Aug. 19, 1930. J. S. BRADY 1,773,444

SNOW REMOVER

Filed Nov. 10, 1927 5 Sheets-Sheet 1

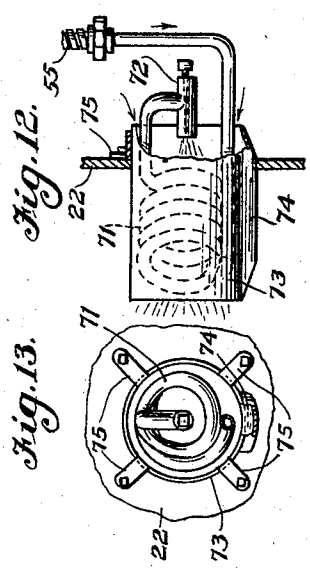


Fig. 12.

Fig. 13.

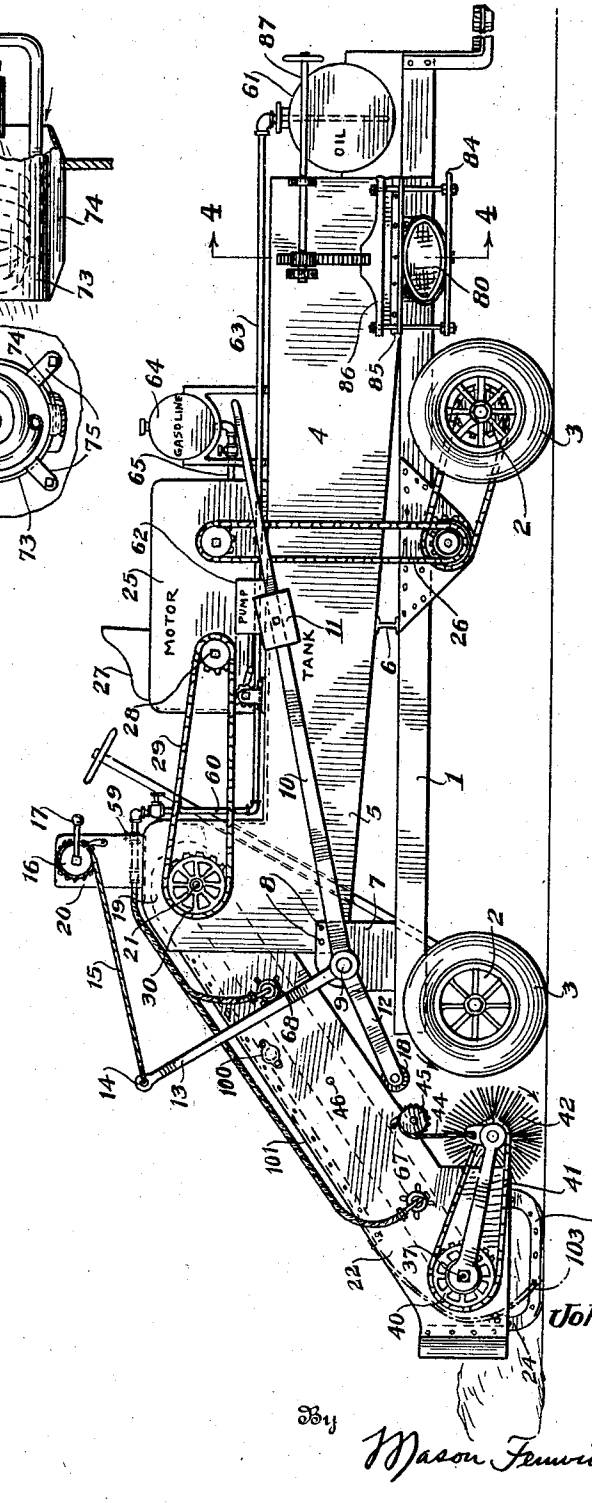


Fig. 1

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SNOW REMOVER

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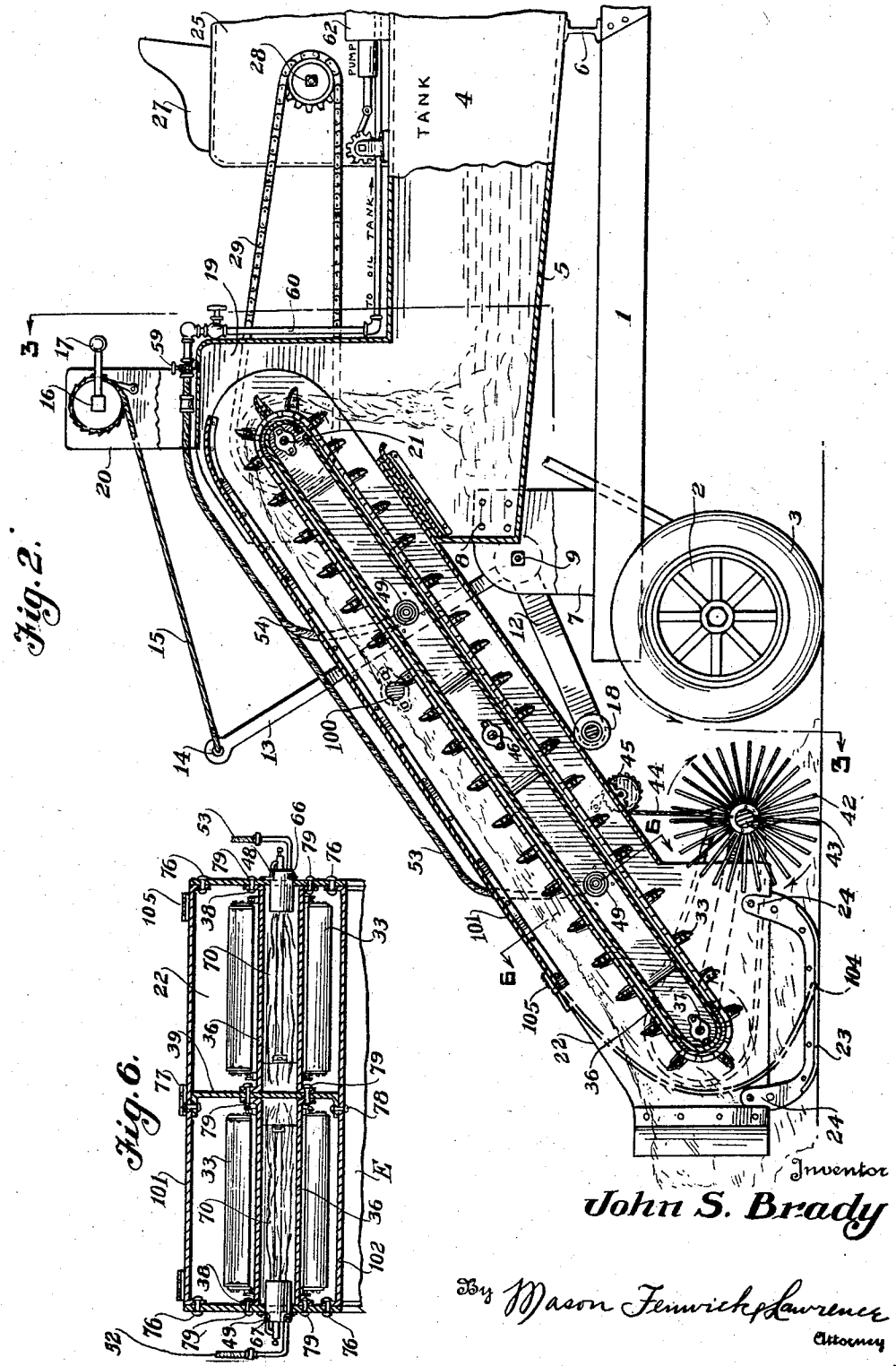


Fig. 2.

Fig. 6.

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SNOW REMOVER

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Fig. 3.

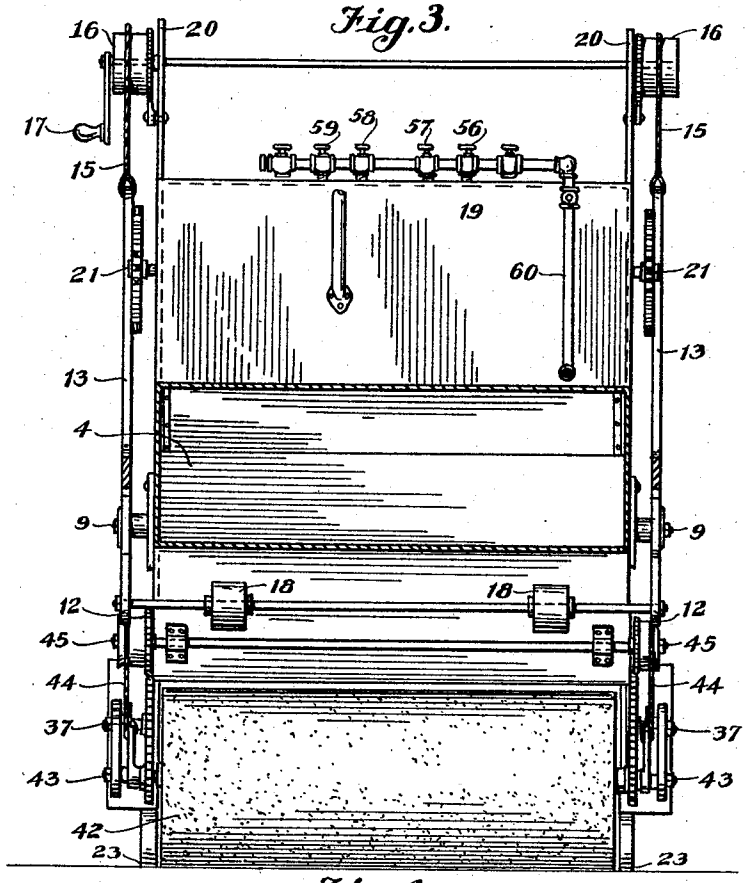
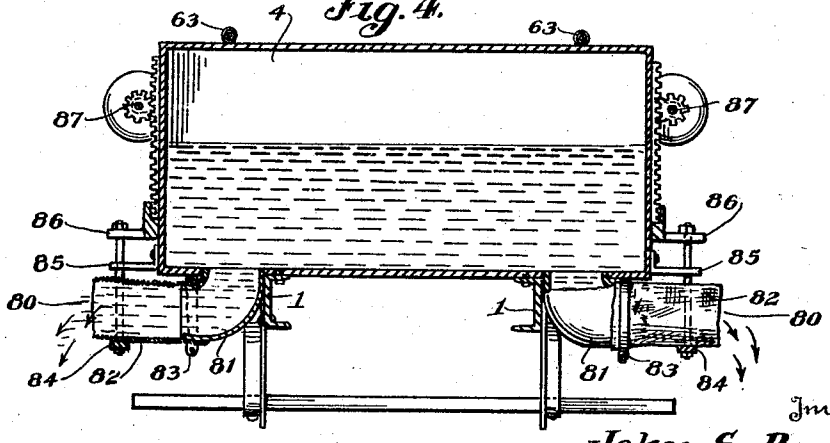


Fig. 4.



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SNOW REMOVER

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Fig. 5.

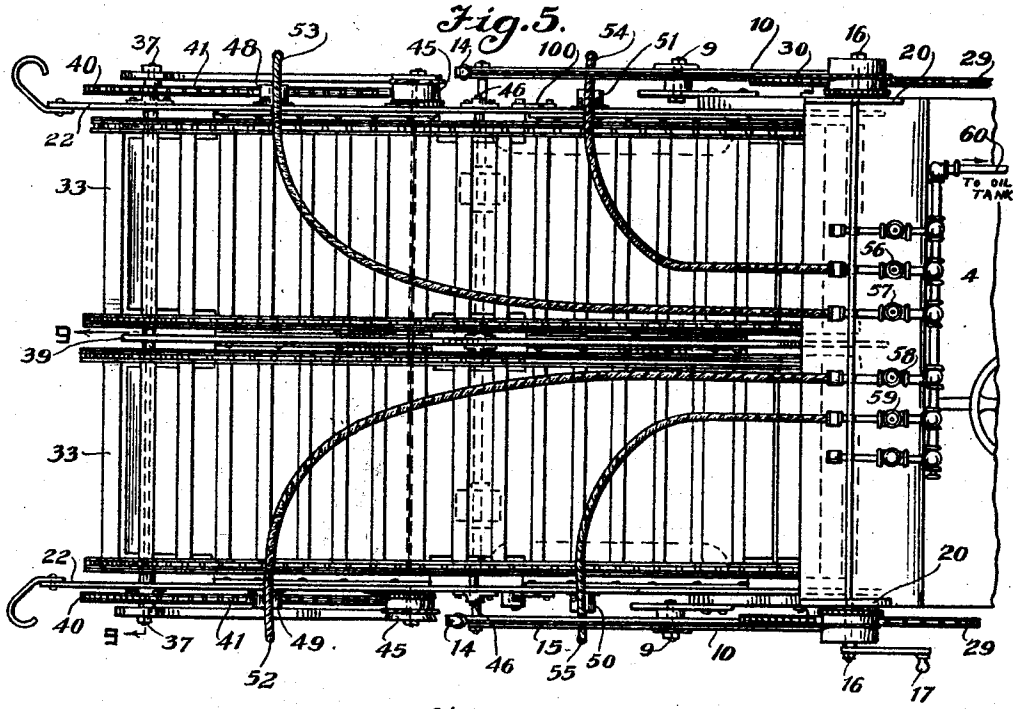
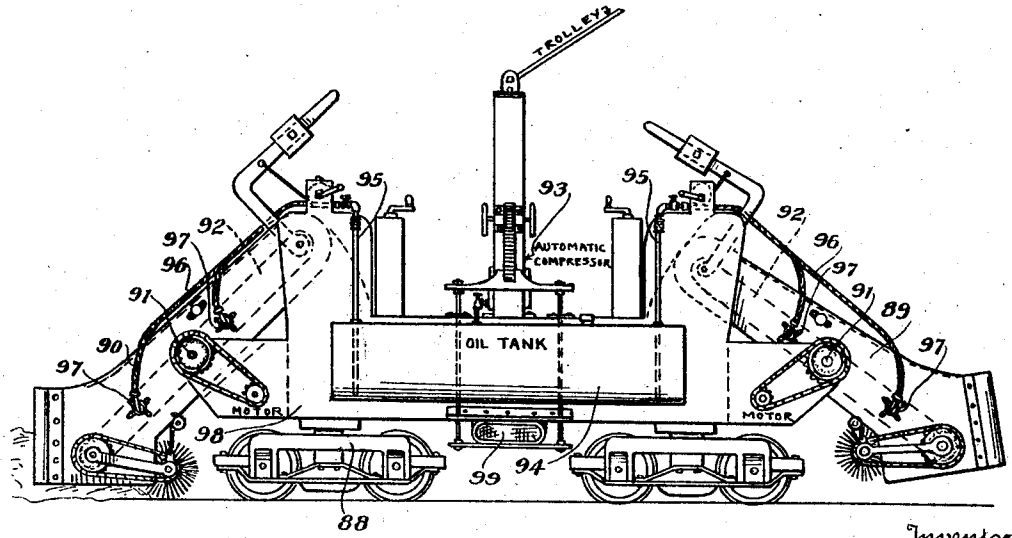


Fig. 14.



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SNOW REMOVER

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Fig. 7.

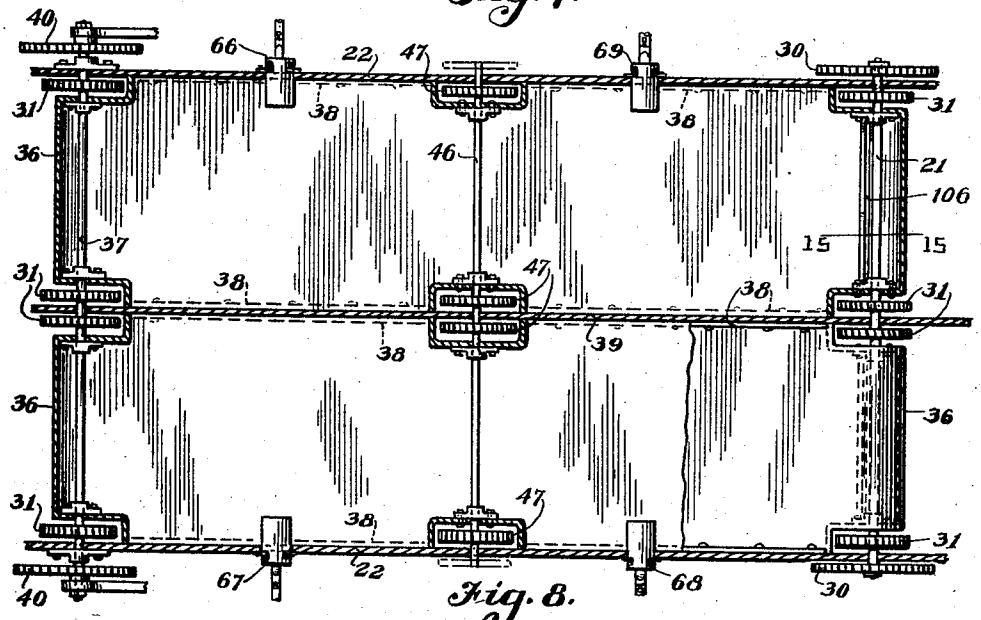


Fig. 8.

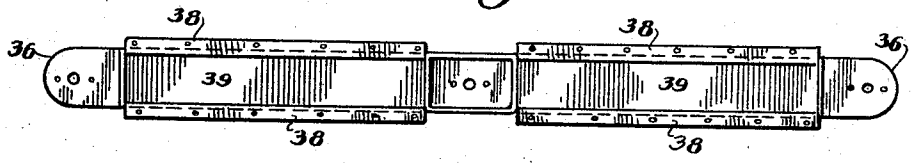


Fig. 9.

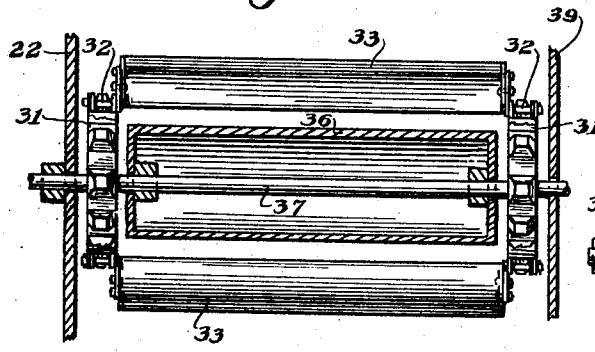


Fig. 10.

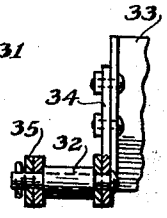


Fig. 11.

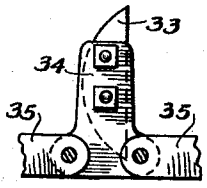
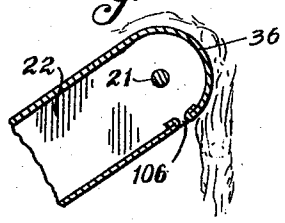


Fig. 15.



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Patented Aug. 19, 1930 1,773,444

UNITED STATES PATENT OFFICE

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SNOW REMOVER

Application filed November 10, 1927. Serial No. 232,394.

This invention relates to improvements in snow removers, particularly in a snow removing apparatus adapted for use on ordinary street thoroughfares, as well as on steam and electric railroads.

An object of this invention is to provide an apparatus which will efficiently remove snow from streets and railroads without the necessity of laborious shoveling, thereby eliminating a very large expense, the apparatus being constructed in such a manner that the snow may be removed through the heating of a box-like structure upon which the snow is allowed to accumulate and melt into a slush or water, which is then allowed to drain from the apparatus.

Another object of this invention is to provide a snow removing apparatus connected to a vehicle or car which may be allowed to travel at any desired speed and, at the same time, function to bring the snow in contact with a heated box-like structure, producing a slush water which may be either allowed to drain readily from a receiving tank on the vehicle in case of mild weather, or may be retained therein during freezing weather and emptied, when necessary, into a sewer intake ordinarily located along the thoroughfare. Naturally, the valves may be left open in mild weather.

A further object of this invention is to provide a snow removing apparatus having a heated box-like structure upon which the snow is allowed to accumulate, the box-like structure being properly balanced and located above the street level so that it may be raised or lowered without undue delay in order to avoid striking extending obstacles and the like. For the purpose of aiding in spreading the snow uniformly over the heated box-like structure, a travelling conveyor, made up of plates or blades is arranged to circulate around the heated box-like structure. In this invention of a snow remover, the heated box-like structure is arranged to be practically enclosed by a container which is in open communication with a tank for receiving the slush water resulting from the melting snow, thereby making it possible to retain most of the melting properties of the steam as it rises from the melting of the snow and preventing the escaping steam, for the most part, from flowing outside of the apparatus.

Another object of this invention is to provide a snow removing apparatus having a heated box-like structure within a container and means for heating the box-like structure, preferably consisting of blow flames, applied thereto in a continuous manner through burners attached to the sides of the box-like structure, each burner being controlled by a valve operated from the driver's seat in the vehicle, the valves being connected in some suitable manner to an oil tank, which is in turn supplied with air from a pump, thereby providing the necessary pressure for forcing the oil into the burners. A revolving sweeper is arranged to co-operate with the conveyor blades by forcing the snow onto the heated box-like structure. The valves for emptying or draining the tank of slush may be of any desired type, preferably oval-shaped, and made large in order to drain the tank quickly, if desired.

One of the prime objects of this invention is to provide a snow removing apparatus which will, in mild or non-freezing weather, when the valves on the tank are left open, for the water to run on the street, take up and melt a large amount of snow, while in extreme cold or freezing weather, when the valves are closed and the tank has to be emptied at the sewer intake, the device will function to take up a slightly less amount of snow. In this one operation, a vast volume of snow will have been picked up, immediately melted, thereby being reduced greatly in volume, and the water emptied in the street inlets as the machine moves along the thoroughfare.

Other objects of this invention will appear from the following detailed description of the device and as disclosed in the five sheets of drawings herewith made a part of this application.

In the drawings—

Figure 1 illustrates a side elevational view of the snow removing apparatus as arranged to function with a street vehicle.

Figure 2 illustrates a side elevational view of the snow scoop with portions broken away in order to disclose the various means for bringing the snow in close contact with the heated box-like structure and conveying it to a point where it empties into a tank located on the main body of the vehicle to which the snow removing device is operably attached.

Figure 3 represents a sectional view of Figure 2 taken along line 3—3 disclosing primarily the location of operating valves in front of the driver's seat, a sectional view of the receiving tank for the slush water and the revolving sweeper in operable relationship with the lower end of the heated box-like structure for receiving the snow.

Figure 4 illustrates a sectional view of Figure 1 taken along line 4—4 and disclosing the rear end of the tank for receiving the slush water, the drain openings, and valve for opening or closing the openings.

Figure 5 illustrates a top plan view of the heated box-like structure in cooperative relationship with a vehicle and disclosing the means for supplying blow flames to the box-like structure, the conveyor for uniformly spreading the snow over the box-like structure and the actuating means for maintaining motion to the conveyor.

Figure 6 illustrates a sectional view of Figure 2 taken along line 6—6 disclosing primarily locations on each side of the heated box-like structure through which the blow flames are admitted.

Figure 7 illustrates a sectional plan view of a portion of the container disclosing the heated box-like structure in attached relationship to the sides of the container and the partition within the container.

Figure 8 represents a side elevational view of Figure 7 showing primarily the side flanges of the heated box-like structure, before fastening to the sides of the container.

Figure 9 illustrates a sectional view of Figure 5 taken along line 9—9 disclosing the arrangement of driving gear and chains for the rotatable plate conveyor, all in assembled relationship with a side of the container and the partition therein.

Figure 10 illustrates a front elevational view to an enlarged scale of one end of a conveyor blade in attached relationship to a chain link of the conveyor.

Figure 11 illustrates an end view of the conveyor blade disclosed in Figure 10 and shows the method of attaching the blade to the conveyor chain links.

Figure 12 illustrates a side elevational view of form of vaporizing type of burner for the purpose of igniting the blow flames within the heated box-like structure.

Figure 13 represents an end view of Figure 12 showing the method of fastening the vaporizing burner to the sides of the container.

Figure 14 illustrates a side elevational view of the snow remover, according to this invention, in assembled and operative relationship with the vehicle adapted for use in connection with railroads.

Figure 15 represents a sectional view of Figure 7 taken along line 15—15.

This invention provides a snow removing apparatus which may be easily adapted for use either on street thoroughfares or for clearing railroad tracks. Numeral 1 designates the main body portion of a truck adapted to be mounted in some suitable manner upon wheels 2 which may be provided preferably with pneumatic tires 3, or the like, supported upon the main body portion 1 of the truck is a tank 4 arranged so that its bottom portion 5 will be inclined toward the rear of the vehicle, this being accomplished by some suitable means, such as a close support 6 and the front end of the base portion 5 of the tank 4 being supported upon a plate structure 7 fastened securely to the main body portion 1 of the truck. The supporting plates 7 may be arranged and fastened to the truck portion 1 on each side of the front end thereof in such a manner that they will not only act to support the front end of tank 4 by means of riveting the side plates of the tank 4 to the plates 7, as at 8, but also will function to pivotally support a spindle 9 upon which is adapted to be mounted a lever 10 having slidably arranged thereon a counter-balance weight 11, and levers 12 and 13 adapted for the purpose of raising and lowering the snow removing apparatus. The free end of lever 14 is provided with an opening 14 for receiving in attached relationship the end of a cable or chain 15, which is adapted to connect with a windlass 16 having a handle 17 for the purpose of raising or lowering the snow remover apparatus, as may be desired. It is to be understood that any suitable form of balancing and raising or lowering the snow remover apparatus in cooperation with the vehicle may be adapted to this invention. The form disclosed herein calls for the lever elements 10, 12 and 13 being integrally connected together and keyed or otherwise attached to the pivotally arranged spindle 9, it being understood that the counterweight 11 may be adjusted to properly balance the snow removing device so that it may be easily lowered or raised at will. It is preferred that the free end of the lever arrangement 12 be provided with a roller 18 so that there will be the least possible friction to overcome in the raising of the device.

The forward end of the tank 4 is pivotally provided on each side with upwardly extending portions 19 adapted to receive in attached relationship supporting plates 20 for the windlass 16. The side plate extensions 19 are also adapted to support in pivotal relationship a spindle 21 upon which is mounted the snow removing apparatus including a

container portion 22 made of suitable material, such as heavy sheet metal or the like, and being arranged in open communication at its lower end with the snow to be removed. In order to maintain efficient and operative relationship with the road surface which is being cleared of snow, suitable runner elements 23 are bolted to the lower outside edges 24 of the container 22, as clearly disclosed in Figure 2.

The driving motor 25 for the vehicle is located in some convenient position above the tank 4 and is adapted to drive in the usual manner through gearing 26 the wheels 3 of the vehicle under control from the driver's seat 27. The motor 25 is also arranged to drive through suitable gearing 28 and chain 29, a sprocket gear 30, which is mounted upon the spindle 21 and keyed thereto, thereby functioning to drive as may be desired through a series of gearing 31 and cooperating chain elements 32, a plurality of conveyor blades 33 which are adapted to be attached in some suitable manner by means of plates 34 to the chain link elements 35. The conveyor plates 33 are of sufficient width to efficiently aid in sliding the snow over a headed box-like structure 36, which is made of any suitable material, such as sheet metal and adapted to extend at its upper end around the spindle 21 and at its lower end around the spindle 37, the sides of the box-like structure 38 being adapted to be securely fastened to the side plates of the containers 22 and to a partition 39, which extends approximately through the center of the container 22. The lower spindle 37 extends a sufficient distance on each side of the container 22 to accommodate a driving gear 40 for the purpose of driving through a chain element 41, a revolving sweeper 42 which is mounted upon a spindle 43. In order to raise and lower the sweeper 42 as may be desired, a cable 44 is attached in some suitable manner to the spindle 43 and extends around a windlass 45. As clearly disclosed in Figure 7, the container 22 for the heated box-like structure is provided with a partition 39 for the purpose of strengthening the container, thereby making it necessary to provide in each container a pair of conveyor elements and heated box-like structure 36, both identical in construction.

The intermediate spindle 46 is provided primarily for supporting idler sprocket wheels 47 for the purpose of guiding the driving chains 32 of the conveyor.

It is contemplated in this invention to heat the snow box-like structure 36 by means of blow flames adapted to be continually received within the box-like structure through burners attached to the sides of the box-like structure. Any suitable device may be used to bring the blow flames into operative relationship with the snow removing apparatus, however, as a modification of a means for this purpose. It is preferred to use any desired number of burners, as disclosed at 48, 49, 50 and 51, each burner being connected in open communication in some suitable manner as by flexible pipe lines 52, 53, 54 and 55 to operating valves 56, 57, 58 and 59, located for control within easy access of the driver's seat 27 and in turn connected through a suitable pipe line 60 to an oil tank 61 located preferably at the rear of the vehicle and as near the ground as possible in order to make it easy to fill. The oil tank 61 is supplied with air under pressure from a pump 62 located at some convenient point on the vehicle through a line 63 and functions to provide the pressure required for forcing the oil from the tank 61 into the burners 48, 49, 50 and 51.

In order to provide the motor 25 with fuel, a gasoline tank 64 is located convenient to the motor on the vehicle and connected thereto by the usual pipe line 65.

It is preferred to use a vaporizer type of burner in connection with this invention requiring but one pipe line to the gas heating coils, the burners 48, 49, 50 and 51 are adapted to be inserted through openings 66, 67, 68 and 69 in the sides of container 22 and snow box-like structure side portions 38 and securely fastened therein as disclosed in Figure 6.

In order to ignite the blow flame 70, various devices may be utilized without effecting the merits of this invention. However, a type of ignition means may be conveniently used as disclosed in Figures 12 and 13 wherein oil, such as coal oil, may be forced by an air pump 62, or air compressor, from the oil tank 61 to a vaporizing coil 71, the regulating valve 72 will be opened and the oil 73 in the oil pan 74 is very conveniently ignited by hand or otherwise as it extends partly outside of the container 22. When the oil 73 in the oil pan 74 is ignited, it functions to heat the vaporizing coil 71, which forms the oil into a gas and gives a long, strong blow flame 70. When the flames start to blow, they will draw fresh air through and around the vaporizing coil 71, thereby providing the required oxygen. It is to be understood that this is only one of many devices for igniting the blow flames, but the type having a one-piece vaporizing burner will accomplish the desired result very efficiently, and are not difficult to manipulate. The lugs 75 attached to the coil may readily be bolted to the sides of the container, thereby providing a strong and substantial construction and easy for renewal, as required.

In the construction of the container 22 and the heated box-like structure sections 36, it is preferred that the container 22 be constructed as disclosed in Figure 6 having top and bottom portions made of suitable ma-

terial firmly riveted or otherwise fastened, as at 76, to side plates, thereby forming a box-like container having a partition 39 therebetween riveted firmly, as at 77 and 78, to the upper and lower portions of the container. The heated snow box-like structure sections 36, comprising preferably an upper and lower plate having turned up flanges 38 along their longitudinal edges, which are adapted to be securely riveted or otherwise fastened to the container 22, as at 79. The upper plate 101 of the container 22 may be detachably connected or fastened securely to the side plates of the container by means of the rivets or securing elements 76, while the lower plate 102 of the container is adapted to be riveted also to the side of the container by means of the rivets or fastening elements 76. It is preferred, in this invention, to provide a hinged extension 103 to the lower end of the upper plate 101 of the container. The plate 103 is primarily a door at the lower end of the container, being formed in a suitable curve and spaced from the lower end of the heated box-like structure 36, and the traveling conveyor blades, the curve being opposite to the direction of the movement of the vehicle so that its lower end 104 will slide easily over the ground or snow covered surface. Suitable hinges 105 are positioned in such a manner that the door plate 103 may be lowered or raised as desired with little exertion, thereby providing a closing plate for the lower end of the container 22, which may be used in case it is desired to convert the snow removing apparatus into a street cleaner for taking up dirt or paper and the like, it being understood that the door 103 may easily be thrown back on top of the container 22, thereby making it possible to admit the snow to the heated box-like structure for the purpose of melting and emptying the slush water into the tank 4 and out of the drain elements 80.

A vent of any suitable form may be provided in the heated box-like structure 36, such as a slot 106, preferably located transversely of the upper end thereof, as clearly disclosed in Figures 7 and 15. The slot 106 will have primarily two functions, one of them being as a vent for the heat or the flames admitted to the box-like structure 36, the other function being that of a drip whereby the slush water, in flowing over the upper end of the box-like structure 36, will fail to pass by the slot and drip directly therefrom into the tank 4.

The tank 4 is adapted to receive the slush water traveling from the heated box-like structure 36 and is provided, preferably near the rear of the vehicle, with a draining valve or device 80, comprising, as clearly disclosed in Figure 4, a metal elbow 81 extending downwardly from the tank 4 and in open communication therewith. These elbows 81 are preferably made of sheet metal, having one end attached to the bottom of the tank and the other end having a heavy convex hose 82 lapped over the elbow 81 and firmly held in connection thereto by means of clamping elements 83. The convex hose portion 82 is arranged to be flattened or closed together by means of lift plates 84 and cooperating members 85 and 86, all functioning to be operated by means of a lifting and lowering gearing 87. Some times, it is desirable to have an auxiliary means for directly heating the snow within the container and, for this purpose, an opening may be made in the side of the container for a removable cover portion 100, through which the snow may easily be reached. Naturally, it is undesirable in practice to heat the snow directly, owing to the fact that a large amount of steam will arise, however, the opening for cover portion 100 may be utilized at times as an emergency inlet to the container.

A removable cover portion for the container 101 is adapted to be fastened in some suitable manner to the sides of the container 22.

Figure 14 represents a modification of this invention disclosing the snow remover apparatus cooperatively attached to a vehicle or car for the purpose of cleaning electric car or steam railway tracks. It is prefered, in this instance, to install a heated box-like structure and operating features connected thereto on each end of the car 88, as clearly disclosed at 89 and 90.

It is preferred in the use of this invention as a snow remover for railroads to vary nearly balance the device by locating the pivoting point approximately at the center of gravity, as at 91, thereby making it much easier to handle and raise or lower from the railroad bed. The snow box-like structure portion 92 is adapted to be heated through a means similar to that described above, an air pump or compressor 93 being used for forcing the oil from the tank 94 through the pipe lines 95 and 96 to the burners 97, which are ignited in a manner similar to that described above and as disclosed in Figures 12 and 13. The means for draining the slush water from the tank 98 is disclosed at 99 and functions in a similar manner to the device described above and disclosed in Figure 4.

In operation, this snow removing apparatus provides a device which may be readily utilized for the cleaning of snow from street thoroughfares and railroad tracks without the need of shoveling.

The snow is adapted to be forced into the lower portion of the container 22 by means of a revolving sweeper 42, aided by the forward movement of the vehicle. In order to assist in uniformly distributing the snow over the heated box-like structure portion 36, a traveling conveyor, comprised of blades or

plates 33 is adapted to revolve around the heated box-like structure, thereby functioning to carry the snow upward along the upper surface of the box-like structure. The snow, including the slush water, will be delivered from the uppermost portion of the heated box-like structure into a tank 4 located on the vehicle and drain therefrom through a suitable valve or outlet portion 80 to the sewer or the street gutter, as may be desired.

Within easy access of the driver or operator in the seat 27 are a series of controlling valves for the blow flames which function to heat the snow box-like structure. The means for igniting the blow flame has been carefully described above and may be of any suitable commercial type.

The snow box-like structure may be counterbalanced as desired by means of levers and weights properly located in connection with the vehicle and snow removing apparatus. A windlass and crank connected thereto is located within easy access of the operator in the driver's seat 27 for the purpose of raising or lowering the snow scoop. Likewise, a hand windlass is available for raising or lowering the revolving sweeper.

It is to be understood that substitutions and alterations may be made in the above disclosure, both in the drawings and specifications, within the scope of the appended claims, without in any manner effecting the merits of this invention.

What I claim is:

1. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the one end of the container being in open communication with the tank, the other end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure.

2. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure, a revolving sweeper arranged in operative relationship with the lower end of the container for aiding in forcing the snow onto the heated box-like structure.

3. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, the container and box-like structure being securely connected together.

4. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, the container and box-like structure being securely connected together and pivotally arranged in relationship to the tank on the vehicle.

5. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, consisting of suitable burners extending therein and operable from the driver's seat of the vehicle through a system of valves, an oil tank on the vehicle, an air pump for forcing oil to the burners through the valves, the valves and burners being in open communication with the oil tank, means for igniting a mixture of oil and air within the snow box-like structure.

6. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, said container having means of access to receive auxiliary means for heating the snow within the container.

7. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the

tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure, a revolving sweeper arranged in operative relationship with the lower end of the container for aiding in forcing the snow onto the heated box-like structure, means for raising and lowering the sweeper.

8. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure, a revolving sweeper arranged in operative relationship with the lower end of the container for aiding in forcing the snow onto the heated box-like structure, the container and snow scoop being securely connected together and pivotally arranged in relationship to the tank on the vehicle, means for raising and lowering the box-like structure.

9. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure, a revolving sweeper arranged in operative relationship with the lower end of the container for aiding in forcing the snow onto the heated box-like structure, the container and box-like structure being securely connected together and pivotally arranged in relationship to the tank on the vehicle, means for raising and lowering the box-like structure, consisting of a plurality of levers pivotally arranged on the vehicle and manually operated for raising and lowering the snow removing apparatus.

10. In an apparatus mounted upon a vehicle for removing snow, a container, a box-like structure for receiving snow thereon within the container, a tank on the vehicle for receiving snow and slush water, a motor for driving the vehicle, the upper end of the container being in open communication with the tank, the lower end of the container being open for admitting the snow on the box-like structure, means for heating the box-like structure, a traveling conveyor within the container for aiding in distributing snow over the surface of the heated box-like structure, a revolving sweeper arranged in operative relationship with the lower end of the container for aiding in forcing the snow onto the heated box-like structure, a hanging door for the lower portion of the container.

In testimony whereof I affix my signature.

JOHN S. BRADY.