a forward end of the snow melting chamber. The snow melting chamber has a water collecting reservoir in a lower portion thereof below a bottom wall of the snow melting chamber. Passage means are provided in the bottom wall to channel water from the snow melting chamber to the water collecting reservoir. A plurality of high pressure steam snow melting jets are disposed along the snow melting chamber to eject hot steam therealong. Snow propelling means is provided along at least a front end portion of the snow melting chamber to propel snow ejected from the snow removal means in the entry opening along the snow melting chamber for contact by the steam to melt the snow. Water evacuating means is provided to evacuate water collected in the water collecting reservoir.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

[0010] FIG. 1 is a perspective view of the snow removal vehicle of the present invention;

[0011] FIG. 2 is a perspective transverse section view of the snow removal vehicle of the present invention;

[0012] FIG. 3 is an enlarged fragmentary cross-sectional side view of the snow melting chamber;

[0013] FIG. 4 is a fragmented cross-section view illustrating the position of the steam jets relative to a snow propelling wheel of the snow melting chamber;

[0014] FIG. 5A is a side view of a high pressure steam snow melting jet;

[0015] FIG. 5B is a top view of FIG. 5A;

[0016] FIG. 5C is a cross-section view along cross-section line C-C of FIG. 5A;

[0017] FIG. 6A is a side view of a further embodiment of a high pressure steam melting jet;

[0018] FIG. 6B is a section view along cross-section line B-B of FIG. 6A;

[0019] FIG. 7 is a block diagram illustrating the function of the control panel in association with various elements of the snow removal vehicle;

[0020] FIG. 8 is a transverse section view through the vehicle showing the construction of the ice removal steel brush;

[0021] FIG. 9 is a transverse section view through the vehicle showing the replaceable axle;

[0022] FIG. 10 is a simplified schematic side view showing a hopper shute removably securable to the front entry opening of the snow removal vehicle;

[0023] FIG. 11A is a perspective view of the hopper shute;

[0024] FIG. 11B is a top view of the hopper shute; and
FIG. 11C is a side view showing the hopper shute removably connected to the hinge plow side panels.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0026] Referring to the drawings and more particularly to FIGS. 1 and 2, there is shown generally at 10 the snow removal vehicle of the present invention. As shown in FIGS. 1 and 2, the front end of the vehicle has a front entry opening 11 in which an auger means in the form of an auger screw 12 is mounted and driven at high speed whereby to eject snow positioned therewithin rearwardly into the vehicle body 13.

A plurality of steam generators 14 are mounted integral with the side walls 15 of the vehicle body 13. The vehicle body 13 defines therein an enclosed snow melting chamber 16 as shown in FIG. 2 and it communicates with the front entry opening 11. The vehicle body is also insulated. The vehicle 10 is supported on three sets of wheels 17, 17' and 17", but could also be supported on tracks or other propelling means, not shown.

[0027] As shown in FIG. 2, the front entry opening 11 is provided with a snow guiding ramp 18 rearwardly of the snow auger screw 12 whereby to guide projected snow in an upward direction of arrow 19 upwardly into the forward end 20 of the snow melting chamber 16.

[0028] The front entry opening 11 is further provided with variable snow collecting means in the form of hinged plow side panels 23, as better shown in FIGS. 1 and 2 which are secured to opposed side edges 24 of the front entry opening 11. The panels 23 may be equipped with a telescopic frontal section 23' to adjust the length of the panels. Pistons 21 are secured to each of these panels whereby to position the hinge plow panels 23 at a desired angle with respect to the front entry opening. Each panel 23 is independently controlled. By controlling the position of the angle of these side panels an operator can control the width of a surface to be plowed, or in this case to clear the snow therewithin as the snow is not displaced to the sides but is ingested by the snow removal vehicle 10.

[0029] With specific reference now to FIGS. 2 and 3, the enclosed snow melting chamber 16 has an intermediate bottom wall 25 supported elevated from the bottom wall 26 of the vehicle. The area between the bottom wall 25 of the chamber and the bottom wall 26 of the vehicle defines a water collecting reservoir 27. A plurality of high-pressure snow melting, high pressure steam turbo-jets 28 are positioned within the vehicle opposed side walls 15. As shown in FIG. 4, these jets may also be optionally mounted in the top wall 29 and adjacent the bottom wall 25 and these are identified by reference numeral 28'. These high-pressure snow melting jets are connected to suitable conduit means (not shown) to the steam generators 14 whereby the enclosed snow melting chamber 16 is filled with high-pressure steam turbulence of about 25 thousand BTUs, along its entire length or at least concentrated in the front portion thereof. Jets 28" may also be fitted with snow propelling wheels 32. Cameras 30 are also mounted in the enclosed snow melting chamber 16 to provide visual access thereof from the control cabin 31 at the front end of the vehicle where an operator sits and controls the vehicle. A control panel 32 is provided in the conductor cabin 31.

[0030] A plurality of snow propelling means in the form of propelling wheels 32 are secured in the enclosed snow melting chamber 16 along at least the forward end portion 20 thereof to propel snow ejected from the auger screw 12 along the snow melting chamber and in contact with the high pressure steam from the high pressure steam ejecting jets 28 whereby to disperse the snow for contact with the high pressure hot steam to melt the snow quickly. Water resulting from the melted snow and condensed steam is channeled through the water collecting reservoir 27 through openings 35 formed in the bottom wall 25 of the snow melting chamber 16. These passage openings 35 have a trough-like shaped wall section 36 and a sufficient number of these are provided whereby the water is evacuated quickly from the snow melting chamber to flow to the water collecting reservoir. Two or more level sensors 37, see FIG. 3, are secured in a wall of the water collecting reservoir to detect the water level. A second uppermost one of the sensors, namely sensor 37", would advise the operator of an approximate quantity of snow that needs to be collected until a top sensor 37" gives a signal to the operator that the reservoir needs to be emptied. This permits the operator to gauge the time remaining to evacuate the water from the reservoir.

[0031] In order to evacuate the water from the reservoir 27 there is provided a drain pipe 38, herein shown mounted in the rear wall 39 of the vehicle and it has a valve 40. A flexible conduit (not shown) is connected to the drain pipe whereby to channel the water from the water collecting reservoir into the city sewer system or elsewhere. Although not shown, one of the steam generators 14 may have another flexible hose connected thereto together with a mechanical rod having a control valve whereby to unblock a sewer should a sewer be iced-in whereby the reservoir can be empty under any cold climate condition in the sewer system. The location of city sewers would also be accessible through stored information available in the control panel.

[0032] As more clearly illustrated in FIGS. 2 and 3, the propelling wheels 32 have a driven axle 45 which is supported across the opposed side walls 15 of the vehicle across the snow melting chamber 16 and this is done by conventional mechanical means. The snow propelling wheels 32 are also supported elevated above the bottom wall 25. To each of the axles 45 there is secured a drum 45' having at least two, herein a plurality of elongated flat blades 46 and extending along opposed sides of the drum and projecting outwardly therefrom. The blades 46, when seen in cross-section, have an elongated curved profile 47 which slopes in the direction of the blade, herein in the clockwise direction as indicated by arrow 48 to project snow disposed on a collection surface 49 thereof upwardly and in a rearward direction, as shown by arrows 48', within the snow melting chamber 16 for contact with the high-pressure steam being ejected by the jets 28. The axles 45 may have a sprocket adjacent an end thereof and driven by a drive chain which is secured to an electric motor whereby to drive these propelling wheels in a clockwise direction. Accordingly, snow from the auger is fed inwardly into the first propelling wheel 32' and it ejects snow upwardly in the direction of arrows 50 for contact with the hot steam. Any snow that has not melted is then deposited onto the following snow propelling wheel 32 and so on until there is no snow or very little snow within the enclosed snow melting chamber. Any snow falling on the bottom wall 25 will melt quickly due to the heat generated by hot water collected within the chamber 16 and the jets. Alternatively, the bottom wall 25 can be heated by running the conduits (not shown) from the steam generators 14 in contact under the wall 25.

[0033] It is also pointed out that the snow melting jets 28 may be connected in two or more groups along the snow
melting chamber 16. Each group of snow melting jets may be secured to one or more steam generators 14. Each steam generator of each of the groups of jets is controlled through the control panel 32 in the cabin 31. This is accomplished, as shown in FIG. 7, by controlling valves 51 associated with each steam generator 14. As shown in FIG. 4, the drum 45 of the propelling wheels 32 may also be equipped with jets 28.

[0034] Referring now to FIGS. 5A to 6B, there will be described the construction of two types of the snow melting jets 28. As shown in FIGS. 5A to 5C, a first type of the snow melting jets is identified by reference numeral 60 and it has an outer conical shape 61 whereby to form a pressure build-up formation 62 on its inner conical passage 61'. As shown in FIGS. 5B and 5C, flanges 63 having an arcuate shape position inside the conical passage 61' and these are of reduced size and create resistance to the high pressure steam line connected to the connector end 64 of the jet 60. This progressively diminishing passage extends to an open nozzle end 65 where the hot steam is ejected at an increased pressure of about 20,000 to 30,000 psi and in the form of a beam.

[0035] In the embodiment of FIGS. 6A and 6B, the high pressure steam snow melting jet 70 is differently shaped and it has a pressure build-up section 71 of reduced cross-section as hereinshown whereby pressure from the conduit connected at its connecting end 72 will build-up and be directed through a narrow bottom opening 73 into a flared narrow passage created in the flared section 74 providing a wide flat beam of high pressure steam whereas in the embodiment of FIGS. 5A to 5C the hot steam is ejected as a very narrow thin-shaped beam. These types of nozzles are directionally mounted to permit the construction of a snow melting chamber producing hot steam beams which are of a flared profile and beam-shaped profile and oriented such as to prevent the accumulation of snow within the snow melting chamber.

[0036] As shown in FIG. 7, the control panel also controls motors 52 coupled to the axles of each of the snow propelling wheels 32 and these can also be controlled independently, as will be described later. As shown in FIG. 1, a control panel 52 may also be mounted exteriorly of the vehicle body 13 to monitor part of the system such as to provide a signal to the operator that the water collecting reservoir 27 is empty as the operator is outside the vehicle to evacuate collected water into the city sewer system. Of course, this can also be sensed or made visible by a transparent section of the conduit connected to the pipe 38 when water stops flowing. A submersible pump, not shown, may also be mounted in the water-collecting reservoir to evacuate water therefrom at high speed whereby the vehicle does not remain idle for a long period of time to discharge the water collected in the reservoir. A GPS system may also be integrated with the control panel to indicate a route for the operator of the vehicle and the status of the streets on which snow has to be collected or has already been cleared.

[0037] FIGS. 1 and 2 show an articulated boom 75 formed of rigid vacuum conduit sections 76 and a rectangular suction port 77 to suck snow from side walls, roofs and other areas difficult to access. The boom 77 connects to an impeller chamber 78 inside the vehicle where a discharge wheel 79 releases the snow onto a propelling wheel 32 through an opening 80. The impeller wheel 79 is driven at high speed to create a suction air flow in the articulated conduit 75 and direct the snow thereon to be propelled through the opening 80 at the end of the curved side wall section 81.

[0038] As shown in FIGS. 1 and 2, it can be seen that the snow removal vehicle 10 of the present invention is further provided with a metal detector assembly 85 which is comprised of a boom 86 having a metal detector sensor 87 secured to a free forward end thereeto. The support frame 86 projects forwardly of the vehicle to detect metal objects in the snow in the path of the vehicle. This metal detector 87 provides signals to the control panel 32 in the operator station 31 whereby to alarm the operator of a metal object in its path to be removed.

[0039] As shown in FIGS. 2 and 8, also provided with the snow removal vehicle of the present invention is an operator actuable ice abrading and removal steel brush 90 which is secured rearwardly of the auger wheel 12 to abrade and brake ice formed on the road surface where snow is being removed. The brush is lowered and retracted by a pair of cylinders 92 secured at opposed ends of the brush axle 93. The abraded and broken ice is propelled by the high speed rotating brush 19 into the snow propelling wheel 32 through a trap door 91 which can also be operated from the cabin. The door 91 also forms a protective passage when open, not shown, to prevent water from the melted snow in the snow melting housing from leaking out therefrom. The brush 90 is a steel brush having stiff bristles capable of abrading and cutting ice.

[0040] With reference to FIGS. 1 and 9, it is pointed out that there are three sets of traction wheels, namely traction wheels 17, 17' and 17". The front and rear sets 17 and 17' are driven in tandem whereas the intermediate set is independently driven. The intermediate set of wheels 17" is also supported elevated from the front and rear sets 17 and 17' by cylinders 95 and is provided with a disconnectable drive couple, of a type well known in the art. The intermediate set 17" has a displaceable axle 94 to which the cylinders 95 are secured whereby this set can be lowered to engage the ground surface and connect to a drive shaft by its drive coupling to permit independent operation of the wheels of the intermediate set whereby to cause the vehicle to maneuver around abrupt street intersections by the use of the intermediate set of wheels.

[0041] Referring now to FIG. 10, there is shown a fragmented front view of the vehicle and to which is removably secured a hopper chute 80 whereby snow can be dumped in the hopper by a front end loader vehicle having an articulated bucket 81 whereby snow can be processed by the vehicle and melted with the water collected while the vehicle is stationary. Such is desirable when it is necessary to evacuate mounds of snow from large parking spaces, for example in shopping plazas, thereby liberating the parking area. Accordingly, a front end loader-type vehicle would gather the snow and dump it in the hopper chute 80 while the snow removal vehicle 10 is stationary close to the snow pile. In order to minimize fuel, the snow removal vehicle 10 can be relocated to different locations where, for example, snow has been piled so that the front end loader vehicles do not have to travel long distances to dump snow. It can be appreciated that with the snow removal vehicle 10 having this retrofit hopper chute that it is no longer required to accumulate large mounds of snow in large parking areas or any other areas. Also, this use of the snow removal vehicle 10 obviates the need of having to transport accumulated snow by the use of dump truck which often have to travel very large distances to snow dumps, again expending fuel and polluting the air and also forming unsightly mountains of snow in city dump areas. This snow removal system is also very expensive.
As shown in FIGS. 10 to 11C, the hopper chute 80 is provided with a circumferential side wall comprised of a front side wall 82, a rear side wall 83 and parallel transverse upper side walls 84, as better seen in FIGS. 11A and 11B, extending between the front side wall 82 and rear side wall 83. A slide wall 85 extends between and is secured to the parallel transverse side walls 84 by means such as welding along welds 86 and projecting downwards from a lower edge 84' of the side walls 84.

As shown in FIG. 11C, the hopper chute 80 is secured to the frontal entry opening 11 by attachment to the hinge plow side panels 23, as previously described. A connector means in the form of latch connectors 87 provides for detachable securement thereto with the hinge plow side panels positioned substantially parallel to one another on the side of the front end opening 11. The hinge plow side panels are positioned and retained in proper alignment by the pistons 21, in a fashion as previously described. Accordingly, snow dumped into the open top end 88 of the hopper chute is guided directly into the hopper screw 12 which projects the snow in an upward direction as shown by arrow 19 into the forward end 20 of the snow melting chamber whereby to be propelled rearwardly by the propelling wheel 32 as previously described. A vibratory motor (not shown) could be incorporated to vibrate the slide wall 85. Once the reservoir of the vehicle is full, the water is dumped in the closest city sewer, thus economizing on fuel and time.

As shown in FIGS. 11A to 11C, the slide wall 85 slopes rearwardly from a top edge 82C of the front wall 82 and inwardly to terminate at a lower end 82D a predetermined distance form the auger screw 12.

It is within the ambit of the present invention to cover any other obvious modifications of the preferred embodiment described herein provided such modifications fall within the scope of the appended claims. For example, it may be contemplated to construct small versions of the vehicle to remove snow from driveways of residential housing and parking lots of shopping centers to prevent the accumulation of snow on valuable space or on city streets or residential land where homeowners would be required to hand shovel. Snow shoveling has been found to be hazardous to the health of certain individuals having weak heart or spinal chord problems. The smaller vehicle would also be equipped with a hose to evacuate water from the reservoir into the city sewer system. It would also be equipped with a small steam boiler and a vacuum pump.

Further, the smaller snow removal vehicle may have the back wheels articulable as are the front wheels whereby the vehicle can maneuver around sharp corners. The snow removal vehicle 10, as herein shown, is also particularly, although not exclusively, adapted to clear snow from main arteries where the roads are wide, long and straight. Also, a scraper means, in the form of a mechanical scraper or water jets, may be mounted adjacent the bottom wall 26 of the reservoir 27 to remove any accumulated sand or debris collected with the snow and transferred therein, and evacuated through a trap door provided in the bottom wall 26. Although not shown, water from the collecting reservoir can be recirculated into the steam generator to maintain the generators in operation.

Although the hopper chute as shown in the drawings is shown secured to the hinge plow side panels 23, it is also intended that if such side panels are not provided on the snow removal vehicle, the hopper chute can be secured otherwise to the front end of the snow removal vehicle, as is obvious to a person skilled in the art and again by a removable connection. Still further, the hopper chute can be secured to a pair of lift arms, one secured on each side of the hopper chute and of the vehicle, and which may be piston operated by the operator of the vehicle whereby the hopper chute can be displaced to a storage position over the front end of the vehicle, such as on top of the cab of the vehicle, and be brought down in front of the vehicle when necessary to utilize the snow removal vehicle with the hopper chute. This provides for a vehicle which can be quickly and easily converted for its use as a plow or as a stationary snow melting vehicle.

1. A snow removal vehicle comprising a vehicle body having an enclosed snow melting chamber, said body being supported on traction means, an operator station in said vehicle, said vehicle body having a frontal entry opening communicating with said snow melting chamber, snow removal means in said entry opening to eject snow inside a forward end of said snow melting chamber, said snow melting chamber having a water collecting reservoir in a lower portion thereof below a bottom wall of said snow melting chamber, said snow melting chamber further having water collecting means electrically connected to said level sensors to monitor the water level in said water collecting reservoir, a plurality of high pressure steam snow melting jets disposed along said snow melting chamber to eject hot steam therealong, snow propelling means along at least a front end portion of said snow melting chamber to propel snow ejected from said snow removal means in said entry opening along said snow melting chamber for contact by said steam to melt the snow, and water evacuating means to evacuate water collected in said water collecting reservoir.

2. A snow removal vehicle as claimed in claim 1 wherein said entry opening is a frontal entry opening provided with adjustable snow collecting means, said adjustable snow collecting means adjusting the width of a surface on which snow is collected and directed into said entry opening.

3. A snow removal vehicle as claimed in claim 2 wherein said adjustable snow collecting means is constituted by hinged plow side panels secured to opposed side edges of said front entry opening, and controllable pistons secured to said hinged plow side panels to independently position each said hinged plow panels with respect to said front entry opening.

4. A snow removal vehicle as claimed in claim 3 wherein said hinged plow side panels have a telescopic frontal section to adjust the length of said side panels.

5. A snow removal vehicle as claimed in claim 1 wherein there is further provided one or more monitoring cameras inside said snow melting chamber to monitor the operation of said snow melting jets.

6. A snow removal vehicle as claimed in claim 1 wherein said snow melting jets are secured to one or more steam generators by conduits, at least some of said conduits having control valves therein.

7. A snow removal vehicle as claimed in claim 1 wherein said snow removal means is an auger screw.

8. A snow removal vehicle as claimed in claim 6 wherein said conduits are provided with control valves controlled by switches provided on an operator control panel.

9. A snow removal vehicle as claimed in claim 8 wherein water level sensors are secured in said water collecting reservoir, said operator control panel having indicator means electrically connected to said level sensors to monitor the water level in said water collecting reservoir.
10. A snow removal vehicle as claimed in claim 1 wherein said propelling means is constituted by two or more elongated snow propelling wheels, each said elongated snow propelling wheels having a driving axle supported across opposed side walls of said enclosed snow melting chamber and spaced above said bottom wall, said axle having at least two elongated curved flat blades secured along opposed sides of said axle and extending outwardly therefrom and oriented to project snow received from said snow propelling means rearwardly into said snow melting chamber.

11. A snow removal vehicle as claimed in claim 10 wherein said axles have a driven end secured to drive means for rotating said axles in unison in a clockwise direction, said curved flat blades slopping in the direction of displacement of said blade to project snow disposed on a collection surface thereof upwardly and in a rearward direction in said snow melting chamber.

12. A snow removal vehicle as claimed in claim 1 wherein said entry opening is a front entry opening provided with a snow guiding ramp rearwardly of said snow removal means to guide snow in an upward direction in said forward end of said snow melting chamber.

13. A snow removal vehicle as claimed in claim 11 wherein said snow removal means is a driven auger screw supported across said entry opening.

14. A snow removal vehicle as claimed in claim 6 wherein said snow melting jets are connected in two or more groups along said snow melting chamber, each group of snow melting jets being secured to one or more steam generators associated with each said group, the operation of said steam generators of each said groups being controlled by a control panel operated by an operator person.

15. A snow removal vehicle as claimed in claim 14 wherein said snow melting jets include a connecting end secured to a steam pressure conduit, a pressure build-up formation in said snow melting jets to increase the pressure of said steam to a desired output pressure to rapidly melt said snow, and a pressure nozzle at a free end of said jets.

16. A snow removal vehicle as claimed in claim 15 wherein said pressure build-up formation is constituted by a progressively diminishing passage between said connecting end and said nozzle.

17. A snow removal vehicle as claimed in claim 16 wherein said nozzle is a small circular opening at said free end of said jets providing a beam of hot high pressure steam.

18. A snow removal vehicle as claimed in claim 16 wherein said nozzle is an outwardly flared narrow passage providing a wide flat beam of hot high pressure steam.

19. A snow removal vehicle as claimed in claim 15 wherein said desired output pressure is in the range of from about 20,000 psi to 30,000 psi.

20. A snow removal vehicle as claimed in claim 1 wherein there is further provided a vacuum suction articulated conduit to suck snow into a vacuum chamber inside said vehicle at said forward end of said snow melting chamber and transfer means to discharge said snow on said snow propelling means.

21. A snow removal vehicle as claimed in claim 20 wherein said vacuum chamber is constituted by an impeller chamber communicating with a rear end of said articulated conduit, a high speed impeller wheel in close fit with a curved inner wall portion of said impeller chamber to create a suction air flow in said articulated conduit and to propel snow sucked thereon through an outlet port of said impeller chamber and onto said snow propelling means.

22. A snow removal vehicle as claimed in claim 1 wherein there is further provided a metal detector secured at a front end of said vehicle body and projecting forwardly thereof to detect metal objects in said snow in the path of said vehicle, said metal detector providing a signal at said operator station for remedial action by an operator person to prevent damage to said vehicle.

23. A snow removal vehicle as claimed in claim 1 wherein there is further provided a mechanical abrading and removal means rearwardly of said snow removal means to abrade and brake ice formed on a road surface where snow is being removed and to propel said broken ice onto said snow propelling means.

24. A snow removal vehicle as claimed in claim 23 wherein said ice abrading and removal means is reconstituted by a steel brush actuated by an operator person in said operator station.

25. A snow removal vehicle as claimed in claim 24 wherein said broken ice is propelled onto said snow propelling means through a trap door and protective passage to prevent water from melted snow and ice from leaking out of said snow melting chamber.

26. A snow removal vehicle as claimed in claim 1 wherein said traction means constitutes three sets of traction wheels, a front and rear set and an intermediate set, said intermediate set being supported elevated from said front and rear set and having a dismountable drive coupling, said front and rear set being secured to a replaceable axle assembly wherein said front and rear set can be lifted to permit said intermediate set to engage a ground surface and be connected to said drive shaft by said drive coupling to permit independent operation of the wheels of said intermediate set to cause said vehicle to maneuver around abrupt street intersections.

27. A snow removal vehicle as claimed in claim 1 wherein a hopper chute is secured to said front entry opening and having circumferential side walls, an open top end and a slide wall for guiding snow introduced from said opening top end to said snow removal means in said entry opening.

28. A snow removal vehicle as claimed in claim 27 wherein said slide wall is angulated from a front side wall of said circumferential side walls to said snow removal means.

29. A snow removal vehicle as claimed in claim 28 wherein snow removal means is an auger screw.

30. A snow removal vehicle as claimed in claim 27 wherein there is further provided hinged plow side panels secured to opposed side edges of said entry opening, displaceable means secured to said hinged plow side panels to independently position each said hinged plow panel with respect to said front entry opening, said hopper chute being securable to said hinged plow panels by detachable connector means.

31. A snow removal vehicle as claimed in claim 30 wherein said detachable connector means are clamps interconnecting said hopper chute to said hinged plow panels with said panels disposed substantially parallel to one another and on a respective side of said entry opening.

32. A snow removal vehicle as claimed in claim 31 wherein said hinged plow circumferential side walls is comprised of said front side wall, a rear side wall, and parallel transverse side walls extending between said front side wall and rear side wall and forming said circumferential side walls rectangular in shape, said side wall extending between and secured to said parallel transverse side walls and projecting downwards from a lower edge of said circumferential side walls and in close fit between said hinged plow side panels.

33. A snow removal vehicle as claimed in claim 30 wherein said connector means are latch connectors.