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2,221,386

SNOW REMOVAL

Filed March 27, 1939

2 Sheets-Sheet 1

Fig. 1.

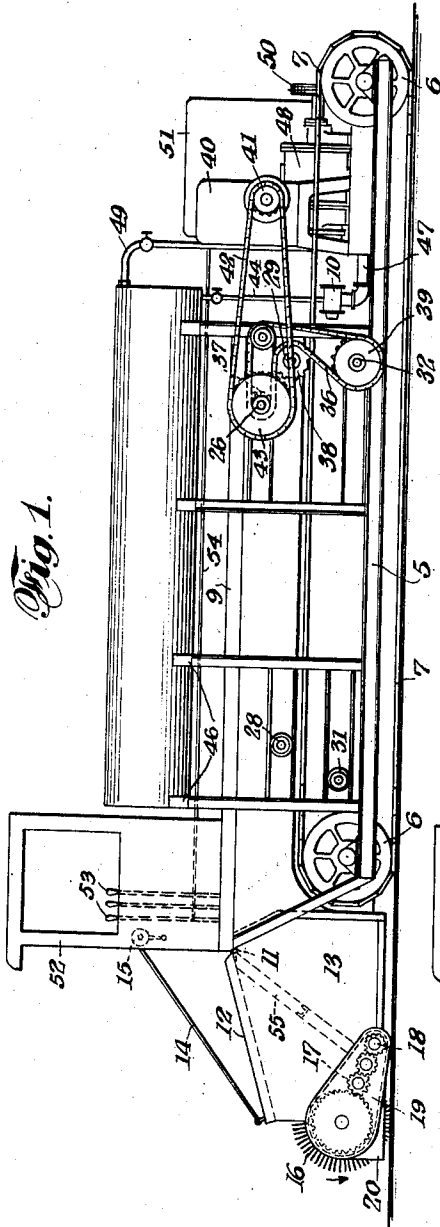
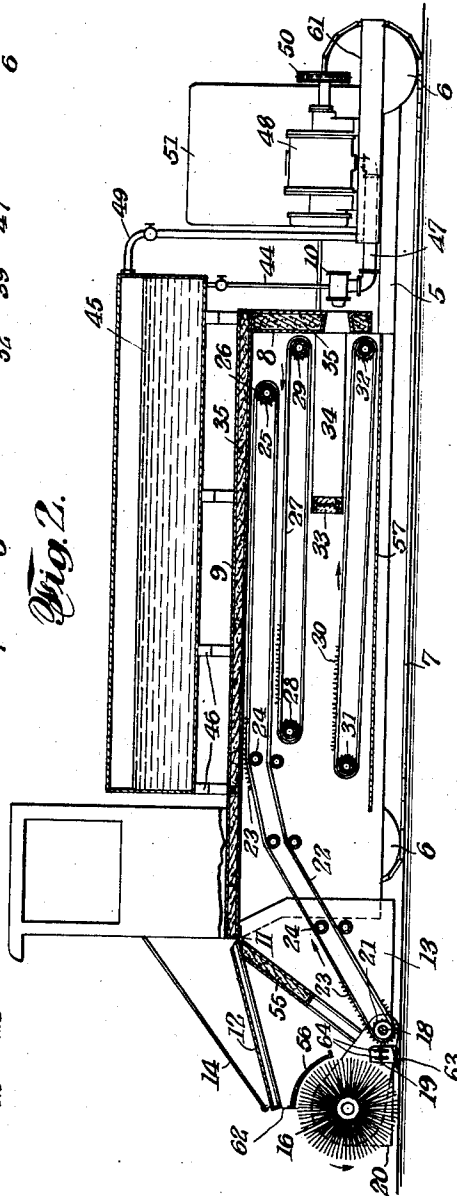


Fig. 2.



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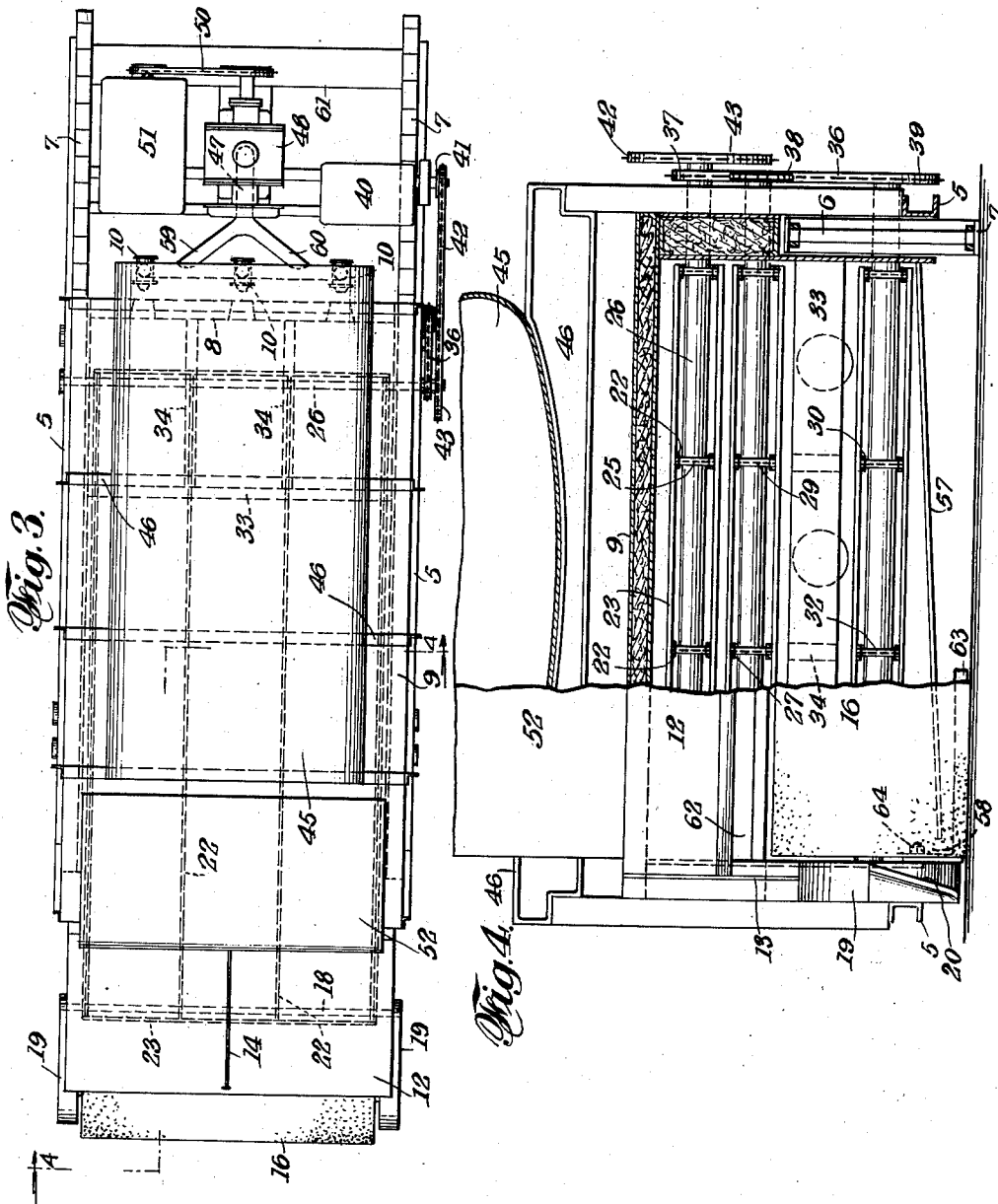
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SNOW REMOVAL

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5 Claims. (Cl. 37—12)

This invention relates to removal of snow and ice from city streets and roadways.

The objects of the invention are to provide a simple, practical and efficient machine for economically removing snow and ice by sweeping and melting operations.

These and other desirable objects are attained in the present invention by the novel features of construction, combinations and relations of parts hereinafter described, illustrated in the accompanying drawings and broadly covered in the claims.

The drawings accompanying and forming part of the specification illustrate one practical commercial embodiment of the invention and with full understanding of the invention, it will be appreciated that various modifications and changes may be made all within the true and intended scope of the claims.

Fig. 1 is a side elevation of a machine embodying the invention.

Fig. 2 is a longitudinal sectional view of the same.

Fig. 3 is a top plan view.

Fig. 4 is an enlarged broken cross-sectional view substantially as on the plane of line 4—4 of Fig. 3.

The main frame of the machine indicated generally at 5, is carried by tractor wheels 6, and treads 7.

This frame mounts a firebox defined generally by a back wall 8, and a top wall 9, this chamber opening forwardly of the machine and having a burner or burners discharging thereinto at the back at 10.

The forward section of the melting chamber is defined by a movable hood pivotally mounted at the top at 11, and made up of a downwardly and forwardly sloping upper wall 12, and attached side walls 13.

A cable or like connection 14 and windlass 15, or the like, serve for raising and lowering this forward hood section.

Journalled between the side walls, at the open front end of the hood is a rotary brush or broom 16, driven by a train of gears 17, from a front conveyor shaft 18. These gears are housed in closed gear casings 19, and these, as indicated particularly in Figs. 2 and 4, have inwardly and upwardly inclined guides 20, at the extreme front for directing snow and ice into the reach of the rotating brush.

The front conveyor shaft 18 carries between the gear casings 19, sprockets 21, for an endless conveyor made up of the chains 22, carrying

cross channel strips 23. The upper run of this conveyor extends on an upward and rearward incline over guide rolls 24, to a rear set of sprockets 25, on shaft 26, traversing the upper rearward portion of the melting chamber.

Below the top conveyor is a second or intermediate conveyor 27, of similar construction carried by shafts 28 and 29. This second conveyor is shown as extending only from the extreme rearward portion of the melting chamber forwardly to where the upper conveyor declines to the open front of the machine.

Beneath and spaced somewhat below the second conveyor is a third, lower conveyor 30, also of the same slatted construction carried by shafts 31, 32, and extending from the lower rearward portion of the chamber forwardly beyond the front end of the intermediate conveyor.

The burners are shown discharging into the space between the lower run of the second conveyor and the upper run of the bottom conveyor. These two runs serve to "sheet" the burner flame therebetween.

To hold the flame and form in effect a "fire-box" a cross baffle is indicated at 33, and side baffles at 34, these preferably being faced with fire clay or equivalent. The back, top and side walls of the furnace chamber may be suitably lined with firebrick or the like, or simply be insulated as indicated at 35, to properly hold the heat.

The three conveyors are driven in reverse directions as indicated by the arrows by suitable gearing and shown in the illustration as a sprocket chain 36, extending over the reverse sides of sprockets 37, 38 and 39, on the rearward conveyor shafts 26, 29, 32, respectively.

The power for operating the conveyors is supplied in the present disclosure by an engine 40, mounted on the rearward portion of the framing and driving by sprocket and chain 41, 42, a sprocket 43, on the upper conveyor shaft 26.

The burners may be in the nature of atomizers taking oil fuel through piping 44, from a tank 45, mounted in saddles 46, over the framing of the furnace chamber, said atomizers being supplied with air through piping 47, from a blower 48. The by-pass line 49 is shown taken off from the pressure side of the blower for putting pressure on the fuel in the tank 45.

The blower 48 for the burners is shown as driven by sprocket gearing 50, from an engine 51, on the rear of the machine framing and which engine may be the same as that which supplies the propulsion power to the chain treads.

The conveyor engine 40 and propulsion-blower engine 51 may either or both be controlled from the cab 52, at the front of the machine. Controls for such purpose are indicated, but only in a general way at 53, with suitable connections running back therefrom at 54.

The machine may be driven at a speed proportionate to the melting to be accomplished. The rotating brush throws the snow and ice inwardly onto the upwardly running surface of the heated top conveyor, which carries the material to be melted backward into the hottest portion of the melting chamber. Any unmelted material is dropped by the rearward end of this conveyor onto the forwardly running upper reach of the second conveyor and any unmelted matter from this second stage is dropped by the intermediate conveyor onto the upper stretch of the inwardly running lower conveyor 30. The overhanging hood prevents escape and waste of heat at the open end of the melting chamber and the successive treatment on the three conveyors assures rapid melting. A downwardly inclined baffle is shown provided in the roof of the hood at 55, and the top of the brush is shown as partly covered at 56, to protect the brush from heat, to further conserve the heat generated by the burners and to hold it confined over and about the conveyors.

The melted material is drained off to the outer side of the road in the illustration by a transversely inclined pan 57, Fig. 4, shown as extending from the left toward the right hand side of the machine and terminating short of the latter side to leave a clear drainage space at 58.

In the present invention, the firebox into which the burner is discharged, is located within and forms in effect a portion of the melting and conveyor chamber. This keeps down the overall length of the apparatus and conserves heat. The burner or burners may be of any desirable form and of any desired number. In the illustration, three burners are shown (Fig. 3) equidistantly spaced on a manifold 59, and the piping 47 from the blower is shown as including a Y-connection 60, the arms of which enter the burner manifold between the center and the end burners to afford substantially equal length and hence equal capacity air flow connections to all burners. All, or at least the main controls, may be arranged in the cab at the front of the machine, so that necessary adjustments may be immediately made as the work progresses. The engine or engines are conveniently located on a low platform 61, at the rear of the machine where, if desired, an attendant may be stationed to aid the driver and in some instances, to attend special parts of the machine, such as the burners, for example.

The machine is designed particularly for use with fresh fallen snow. The rotary brush is effective under these conditions to separate the snow into small particles which are thrown onto the heated conveyor and transported immediately back into the melting chamber, wherein heat from the burners is confined in the burning gases held under a certain degree of compression. In this fashion and by these means, the heat is most effectively utilized. A moist heat condition is created which is more effective for the snow melting purpose than dry heat would be. To permit sufficient circulation, an escape flue or passage 62, is shown provided in the front of the

hood, over the brush guard 56. A scoop blade is shown at 63, Fig. 2, having angled ends adjustably secured by bolt and slot connections at 64, to the inner sides of the gear cases. This partly collects material from the brush and aids in feeding it to the upwardly running conveyor. This blade may be adjusted to act also as a scraper to lift masses of snow or ice that may be left by the brush on the roadway.

What is claimed is:

1. Snow melting apparatus, comprising a melting chamber, a rotary brush discharging into the front end of the same, a burner discharging into the rear end of the same, a top conveyor extending from adjacent said brush into the upper rearward portion of the melting chamber above the burner discharge, a lower conveyor operating in the melting chamber below the burner discharge and a baffle for the burner located in the melting chamber between the conveyors.
2. A snow melting machine, comprising a portable oven, a rotary brush discharging into the front end of said oven, burners discharging into the rearward end of said oven, front and side baffles for said burners within the oven, an upper conveyor extending from adjacent the brush into the upper portion of the oven above said baffles and a lower conveyor in the oven below said baffles.
3. A snow melting machine, comprising a portable oven, a rotary brush discharging into the front end of said oven, burners discharging into the rearward end of said oven, front and side baffles for said burners within the oven, an upper conveyor extending from adjacent the brush into the upper portion of the oven above said baffles, a lower conveyor in the oven below said baffles and guides at the ends of the brush for directing material into the reach of the brush.
4. A snow melter comprising a traveling melting oven, a rotary brush at the front end of the same, a conveyor extending from said brush back into the oven, a guard within the oven, partly covering the top of the brush to protect same from heat of the oven, a burner discharging forwardly into the oven and a flue passage over the top of the brush guard for escape of heat products.
5. Portable snow melting machine, comprising a tractor having tractor treads located within the bounds of the machine and a motor for operating the same, an upwardly inclined conveyor running from the lower front portion of the machine toward the rear thereof, means at the front of said machine in advance of said conveyor for separating snow and depositing the same on the upwardly inclined front portion of said conveyor, a forwardly running conveyor below the rearward end of said first conveyor and positioned to receive products therefrom, a rearwardly running conveyor beneath said forwardly running conveyor in position to receive products from the latter, a burner discharging forwardly between said last mentioned forwardly and rearwardly running conveyors, said conveyors having flanged channel strips for baffling the flame of said burner, a blower connected with said burner and operated from said tractor motor and means for driving said conveyors and said means for separating and depositing the snow.

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