March 31, 1964 F. C. SMITH 3,126,883

SNOW MELTING MACHINE

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FIG. 1

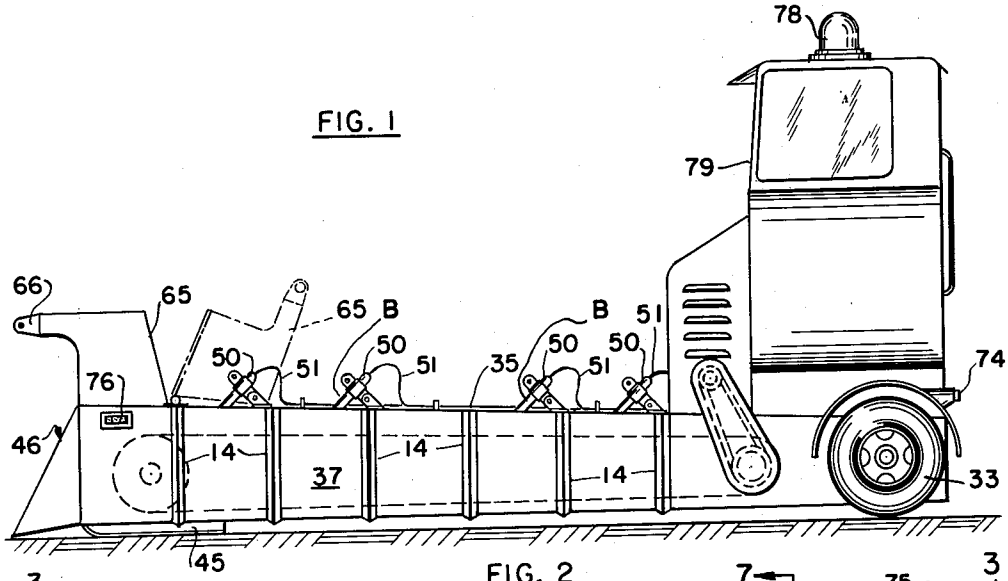


FIG. 2

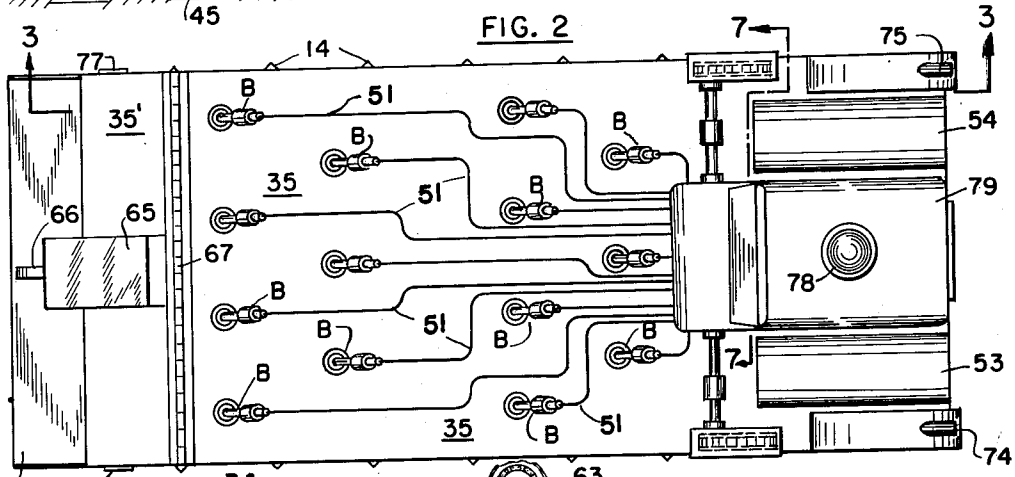
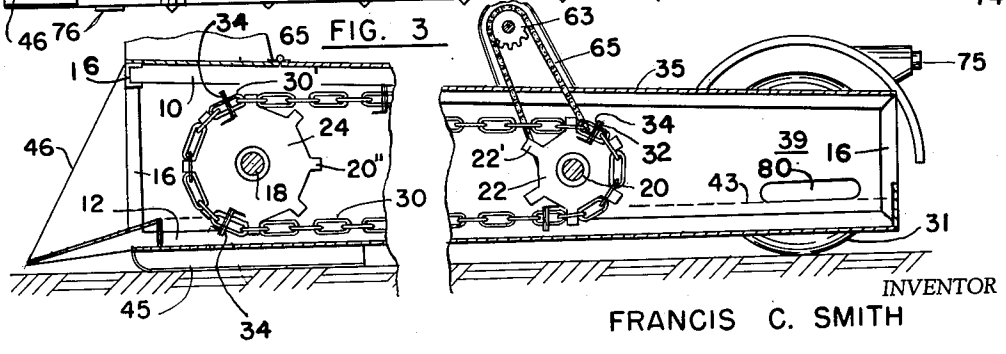


FIG. 3



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FIG. 4

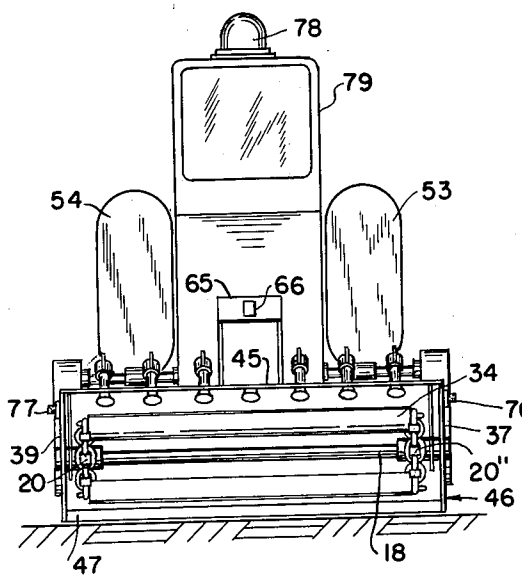


FIG. 5

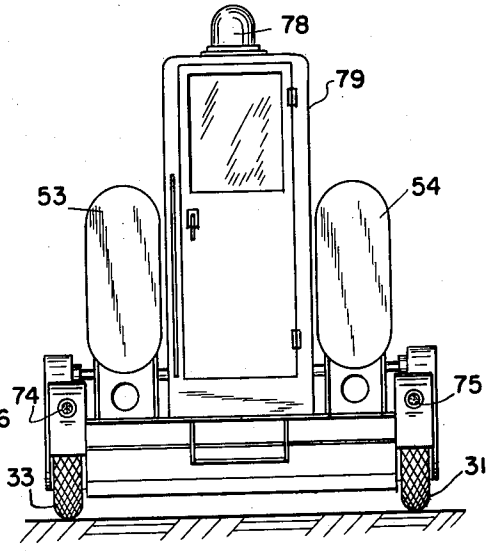
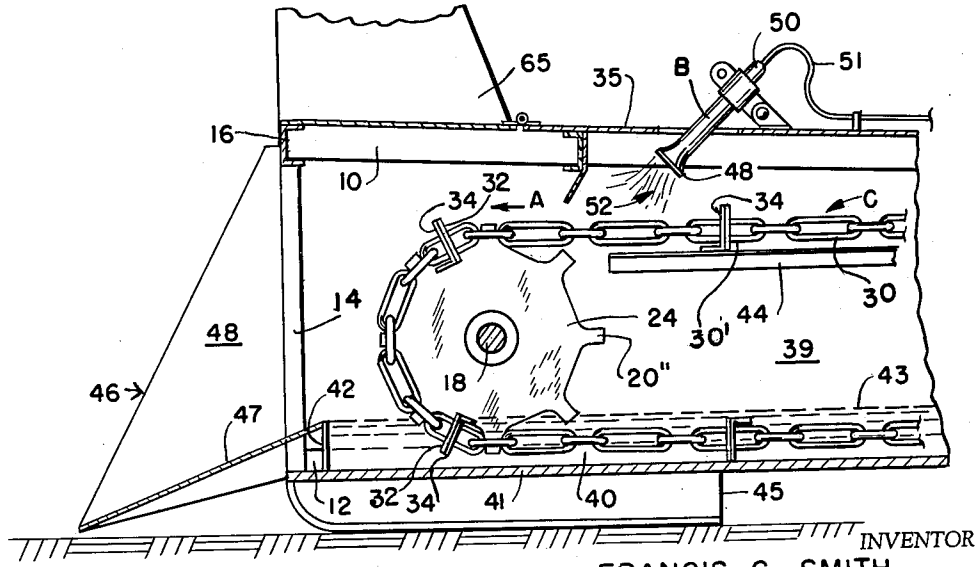


FIG. 6



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FIG. 7

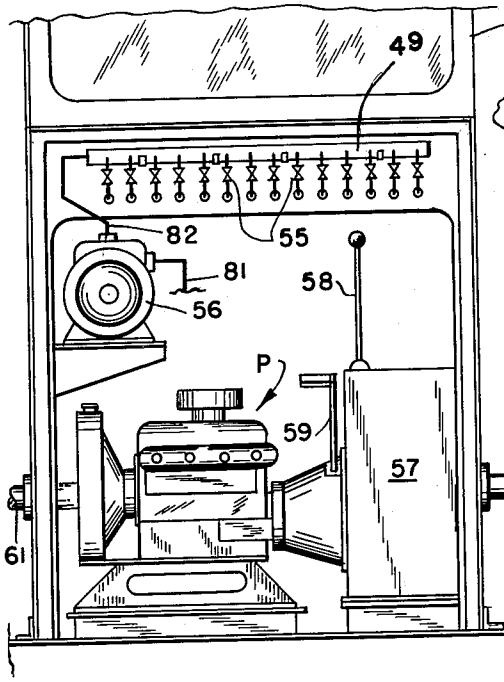
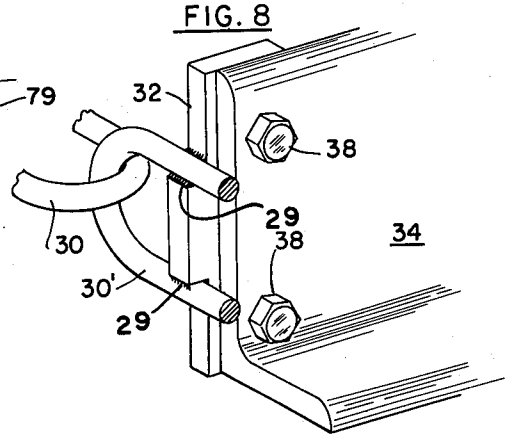


FIG. 8



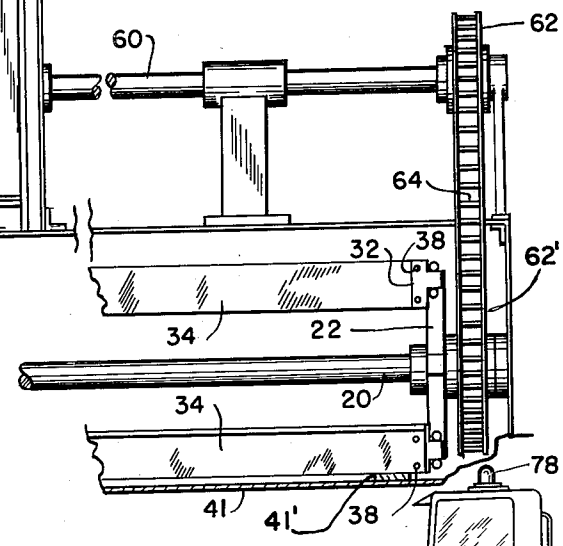
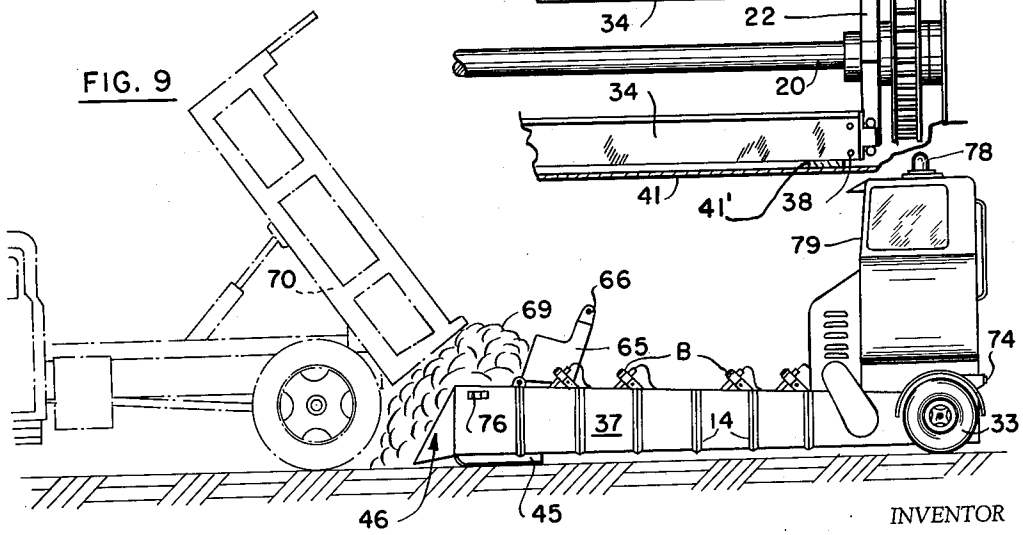


FIG. 9



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3,126,883

Patented Mar. 31, 1964

3,126,883

SNOW MELTING MACHINE

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Filed June 18, 1962, Ser. No. 203,692
2 Claims. (Cl. 126—343.5)

The present invention relates to a snow melting machine and in particular to a machine that may be moved over a roadbed, or used in a stationary location for turning the snow into water, whereby it may be drained off through the storm sewerage system, or otherwise disposed of.

Snow removal from highways and streets has always been a major problem in parts of the world subject to snow fall. There has been in the past machines of this general nature. However, they have been massive, expensive and difficult to transfer from one location to another where their use was required. Every year, snow removal is becoming more of a problem, especially in large cities, super-highways, airports, etc. Not only is the snow removal of the snow itself a major problem, but it is expensive and unpredictable as to the need of labor and various types of apparatus necessary to remove the snow in bulk and it is with these thoughts in mind that the present machine has been developed.

The primary object of the present invention is to provide a machine that is economical to manufacture and simple in its operation.

Another object of the invention is to provide a machine that may be operated by attaching the machine behind a conventional tractor or truck.

Still another object of the invention is to provide a machine that may be operated in a stationary position by having the snow hauled to the machine and turning the same into water at a convenient place.

A further object of the invention is to provide a machine which may be operated with operators of limited skill.

Another object of the invention is to provide a machine with a minimum number of moving parts and with a low maintenance cost.

While several objects of the invention have been set forth, other objects, uses and advantages will become more apparent as the nature of the invention is more fully disclosed, and the same consists in the novel construction, combination and arrangement of its several parts as illustrated in the accompanying drawings and described in the written description.

In the drawings:

FIGURE 1 is a view in side elevation of the snow melting machine.

FIGURE 2 is a plan view of the same.

FIGURE 3 is an enlarged schematic fragmentary sectional view taken along line 3—3 of FIGURE 2 showing the location of the conveyor and the drive therefor.

FIGURE 4 is a front end view in elevation of the machine.

FIGURE 5 is a rear end view in elevation of the machine.

FIGURE 6 is an enlarged fragmentary sectional view of the front end section of the machine.

FIGURE 7 is a view partly in section taken along 7—7 of FIGURE 2 and partly in elevation of the power plant and burner control mechanism.

FIGURE 8 is an enlarged perspective view of one end of a cross member showing the method of attaching the same to a chain link.

FIGURE 9 is a view in side elevation of the machine which illustrates the machine being used in a fixed location.

In the drawings, like character references are used to designate like and similar parts throughout the several views.

The invention comprises in its general organization a supporting frame illustrated by top and bottom longitudinal frame members 10 and 12, respectively, vertical frame members 14 and lateral frame member 16. The frame provides an outline of a relatively low rectangular box-like area into which is operated a conveyor C. The conveyor is made up of two rotatable shaft members 18 and 20. The shafts are provided, one at the front end of the machine and the other adjacent the rear of the machine. The shafts are provided with corresponding sprockets, as shown at 22 and 24 in FIGURE 3. There are at least two such sprockets secured at each shaft adjacent its ends which are provided with conventional teeth, as shown at 20'' and 22' as shown in FIGURE 4. Extending between the corresponding sprockets on each of the two shafts, as shown in FIGURE 3, is a link chain made up of individual links 30. At predetermined intervals along the chain there are links 30' to which is welded at 20 a bracket 32 (see FIG. 8). Fixed to the brackets 32 are movable cross members 34, preferably of angular cross-section, referred to in the trade as angle iron. The members 34 are secured to the brackets 32 by the bolts 38, or they may be riveted or welded depending on the method desired.

These cross-members 34 extend substantially the full width of the machine, as shown in FIGURE 4, and are operated in the direction of the arrow A shown in FIGURE 6. Extending substantially the full width of the machine and at least as long as the conveyor is a pan 40 having a bottom 41, end portions 42 and side portion 43. The pan is open throughout its top area and is adapted to slidably receive the cross-members 34 of the conveyor to move the snow rearwardly in the pan. The weight of the chain conveyor is supported on its lower travel by runners 41' extending longitudinally along each side of the bottom of the pan and on its upper level by the stationary track members 44.

The frame is covered with a sheet like material, preferably of metal, as shown at 35, 37 and 39.

The front end of the machine is preferably supported by runners 45 positioned at each side of the front end; however, low wheels, or casters may be used if desirable.

The front of the machine is open for receiving the snow and there is provided a scoop 46 having a bottom 47 and side portions 48. The scoop extends outwardly from the front of the machine and its outer end is angled downwardly toward the roadbed, and its inner end is positioned adjacent the front and upper edge of the pan 41 and is adapted to deliver the snow to the pan when the machine is towed over the road-bed.

Distributed at predetermined locations over the top of the machine are a plurality of burner nozzles B. These nozzles are directed downward toward the conveyor and pan and are angled toward the front of the machine as shown in FIGURES 1 and 6. Each burner nozzle has a front end 48 for projecting a flame 52 and a rear end 50 which is adapted to receive a fuel supply pipe 51. Fuel is fed to the nozzle under pressure where it is ignited, producing the flame 52 which is expelled from the front end portion 48 as illustrated in FIGURE 2. These burner nozzles are evenly distributed over the entire area of the pan. The heat supplied by these nozzles is such as to change completely the snow taken in by the machine to water by the time it is conveyed to the rear of the pan by the conveyor. A fuel supply for the burners is carried in appropriate tanks 53 and 54. The fuel may be of any desirable kind among which may be fuel oil, gasoline, propane, etc. A separate conventional compressor 56 may be used to supply pressure to the fuel system. This compressor may be either operated by a separate power

plant, as shown, or by the power plant used to operate the conveyor. The fuel is controlled to each nozzle by separate control valves such as shown at 55, which controls the flow of fuel from a manifold 49 to each of the separate fuel lines 51 leading to the burner nozzle B. The compressor 56 receives the fuel from the fuel tanks through the pipe 81 and deposits it in the manifold 49 under the required pressure from the pipe 82.

The conveyor is operated by a conventional power plant P. Connected with the power plant is any well known conventional gear reduction unit 57, the workings of which are not shown. The ratio of the speed between the power plant and the conveyor is selectable by operating a lever 58. There is also provided a clutch mechanism between the power plant and the gear unit 57 (not shown) which is operated by a clutch peddle 59, for disengaging the power plant from the gear reduction unit 57. There are provided shafts 60 and 61 extending outwardly from each side thereof for rotating sprockets 62 and 63 secured thereto. Extending about the sprockets 62 and 63 are drive chains 64 and 65 which extend also about the sprockets secured to the rear conveyor shaft, as shown at 62' in FIGURE 7. With this arrangement the conveyor is operated at the proper speed to convey the snow through the machine.

The pan may be provided with openings 80 adjacent its rear for draining off the water accumulated from the melted snow, or have a pipe connection may be made to pump the water into a tank truck.

The machine is designed to be towed behind a tractor or truck; however, it may be self propelled if desired. By having the machine designed to be towed instead of being self propelled, it lends itself at a more economical construction and operation of the machine. In order to tow the machine there is provided a towing element 65, positioned adjacent the front of the machine having an extension 66 for connecting the same to the towing vehicle. The towing element and the front portion of the cover 35' are hinged to the remaining cover and frame of the machine by a hinge 67. This portion of the cover and towing element may be folded back on the machine to provide an opening above the forward end of the conveyor for dumping snow 69 from a truck, as shown at 70 in FIGURE 9. This is a modified use of the machine in melting snow that may be transported thereto in trucks. The machine may be conveniently located adjacent a storm drain or a tank truck and the snow brought to it to prevent long hauls of snow trucks or to keep them out of traffic which may already be congested by reason of the snow. After the snow is melted it is run off into the storm drain or pumped into a conventional tank truck.

The machine is provided with red signal lights 74 and 75 adjacent its rear end, and forward lights 76 and 77 and also a rotatable signal light 78 atop the cab 79, which provides a safety feature when the machine is on the street or otherwise associated with moving vehicles. The cab is located adjacent the back of the machine in order that the operator may observe the complete operation of the machine.

In operation the machine may be towed along the road-bed, or street, etc., picking up the snow by its scoop and passing it through the machine for changing the snow into water which is disposed of as previously mentioned, that is, a drain sewer or into a tank truck. The machine may be used as illustrated in FIGURE 9 wherein the machine is placed in a stationary position and the front opened up by swinging the cover portion 35' about the hinge 67. Trucks loaded with snow may dump the snow in the front end of the machine directly over the front end of the conveyor and by operating the conveyor C in the direction of the arrow, the snow will be conveyed along the pan 41 beneath the burner nozzles B where it is melted and disposed of as water.

While the invention has been illustrated in a particular form, it is not intended as a limitation and its scope is best defined in the appended claims.

I claim:

1. A snow machine for removing snow from roadways including means for collecting snow and heating means for melting the same comprising, in combination:

(*a*) a horizontal elongated rigid frame comprising two spaced vertical side walls having substantially horizontally parallel upper and lower edges and means for supporting the vertical frame members with their lower horizontal edges adjacent a roadway;

(*b*) a shallow pan including a horizontal bottom, two side wall members, a front wall member and a rear wall member, said pan extending substantially the full width of the frame and between the two sides from a point adjacent the front of the frame to a point adjacent the rear of the frame for carrying a layer of a predetermined amount of water from the melted snow;

(*c*) a scoop attached to the forward end of the rigid frame and extending outwardly therefrom having its outer edge positioned downwardly from the front end of the frame and in a plane below the height of the pan and its inner edge extending over the upper edge of the front wall of the pan;

(*d*) a cover extending over the area between the side frames and supported upon the upper edges thereof;

(*e*) horizontal wall tie members extending at least between the upper edges of the side frame members;

(*f*) a rotatable shaft positioned at approximately each end and laterally of the frame and parallel with the bottom of the pan, and in a plane lying between the upper end lower edges of the side frames;

(*g*) corresponding sprockets carried at least adjacent each end of the two shafts and adjacent the inner side surfaces of the pan and adapted to extend downwardly into the pan;

(*h*) an endless link horizontal chain conveyor made up of at least two chains formed from individual link members extending around and between the corresponding sprockets of the two shafts to form upper and lower conveyor portions;

(*i*) cross bar members extending between corresponding opposite link members carried on each of the two chains, the lower portions of the conveyor being below the upper edges of the side walls of the pan and parallel with the bottom thereof;

(*j*) means for rotating the sprockets for moving the lower portions of the conveyor rearwardly through the pan carrying the snow;

(*k*) said heating means comprising a plurality of separate burners having at least their front ends positioned in the interior area of the machine formed by the cover, the side walls and the pan, said burners being spaced apart laterally from side to side of the machine and extending from a point adjacent the front of the machine to a point adjacent the rear thereof and adapted to direct their flames into the interior area of the machine and upon and around the cross bar members for storing heat therein;

whereby, the snow is melted by the heat from the flames emanating from the ends of the burners, the heated cross bar members, and the water as it is carried through the pan toward the rear of the machine.

2. A snow machine for removing snow from roadways including means for collecting snow and heating means for melting the same comprising, in combination:

(*a*) a horizontal elongated rigid frame comprising two spaced vertical side walls having substantially horizontal parallel upper and lower edges and means for supporting the vertical frame members with their lower horizontal edges adjacent the roadway;

(*b*) a shallow pan for retaining a predetermined amount of water including a horizontal bottom, two side wall

members, a front wall member and a rear wall member, said pan extending substantially the full width of the frame and between the two sides from a point adjacent the front of the frame to a point adjacent the rear of the frame;

(*c*) a cover extending over the area between the side frames and supported upon the upper edges thereof;

(*d*) horizontal wall tie members extending at least between the upper edges of the side frame members;

(*e*) a rotatable shaft positioned at approximately each end and laterally of the frame and parallel with the bottom of the pan, and in a plane lying between the upper and lower edges of the side frames;

(*f*) corresponding sprockets carried at least adjacent each end of the two shafts and adjacent the inner side surfaces of the pan and adapted to extend downwardly into the pan;

(*g*) an endless link horizontal chain conveyor made up of at least two chains formed from individual link members extending around and between the corresponding sprockets of the two shafts to form upper and lower conveyor portions;

(*h*) cross bar members extending between corresponding opposite link members carried on each of the two chains, the lower portions of the conveyor being below the upper edges of the side walls of the pan and parallel with the bottom thereof;

(*i*) means for rotating the sprockets for moving the lower portions of the conveyor rearwardly through the pan;

(*j*) said heating means comprising a plurality of separate burners having at least their front ends positioned in the interior area of the machine formed by the cover, the side walls and the pan, said burners being spaced apart laterally from side to side of the machine and extending from a point adjacent the front of the machine to a point adjacent the rear thereof and adapted to direct their flames into the interior area of the machine and upon and around the cross bar members for storing heat therein;

(*k*) said cover having immediately above the forward end of the conveyor a hinged portion adapted to swing upwardly and rearward to provide an opening in the forward end of the cover through which snow may be deposited directly upon the forward end of the conveyor;

whereby, the snow is melted by the heat from the flames of the said burners, the cross bar members and the water at it is carried through the pan toward the rear of the machine.

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