

1,386,137.

C. SQUIRE.
SNOW REMOVAL APPARATUS.
APPLICATION FILED JUNE 4, 1920.

Patented Aug. 2, 1921.

5 SHEETS-SHEET 1.

Fig. 1

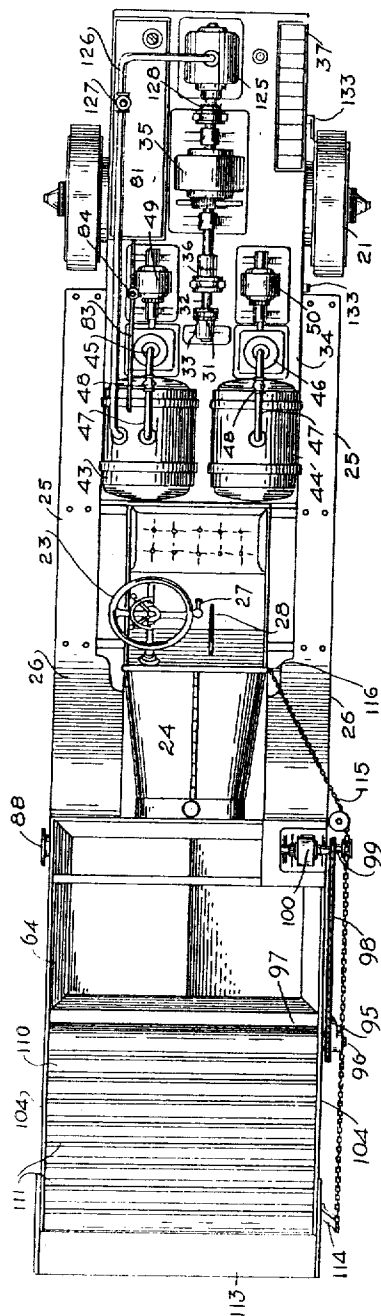
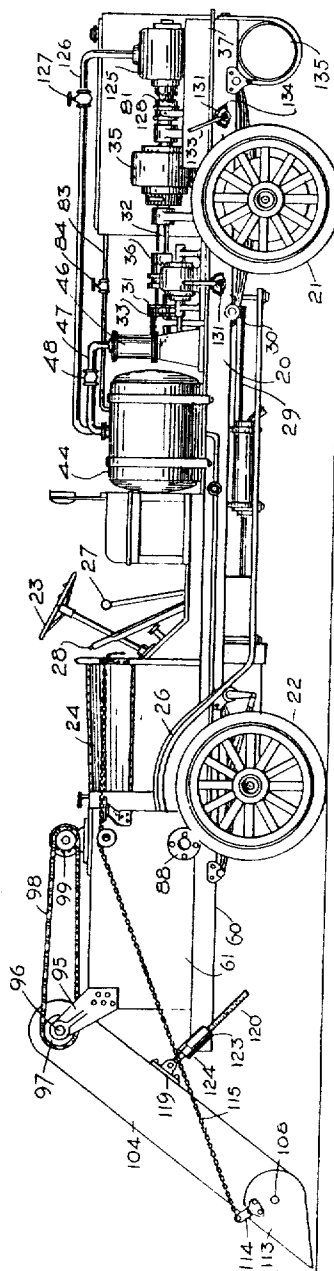


Fig. 2.



Inventor
Charles Squire,

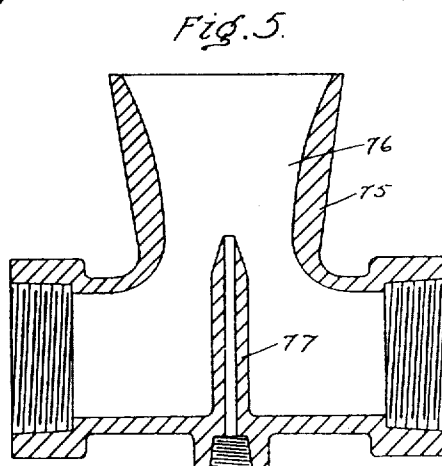
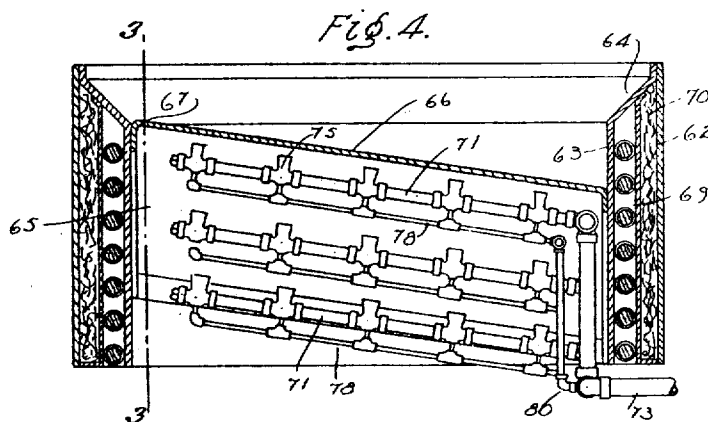
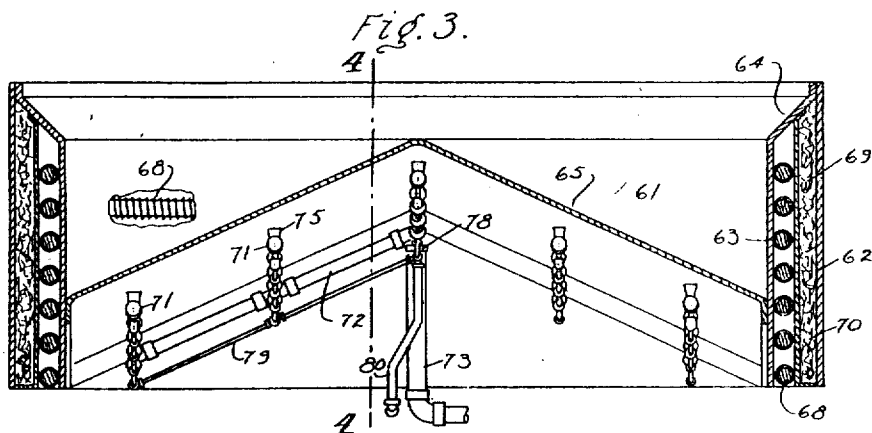
By

Biesen Schreyer
Attorney

1,386,137.

C. SQUIRE.
SNOW REMOVAL APPARATUS.
APPLICATION FILED JUNE 4, 1920.

Patented Aug. 2, 1921.
5 SHEETS—SHEET 2.



Inventor
Charles Squire,

By *Bruce Schreuk*
Attorney

1,386,137.

C. SQUIRE.
SNOW REMOVAL APPARATUS.
APPLICATION FILED JUNE 4, 1920.

Patented Aug. 2, 1921.

5 SHEETS—SHEET 3.

Fig. 6.

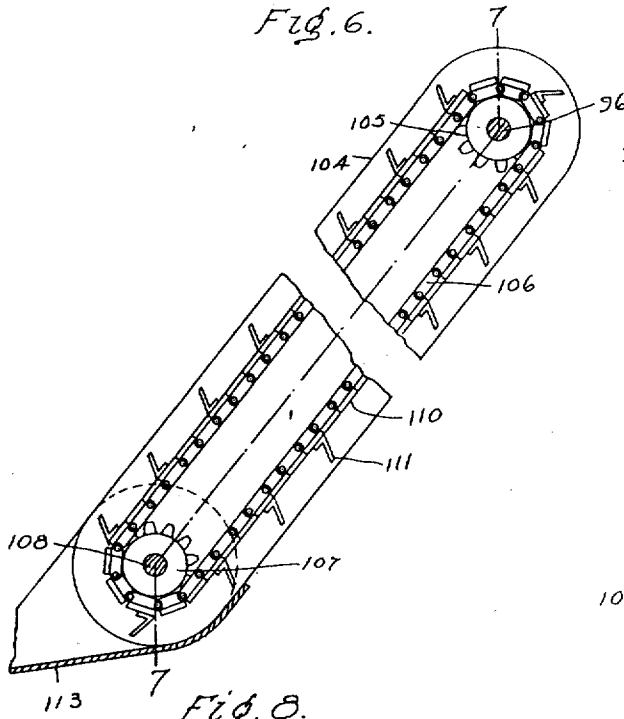


Fig. 7.

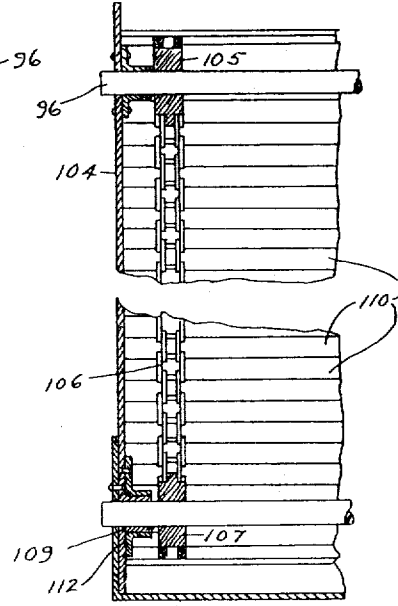
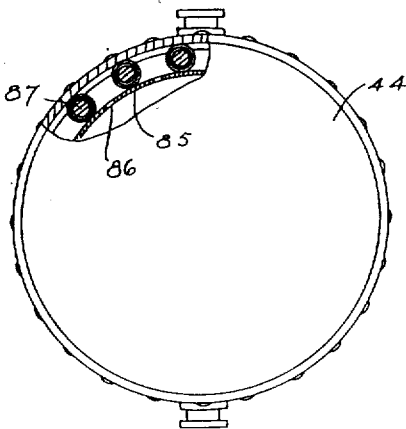
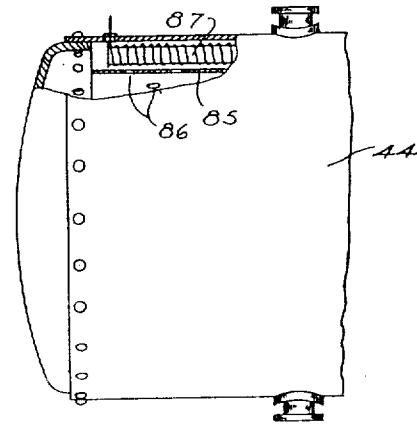


Fig. 9.



Inventor
Charles Squire.

By *Briesen Schenk*
Attorney

1,386,137.

C. SQUIRE.
SNOW REMOVAL APPARATUS.
APPLICATION FILED JUNE 4, 1920.

Patented Aug. 2, 1921.
5 SHEETS—SHEET 4.

Fig. 10.

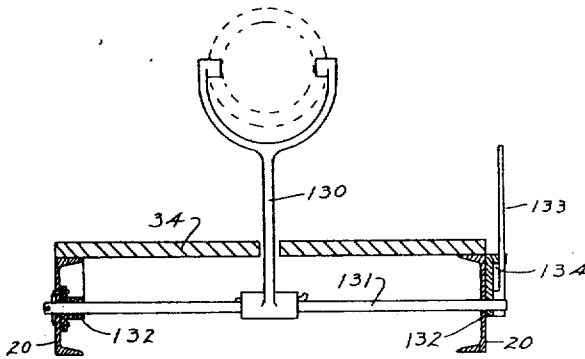


Fig. 11.

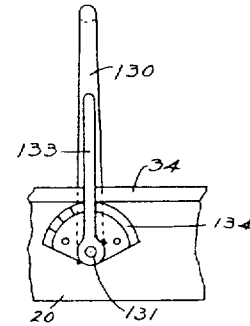


Fig. 12. Fig. 13.

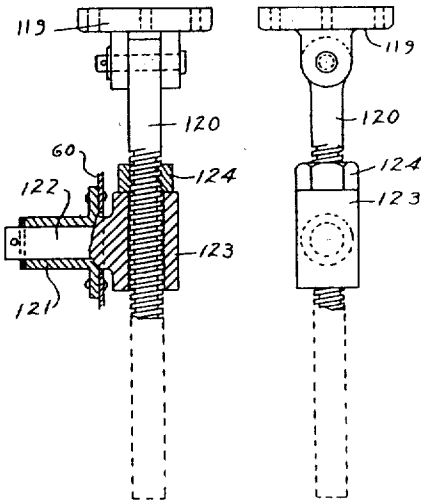
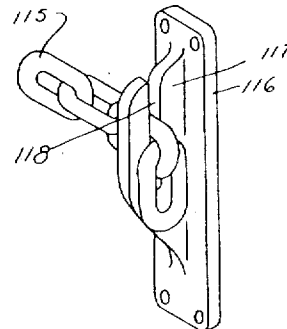


Fig. 14.



Inventor
Charles Squire,

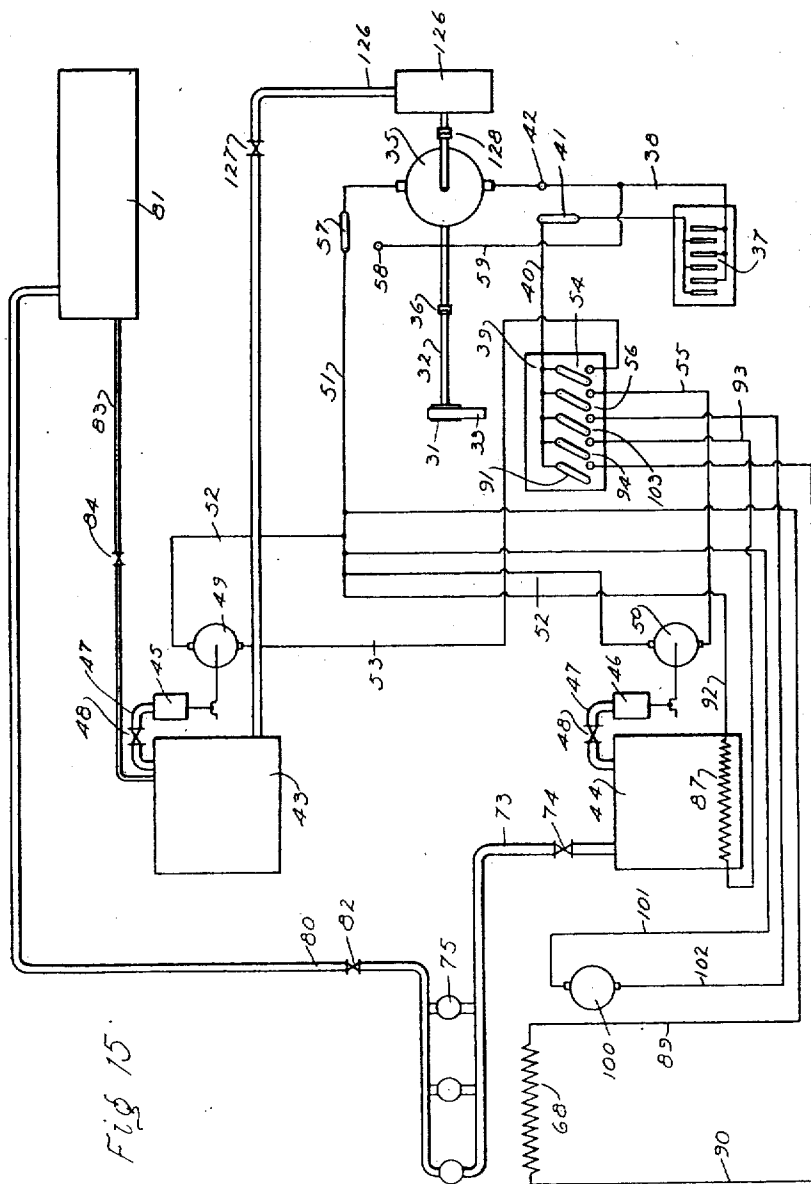
By

Bissen Schenk
Attorney

1,386,137.

C. SQUIRE.
SNOW REMOVAL APPARATUS.
APPLICATION FILED JUNE 4, 1920.

Patented Aug. 2, 1921.
5 SHEETS—SHEET 5.



Inventor
Charles Squire,

By *Biesen Schenk*
Attorney

UNITED STATES PATENT OFFICE.

CHARLES SQUIRE, OF DEANS, NEW JERSEY.

SNOW-REMOVAL APPARATUS.

1,386,137.

Specification of Letters Patent.

Patented Aug. 2, 1921.

Application filed June 4, 1920. Serial No. 386,559.

To all whom it may concern:

Be it known that I, CHARLES SQUIRE, a citizen of the United States, and resident of Deans, Middlesex county, New Jersey, have invented certain new and useful Improvements in Snow-Removal Apparatus, of which the following is a specification.

This invention relates to devices for removing snow from highways, and has special reference to a snow melting machine.

One object of the invention is to provide an improved and simplified construction of devices of this character.

A second object of the invention is to provide an improved snow melting machine wherein the mechanism is so arranged that the snow is gathered up into a tank, melted in the tank and the resultant water allowed to flow out along the sides of the road or street so that in a street it may pass along the gutters to the sewer drops.

A third object of the invention is the provision of an improved form of melting tank for use in connection with a device of this description.

A fourth object of the invention is the provision of an improved arrangement of fuel oil burners and the supply of air and fuel air therefor.

A fifth object of the invention is the provision of an improved machinery arrangement for such a device so that when desired the machinery for propelling from one place to another may be utilized for operating the elevator, which forms a part of the device, and supplying compressed air, the utilization of such machinery being effected through power transmission elements suitably arranged.

A sixth object of the invention is the provision of means in connection with certain of the foregoing power transmission elements whereby the propelling machinery may be operated to use its entire force in propulsion, the last mentioned means effecting operation of the melting and elevating devices independently of the propelling means.

With the above and other objects in view, as will be hereinafter apparent, the invention consists in general of certain novel details of construction, combinations of parts, and arrangements of elements hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like char-

acters of reference indicate like parts in the several views, and:—

Figure 1 is a plan view of an automobile truck carrying the improved snow melting machinery.

Fig. 2 is a side elevation thereof.

Fig. 3 is a detail transverse section of the melting tank of my invention, taken on the line 3—3 of Fig. 4, the section being taken close to the front end of such tank and a part of the rear wall of the tank being broken away in order to show one of the heating elements.

Fig. 4 is a longitudinal median section through such tank on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged detailed longitudinal sectional view through one of the oil burners shown in Fig. 4.

Fig. 6 is an elevation of the elevator which forms part of my invention, one side board of the elevator shown in Fig. 7 being removed to expose the interior arrangement and certain of the parts being in section.

Fig. 7 is a longitudinal sectional view on the line 7—7 of Fig. 6.

Fig. 8 is an enlarged end view of a compressed air tank used herewith, the tank being arranged to heat the contained air, and a certain portion of the end being broken away to show the heating elements.

Fig. 9 is a side elevation of the tank shown in Fig. 8, only one end being shown and that partly broken away to show the heating elements.

Fig. 10 is a detail view looking from the left of Fig. 11 of a clutch shipper arrangement forming part of my invention.

Fig. 11 is a side elevation of the parts shown in Fig. 10 viewed from the right.

Fig. 12 is an enlarged detail view partly in section showing the swiveling jackscrew device used for raising the free end of the elevator.

Fig. 13 is a side elevation of the parts shown in Fig. 12.

Fig. 14 is a perspective view of a chain grip used to permit regulation of the height of the front edge of the elevator boot.

Fig. 15 is a piping and wiring diagram showing the arrangement of the various parts of the device in a schematic manner.

In carrying out the objects of the invention there is provided an automobile truck having the usual frame supported on driving wheels and steering wheels, the latter being controlled through the usual steering post and wheel as indicated at 23.

On the forward part of the truck is mounted the propelling engine, not shown, which is covered by the ordinary hood 24. At each side of the truck is a running board 25 which is continued forwardly in the usual manner to form mud guards 26 for the wheels 22. The truck is, of course, provided with the gear shafting lever 27 and brake lever 28 with their connections to the various parts of the driving mechanism which, being all of the old and well known type are not deemed necessary to be shown here in detail, but it is to be noted that among these parts is a line shaft or tail shaft 29 which carries a sprocket 30. This sprocket 30 is connected to a sprocket 31 on the jackshaft 32 by means of a sprocket chain 33. The truck is provided with a platform 34 and on this platform with its shaft in alignment with the jackshaft 32 is mounted a generator 35 of any preferred type.

A clutch 36 serves to connect the jackshaft 32 with the generator shaft at will so that when the motor of the truck is running and the jack and generator shafts connected the generator will be operated.

At 37 is a storage battery, one pole of which is connected to the generator 35 by a wire 38 as shown in Fig. 15. At 39 is a switchboard and the other pole of the battery 37 is connected to the pivot points of a series of switches on the switchboard 39 by means of a wire 40, a switch 41 being interposed in the wire 40; the latter being so arranged that it may be opened to break the circuit through the battery 37 from the generator 35 and form a circuit from the generator 35 directly to the wire 40, a contact 42 being connected to the wire 38 between the generator and battery 37 for this purpose.

Carried on the platform 34 are certain compressed air tanks 43 and 44, the former being the cold air tank and the latter the hot air tank. It is the intent to have these tanks of sufficient strength to carry a very considerable amount of pressure, as for instance, the tank 43 will be preferably designed to carry 1000 pounds to the square inch, while the tank 44 will carry say 500. These tanks 43 and 44 are respectively supplied with compressed air by means of pumps 45 and 46 which are provided with suitable automatic mechanisms to prevent excess pressure being supplied the tanks. The pumps are connected to their respective tanks by the pipes 47 wherein are check valves 48. For the purpose of operating the pumps 45 and 46 there are provided motors 49 and 50. One pole of each of these motors is connected to a line wire 51 leading to the generator 35 by means of a wire 52. The remaining pole of the motor 49 is connected by a wire 53 to one terminal of a switch 54; this being one of the switches

connected to the wire 40. In like manner the motor 50 is connected by a wire 55 to a switch 56. Moreover, in the wire 51 is a switch 57 which may be swung to connect with a contact 58 at the end of a wire 59 connecting the wire 38. Now it will be seen that by this means if, for instance, the switch 54 be closed and the other switches remain in the position shown in Fig. 15, with the generator 35 in operation, current will flow from the generator 35 through the wire 38, battery 37, wire 40 and switch 41; switch 54, wire 53, motor 49, wire 52, wire 51, and switch 57, back to the generator 35. Again, if the switch 41 be engaged with the contact 32 it will be obvious that in place of the current flowing through the battery 37, it will flow directly from the generator to the wire 40. In this way the battery may be cut out when it is not desired to use the same. Still further, in case of failure of the generator 35, the switch 57 may be turned to engage the contact 58, the switch 41 remaining as in Fig. 15. In this instance, current will flow from the battery through the wire 40 and the circuit previously described coming back to the battery through the wire 51, switch 57, contact 58, wire 59 and wire 53. In this manner, the battery itself may be utilized to run the motor. In like manner the circuit may be traced to run the motor 50 and this motor may obtain its power directly from the generator, directly from the battery or from the generator through the battery.

The forward end of the truck frame is extended as at 60 and on this extended end is mounted a melting tank 61. This melting tank is provided with an outer wall 62 and an inner wall 63 which is spaced from the outer wall and is beveled outwardly at the top to connect with said outer wall as shown at 64. The bottom of this tank consists of a plate which is so bent as to provide inclined sides 65 and at the same time is inclined from front to rear as clearly seen in Fig. 4; the ridge of the plate being there indicated at 66 and it will be noted that at the forward end this ridge terminates in a peak 67 so that there is formed beneath the bottom a ridged and peaked pocket. Arranged between the inner and outer walls 62 and 63 are longitudinally extending electric heating elements 68 which are held away from the outer wall by a partition 69; the space between the outer wall and partition being packed with asbestos or the like as at 70 so that the heat from these elements will be practically confined to the inner portion of the tank.

Below the tank bottom and in the pocket formed by the bottom is a series of longitudinally extending pipes 71 which are inclined to lie parallel to the inclination of the

ridge 66 as can be seen in Fig. 4. These pipes connect to a header 72 which in turn connects, by means of a pipe 73, with the tank 44, a suitable valve 74 being located in said pipe 73. The pipes 71 carry burners 75. Each of these burners has its interior shaped to form a Venturi tube 76 and each burner is provided with a jet nozzle 77, the mouth of which terminates at the narrowest part of the venturi. These jets 77 are connected to pipes 78 which lie beneath the pipes 71 and which communicate with a header 79 which in turn communicates with a pipe 80 leading to a fuel oil supply tank 81 carried on the truck adjacent the rear thereof. In the pipe 80 is a valve 82 for controlling the flow of oil through this pipe. Furthermore, in order to force the oil from the tank 81 this tank is connected by a pipe 83, having a valve 84 therein, with the tank 43 previously described.

Within the tank 44 is arranged a lining 85 which is perforated as at 86 and between this lining and the outer wall of the tank are provided electrical heating elements 87 of the ordinary type. Thus, by operating these heating elements the air in the tank 44 may be heated prior to feeding it to the burner 75 and thus a higher efficiency may be obtained from these burners than would be the case if cold air were used.

It is to be noted that the melting tank 61 is provided with flanged outlet pipes 88 on each side so that suitable hose or delivery pipes may be connected to these outlets and water from the melting tank delivered to any desired point along the road.

The heating element 68 has one of its terminals connected by means of a wire 89 with the wire 51. The other terminal of this heating element is connected by a wire 90 with a switch 91 on the switchboard 39, this switch being one of those connected to the wire 40. Thus, by closing the switch 91, current will pass through the heating element 68 as can readily be traced by referring to Fig. 15. In like manner, a wire 92 connects the terminal of the element 57 to the wire 51, while a wire 93 connects the other terminal of said element to a switch 94 on the switchboard 39.

Mounted on the forward upward corners of the tank 61 are brackets 95 which support a shaft 96 on which is mounted a sprocket 97. This shaft 97 is connected by a chain 98 with a sprocket 99 on the shaft of a motor 100, so that when this motor is operated the shaft 96 will be driven. One pole of the motor 100 is connected by a wire 101 with the wire 51, while the other pole is connected by a wire 102 with a switch 103 on the switchboard 39 so that by closing the switch 103 the motor 100 may be operated.

Supported on the shaft 96 is an elevator 65 which is provided with side boards 104 and

between these side boards on the shaft 96 are fixed sprockets 105 which are connected by chains 106 to sprockets 107 mounted on a shaft 108 carried in journals 109 at the lower ends of the side boards 104. On the chains 106 are fixed the sections of a slat apron 110, certain sections of the apron carrying flights 111. Mounted on the outside of the bearings 109 are other bearings 112 and serve to carry a scoop-like elevator boot 113, the elevator boot being so arranged that it may have limited rotation about the shaft 108 with respect to the sides 104. At one side of the boot 113 is a bracket 114 where to is connected one end of a chain 115. As shown in Fig. 14, there is provided adjacent the driver's seat a bracket 116 having a rib 117 projecting therefrom and provided with a slot 118 of sufficient width to receive a link edgewise, but which is sufficiently narrow to prevent passage of a link in any other position as can be clearly seen by referring to said figure. By means of this chain it will be obvious that the forward edge of the boot 113 may be raised or lowered at the will of the operator of the device. Secured beneath the elevator at each side thereof is a pivot bracket 119 where to is pivoted one end of a jack-screw 120. Mounted at each side of the frame extension 60 is a bearing 121 which receives the pivot 122 of a swiveling sleeve 123 through which passes the screw 120, the screw being freely slidable in said sleeve. On top of the sleeve and fitting the screw is an adjusting nut 124 which may be rotated by any suitable means as by a ratchet wrench. Thus, by rotating the nut in one direction, the elevator as a whole will be raised while, if the nut be rotated in the opposite direction, the elevator will drop. At 125 is a fluid pressure engine preferably a turbine, and this engine is connected by a pipe 126, having a valve 127, with the tank 43. Moreover, the shaft of this turbine is in alignment with the shaft of the generator 35, and may be clutched thereto by means of a clutch 128. Thus, in the event that it be desired to use the full power of the propelling engine of the truck for a short time in propelling the device it is merely necessary to disconnect the shaft 32 by proper operation of its clutch, from the generator, connect the turbine 125 to the generator by its clutch and open the valve 127.

In order to operate the clutches 36 and 128 there is provided a shipper fork 130 for each of these clutches, each of such forks being mounted beneath the platform 34 on a shaft 131, supported in bearings 132 and provided with a suitable operating lever 133 working over a quadrant 134. Thus, the clutching or unclutching of the shafts previously mentioned may be readily regulated as can be seen by reference to Figs. 1 and 2. At the

rear end of the machine is provided the usual gasoline tank 135 best seen in Fig. 2.

In the operation of the device the operator adjusts the lower end of the elevator 5 by means of the screws 120 and nut 124. He then adjusts the forward edge of the boot 113 by means of the chain 115. In the case of asphalt pavements, it would be advisable to allow the edge to scrape the pavements 10 while when the roads are rough, this forward edge should be raised a considerable distance above the surface of the road to avoid irregularities. Being thus in position for operating the truck motor is started and under ordinary circumstances the generator 15 connected up. This generator is operated by closing the proper switches on the switch-board 39 to pump air into the tanks 43 and 44, switch 94 being also closed at this time 20 to heat the air in the tank 44. When the air pressure has reached the desired amount in the compressed air tanks the valves 74, 82 and 84 are opened, and the burners 75 lighted. The truck is then moved forward 25 and the motor 100 started. As the truck advances snow is scooped up by the boot 113, elevated and deposited in the melting tank. Owing to the peculiar shape of the bottom of this tank the heat from the burners is 30 confined to a great extent in the bottom and at the same time the snow which is deposited on the ridge of the bottom will spread down on the anticlinal sides of the bottom and also to the rear, thus being 35 effectively and quickly melted so that the water may be drawn off through the outlets 88. In the event that the snowfall is heavy and beyond the capacity of the fuel oil burners to melt, additional heat may be 40 readily provided by closing the switch 91 and thus actuating the heat elements 68. It will thus be seen that the device provides for the various conditions of snowfall and not only that, but provides for temporary increases of power as in working through 45 drifts since the turbine can be used to assist the truck the propelling engine whenever desired and the storage battery can be drawn on in like manner to relieve the truck propelling engine.

There has thus been provided a highly efficient device of the kind described and for the purpose specified.

It is obvious that many minor changes 55 may be made in the form and construction of the invention without departing from the material principles thereof. It is not therefore desired to confine the invention to the exact form herein shown and described, but 60 it is wished to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new is:

1. The combination with a wheeled truck 65 and its motor; of an elevator at the front

of the truck arranged to continuously elevate snow and the like as the truck moves forward, a melting tank on the truck having a bottom down which snow may pass 70 said bottom sloping downwardly in opposite directions from an intermediate point and in a direction transverse to said first named directions; said tank also having outlets at the foot of the slopes of the bottom, and means to heat said bottom whereby to melt 75 the snow as it passes over said bottom.

2. A snow melting machine including a truck, a motor to drive said truck, a melting tank on the truck, fuel burners arranged to heat said tank, a liquid fuel supply tank 80 communicating with said burners, a plurality of compressed air tanks on said truck, one of said tanks communicating with said burners, independent air pumps for supplying compressed air to said tanks, an electric 85 motor for each of said pumps, a generator, circuit connections between the generator and the electric motors, an operative connection including a clutch between the generator and the truck motor, an air engine for 90 said generator having supply connection with the second compressed air tank, and an operative connection including a clutch between the air engine and generator.

3. A snow melting machine including a 95 truck, a motor to drive said truck, a melting tank on the forward end of said truck, an elevator carried by the truck and arranged to deliver snow to said tank, fuel oil burners beneath the tank, auxiliary electric heaters surrounding the melting space in said 100 tank, electric motor means to operate the elevator, a fuel oil tank connected to said burners, an air pump for compressing air for said burners, electric motor means for 105 driving said pump, a generator connected to the heaters and electric motor means, and an operative connection between the generator and the driving motor of the truck.

4. A snow melting machine including a 110 truck, a motor to drive said truck, a melting tank on the forward end of said truck, an elevator carried by the truck and arranged to deliver snow to said tank, fuel oil burners beneath the tank, auxiliary electric heaters surrounding the melting space in said 115 tank, electric motor means to operate the elevator, a fuel oil tank connected to said burners, an air pump for compressing air for said burners, electric motor means for driving said pump, a generator connected to 120 the heaters and electric motor means, a releasable connection between the generator and the truck driving motor, and independent driving means releasably connected to 125 the generator.

In testimony whereof I have hereunto set my hand.

CHARLES SQUIRE.