

June 28, 1949.

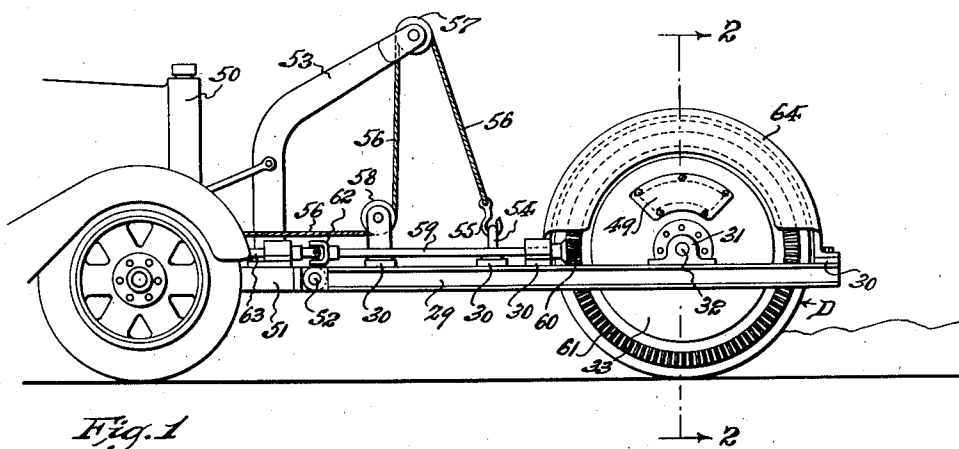
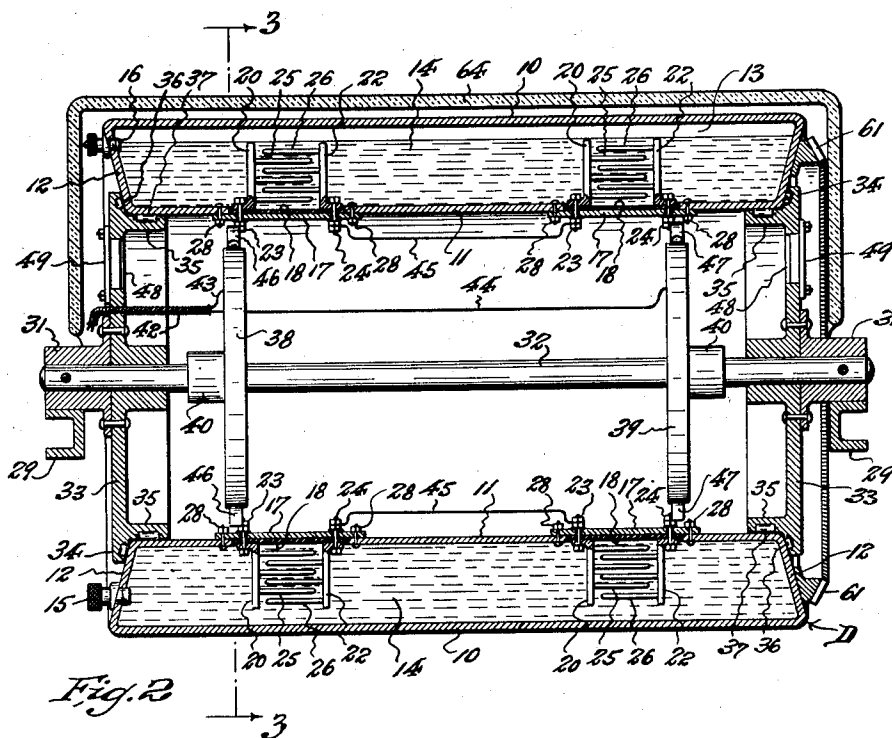
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2,474,759

SNOW REMOVER

Filed Feb. 21, 1948

2 Sheets-Sheet 1



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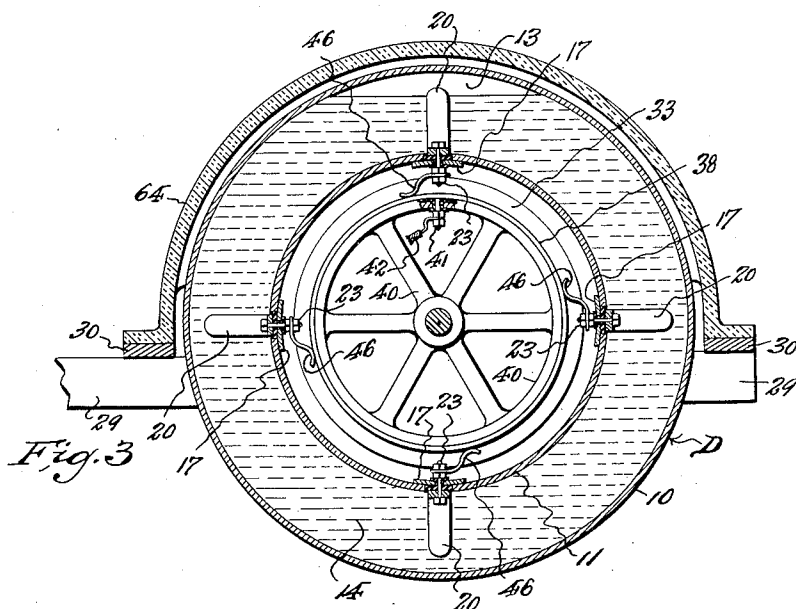
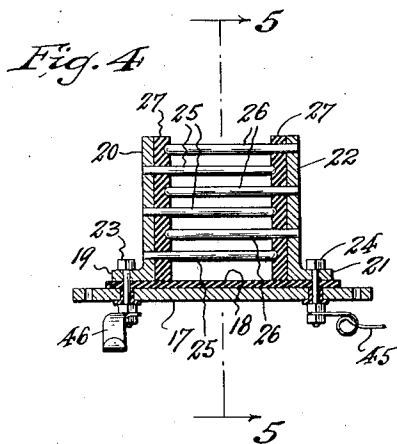
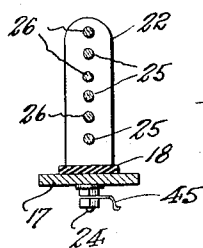
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SNOW REMOVER

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2 Sheets-Sheet 2



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2,474,759

SNOW REMOVER

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Application February 21, 1948, Serial No. 10,001

5 Claims. (Cl. 219-19)

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This invention relates to snow removing apparatus, and the invention has reference, more particularly, to that type of snow removing apparatus which effects removal by melting the snow.

The invention has for an object to provide a novel construction of snow melting apparatus which comprises a hollow walled rotary drum or cylinder adapted to contain a content of liquid, such e. g. as water, and which includes electrical means for raising the temperature of such content, whereby the heat thereof may be transferred through the external walls of the drum or cylinder, as the latter is rolled upon the snow, so as to effect melting of the snow contacted thereby.

The invention has for a further object to provide a rotary drum or cylinder characterized as above stated, including means to support the same for rolling traction over snow, and further including means for serving current to the electrical heater devices with which the interior of the drum or cylinder is provided.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a side elevational view of one illustrative form of snow melting apparatus including the heated rotary drum or cylinder, as arranged to be propelled by an automotive vehicle over snow desired to be removed; Fig. 2 is a vertical sectional view taken on line 2-2 in Fig. 1, but drawn on an enlarged scale; Fig. 3 is a transverse vertical sectional view, taken on line 3-3 in Fig. 2.

Fig. 4 is a vertical sectional view through one of the electrical heater devices with which the rotary drum or cylinder is provided, shown on a further enlarged scale; and Fig. 5 is a transverse vertical sectional view thereof, taken on line 5-5 in Fig. 4.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

Referring to the drawings, the snow melting apparatus of this invention comprises, essentially, a hollow walled drum or cylinder D formed by an external wall 10, an internal wall 11 and connecting end walls 12, whereby to provide a closed chamber 13, intermediate said external and internal walls, concentric to the axis of said drum or cylinder. The spacing of said external

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and internal walls is such as to provide a chamber 13 of relatively shallow radial dimension. The drum or cylinder may be produced in length and diametric sizes suitable to the particular use to which it is to be put; in other words, it may be made of comparatively large size suitable for road or street clearing use and adapted to be propelled by an automotive vehicle or the like, or it may be made of relatively small size suitable for side walk or path snow clearing use and adapted to be propelled by hand. The drum or cylinder is made from metallic material, and is preferably provided with walls of as little thickness as possible without involving risk of injury or deformation in use.

The drum or cylinder chamber 13, in use, is supplied with a content of liquid, such e. g. as water 14. The drum or cylinder is provided with a suitably located but normally closed filling opening means 15. The quantity of water 14 initially supplied to the chamber 13 is only such as will allow for expansion thereof under applied heat, so that, when heated and expanded, the same will then substantially fill the chamber 13. Means to so determine the initial supply of water is provided by a suitably located but normally closed overflow means 16. The overflow means 16 is preferably in the form of a suitable type of safety valve which, when opened during the water filling operation, may serve the overflow function, but which, when normally adjusted and closed, may serve as an excess pressure relief or safety valve. It will be understood, however, that, if desired, separate and independent overflow and safety valve devices may be provided.

Arranged within the chamber 13 of the drum or cylinder, so as to be submerged in the water content 14 thereof, are a plurality of suitably located electrical heater devices. Each said heater device comprises a carrier plate 17 upon which is mounted a base plate 18 made of electrical insulation material. Supported on said insulating base plate 18, by its foot piece 19, is an electrically conductive positive terminal bracket 20; and, similarly, supported on said insulating base plate 18, by its foot piece 21, is an electrically conductive negative terminal bracket 22. Said positive and negative terminal brackets are spaced apart in opposed relation. The positive terminal bracket 20 is secured to the insulating base plate 18 and carrier plate 17 by fastening bolt and nut means 23 which is insulated from the latter, and which, in addition to its affixing function, also serves as an electrically conductive binding post. In like manner, the negative

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terminal bracket 22 is secured to the insulating base plate 13 and carrier plate 17 by a fastening bolt and nut means 24 which is insulated from the latter, and which, in addition to its affixing function, also serves as an electrically conductive binding post. Extending from the positive terminal 20 toward but short of the opposite negative terminal bracket 22 are a plurality of spaced positive electrodes 25; and, similarly, extending from the negative terminal bracket toward but short of the positive terminal bracket 20 are a plurality of negative electrodes 26. Said electrodes 25 and 26 are preferably formed by metallic rods of low conductive resistance, such e. g. as copper rods. The positive and negative electrodes 25 and 26 are arranged in spaced apart alternated relation, so as to be separated by the water content of the drum or cylinder chamber by which they are surrounded. If desired, the free ends of the respective electrodes 25 and 26 may be supported, against vibration and risk of breakage, by blocks 27 of insulating material which are suitably mounted on the inner faces of the respective terminal brackets 25 and 22 (see Fig. 4).

The internal wall 11 of the drum or cylinder is provided with openings or hatchways through which the heating devices may be passed for operative disposition within the chamber 13; the carrier plates 17 of said heating devices being adapted to serve as closures for said openings or hatchways, and to this end being secured to said internal wall 11 of the drum or cylinder by fastening bolts 28.

A desired number of the heater devices are arranged in suitably grouped relation around the interior of the chamber 13. Preferably two or more longitudinally spaced groups of said heater devices are provided; with those of each group equi-spaced circumferentially around the chamber interior. Means, hereinafter more particularly described, is provided for serving operating current to said heater devices.

Means is provided for mounting the drum or cylinder so that it may revolve about its axis. Means for this purpose is, of course, subject to wide variation in kind and detail construction. One illustrative arrangement suitable for the purpose, as shown, is provided by a framework comprising longitudinal side members 29 and connecting transverse members 30. Fixed on said side members 29 are supporting pedestals or blocks 31 which support a non-rotatable transverse shaft 32. To mount the drum or cylinder for rotation about the axis of shaft 32, stationary bearing members 33 are provided to journal the respective ends of the drum or cylinder for such rotation. These bearing members 33 are affixed to the supporting pedestals or blocks 31 and to the shaft 32 so as to be themselves non-rotatable. Said bearing members 33 are provided with peripheral flanges 34 to abut or lap the end walls 12 of the drum or cylinder, and with concentric inwardly directed annular flanges 35 upon which the respective ends of the internal walls 11 of the drum or cylinder are journaled. Preferably said peripheral flanges 34 and annular flanges 35 are respectively provided with anti-friction bearings, such e. g. as the roller bearings 36 and 37, whereby the drum or cylinder is not only supported for desired rotation about its axis, but also against axial displacement.

The means for serving operating current to the heater devices, in one illustrative form thereof as shown, comprises a suitably located posi-

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tive slip ring 38, and a suitably located negative slip ring 39, each said slip ring being supported from the shaft 32 by a carrier frame 40. Each slip ring is suitably electrically insulated from its carrier frame 40, and is provided with a binding post or terminal connection 41 to which a current carrying conductor may be connected. A cable 42, containing ingoing and outgoing conductors 43 and 44, is led from a source of electrical energy through a bearing member 33 into the interior of the drum or cylinder. The ingoing or positive conductor 43 is connected with the positive slip ring 38, and the outgoing or negative conductor 44 is connected with the negative slip ring 39. Longitudinally aligned heater devices of the respective groups thereof are preferably connected in series by intermediate conductors 45, as shown in Fig. 2. The binding post means 23 of each positive terminal bracket 20 of the group of heater devices adjacent to the positive slip ring 38 is provided with a current take off brush 46 which rides around said slip ring 38. Similarly, the binding post means 24 of each negative terminal bracket 22 of the group of heater devices adjacent to the negative slip ring 39 is provided with a current take off brush 47 which rides around said slip ring 39 (see Figs. 2 and 3). By this arrangement, flow of operating current from a suitable source is established through the several heater devices during rotation of the drum or cylinder.

The bearing members 33, by which the drum or cylinder is rotatably supported, are provided with man-holes 48, normally closed by detachable cover plates 49. Access to the interior of the drum or cylinder may be had through said man-holes 48 for inspection, repair or adjustment of the heater devices and the current service means therefor.

When the snow melting apparatus is sized for use in street and road clearing, the framework is arranged for suitable coupled connection with an automotive vehicle 50, so that the drum or cylinder may be propelled thereby. In such case, the automotive vehicle is provided with a suitably constructed connecting framework 51, and the rear end of the drum or cylinder framework is preferably pivotally coupled to the latter at 52 (see Fig. 1), so that the drum or cylinder can be raised and lowered as may be desired. When operating on deep snow or drifts, it is of advantage to be able to raise the drum or cylinder so as to better attack the same. Any suitable means may be provided for so manipulating the drum or cylinder. One illustrative arrangement for such purpose, as shown in Fig. 1, comprises a crane 53 which is mounted on the automotive vehicle so as to overhang the drum or cylinder supporting framework. To the drum or cylinder supporting framework is affixed a suitably located coupler eye 54 to which a snatch hook 55 of a lift cable 56 may be coupled. Said lift cable is run over a crane pulley 57 and a guide pulley 58, the latter being mounted on the drum or cylinder framework, and thence to a power operated winch (not shown) which is carried by the automotive vehicle.

In street or road clearing operations, it may be desired, especially when attacking deep snow or drifts, to provide means for revolving the drum or cylinder by power. In such case, a propeller shaft 59 is mounted on the drum or cylinder supporting framework, and is provided with a drive pinion 60 adapted to engage and drive a gear ring 61 which is affixed to the drum or

cylinder. Said propeller shaft 59 is coupled by a universal coupling connection 62 to a power shaft 63 which is adapted to be driven by the power plant of the automotive vehicle.

In order to reduce loss of heat by radiation, the upper side of the drum or cylinder is preferably enclosed in a covering hood 64 including any suitable heat insulation material. This covering hood 64 is secured by its ends to the drum or cylinder framework.

When the snow melting apparatus is arranged to be propelled and operated by an automotive vehicle, the latter will be provided with a power driven electric generator (not shown), which will operate to supply electrical energy to the heater devices of the drum or cylinder through the described current service means. When current is supplied to the heater devices, the current is caused to flow between the positive and negative electrodes 25 and 26 through the surrounding water 14, so that the temperature of the water is quickly raised. It has been found that the heater devices will, in operation, easily maintain a water temperature ranging from 180° to 200° F. If desired, any well-known thermostatic control means may be provided for preventing the water from reaching the boiling point, and for holding the temperature not in excess of 200° F. When the apparatus is in use, the heat of the water will, by conduction through the external wall 10 of the drum or cylinder, be applied to the snow over which the drum or cylinder is rolled, with rapid melting effect upon said snow.

When the snow melting apparatus is sized for propulsion by hand, the supporting framework of the drum or cylinder will be suitably modified to facilitate such propulsion. In such case, electric current for operation of the heater devices may be served from a house service outlet through a cable of sufficient length to permit of a range of progress of the apparatus sufficient to cover the area of operation.

It will be understood that various changes may be made in the construction and details of the above described snow melting apparatus without departing from the scope of the invention as defined by the herefollowing claims. It is therefore intended that the constructions shown and described are to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus for the purposes described, a hollow roller having spaced external and internal circumferential walls and connecting end walls adapted to define an annular liquid containing

chamber, electrical heater means of the liquid-in-circuit type submerged in the liquid content of said chamber, means to serve operating current to said heater means, and a framework having means for supporting the roller subject to tractional rotation, said framework being adapted to be connected to an automotive vehicle by which the roller is to be propelled.

2. In a snow remover apparatus, a hollow roller having spaced external and internal circumferential walls and connecting end walls defining an annular liquid containing chamber, draft means to support the roller subject to tractional rotation, electrical heater means of the liquid-in-circuit type supported within said chamber and submerged in the liquid content thereof, and means to serve electric current to said heater means.

3. In a snow remover apparatus as defined in claim 2, including an enclosure means of heat insulating character supported by said draft means to enclose the upper part of the roller.

4. In a snow remover apparatus, a hollow roller having spaced external and internal circumferential walls and connecting end walls defining an annular liquid containing chamber, a shaft including bearing means for rotatably supporting the roller, draft means to carry said shaft and the roller whereby to mount the latter for tractional rotation, electric heater means of the liquid-in-circuit type supported by the internal walls of the roller within its chamber and submerged in the liquid content of the latter, and means to serve electric current to said heater means comprising current charged slip rings mounted on said shaft within the hollow interior of the roller, and said heater means having electrical terminals certain of which are provided with brushes to ride on said slip rings.

5. In a snow remover apparatus as defined in claim 4, including an enclosure means of heat insulating character supported by said draft means to enclose the upper part of the roller.

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