Jan. 31, 1933. E. A. SMITH 1,895,900

SNOW REMOVAL

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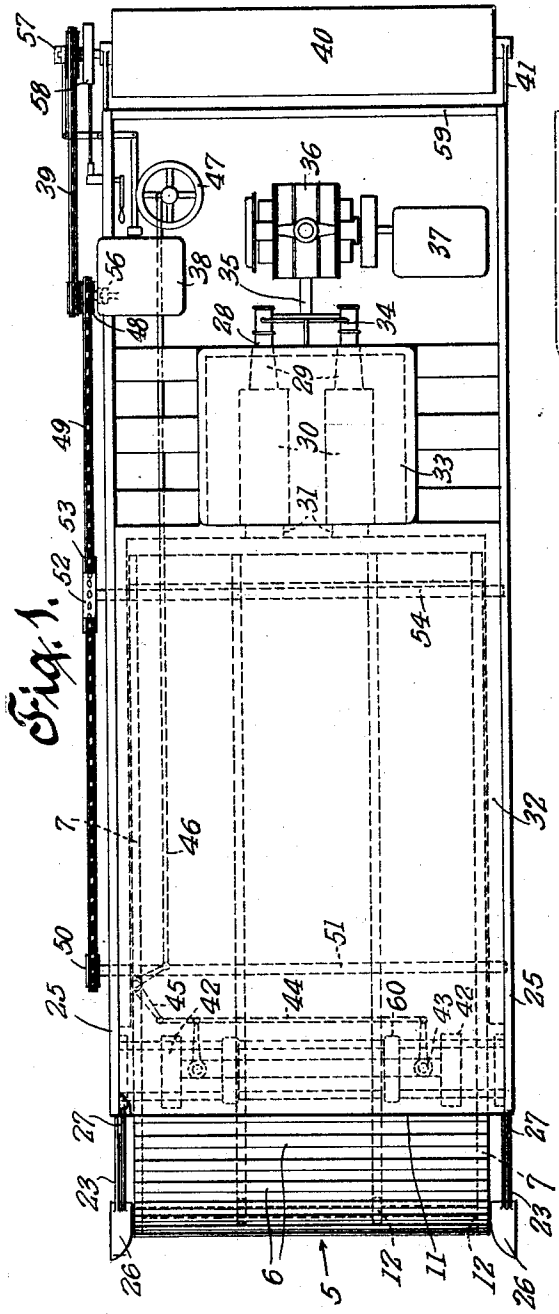


Fig. 1.

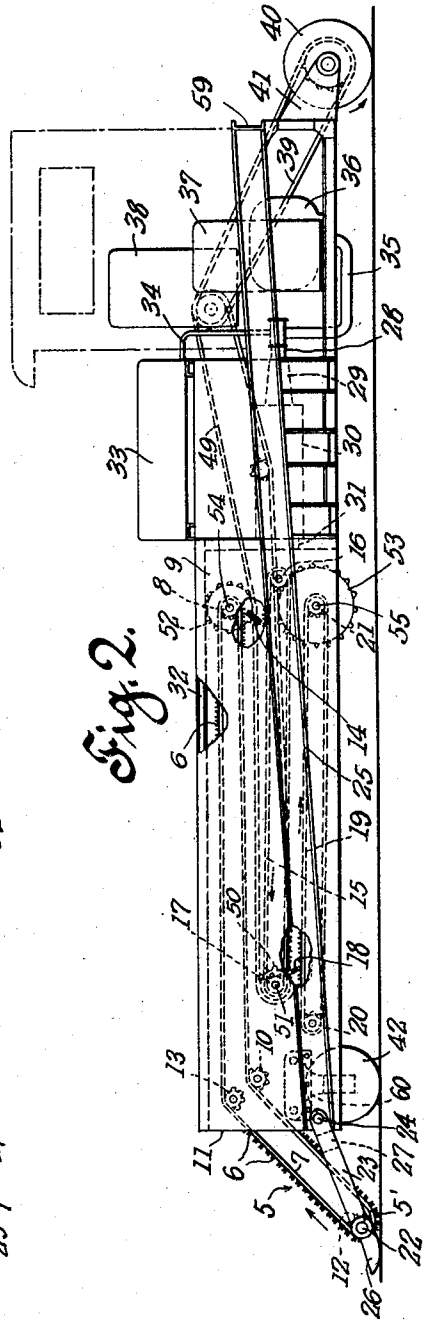


Fig. 2.

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SNOW REMOVAL

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Special objects of this invention are to provide practical and efficient apparatus for removing snow from streets and roadways and which will operate rapidly to accomplish the desired results.

The drawing accompanying and forming part of the specification illustrates one commercial embodiment of the invention, wherein the foregoing objects are attained by certain novel features of construction, combinations and relations of parts as hereinafter described and broadly claimed.

Fig. 1 is a top plan view of the apparatus; Fig. 2 is a side elevation of certain parts broken away and appearing in section.

The machine disclosed consists in the main of a series of chain conveyors adapted to pick up and carry the snow into the melting range of a fire box, said chains operating in effect as a set of flues into which the fire box discharges.

The first conveyor which is designated 5 consists of a series of channel slats 6 carried by chains 7 and extending from sprockets 8 within the heating chamber 9 of the machine forwardly over sprockets 10 and downwardly out through the open end 11 of the chamber over sprockets 12 and upwardly over sprockets 13, and backwardly on a slight downward incline to the rearward sprockets 8. A cross blade 14 beneath the lower run of the chain adjacent the sprockets 14 serves as a stripper to drop any unmelted snow onto the upper length of an outwardly running conveyor 15, which may be constructed similarly to the first and which is shown as supported on sprockets 16, 17. The upper run of this conveyor also slants back into the machine as clearly shown in Fig. 2.

Beneath the lower run of this second conveyor adjacent the outermost sprockets 17, a stripper 18 is shown for scraping any unmelted material off onto the third conveyor indicated at 19 and shown as supported on sprockets 20, 21.

The third conveyor may be made up of slightly separated channel slats mounted on chains as in the case of the first conveyor and this like the first two is shown as having its upper run inclined downwardly toward the inner end of the heating chamber. This third conveyor is operated the reverse of the second conveyor, that is with its upper end travelling inwardly toward the inner end of the heating compartment.

The sprockets supporting the extended portion of the upper conveyor are shown as mounted on a transverse shaft 22, carried by forwardly extending arms 23 pivoted at 24 to the front ends of the channel 25 forming the side frames of the machine. As indicated at 5′ in Fig. 2, the lower run of the chain may be permitted to drag on the pavement or road surface, so as to exert a "sweeping" effect on the snow, thereby breaking and picking it up to an extent and gaining a purchase on the same to pick it up and carry it on the upwardly extending run. Shoes 26 at the forward ends of the arms 23 operate as runners for engagement with the road surface to raise and lower the slack forward portion of the conveyor in accordance with road configuration to prevent the arms from lowering the forwardly extending portion of the conveyor too far. Stop blocks 27 are shown secured between the pairs of side arms 23 and adapted by engagement with the forward ends of the side channels 25, Fig. 2 to limit the lowering movement of said arms and of the chain sprockets carried thereby. If desired, road wheels may be mounted in the runners 26 or on the shaft 22 and these runners may be widened as indicated in Fig. 1 to operate as scoops for directing the snow over toward the upper run of the conveyor.

The heat for melting the snow is provided in the present disclosure by suitable oil burners 28, discharging through ports 29, into fire boxes 30, which in turn discharge by ports 31 into the inner end of the melting

chamber 9. This chamber is indicated in Fig. 2 as closed over by a double walled top 32 to conserve the heat, but may be opened at the bottom and at the front end of the same. The fire boxes or combustion chambers are indicated as discharging directly toward the inner ends of the conveyor chains, which thereby serve as flues confining the heat sufficiently to effect substantially complete melting of the snow on the conveyors.

The burners are shown as supplied with fuel from a tank 33 through a pipe line 34 and with air through a line 35 from a blower 36 driven by an internal combustion engine 37.

The machine may be self propelled or be drawn or pushed by suitable power. In the illustration, the machine is propelled by an engine 38 geared by chain 39 to a supporting roller 40 journalled in brackets 41 in the rear of the machine. Steering is accomplished in the illustration by steerable front wheels 42 indicated as provided with suitable steering knuckles at 43 and connected by linkage 44, 45, 46, with the steering wheel 47. The motor 38 which is used for driving the machine is also employed in the illustration for operating the conveyors, it being shown as equipped for this purpose with an extra sprocket 48 driving a chain 49, running over a sprocket 50 on the shaft 51, which carries the sprockets 17, Fig. 2, for the second conveyor. This second conveyor therefore is thus directly driven by chain 49.

The first and third conveyors also are directly driven from the main drive chain 49 in the illustration by having sprockets 52, 53 on the sprocket shafts 54, 55 of these conveyors and in mesh respectively with the upper and lower runs of said main drive shaft as plainly shown in Fig. 2.

A suitable clutch is indicated at 56 in Fig. 1 by which the conveyor drive may be controlled at will and another clutch is indicated at 57 in the line of drive connections to the roller 40, whereby the propulsion of the vehicle may be controlled at will. If desired, the propulsion gearing may include suitable change speed gears enabling the rate of travel to be governed according to road conditions without changing the drive of the conveyor chains.

Suitable braking mechanism for holding and controlling the vehicle may be provided as indicated in a general way at 58 in Fig. 1, the braking being shown as applied to the road roller 40.

As shown the conveyor is propelled along the roadway, the inclined front conveyor will pick up the snow and carry the same upward and inward into the melting chamber. If any unmelted snow remains at the end of the rearward travel of this conveyor, the same is deposited onto the upward, outward length of the second conveyor and if the melting is not completely accomplished on this second conveyor, the unmelted material is dumped on to the inwardly running upper length of the third conveyor, which then carries the material back into the hottest region of the melting chamber close to the burner exist flues 31. The three conveyors superposed as they are, sheet the flame from the burners, operating as flues to confine or control the heat in layers above and below the respective conveyors. The speed of travel of the conveyors and the machine may be regulated to effect complete or substantially complete conversion of the snow and ice. The melting chamber being open at the bottom has the effect of warming the pavement or roadway over which the machine travels, to melt the snow fragments which the front conveyor may have failed to pick up and the road roller 40, carrying the weight of the machine and also exerting the propulsive force, has the effect of breaking up and ironing out any snow or ice fragments which may have remained unconsumed. This road roller may be smooth or be ribbed, grooved or roughened as desired, for tractive purposes. Due to the weight of the machine, the smooth roller usually is sufficient and may be preferred for ironing out purposes. The shoes at the side edges of the elevating conveyor aid in directing the snow and ice to and upon the up-running reach of this conveyor and the slack at the down running side of this conveyor causes the cross slats to drag on the ground breaking the bond with the pavement and sweeping the loose fragments forwardly, so as to ride up on the chain into the oven or melting chamber. The side channels 25 give the necessary strength to the body of the machine, inclining upwardly from the front end back to the rearward end, where they are connected by a cross channel 59. The rear wheel brackets 41 are indicated as connected to this channel frame and similarly the front wheel brackets 60 carrying the front axle and the steering wheels may be connected to the channel frame structure as indicated in Fig. 2.

In travelling over the roads when the machine is not in actual operation, the front conveyor may be lifted out of the way, it swinging upward on the pivoted supporting arms 23 and being hooked or otherwise supported in this elevated inoperative position.

What is claimed is:

1. Snow melting apparatus, comprising a communicating fire box and melting oven, an upper snow conveyor having an upper run operating in said oven chamber and travelling toward said fire box, an intermediate conveyor beneath the upper conveyor and having its upper run travelling away from the fire box, a lower conveyor having its upper run disposed beneath the intermediate conveyor and travelling toward the fire

box and a single drive chain operating the intermediate conveyor and having upper and lower reaches in driving relation to the upper and lower conveyors.

2. Snow removal apparatus, comprising a melting chamber, a fire box at the inner end of said chamber and discharging longitudinally of said chamber, a slat conveyor having its upper run extending in upwardly inclined relation into the front end of said chamber and backwardly therein substantially to the fire box at the inner end of said chamber and a second conveyor having an upper run disposed beneath the first conveyor and travelling from a position adjacent the fire box forwardly toward the front end of the melting chamber.

3. Snow removal apparatus, comprising a melting chamber, a fire box at the inner end of said chamber and discharging longitudinally of said chamber, a slat conveyor having its upper run extending in upwardly inclined relation into the front end of said chamber and backwardly therein substantially to the fire box at the inner end of said chamber, a second conveyor having an upper run disposed beneath the first conveyor and travelling from a position adjacent the fire box forwardly toward the front end of the melting chamber and a third conveyor within the melting chamber and having an upper run beneath the second conveyor and travelling rearwardly from a point adjacent the front end of the melting chamber toward the fire box.

4. Snow removal apparatus, comprising a melting chamber, a fire box at the inner end of said chamber and discharging longitudinally of said chamber, a slat conveyor having its upper run extending in upwardly inclined relation into the front end of said chamber and backwardly therein substantially to the fire box at the inner end of said chamber, a second conveyor having an upper run disposed beneath the first conveyor and travelling from a position adjacent the fire box forwardly toward the front end of the melting chamber and a third conveyor within the melting chamber and having an upper run beneath the second conveyor and travelling rearwardly from a point adjacent the front end of the melting chamber toward the fire box, said second and third conveyors being also of slatted construction to "sheet" the heat from the fire box in layers within the melting chamber.

5. Snow removal apparatus comprising a portable melting oven open at one end, a burner for delivering heat into the opposite end of the oven and conveyor means for carrying ice and snow from the open end of the oven into the influence of the burner and consisting of side chains connected by closely spaced channels forming cross-slats and disposed with the side flanges of the same projecting outwardly of the conveyor, which conveyor extends in inclined relation out through the open front end of the melting oven and self-supporting means for carrying said inclined portion of the conveyor in close relation to the road surface, with the lower run of the chain sufficiently slack to drag on the pavement or road surface to exert a sweeping effect on the snow, the projecting flanges thereby breaking up and dislocating snow and ice adhering to the pavement.

In testimony whereof I affix my signature.

EDWARD A. SMITH.