United States Patent

[11] **3,540,430**

[72] Inventor **Donald P. Rudnik**
311 S. Riverside Drive, Villa Park, Illinois 60181

[21] Appl. No. **710,248**
[22] Filed **March 4, 1968**
[45] Patented **Nov. 17, 1970**

[54] **SNOW DISPOSAL APPARATUS**
6 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **126/343.5;** 134/57, 134/108
[51] **Int. Cl.** **B08b 3/10**
[50] **Field of Search** 134/56, 57, 108; 126/343.5; 37/12, 14, 16

[56] **References Cited**

UNITED STATES PATENTS

553,401	1/1896	Garnier	126/343.5
2,353,368	7/1944	Schulz	134/57UX
2,358,507	9/1944	Haberstump	134/56
2,977,955	4/1961	Altenburg	126/343.5
3,083,717	4/1963	Bear	134/108X
3,123,922	3/1964	Spinelli	126/343.5X
3,125,817	3/1964	Spinelli	126/343.5X
3,140,707	7/1964	Spinelli	126/343.5
3,155,089	11/1964	Hoyt	126/343.5
3,166,066	1/1965	Dunn et al.	126/343.5
3,381,680	5/1968	Retz	126/343.5

Primary Examiner—Daniel Blum
Attorney—Wallenstein, Spangenberg, Hattis and Strampel

ABSTRACT: Snow disposal apparatus is provided which preferably comprises a container for receiving snow to be melted, water spray means in the upper portion of the container for spraying hot water upon the top of a load of snow delivered to the container, and vertical partition-forming walls in the container for providing downwardly moving streams of water to aid in the collapsing and melting of the snow.

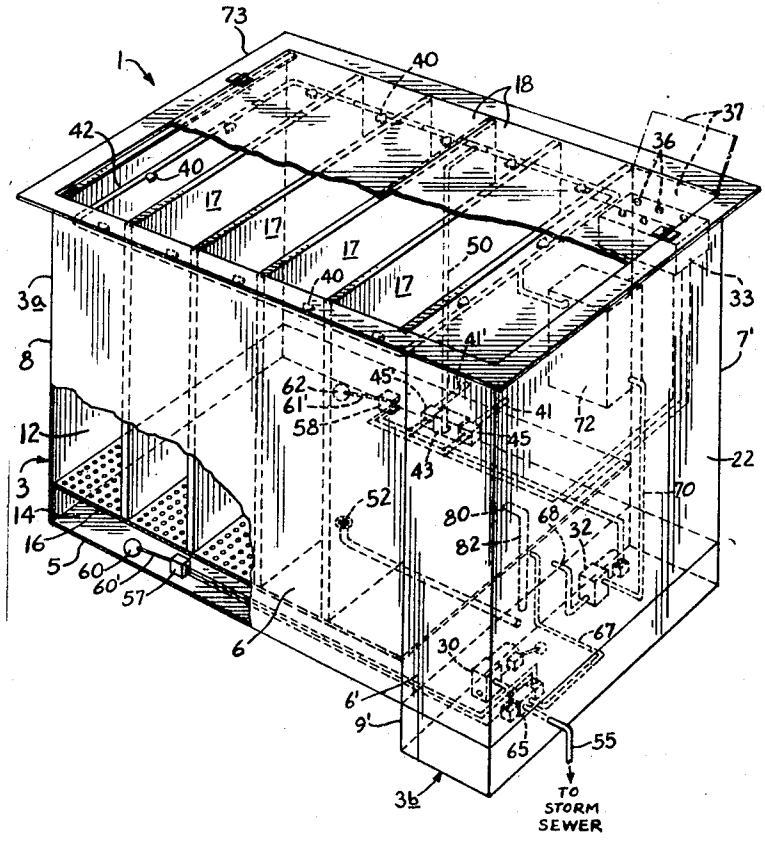


FIG. 1

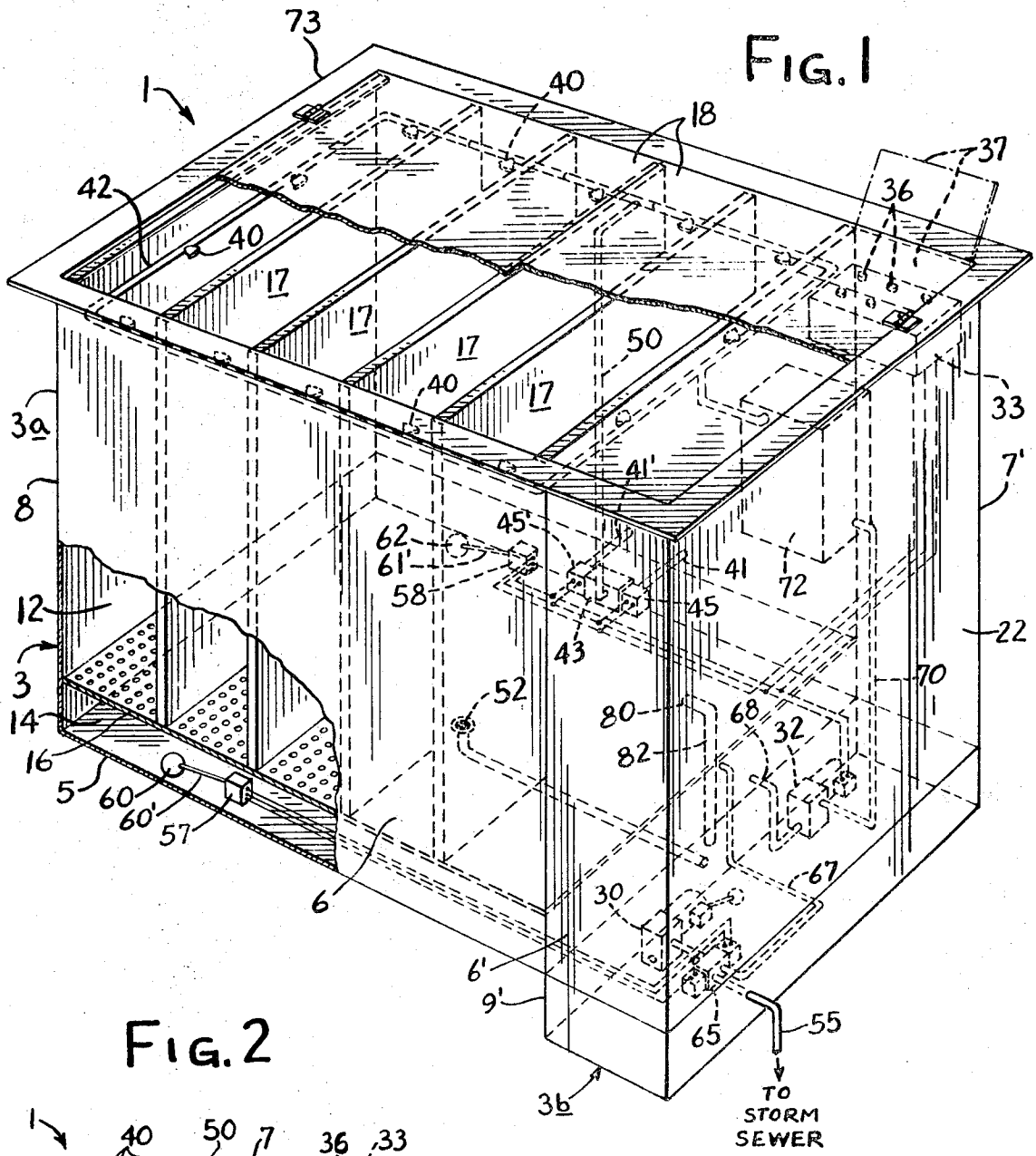
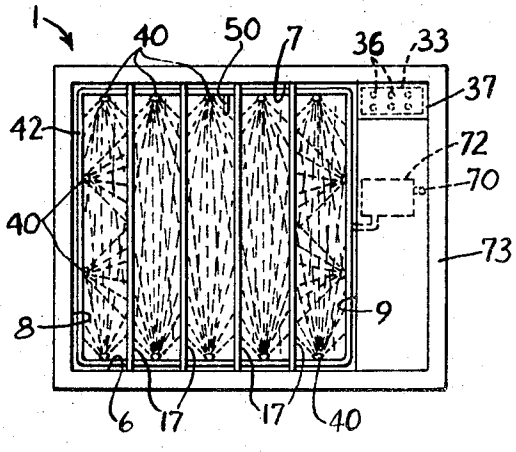


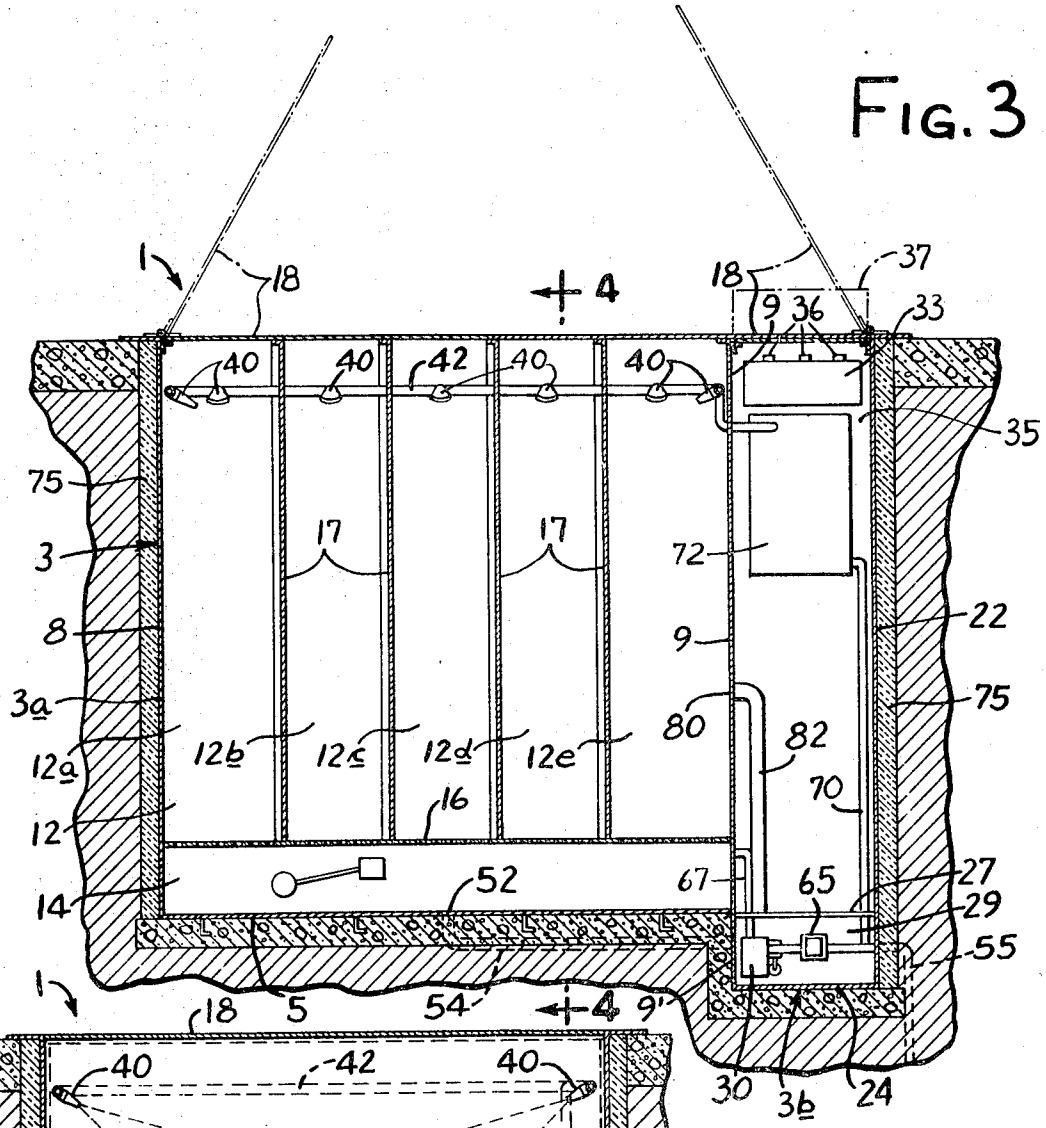
FIG. 2



INVENTOR
DONALD F. RUDNIK

by: Wallenstein, Spangenberg, Hattis & Strampel
ATTYS.

FIG. 3



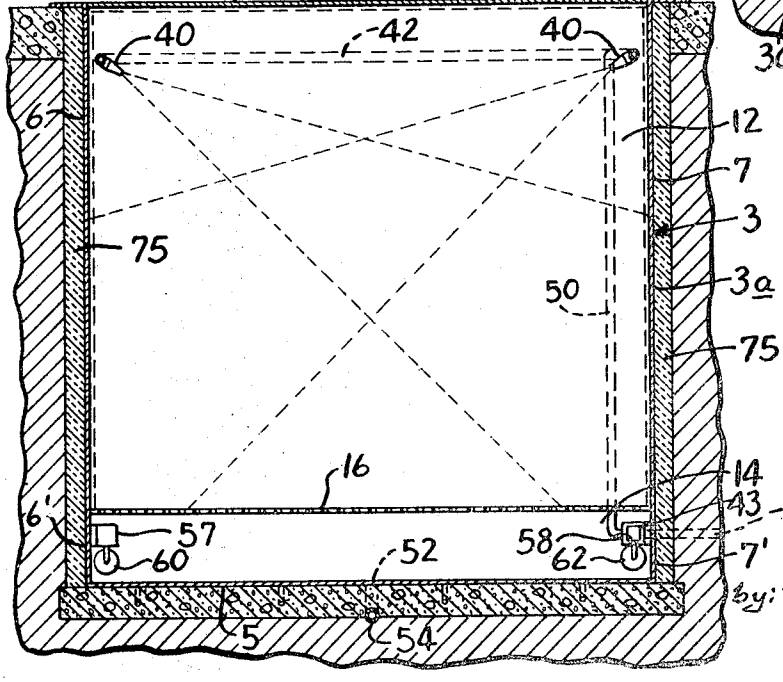


FIG. 4

INVENTOR
DONALD P. RUDNIK
by: Wallenstein, Spangenberg, Hattis & Strampel
ATTYS.

SNOW DISPOSAL APPARATUS

SUMMARY OF INVENTION

This invention relates to snow disposal apparatus, and, in particular, to apparatus in which relatively large quantities of snow can be dumped and melted within a relatively short time and the melted snow discharged to a sewer or the like. The invention has particular utility, for example, in disposing of snow in parking lots, driveways and the like.

In many of the snow melting systems heretofore proposed, snow is dumped into a body of high temperature water which melts the snow as it becomes immersed therein. Since the melted snow lowers the temperature of the heated water, it is apparent that the amount of heat which must be transmitted to the body of water to keep it at a high temperature when mixed with the melting snow becomes substantial.

One of the objects of the present invention is to provide an improved snow melting apparatus which can be made at a substantially lower cost than snow melting apparatus heretofore proposed.

Another object of the invention is to provide snow melting apparatus of the type described where water is heated and used in a manner which minimizes the amount of water used and/or the heat required to melt a given quantity of snow.

A further object of the invention is to provide snow melting and disposal apparatus as described which can be easily and readily inexpensively installed by connection to existing water pipes, sewer lines and electrical power lines, the electrical power supplying all of the energy for operating any pumps or heating units used in the apparatus.

In accordance with one of the features of the invention, instead of fully immersing the load of snow delivered to the snow melting apparatus in a body of hot water, hot or warm water is sprayed under pressure upon an exposed body of snow, so both the heat, weight and pressure of the water being sprayed onto the snow aids in the melting of the snow.

In the most preferred form of the invention, the collapsing and melting of the load of snow is enhanced by providing a snow-receiving chamber which is broken up into relatively small compartments by vertically extending partition-forming walls. The water is sprayed into the upper portion of each of these compartments onto the snow and against the partition-forming walls, the resulting downwardly moving streams of water on the walls aiding in the collapsing and melting of the snow.

In one form of the invention, water is delivered to the spray nozzles from an inlet conduit through a control valve. This control valve may be permanently closed when the equipment is not in use, or may under automatic control where water is fed therethrough only when the level of the water in the apparatus drops below a given level. Normally, the water to be sprayed is obtained from the melted snow which water is recirculated by a water recirculating pump and fed through a heater on its way to the water spray nozzles. The balance of the melted snow is discharged from the apparatus by a discharge pump.

In the most preferred form of the invention, the snow melting apparatus has, in addition to a relatively large snow chamber, a relatively small water chamber positioned immediately below the snow chamber and separated therefrom by an apertured wall. The water from the melting snow drains into the water chamber which contains float controlled water level sensing means for controlling the operation of the water recirculating pump, the water discharge pump and the control valve associated with the inlet conduit. The discharge pump is preferably contained within a water collection chamber positioned at a lower elevation than the water chamber and into which water drains relatively slowly from the bottom of the water chamber and from a water overflow opening in the lower portion of the snow chamber which opening determines the level of the water in the snow chamber.

The above and other objects, features and advantages of the invention will become apparent upon making reference to the specification to follow, the claims and the drawings wherein:

FIG. 1 is a perspective view of a snow disposal unit constituting the most preferred form of the invention, which unit is designed to be mounted in the ground within or at the perimeter of a parking lot, driveway or the like;

FIG. 2 is a reduced plan view of the snow dispensing apparatus shown in FIG. 1;

FIG. 3 is a vertical sectional view through the snow dispensing unit of FIGS. 1—2 when mounted in the center of a driveway, parking lot or the like; and

FIG. 4 is a sectional view taken substantially along the line 4–4 in FIG. 3.

Referring now to the drawings, the snow disposal unit there shown and generally indicated by reference numeral 1 is designed to be mounted in the ground within a parking lot or driveway or at the perimeter thereof. A similar unit could be mounted on a truck or trailer. The snow disposal unit 1 comprises an integral housing 3 whose outer walls may be formed of concrete, if desired, or, as illustrated, by metal walls to be described. The size of the housing 3 will vary, depending upon the quantity of snow to be accommodated therein. The number of snow disposal units 1 may be spaced at different locations within a very large parking lot area to minimize the distance the snow must be plowed or carried thereto.

The housing 3 has a main body portion 3*a* comprising a bottom horizontal wall 5, spaced parallel vertical side walls 6 and 7 and an outer vertical end wall 8 and an inner vertical end wall 9 (see FIGS. 3 and 4). The main body portion 3*a* of the housing 3 formed by the aforementioned walls 5—9 is divided into two main chambers 12 and 14 by a perforated wall or grating 16 welded or otherwise suitably connected to the vertical side walls 6—9. The upper chamber 12, to be referred to as a snow chamber, occupies the major portion of the space within the main body portion of the housing. The chamber 14 will be referred to as a water chamber.

In the most preferred form in the invention, the snow chamber 12 is divided into a number of relatively narrow, vertically extending compartments 12*a*, 12*b*, 12*c* etc. by vertical partition-forming walls 17 which extend from the grating 16 to an elevation approximately coextensive with the top of the vertical walls 6—9. Supported directly over the upper portion of the partition-forming walls 17 are one or more cover plates 18 which normally cover an opening into the compartments 12*a*, 12*b*, 12*c* etc. The cover plates 18 illustrated in the drawings may be pivoted back so they rest on the ground where snow can be readily plowed or dropped into the compartments 12*a*, 12*b*, 12*c* etc. where the snow is melted in a manner to be described.

The housing 3 also has at one end of the main body portion thereof an end portion 3*b* formed by an outer vertical end wall 22 which extends between the outer vertical side walls 6 and 7. The end wall 22 in the most preferred form of the invention extends down to a point lower than the bottom wall 5 of the main body portion of the housing 3. The end portion 3*b* of the housing further includes a bottom wall 24 which extends between the bottom of the vertical outer end wall 22 and vertical wall portions 6′—7′ which may be extensions of the vertical outer side walls 6—7 and a wall portion 9′ which may be an extension of the inner vertical end wall 9 forming part of the main body portion 2*a* of the housing 3. The end portion 3*b* of the housing 3 has a horizontal wall 27 spaced a relatively small distance from the bottom wall 24 to form a water collection chamber 29. A self-priming water discharge pump 30 and a water recirculating pump 32 are most advantageously mounted within the water collection chamber 29. The water collection chamber 29, as indicated, is at an elevation below the water chamber 14 for reasons to be explained.

A control unit 33 is mounted in the upper section of a compartment 35 positioned above the wall 27 in the end portion 3*b* of the housing 3. The control unit 33 is accessible by opening a pivoted cover 37 mounted on the top of the end portion 3*b* of the housing 3. The control unit 33 has one or more switch control knobs 26 for turning the snow disposal unit 1 on and off.

In accordance with the invention, water spray nozzles **40** connected to a water supply pipe **42** are positioned along the inner walls at the upper ends of the compartments **12***a*, **12***b*, **12***c* etc. of the snow chamber **12**. The nozzles provide fan-shaped streams of water directed to all portions of the upper portions of the compartments **12***a*, **12***b*, **12***c* etc. Thus, water is directed both into the center portions of the compartments and also along the partition-forming walls **17**, so that streams of water run downwardly along the walls **17** and water under pressure impinge upon the exposed portions of the snow delivered to the compartments **12***a*, **12***b*, **12***c* etc. The water delivered to the nozzles **40** is preferably hot water so both the temperature, the pressure and weight of the water, and the streams of water moving along the partition-forming walls **17**, all contribute to collapse and melt the snow.

The source of water for melting the snow may be hot water delivered to the snow disposal unit **1** directly from the hot water supply of a building associated with the parking lot, driveway, etc. To this end, a hot water inlet conduit **41** extends to an inlet solenoid operated control valve **45**. The control valve **45**, which is normally closed, may be opened by operating one of the switch control knobs **36** in the control unit **33**. If the water in the inlet conduit **41** is at a much higher temperature than is needed for the snow melting operation, and it is desired to minimize the use of the amount of hot water in such case, the hot water flowing through the inlet conduit **41** may be mixed with cold water flowing into a mixing unit **43** through a cold water inlet conduit **41'**. A solenoid operated control valve **45'** is connected to the cold water inlet conduit **41'** and is operated with the solenoid operated valve **45**. As is well known in the art, mixing unit **43** may be provided with suitable control equipment for controlling the ratio of the mixture of the hot and cold water flowing from the conduits **41** and **41'**. The control equipment in the mixing unit **43** will automatically control the proportion of the hot and cold water fed to a common feed line **50** connected to the water supply pipe **42** extending to the various water spray nozzles **40**.

Melted snow or other water delivered to the bottom of the various compartments of the snow chamber **12** drain through the grating **16** into the water chamber **14**. The bottom wall of the water chamber **14** may be provided with a relatively small, screen covered drain **52** connected to a discharge pipe **54** leading to the upper portion of the collection chamber **29**. The discharge pump **30** in the collection chamber **29** is a self-priming pump which will automatically become operative when the water in the collection chamber rises to a given level. Normally, the pump **30** will discharge water through an outlet pipe **55** leading to a sewer or the like.

Where water is very expensive, it is desirable to minimize the amount of water used in the snow disposal unit **1**. In such case, provision is made for recirculating water in the snow or water chamber by means of the water recirculating pump **32** mounted within the water collection chamber **29**. Also, in such case, when there is no snow being melted in the snow dispensing unit **1** and the unit **1** is prepared for operation, means are provided for directing water from the outlet of the water discharge pump **30** back into the snow chamber or water chamber.

To this end, in the most preferred form of the invention, the water chamber **14** is provided with a pair of float operated switch units **57** and **58**. Floats **60** and **62** are attached to pivoted arms **60'** and **61'** and control the switch units **57** and **58**. When the float **60** is in a position near the bottom of the water chamber **14**, a set of contacts within the switch unit **57** close or open, depending upon whether or not normally open or closed contacts are used, to operate a solenoid controlling a valve **65** connected to the outlet discharge pump **30** to divert the water at the pump outlet into a recirculating conduit **67** (FIG. **1**) opening onto the upper portion of the water chamber **14**.

When the float **62** associated with the switch unit **58** is in a given upper position indicating that the water level is in the upper portion of the water chamber **14**, the switch unit **58** will open or close a set of contacts to effect operation of a solenoid which overrides the effect of control knob **36** which opened the valves **45** and **45'** to close the valves so as to shut off the flow of any hot or cold water in the hot and cold water inlet conduits **41** and **41'**. Another set of contacts of the switch unit **58** will then be operated to energize the water recirculating pump **32**. A water inlet conduit **68** extends from the water chamber **14** to the inlet of pump **32** so that water will be pumped through a conduit **70** to a heating unit **72** which heats the water to a desired temperature. The heating unit **72** will then deliver heated water to the water supply pipe **42** feeding the various water spray nozzles **40**. The water heating unit **72** may be any one of a number of well known heating units which automatically heats water delivered thereto to a selected temperature. The heating unit **72** may be automatically rendered operative in any suitable way, as, for example, by a pressure responsive switch in the conduit **70** which will energize the heating unit **72** when there is a given water pressure in the conduit **70**.

To enable the water disposal unit **1** to be readily mounted within the ground, a peripheral flange **73** is provided around the perimeter of the upper portion of the housing **3**. The flange rests on the top of the ground, the driveway or the like. Also, to contain heat within the housing, the latter is preferably provided with a covering **75** of a suitable solid insulating material, such as Styrofoam. If desired, the snow disposal unit **1**, with or without the insulation therearound, may be embedded in a concrete well (not shown).

To prevent water from building up to undesired levels within the snow chamber **12**, an overflow opening **80** may be provided within the lower portion of the vertical wall **9** and the suitable level thereof, the opening **80** being connected by conduit **82** to the water collection chamber **29**. Also, in the most preferred form of the invention, it is desirable that there be a certain amount of water within the bottom portion of the snow chamber **12** to aid in the melting of the snow in the bottom portion thereof. To this end, the drain **52** in the water chamber **14** is such a small opening that the rate at which the water will drain therethrough is less than the rate at which the snow is melted within the snow chamber **12**. The desired level of water in the snow chamber, will, of course, be determined by the level of the water overflow opening **80**.

It should be understood that numerous modifications may be made in the most preferred form of the invention described above without deviating from the broader aspects thereof. For example, where hot water is cheap and readily available, the heating unit **72** and recirculating pump **32** can be eliminated. Alternatively, the hot water inlet conduit **41** and mixing unit **43** can be eliminated and the heating unit **72** used to supply all of the hot water used in the snow disposal unit of the invention.

I claim:

1. Snow disposal apparatus comprising a container divided into a snow chamber into the upper portion of which snow to be melted is fed to the chamber, a water chamber immediately below the snow chamber and separated therefrom by a perforated wall which enables water resulting from the melting of the snow in the chamber to drain into the water chamber, and a collection chamber the lower portion of which is at an elevation below the bottom of said water chamber and positioned laterally to one side thereof water spraying means in the upper portion of said snow chamber for spraying water upon the top of a load of snow delivered to said snow chamber wherein the weight and pressure of the water on the snow aids in melting the same, means for supplying water to said spraying means at a temperature substantially above the melting temperature of the snow wherein the heat from the water in addition to the weight and pressure thereof speeds the melting thereof, means for draining water from the bottom of said water chamber at such a slow rate that water builds up in said snow chamber to a desired level where the water therein covers only the lower portion of the snow delivered to the snow chamber, means for

discharging excess water from said snow chamber into said collection chamber, and a pump in said collection chamber for discharging the water from said collection chamber.

2. Snow disposal apparatus comprising a container divided into a snow chamber into the upper portion of which snow to be melted is fed to the chamber, a water chamber immediately below the snow chamber and separated therefrom by a perforated wall which enables water resulting from the melting of the snow in the snow chamber to drain into the water chamber, and a collection chamber the lower portion of which is at an elevation below the bottom of said water chamber and positioned laterally to one side thereof, said snow chamber having horizontally spaced vertical partition-forming walls extending from the bottom to the upper portions of the container which walls divide the same into separate vertically extending compartments, water spraying means in the upper portion of said snow chamber for spraying water upon the top of a load of snow delivered to said snow chamber wherein the weight and pressure of the water on the snow aids in melting the same, each of said compartments having a portion of said water spraying means therein which spray water down upon the snow in the compartment involved and against the partition-forming walls, causing a downwardly moving stream of water along each wall which aids in collapsing the snow in the compartment involved, means for supplying water to said spraying means at a temperature substantially above the melting temperature of the snow wherein the heat from the water in addition to the weight and pressure thereof speeds the melting thereof, means for discharging excess water from said snow chamber into said collection chamber, and a pump in said collection chamber for discharging the water from said collection chamber.

3. Snow disposal apparatus comprising: means forming a relatively large snow receiving and melting and water collection space into the upper portion of which snow to be melted is fed, means forming a separate water collection chamber at an elevation below the bottom of said space, a drain at the bottom of said space for draining water at a slow rate to said collection chamber so water will accumulate above the drain to a level which covers the lower portion of the snow delivered to the space, so that the melting of the snow is further enhanced by the presence of a body of water in which the snow delivered to the container is partially immersed, a discharge pump in said collection chamber for discharging the water therein to an external disposal location, overflow opening means in said space for draining excess water from said snow chamber to said collection chamber, and means for supplying warm water to said space to aid in melting the snow therein.

4. The snow disposal apparatus of claim 3 wherein there is provided water recirculating means for recirculating water from the bottom portion to the upper portion of said space, and water heating means for heating the water being recirculated to a temperature well in excess of the melting temperature of the snow.

5. The snow disposal apparatus of claim 4 wherein the means for recirculating water includes water level sensing means in said space which permits recirculation of water only when the water therein reaches a given level above the bottom thereof.

6. The snow disposal apparatus of claim 3 wherein there is provided a water level sensing means responsive to the dropping of the level of water in said space below a given level for diverting the water discharged by said pump to an elevated portion of said space.