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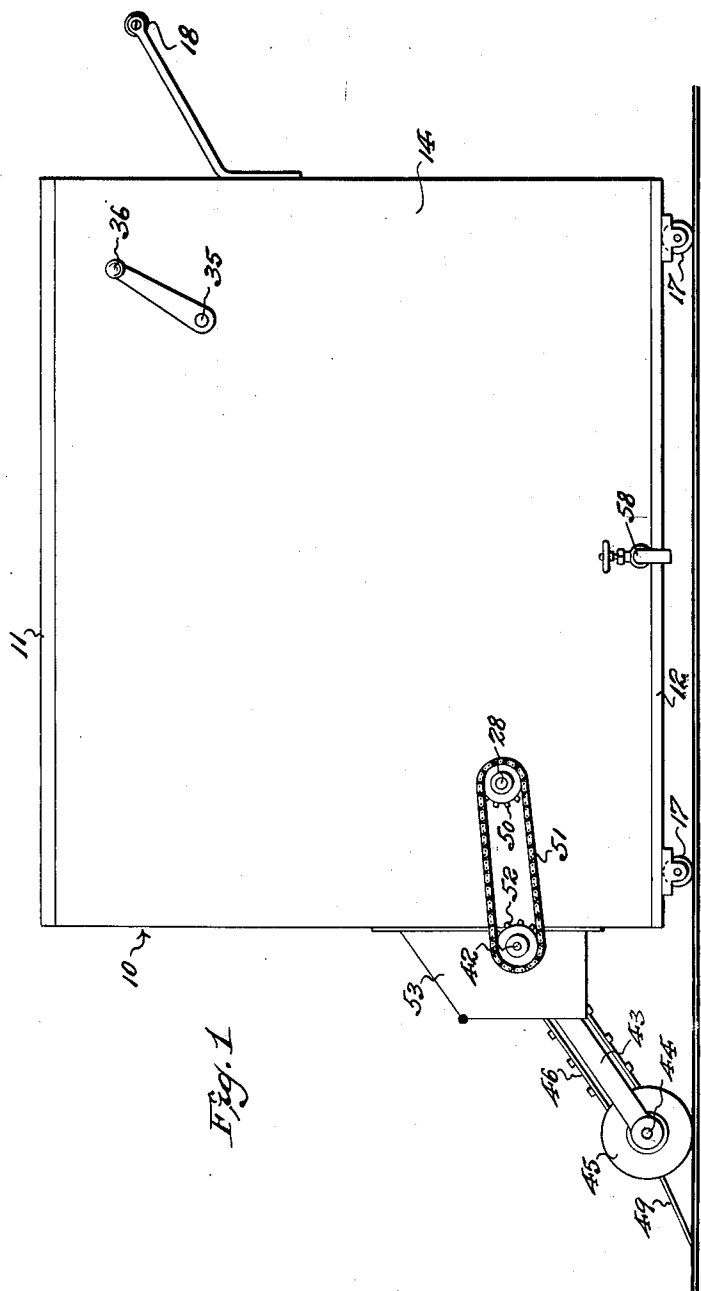
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SNOW REMOVING APPARATUS

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2 SHEETS--SHEET 1



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SNOW REMOVING APPARATUS

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This invention relates to improvements in apparatus for removing snow from walk, path and roadway surfaces, and then disposing of the collected snow by melting the same to water for subsequent discharge from the apparatus.

The invention has for an object to provide an improved apparatus for collecting and disposing of snow in the operation of clearing walk, path and roadway surfaces, and to this end to provide an apparatus adapted to be propelled over the surface to be cleared, said apparatus including a heated melting chamber having an endless series of snow receiving pans adapted to be circulated through the heated interior of the chamber, whereby to subject the conveyed snow to a melting temperature for reduction thereof to water; means being further provided for taking up the snow from the surface to be cleared and delivering the same onto the circulating snow pans for movement through the melting chamber; and means being also provided for collecting the resulting water subject to discharge from the apparatus.

Another object of the invention is to provide in the path of movement of the snow pans, which are circulated within the melting chamber, dip trough means containing heated water into which the snow pans dip during their movement through the melting chamber, whereby to assist and speed up the snow melting process, and to assure complete discharge of snow from the snow pans before the latter return to the snow receiving point in their circulation to be there reloaded.

Other objects of the invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a side elevational view of the snow removing apparatus according to this invention; and Fig. 2 is a longitudinal vertical sectional view through the same.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

In the illustrative embodiment of this invention as shown in the drawings, the same is of relatively small size suitable for hand propulsion and manual operation, and thus especially adapted for use in removing snow from side walks, park paths and similar footways. It will be understood, however, that the principles of this invention may be embodied in larger and

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power propelled apparatus suitable for road and street snow removal service.

Referring more particularly to the drawings, the reference character 10 indicates the body of the apparatus which is formed by a top wall 11, bottom wall 12, end walls 13 and side walls 14, thus providing the body with an enclosed interior constituting a melting chamber 15. Incorporated with the walls of the body 10 is a suitable heat insulating material 16, whereby to prevent wasteful radiation of heat from the body when the apparatus is in use. The body 10 is supported by traction wheels 17, and, when hand propelled, is provided, in extension from its rear end wall 13 with handle bar means 18 for propulsive manipulation thereof.

Housed within the interior of the melting chamber 15 of the body 10 is an endless series of traveling snow pans which, in use of the apparatus, receive the snow delivered thereto from the surface over which the apparatus is propelled. Said series of snow pans is supported by endless conveyor means, whereby said snow pans are caused to be circulated through the melting chamber 15 from and back to a point at which the same are loaded with collected snow.

In one illustrative arrangement thereof the conveyer means comprises a series of suitably disposed sets of supporting pulleys, wheels or the like which are mounted within the melting chamber 15 respectively adjacent to opposite sides thereof. To this end, longitudinally extending upper frame bars 19 and lower frame bars 20 are affixed to the side walls 14 of the body 10 within the melting chamber interior. Fixed upon the upper frame bars 19 are upstanding bearings 21, respectively adjacent opposite ends of the melting chamber, and suitably spaced dependent bearings 22 disposed intermediate said end bearings 21. Rotatably supported by the upstanding end bearings 21 are the shafts or axles 23 of upper end pulleys or guide wheels 24, and rotatably supported by the dependent intermediate bearings 22 are the shafts or axles 25 of upper intermediate pulleys or guide wheels 26. Fixed on the lower frame bars 20 are suitably spaced dependent bearings 27, and rotatably supported thereby are the shafts or axles 28 of lower pulleys or guide wheels 29. Over each set of pulleys or guide wheels thus provided runs an endless conveyer belt 30. Spaced along the conveyer belts, in bridging extension therebetween, and thus across the interior of the melting chamber 15, are a multiplicity of upwardly open snow pans 31, the end walls 32 of which are respec-

tively pivotally connected with the respective conveyer belts 30 so as to swingably depend therefrom. Each snow pan 31 is provided with drain openings 33 in the bottom thereof, through which water from melting snow carried by said snow pans can discharge and gravitate to the bottom of the melting chamber 15, to be there collected in a catch basin 34 which is disposed within the bottom interior of said melting chamber.

In preferred arrangement of courses along which the conveyer carried snow pans 31 are circulated through the melting chamber 15, a rising course *a* runs parallel and adjacent to the front end wall of the body 10 over the forward upper end pulley or guide wheel 24 and thence in a horizontal course *b*, which extends adjacent to the top wall of the body 10, to and over the rearward upper end pulley or guide wheel 24. From said rearward upper end pulley or guide wheel extends a descending course *c* which runs parallel and adjacent to the rear end wall of the body 10 to a rearward lower pulley or guide wheel 29. From said rearward lower pulley or guide wheel rising and descending courses *d* pass between successive lower pulleys or guide wheels 29 and upper intermediate pulleys or guide wheels 26 in return to the rising course *a*. By this arrangement, the conveyer carried snow pans 31 travel a path of considerable length from a loading point and back thereto, whereby the snow loaded in said snow pans 31 is subjected to the melting influence of the heated atmosphere within the melting chamber 15, thus providing ample time for the carried snow to melt and discharge therefrom as water, so that the snow pans will be empty again by the time they make return approach to the loading point.

Means is provided for driving the conveyer carried snow pans. In the illustrated small size apparatus shown, this means is adapted for manual operation, although it will be obvious that in large size apparatus, and in fact in apparatus of any size, the conveyer carried snow pans may be power driven by means of any suitable prime mover. As illustratively shown, the driving means comprises a transverse drive shaft 35 which is suitably journaled in and between the side walls of the body 10. This drive shaft 35, when desired to be manually operated, is provided on an exteriorly projecting end thereof with a crank handle 36 by which it can be turned by an attendant. Fixed on the drive shaft are pinions 37 which mesh with gear wheels 38 respectively affixed to the shafts or axles of selected opposed pulleys or guide wheels, preferably of the rearward upper end pulleys or guide wheels 24, whereby the latter serve as the driving pulleys or guide wheels of the conveyer system.

The means for collecting snow from a surface to be cleared and delivering the same to and loading it into the snow pans 31 circulating within the melting chamber 15 is arranged as follows:

Provided in the front wall of the body 10 is a suitably located snow admission opening 39, which is provided on its inner side with an inwardly extending discharge chute 40, the free end of which is traversed by the snow pans 31 as they move upwardly through their rising course *a*.

Supported by external bearings 41, for extension across the lower portion of the snow admission opening 39, is the transverse driving shaft 42 of an endless snow pick-up conveyer. Pivotal-

ly attached to said shaft 42, for downwardly inclined outward extension therefrom, are carrier arms 43. Journaled in and between the lower free end portions of said carrier arms 43 is a lower transverse shaft 44, upon the opposite ends of which are mounted rotatable wheels 45 by which the lower end of the snow pickup conveyer is supported. Said snow pick-up conveyer comprises an endless, transversely cleated apron 46 which runs over and between rollers 47 and 48 respectively fixed on the respective shafts 42 and 44. Supported by the lower shaft 44, to incline downwardly from the receiving end of the snow pick-up conveyer, is a scoop plate 49 which guides collected snow from the surface being cleared onto the snow pick-up conveyer. Means is provided for driving the snow pick-up conveyer from the snow pan conveyer system, and to this end a shaft or axle 28 of a forward lower pulley or guide wheel 29 of the snow pan conveyer system is extended to project exteriorly from a side wall of the body 10. Fixed on the thus projecting end of said shaft or axle 28 is a drive sprocket 50 over which runs a transmission chain 51 to and over a driven sprocket 52 which is fixed on and drives the upper or drive shaft 42 of the snow pick-up conveyer.

To avoid undue escape of heat from the interior melting chamber 15 of the apparatus through the snow admission opening 39, the exterior side of the latter is enclosed within the hood 53. The outer end of this hood 53 is sufficiently open to admit passage of the snow pick-up conveyer, but is closed above the latter by a yieldable curtain 54 which is preferably made of flexible material adapted to readily yield to inward passage of snow carried by the pick-up conveyer, without risk of dislodging the snow from the latter.

It will be obvious that snow carried through the snow admission opening 39 by the pick-up conveyer will be discharged from the inner end of the latter into the chute 40 by which the thus delivered snow is discharged into the successively passing snow pans 31, which, as thus loaded, are thereupon circulated through the heated atmosphere of the melting chamber 15.

Means is provided for heating the interior of the melting chamber 15. It will be obvious that any known type of heat generating means may be utilized for this purpose, such as liquid or gaseous fuel burner means, electrical heating elements, or the like. For the purpose of illustration, electrical heating elements have been shown, the same being located along the sides of the melting chamber 15, and to this end may be supported upon the frame bars 19 and 20. In small size apparatus for local use, such as for residence side walk and path cleaning use, the heating elements 55 may be supplied with current from house service through a flexible cable or cord (not shown) which can trail the apparatus as it is propelled over the surface to be cleared. In large size apparatus, current may be supplied to the electrical heating elements by generator means carried by such apparatus.

To assure complete melting of the content of the snow pans and thorough emptying and cleaning thereof before they return to the loading point for reloading, it has been found of advantage to provide shallow dip troughs 56 through which, in the course of their circulatory travel through the melting chamber 15, the snow pans may pass. These dip troughs contain water, and it is preferable to equip the same with electrical heating

elements 57 adapted to warm the water content thereof. Preferably a plurality of such dip troughs 56 are provided, one at the bottom of each descending and rising course of the snow pan conveyer system, whereby as a snow pan moves from a descending course to a rising course it will dip into and pass through the warm water content of a dip trough. The effect of this is not only to accelerate melting of the snow carried by the snow pan, but also to ultimately complete the melting and to wash the interior of the snow pan so as to assure it will be empty and thus ready for reloading with snow as it again passes by the loading point in its travel circuit through the melting chamber 15.

As will be understood, as the snow carried by the snow pans through the melting chamber melts, the resulting water formed therefrom will discharge and drip from the snow pans, and thus gravitate for collection in the catch basin 34 located within the bottom of the melting chamber 15. From time to time the water thus collected in the catch basin 34 can be discharged therefrom, and to provide means for attaining such discharge, the body 10 is provided with a manipulatable external discharge valve or faucet 58 which communicates with and leads from said catch basin 34.

Having now described my invention, I claim:

1. In snow removal apparatus, a snow melter structure comprising a hollow body adapted to be propelled over a surface from which snow is to be cleared, the interior of said body providing a melting chamber having means to supply heat to its atmosphere, said body having a snow admission opening at its forward end, a multiplicity of conveyer carried perforate snow pans arranged to travel a circuitous path within the melting chamber, the path of travel of said conveyer carried snow pans comprising a forward rising course disposed to move past the snow admission opening whereby the snow pans can be loaded with snow as they successively pass said opening, a rearwardly moving upper course, a rearward descending course, and successive forwardly moving rising and descending courses to complete the circuit, a water filled dip trough below the juncture of at least one descending and rising course into which the snow pans dip as they pass the same, a catch basin in the bottom of the melting chamber to receive water discharged from snow melted during circuit of the snow pans within the melting chamber, and manipulatable means for discharging collected water from the catch basin.

2. In snow removal apparatus as defined in claim 1, wherein the dip trough is provided with means for heating the water content thereof.

3. In snow removal apparatus, a snow melter structure comprising a hollow body adapted to be propelled over a surface from which snow is to be cleared, the interior of said body providing a melting chamber having means to supply heat to its atmosphere, said body having a snow admission opening at its forward end, endless conveyer means within the melting chamber comprising

parallel runs respectively adjacent opposite sides of the latter, a multiplicity of perforate snow pans spaced along and pivotally suspended from the conveyer runs in transverse extension therebetween, the path of travel of the conveyer means and snow pans carried thereby comprising a forward rising course disposed to move past the snow admission opening whereby the snow pans can be loaded with snow as they successively pass said opening, a rearwardly moving upper course, a rearward descending course, and successive forwardly moving rising and descending courses to complete the circuit, means for driving the snow pan conveyer means, a catch basin in the bottom of the melting chamber to receive water discharged from snow melted during the circuit of the snow pans within the melting chamber, and manipulatable means for discharging collected water from the catch basin.

4. In snow removal apparatus, a snow melter structure comprising a hollow body adapted to be propelled over a surface from which snow is to be cleared, the interior of said body providing a melting chamber having means to supply heat to its atmosphere, said body having a snow admission opening at its forward end, endless conveyer means within the melting chamber comprising parallel runs respectively adjacent opposite sides of the latter, a multiplicity of perforate snow pans spaced along and suspended from the conveyer runs in transverse extension therebetween, the path of travel of the conveyer means and snow pans carried thereby comprising a forward rising course disposed to move past the snow admission opening whereby the snow pans can be loaded with snow as they successively pass said opening, a rearwardly moving upper course, a rearward descending course, and successive forwardly moving rising and descending courses to complete the circuit, water filled dip troughs below the junctures of descending and rising courses into which the snow pans dip as they pass the same, means for driving the snow pan conveyer means, a catch basin in the bottom of the melting chamber to receive water discharged from snow melted during the circuit of the snow pans within the melting chamber, and manipulatable means for discharging collected water from the catch basin.

5. In snow removal apparatus as defined in claim 4 wherein the dip troughs are provided with means for heating the water content thereof.

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