March 10, 1953 E. A. SMITH 2,630,637

SNOW MELTER

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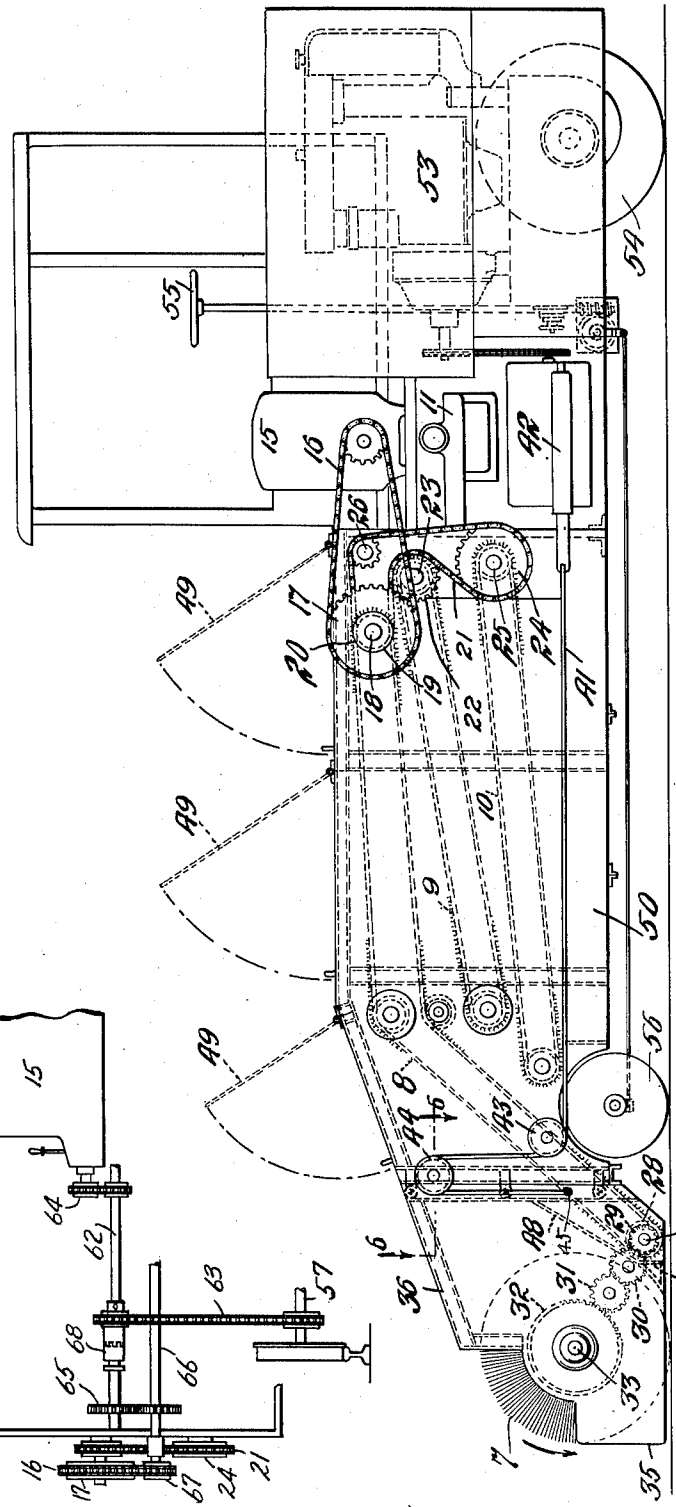


Fig. 1.



Fig. 2.

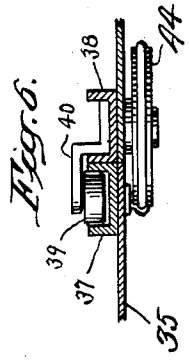


Fig. 6.

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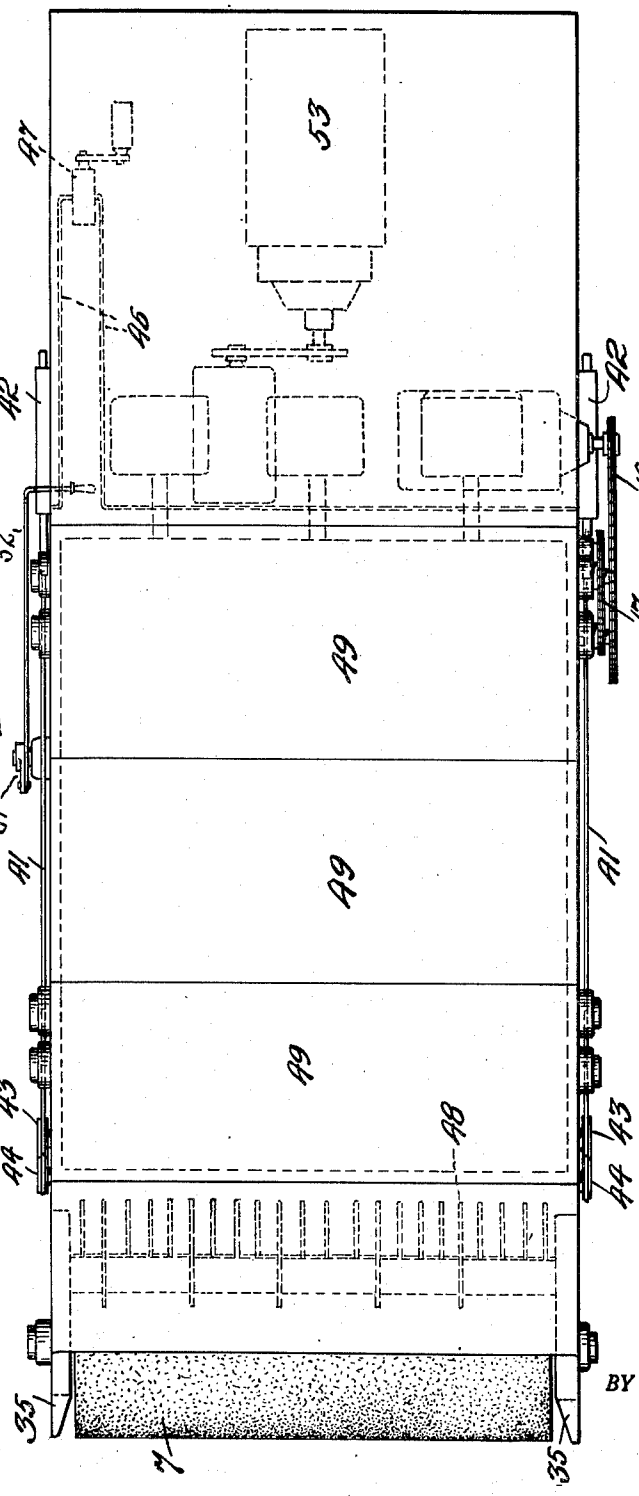



Fig. 2.

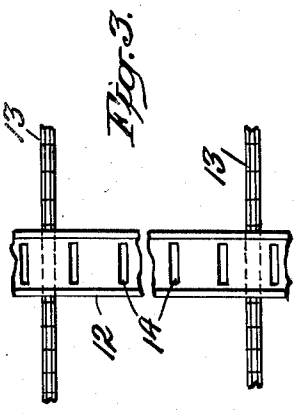



Fig. 3.

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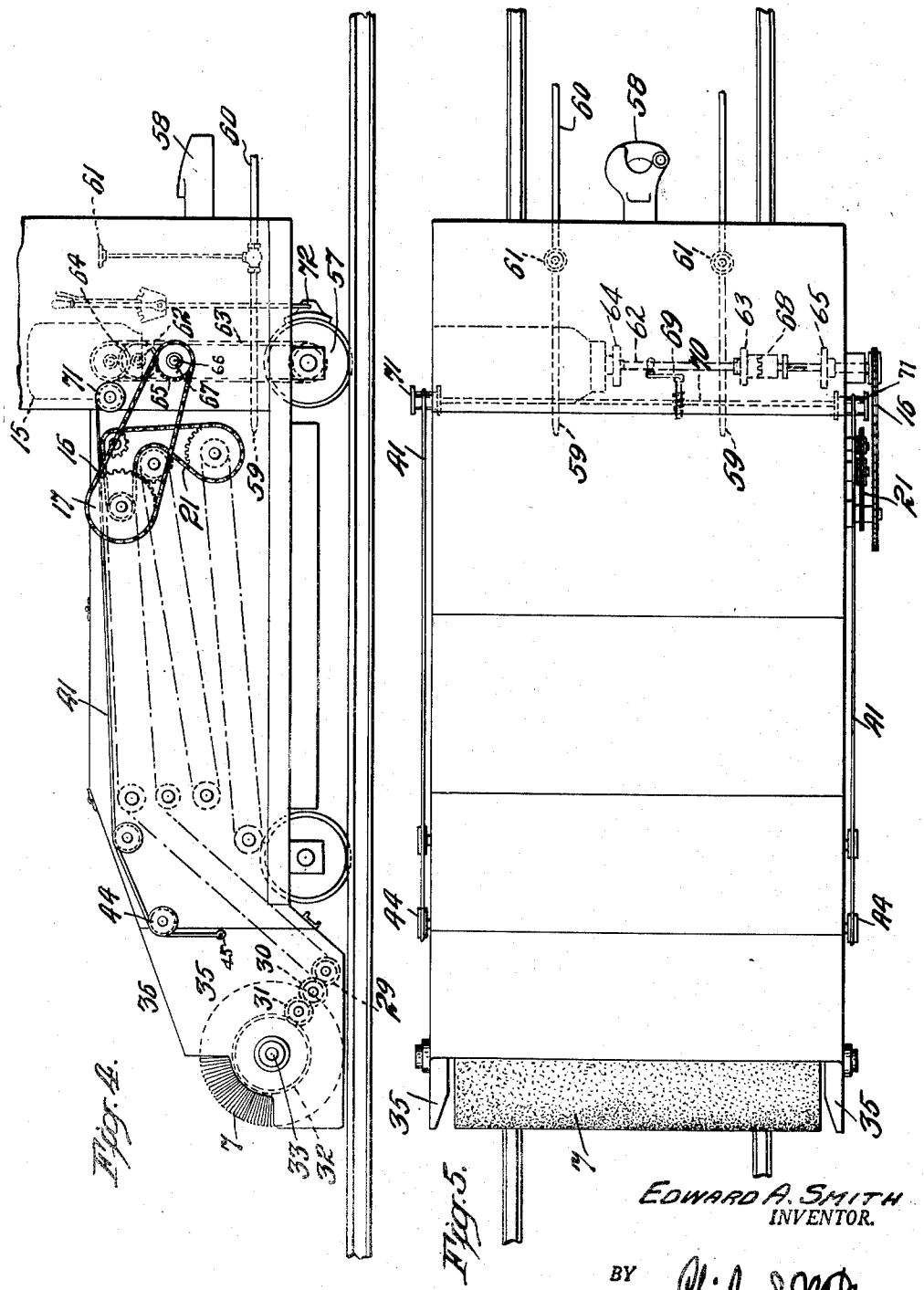


Fig. 4.



Fig. 5.

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# UNITED STATES PATENT OFFICE

2,630,637

## SNOW MELTER

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Application January 15, 1946, Serial No. 641,199

1 Claim. (Cl. 37—12)

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The invention here disclosed relates to the removal of snow and ice from streets, roadways, railway tracks and the like and is in the nature of an improvement on prior machines covered in Edward A. Smith Patents 1,753,757, dated April 8, 1930; 1,895,900, dated January 31, 1933; and 2,221,386, dated November 12, 1940

Objects of the present invention are to provide a practical and efficient machine for removing snow and ice which will take in and melt frozen material as it advances, separate out trash or foreign matter encountered and hold and dispose of the collected water as best suited to the immediate conditions.

Special objects of the invention are to enable immediate clearance of any refuse that may collect or be taken in by the machine and the adjustment and setting of the brush or sweeper mechanism to best suit the conditions encountered.

Other objects of the invention are to provide a form of melter which with necessary changes in design may be applied to either roadway or railway uses and which may be adapted to utilize the heat of different kinds of burners, such as oil burners for street cleaning purposes and steam nozzles supplied from a locomotive for railway track cleaning purposes.

In connection with the railroad type of melter, further objects of the invention are to provide such a machine which may be propelled either by the locomotive or be self-propulsive and also, if occasion required, be able to apply its propulsive effort to the action of the locomotive.

Other desirable objects and the novel features by which the purposes of the invention are attained are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate certain of the present practical embodiments of the invention. Structure, however, may be modified and changed as regards the immediate disclosure, all within the true spirit and scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawing is a side elevation of a form of the invention designed for roadway use;

Fig. 2 is a plan view of the same;

Fig. 3 is a broken detail of one of the slotted channel bars used on the snow melting conveyers;

Figs. 4 and 5 are side and top plan views, respectively, of a railroad type of machine.

Fig. 6 is a broken sectional detail on substantially the plane of line 6—6 of Fig. 1.

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Fig. 7 is a broken and somewhat diagrammatic view illustrating the controllable selective drive means of the railroad type machine illustrated in Figs. 4 and 5.

In general the machine consists of a rotary brush or broom 7 turning at the front of a portable melting chamber and operating to sweep inwardly and throw snow and ice fragments onto the upwardly inclined run of a preheated conveyor 8 which extends rearwardly into the chamber and drops unmelted fragments onto the forwardly and downwardly inclined run of an intermediate conveyer 9 which in like fashion drops any unmelted fragments onto the upwardly and inwardly inclined run of a lower conveyer 10.

Heat is furnished by suitable burner mechanism, such as the direct flame heat from oil burners, or indirectly as steam from a locomotive or other burner or furnace fired boiler.

In the embodiment shown in Figs. 1 and 2 the heat is funished by burners 11 discharging forwardly beneath the lower run of intermediate conveyer 9 and above the upper run of the lower conveyer 10, said conveyer serving to direct the heat forwardly beneath the inclined runs of the front and top conveyer 8.

The three conveyers may be generally alike, made up of transverse channels 12 carried by chains 13, said channels being cross slotted as at 14 for passage of heat and drainage of melting ice and snow.

The broom and conveyers are connected together preferably so that they may all be driven from a single power source. This power unit may be an internal combustion engine such as represented at 15, driving by chain 16 a gear 17 on shaft 18 carrying sprocket pinions 19 for the upper conveyer. This shaft is shown carrying a sprocket pinion 20 traversed by drive chain 21 running over the top of sprocket pinion 22 on shaft 23 of the intermediate conveyer 9 and around the under side of sprocket gear 24 on shaft 25 of the lower conveyer 10, said common drive chain completing its circuit over an idler 26. In this manner the conveyors are driven with the upper run of the top conveyer operating inwardly, the upper run of the middle conveyer operating outwardly or forwardly and the upper run of the bottom conveyer travelling inwardly.

The shaft 27 carrying the sprockets 28 for the lower forward end of the front and upper conveyer 8 also carries spur gears 29 in mesh with intermediate gears 30 which in turn drive gears 31 in mesh with gears 32 on the broom shaft 33.

In this manner the broom is rotated in the direction of the arrow to sweep snow and ice inwardly into the melting chamber.

At the foot of the front conveyer a scraper or plow 34 is shown located to direct the inwardly swept material up over the upwardly travelling run of the conveyer. This scraper and guide is shown as carried by the side frames 35 in which the broom shaft is journaled and which frames also carry the journals for the conveyer shaft 27 and intermediate direction reversing drive gears 30, 31.

The broom is hooded over at the top by a downwardly and forwardly inclined top wall 36 connected with the side walls 35 and this enclosure is constructed as a complete unit separate from the body of the melting chamber.

The hood last described is mounted for vertical adjustment at the front of the melting oven, in the present illustration by having vertical channels 37 at the inner ends of the same guided in sliding engagement against the vertical channels 38 at the front of the melting chamber by rolls 39 supported in the movable channel 37 by stationary brackets 40.

Vertical movements are imparted to or permitted the broom hood in the present disclosure by cables 41 extending from hydraulic rams of jacks 42 around guide sheaves 43, 44, and connected with the sides of the hood at 45.

The broom lifting and lowering jacks 42 are shown in Fig. 2 as connected by piping 46 with a suitable pump and control unit 47 operable to effect desired lifting and lowering movements and securing of the broom at a desired level.

To screen trash or other matter away from the first conveyor and to break up snow and ice to a size best suited for quick melting, baffles are usually provided at the entry to the first conveyor, these being shown in the present illustration as spaced rods 48 carried by and upwardly inclined from the scraper 34 over the lower, upwardly inclined run of the conveyer.

The rotary broom, drive gearing for the same, scraper, guard screen and supporting shaft for the lower end of the front conveyor are all carried by the front hood and hence will move up and down as a unit in the vertical adjustments of this hood. In such movements the front conveyor may slacken to some extent and if extreme vertical adjustments are contemplated, automatic take-up means may be provided for this conveyer.

Trash collecting on the guard screen may be discharged at any time by raising the broom head unit carrying this screen and if need be, the unit may be quickly raised and lowered at any time to in effect shake clear any collected material and prevent overloading of the mechanism.

The main body of the machine is shown as having hinged doors 49 forming the top of the same which may be opened for inspection or repair, or for any other purposes, such as for clearing the conveyors of any foreign material.

The bottom of the melting chamber is shown as made up in part of a pan or reservoir 50 for collecting melted material, and this may be equipped with a suitable trap or relief valve 51 operable by connections 52 from the cab of the machine so that water may be held and carried until such time as it may best be discharged.

The roadway machine is shown as propelled by an engine 53 suitably coupled with the road wheels 54 and the machine may be suitably steered



as by a wheel 55 connected with the front, steering wheels 56.

The railroad type machine illustrated in Figs. 4, 5 and 7 differs from that described principally in that it is mounted on railway car wheels and axles 57, provided with a coupler mechanism 58 by which it may be connected with a locomotive and equipped with steam nozzles 59 in place of the burners, and piping 60 arranged for connection with the locomotive boiler. The nozzles are controlled by suitable valve mechanism such as indicated at 61.

In the illustration the conveyers may be driven either from the rear car axle 57 or from the motor 15, through the medium of an intermediate shaft 62 adapted to be driven by sprocket chain 63 from the axle or by sprocket chain 64 from the motor, said intermediate shaft driving through reversing gears 65, the lower shaft 66 which carries the drive sprocket 67 for the conveyer drive chain 16. Suitable clutch mechanism indicated at 68 enables this drive gearing to be selectively controlled so that the machine may be operated solely from the car axle or from the motor and so that if required, the motor may also propel the machine to make it transitory independently of the locomotive, or possibly to assist the locomotive in the event of heavy snow.

The lifting and lowering of the hood is shown as controlled in this railway form of the device by hand winch 69 for turning a cross shaft 70 carrying windlasses 71 for the hood lifting and lowering cables 41.

The vertical adjustment of the front hood 36 may be utilized to control to some extent the blower effect of the rotary broom on the heat supplying means. The upper portion of the broom rotating outwardly creates a draft, drawing the heat products forwardly through, beneath and about the conveyers. By raising or lowering the hood the suction effect may be varied and the melting operations regulated and controlled. This blower operation also is utilized to heat the broom to some extent, to prevent ice and snow from caking or freezing on it.

Control also may be exercised by opening one or more of the top doors 49 and securing it or them in partially or completely raised positions.

The heating of the broom also makes it more effective for scraping and breaking snow and ice away from the road surface and for flaking and breaking it up into smaller particles which will quickly disintegrate in contact with the preheated conveyors. Heated air that may be drawn out over the top of the broom is deflected downwardly by the downwardly and forwardly inclined hood onto snow immediately in advance of the machine, preparing it for action by the broom.

The machine of the present invention has been designed to take advantage of the principle established through a series of experiments by this inventor, that the heat required to melt a given volume of snow depends directly on the density of the snow, other variables being held constant. In this improved machine the B. t. u.'s required to melt a given volume of snow have been reduced to 87 B. t. u.'s per cubic foot as against 143–145 B. t. u.'s per cubic foot at present given by standard engineering practice.

In addition to the various controls described, the machine may be supplied with suitable braking mechanism such as indicated at 72, Fig. 4, and the like.

While a rotary broom may usually be preferred for sweeping in snow and ice and delivering it on

the preheated grids of the conveyors, it is contemplated that other forms of rotary members may be employed for such purposes, particularly if necessary to chop or break up heavier snow or ice formations.

What is claimed is:

A snow melter comprising a portable melting chamber having vertical guides at the front end of the same, a hood slidable vertically on said guides, power means on said portable melting chamber for raising and lowering said hood, a rotary snow entraining member mounted in said hood and adapted to be vertically raised and lowered therewith, conveyors travelling rearwardly into said melting chamber from said hood, means on said chamber for driving said rotary snow entrainer and conveyors, a scraper extending across the base of said hood for directing snow swept by said rotary snow entraining member onto said conveyors, a trash screen mounted in said hood between said scraper and conveyors, said conveyors having cross channels slotted for passage of heat, and heat furnishing means in the rearward portion of said melting chamber discharging forwardly beneath and upwardly through the slotted channels of said conveyor.



EDWARD A. SMITH.

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