Nov. 5, 1968 C. V. GETTI 3,409,006

SNOW DISPOSAL MACHINE

Filed March 2, 1967 2 Sheets-Sheet 1

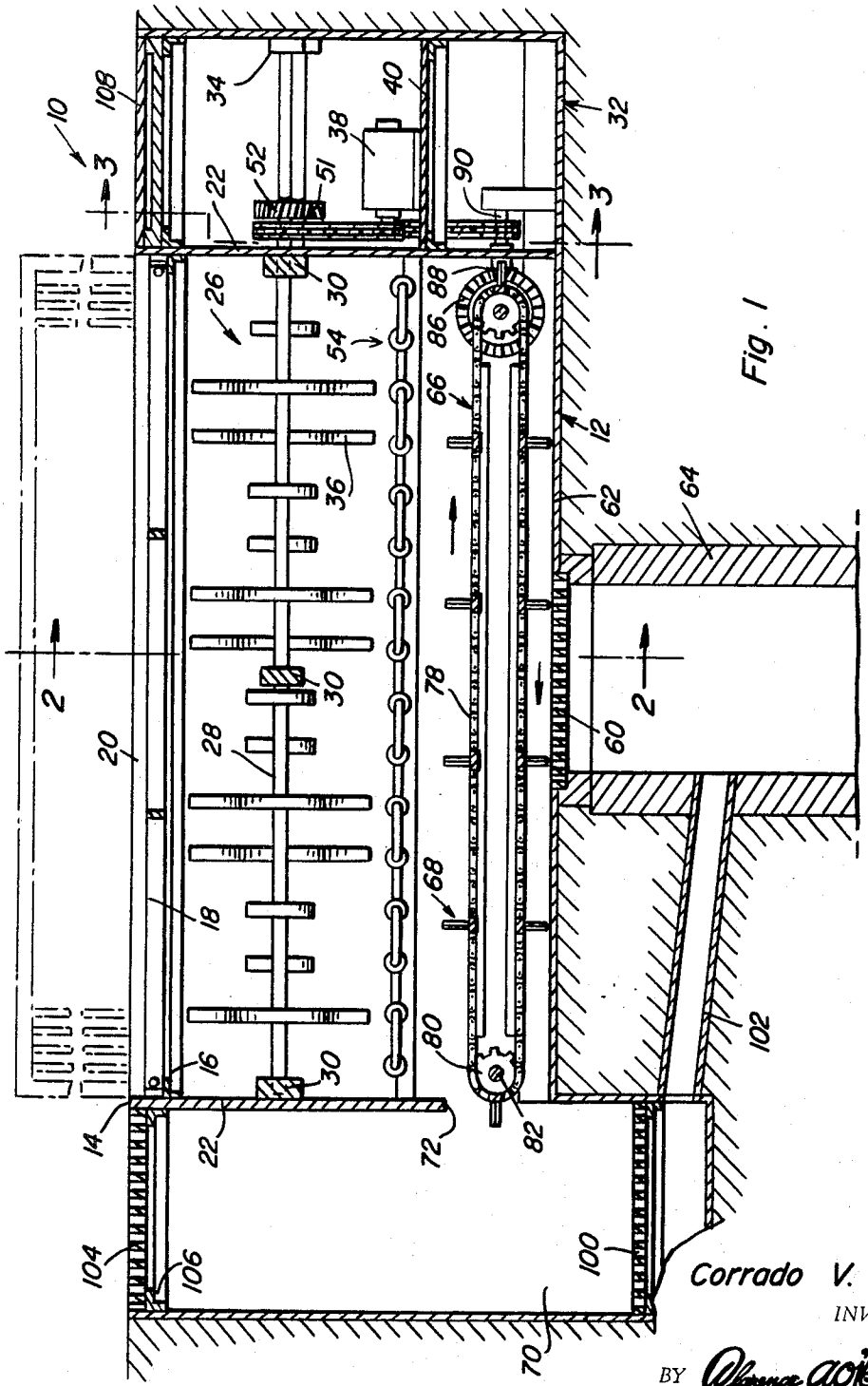


Fig. 1

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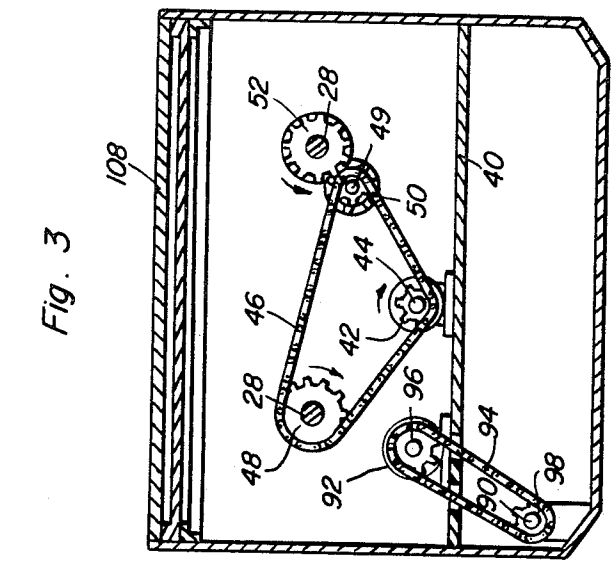


Fig. 3

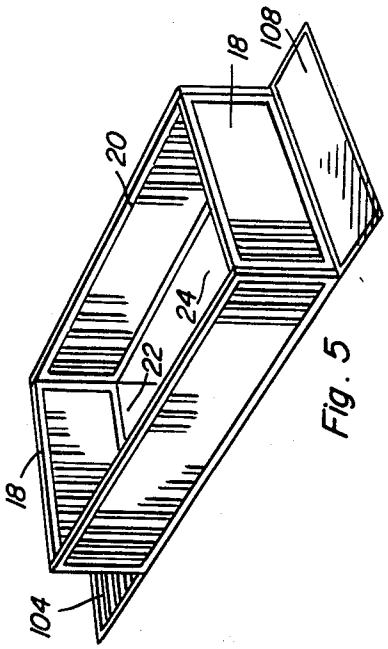


Fig. 5

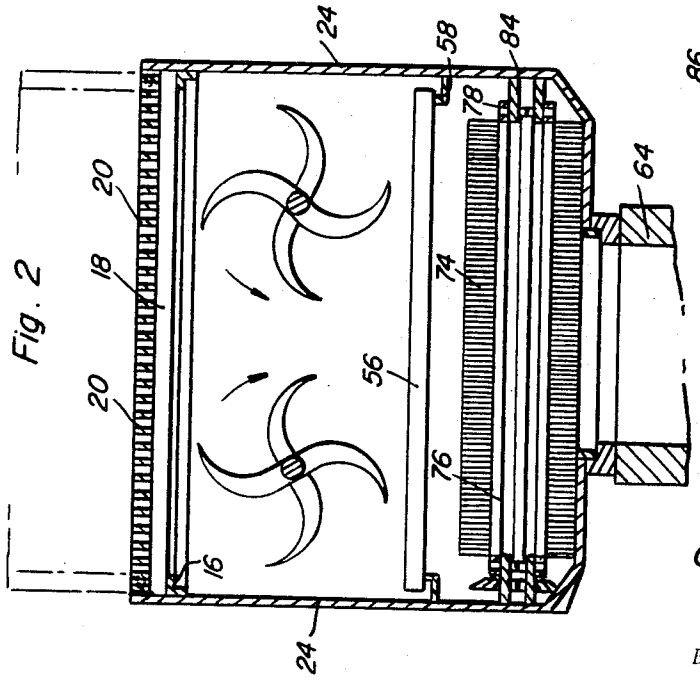


Fig. 2

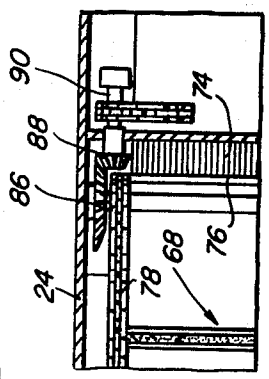


Fig. 4

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SNOW DISPOSAL MACHINE

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10 Claims. (Cl. 126—343.5)

ABSTRACT OF THE DISCLOSURE

A machine for receiving, pulverizing and melting large amounts of snow for subsequent disposal of the melted snow through a municipal sewer system. The apparatus includes means for separately collecting the debris associated with the load of snow so as not to clog or otherwise interfere with the disposal of the melted snow through the sewer system.

The instant invention generally relates to a snow disposal machine, and is more particularly concerned with apparatus adapted to receive collected snow from dump trucks or the like and subsequently completely disposing of both the snow and the debris normally associated with such loads of snow.

A major snow removal problem particularly prevalent in larger cities is the actual disposal of the snow subsequent to its removal from the streets. Such snow is often trucked long distances at great expense or, as is equally unsatisfactory, piled in high banks to each side of the street, and in many instances over the various sidewalks bordering the streets. Accordingly, it is a primary object of the instant invention to provide a means for the disposal of large volumes of snow utilizing the conventional sewer system of the particular municipality involved and requiring the trucking of loaded snow for only extremely short distances.

Basically, in achieving this object, the instant invention is to comprise snow removal apparatus which is adapted to be mounted below ground level at any readily available location, such as for example public or private parking lots, side roads, etc. This apparatus is to include a barrier defining series of grate sections which, when closed, constitute a portion of the road bed or parking lot area capable of sustaining any of the normally expected loads, whether it be cars passing thereover or cars parked thereon. In this manner, it will be appreciated that the only time the particular space under which the machine is located will not be available for normal uses, will be during snow emergencies when it becomes necessary to dispose of large quantities of snow. The actual disposal operation includes the passing of dump truck loads of snow through a pulverizing unit, and subsequently onto and through a heating unit which, in conjunction with the pulverized state of the snow, effects a thorough melting of the snow for disposal through a subjacent storm sewer or the like communicated directly with the sewer system. In addition, in order to avoid any clogging of the sewers, special provision is made for the lateral disposal of any debris which might have been included in the snow load.

In providing such an apparatus, it is also a particularly significant object of the invention to devise a machine which is both, economical to manufacture and extremely simple in operation, notwithstanding the uniqueness associated therewith.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout and in which:

FIGURE 1 is a longitudinal cross-sectional view through the snow disposal machine comprising the instant invention;

FIGURE 2 is a transverse cross-sectional view taken substantially on a plane passing along section line 2—2 of FIGURE 1;

FIGURE 3 is a transverse cross-sectional view taken substantially on a plane passing along line 3—3 of FIGURE 1;

FIGURE 4 is a partial cross-sectional view illustrating the drive for the debris removal unit; and

FIGURE 5 is a schematic illustration, in perspective, of the manner in which the machine covering grates cooperate, in their open position, in the formation of a safety barrier.

Referring now more specifically to the drawings, reference numeral **10** is used to generally designate the snow disposal machine of the instant invention. This machine **10** includes a buried, central enlarged and elongated corrosion resistant tank **12** which may be formed of galvanized steel, concrete, or any other suitable material capable of being embedded in the earth, sustaining its shape, and resisting deterioration.

Secured peripherally about the inner surface of the tank **12** immediately below the ground level located top edge **14** thereof is a support shoulder defining member **16** which receives two layers of grate panels **18** and **20**. The panels **18** are pivotally mounted adjacent each tank end wall **22** for movement between a first horizontal position supported on the peripheral shoulder defining member **16**, and a second vertical position, paralleling the adjacent end walls **22**. The two grate panels **20** are pivotally mounted adjacent each tank side wall **24** for movement between a first horizontal position overlying and supported on the horizontally positioned grate panels **18** and a second position projecting vertically upward from the tank **12** immediately adjacent and parallel to the elongated side walls **24**. The height of the grate panels **20** are to be such whereby the two panels **20**, when positioned horizontally, combine so as to completely cover the top of the tank **12** and constitute a support surface for any load to which the location area might be subjected during normal usage. The grate panels **18**, by the same token, are of substantially equal height with the panels **20** thereby, noting FIGURE 1, in most instances actually terminating short of each other when positioned horizontally, while at the same time providing a substantaial support base for a major portion of the grate panels **20**. When the panels **18** and **20** are vertically orientated a peripheral safety barrier, preferably approximately two and one-half to three feet high, is provided about the top of the tank **12**. This barrier will of course be stabilized through the provision of suitable means for inter-connecting the adjacent ends of the grate panels **18** and **20**, and will thereby provide for the protection of persons working about the machine during the unloading operation. Furthermore, the limiting of the height of the grate panels to approximately two and one-half to three feet is particularly significant in that this height can be easily cleared by a conventional dump truck, thereby allowing for a dumping of a load of snow and possibly ice into the tank **12** without lowering or otherwise removing the barrier formed by the adjacent vertically positioned grate panels **18** and **20**. The actual hinged or pivoted mounting of the panels **18** and **20** can of course be effected in any desired manner, such as through the use of pivot pins extending from each of the side members of each of the panels and into the adjacent wall of the tank **12**, or through the utilization of a conventional leaf-type hinge.

Mounted beneath the protective grates is the snow

pulverizing unit **26**. This pulverizing unit **26** comprises a pair of longitudinally extending laterally spaced shafts **28** rotatably mounted on the opposed end walls **22** of the tank **12**, as well as and at an intermediate point therealong, by means of suitable bearing type supports **30**. Each of the shafts **28**, at one end thereof, continues through the adjacent end wall **22** and into a secondary buried tank **32** within which the various power producing means are located. The shafts **28** within the tank **32** may extend completely thereacross for a support of the remote end thereof by a suitable bearing support **34** similar to the supports **30** associated with the shaft **28** within the main tank **12**. Each of the shafts **28** has a series of chopping or pulverizing blades **36** affixed thereto for rotation therewith. The blades on each of the shafts **28** are located at equally spaced points therealong within the tank **12** with each blade being orientated at a rotated 90 degrees from the adjacent blades so as to insure maximum contact with the normally compacted snow being introduced into the tank **12**. By the same token, as will be readily appreciated from FIGURE 2, each of the blades **36** will curve outwardly and forwardly, along the path of rotation, from diametrically opposed sides of the corresponding shaft **28**. The length of the blades **36**, as well as their exact orientation relative to each other and the blades of the adjacent shaft **28**, will of course be such so as to allow for a free rotation thereof, with the actual spacing between the blades **36** mounted on the two shafts **28** being such so as to obtain the maximum pulverizing action for the particular nature of the snow or ice normally encountered in a particular environment.

The driving of the shafts **28** is achieved through the utilization of an electric motor or the like **38** mounted upon an appropriate base or platform **40** within the machinery tank **32**. This motor **38** has an appropriate drive gear **42** mounted on the drive shaft **44** thereof. The gear **42**, through an endless chain **46**, drives one shaft **28** by engagement of the chain **46** over a gear **48** keyed directly to this one shaft **28**, and driving the other shaft **28** by an engagement of the chain over a gear **50** mounted on an auxiliary shaft **49** which in turn mounts a gear **51** meshed with gear **52** keyed directly to the second pulverizing shaft **28**. The two shafts are thereby simultaneously driven inwardly relative to each other. This particular gear arrangement will be best appreciated from FIGURE 3.

Immediately below the pulverizing unit **26**, and also extending along the full length of the tank **12**, is the snow melting unit **54**. This unit **54** comprises a plurality of laterally spaced electric rods **56**, each extending transversely across the tank **12** and being supported on suitable insulated supports **58** affixed along the side walls **24**. These rods **56** are of course all interconnected both to each other and to a source of electrical power which will also be located within the machinery tank **32**. It is contemplated that the rods **56** be so spaced from each other as to come into contact with a major portion of the pulverized snow falling to and through the melting unit **54**, thereby effecting a substantially complete melting of the pulverized snow for a subsequent disposal through a grate **60** located centrally within the bottom wall **62** of the tank **12** and communicated directly with a storm sewer **64** or the like which in turn constitutes a portion of or leads directly to the municipal sewer system. In this manner, it will be appreciated that the snow originally introduced through the top of the tank **12** ultimately runs off through the sewer system in the form of water. Furthermore, in order to facilitate the drainage of the water through the grate **60**, the bottom wall or floor **62** of the tank **12** may include a slight slope thereto leading to the grate **60**.

While such a system constitutes a highly efficient means for disposing of large quantities of snow, the snow delivered to the machine **10** by means of dump trucks or the like frequently contains large amounts of additional debris which, if allowed to collect on the grate **60** or enter the storm sewer **64**, would greatly inhibit the drainage of the melted snow therethrough, and could ultimately cause a complete blockage thereof. In order to avoid this problem, a debris removing unit **66** is provided within the tank **12** immediately above the bottom **62**. This unit **66** comprises a series of longitudinally spaced transversely extending brushes **68** which, during the operation of the machine **10**, constantly sweep longitudinally along the bottom **62** of the tank **12** so as to dispose of any accumulated debris through a movement of the debris into a second end-located tank **70** provided at the end of the main tank **12** opposite from the tank **32**, the debris being introduced into the tank **70** through an appropriate opening **72** provided in the adjacent main tank end wall **22** as will be readily appreciated from FIGURE 1.

Each of the brushes **68**, in addition to the sweeping bristles **74**, also includes a transversely elongated bristle mounting spline or bar **56** which is affixed, at the opposite ends thereof, to a pair of endless chains **78**. The chains **78**, located adjacent the opposed side walls **24** of the main tank **12**, are in turn engaged about, in each instance, a pair of sprockets or gears **80** affixed to a pair of shafts **82** extending transversely across the main tank **12** adjacent the ends thereof. The upper and lower runs of each of the chains **78**, between the shaft mounted gears **80** about which they are engaged, will be suitably supported by backing plates **84** which, noting FIGURE 2, engage under each of the upper chain runs and over each of the lower chain runs. In this manner, not only is the upper chain run of each chain **78** properly supported during its return movement, but also, each of the lower chain runs is maintained at a fixed elevation so as to insure a proper brushing engagement of the bristles **74** with the bottom **62** of the tank **12**. The driving of the chains **78**, and thereby the sequential movement of the brushes **68** along the bottom **62** of the tank **12**, is effected through meshed beveled gears **86** and **88**, one affixed to the chain shaft **82** located adjacent the machinery tank **32**, and the other engaged therewith and mounted on a rotatably mounted shaft **90** projecting through the adjacent end wall **22** and appropriately driven from a second motor **92** through an endless chain **94** engaged about the drive gear **96** on the motor **92** and a second gear **98** fixed to the shaft **90**. In this manner, upon operation of the motor **92**, the debris removing unit **66** will commence operation with the transversely elongated brushes **68** being sequentially moved along the bottom **62** of the tank **12** so as to move any accumulated debris therealong away from the drainage grate **60** and into the debris receiving end tank **70** through the end wall opening **72**, the brushes **68** continuing in an endless manner through the tank **12**.

The debris receiving tank **70** is in turn provided with a drainage or grate floor **100** which enables a draining of any water introduced thereinto through an appropriate pipe or channel defining member **102** into the main storm sewer **64**. It will of course be appreciated that the main portion of the water will drain directly from the main tank **12** through the grate **60**. The debris receiving tank **70** will naturally have to be cleaned at intervals as the debris accumulates therein. However, it is contemplated that the draining floor **100** therein be so located below the opening **72** through which the debris is introduced as to make such cleanings infrequent. In order to provide access into the tank **70** for cleaning, a separate removable grate **104** is provided at the upper end thereof on a suitable internal peripheral supporting shoulder defining member **106**. Along the same lines, a suitable waterproof cover **108** is similarly provided for the upper end of the machinery tank **32**, the cover **108** if so desired, actually constituting two overlying plates forming a positive weather-tight shield.

From the foregoing, it will be appreciated that a unique snow disposal machine has been defined, this machine being capable of location in any downtown area without

requiring the elimination of any normal surface area for parking spaces or the like, excepting during an actual use of the machine. In such use, the buried machine receives large loads of snow, normally from dump trucks or the like, and initially pulverizes and subsequently melts the pulverized snow for the disposal of the resultant water through the municipal sewerage system. In conjunction with the receiving and disposing of the loads of snow, specific provision is made for the removal of any associated debris and in turn which avoids a clogging of the machine or sewer system and allows the continued efficient operation of the machine without frequent work stoppages such as would be necessary were specific provision not made for the removal of debris. Also of significance with regard to the use of the machine, is the utilization of the covering grates as a means for providing a safety barrier completely about the snow receiving tank, this being done without effecting the snow receiving nature of the tank. Further, while not specifically illustrated, the instant invention contemplates the optional provision of an easily opened cover directly below the grates for the purpose of retaining heat within the tank **12** should truck loads of snow be arriving several minutes apart. This cover can be in the nature of a slat screen mounted on a spring biased rod in the manner of a conventional window shade for selective extension across the tank.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A snow disposal machine comprising an enlarged tank, snow pulverizing means mounted within the upper portion of said tank, snow melting means mounted within said tank below said pulverizing means, water draining means communicated with the lower portion of said tank, debris removing means located in said tank between said draining means and said snow melting means for effecting a removal of debris prior to entry into said draining means, cover means mounted on said tank and movable between a first position overlying and enclosing said tank, and a second position defining a protective vertically extending barrier peripherally about said tank, said debris removing means comprising means laterally movable across the bottom of said tank in debris moving orientation relative thereto, and an end tank mounted at the far end of said first tank along the path of movement of said debris moving means for the reception and retention of said debris remote from said first tank draining means, said means for moving the debris comprising a plurality of transversely elongated brushes mounted for continuous sequential movement along the bottom portion of said tank.

2. The machine of claim **1** wherein said cover means comprises four panels, each of said panels being hingedly mounted adjacent one wall of said tank, said panels constituting a lower pair of panels and an upper pair of panels, said upper panels, when horizontally orientated, combining to completely cover said tank.

3. The machine of claim **2** wherein said end tank includes a drain floor and means communicating said drain floor with the draining means associated with said first tank.

4. The machine of claim **3** wherein said pulverizing means comprises a plurality of elongated shafts spanning said tank, a plurality of longitudinally spaced blades mounted on said shaft, and means for rotatably driving said shafts and the blades mounted thereon.

5. A snow disposal machine comprising an enlarged tank, snow pulverizing means mounted within the upper portion of said tank, snow melting means mounted within said tank below said pulverizing means, water draining means communicated with the lower portion of said tank, debris removing means located in said tank between said draining means and said snow melting means for effecting a removal of debris prior to entry into said draining means, said debris removing means comprising means laterally movable across the bottom of said tank in debris moving orientation relative thereto, and a tank mounted at the far end of said first tank along the path of movement of said debris moving means for the reception and retention of said debris remote from said first tank draining means, said means for moving the debris comprising a plurality of transversely elongated brushes mounted for continuous sequential movement along the bottom portion of said first tank.

6. The machine of claim **5** wherein the tank mounted at the far end of said first tank includes a drain floor and means communicating said drain floor with the draining means associated with said first tank.

7. The machine of claim **5** wherein said pulverizing means comprises a pair of laterally spaced elongated shafts spanning said first tank, a plurality of longitudinally spaced blades mounted on each of said shafts, and means for rotatably driving said shaft and the blades mounted thereon.

8. A snow disposal machine comprising an enlarged tank, snow melting means mounted within said tank above the lower portion thereof, water draining means communicated with the lower portion of said tank, debris removing means located in said tank between said draining means and said melting means for effecting a removal of debris prior to entry into said draining means, said debris removing means comprising means laterally movable across the bottom of said tank in debris moving orientation relative thereto, and a debris receiving area at the far end of said tank along the path of movement of said debris moving means for the reception and retention of said debris remote from said tank draining means, said means for moving the debris comprising a plurality of transversely elongated brushes mounted for continuous sequential movement along the bottom portion of said tank.

9. The machine of claim **8** including snow pulverizing means mounted within the upper portion of said tank above said snow melting means.

10. The machine of claim **8** including cover means, said cover means comprising four panels, said tank being rectangular and comprising four substantially vertical walls, each of said panels being hingedly mounted adjacent the upper edge of one wall of said tank, said panels being movable between a first position overlying and covering said tank, and a second position defining a protective equal height vertically extending barrier completely about said tank, said panels, in the first position, constituting a lower pair of panels and an upper pair of panels, said upper pair of panels combining to completely cover said tank.

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