W. T. ERICKSON.

SNOW MELTER.

APPLICATION FILED JAN. 26, 1915.

1,243,497.

Patented Oct. 16, 1917.

5 SHEETS—SHEET 1.

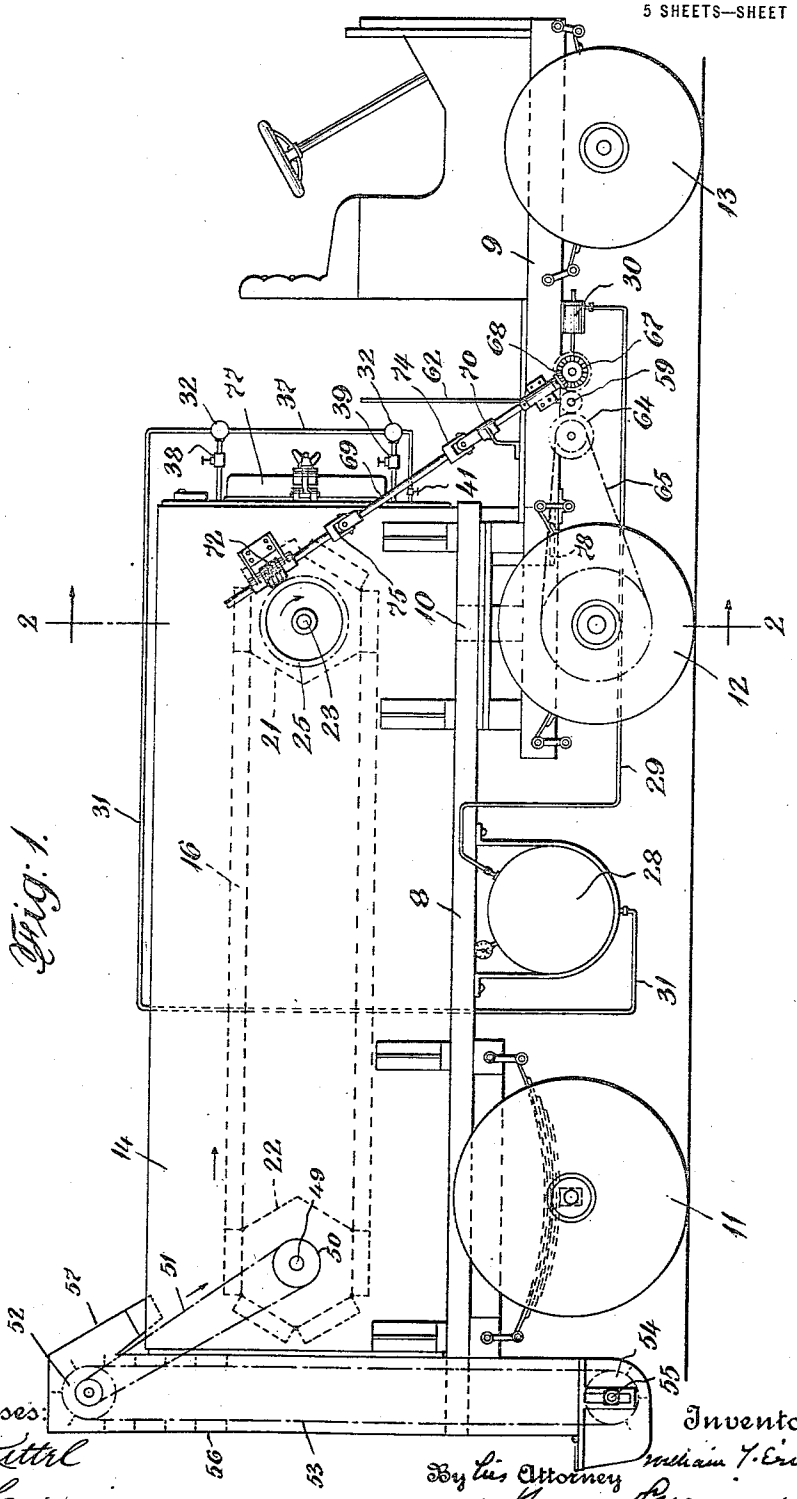

Fig. 1.

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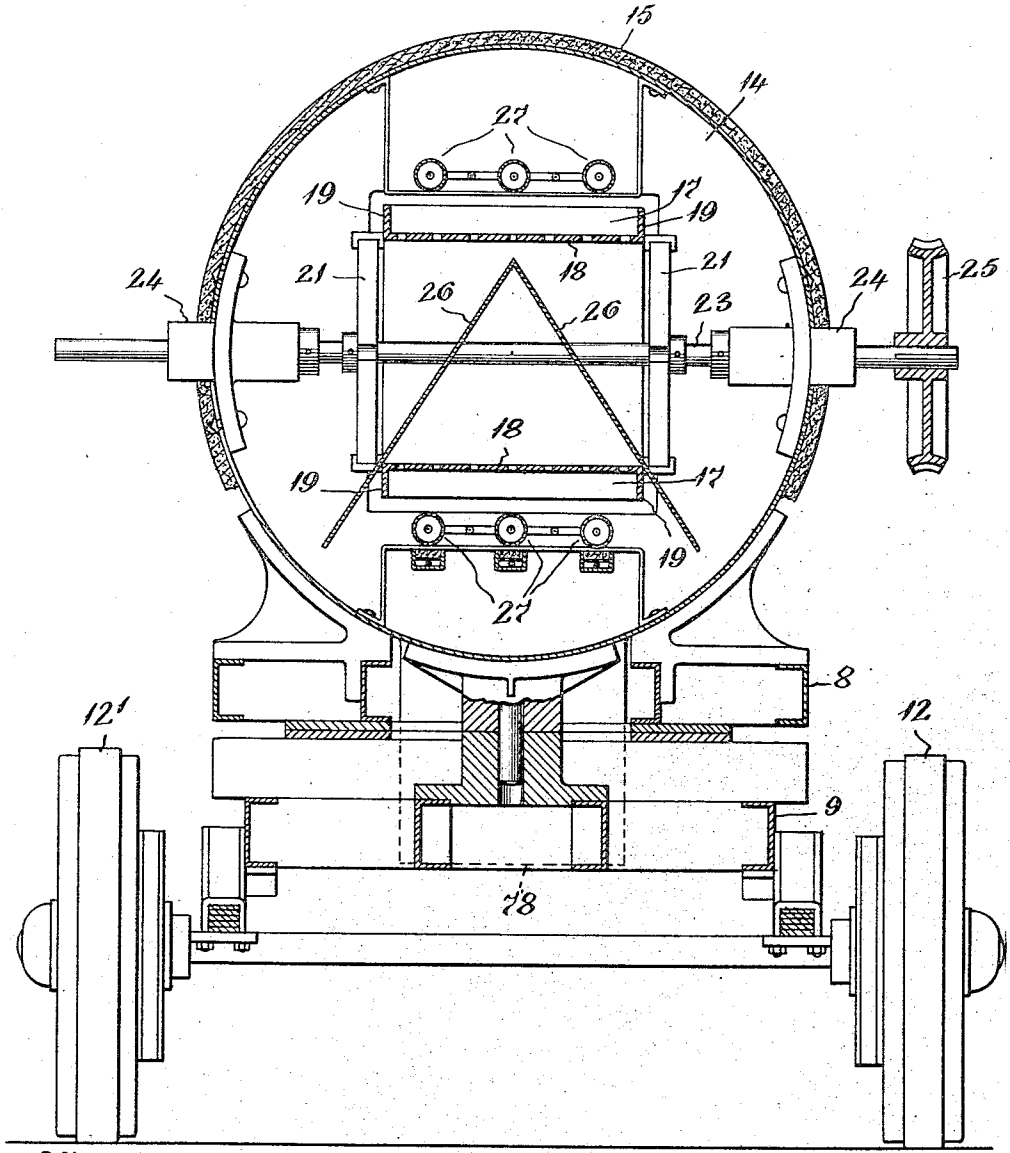
5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

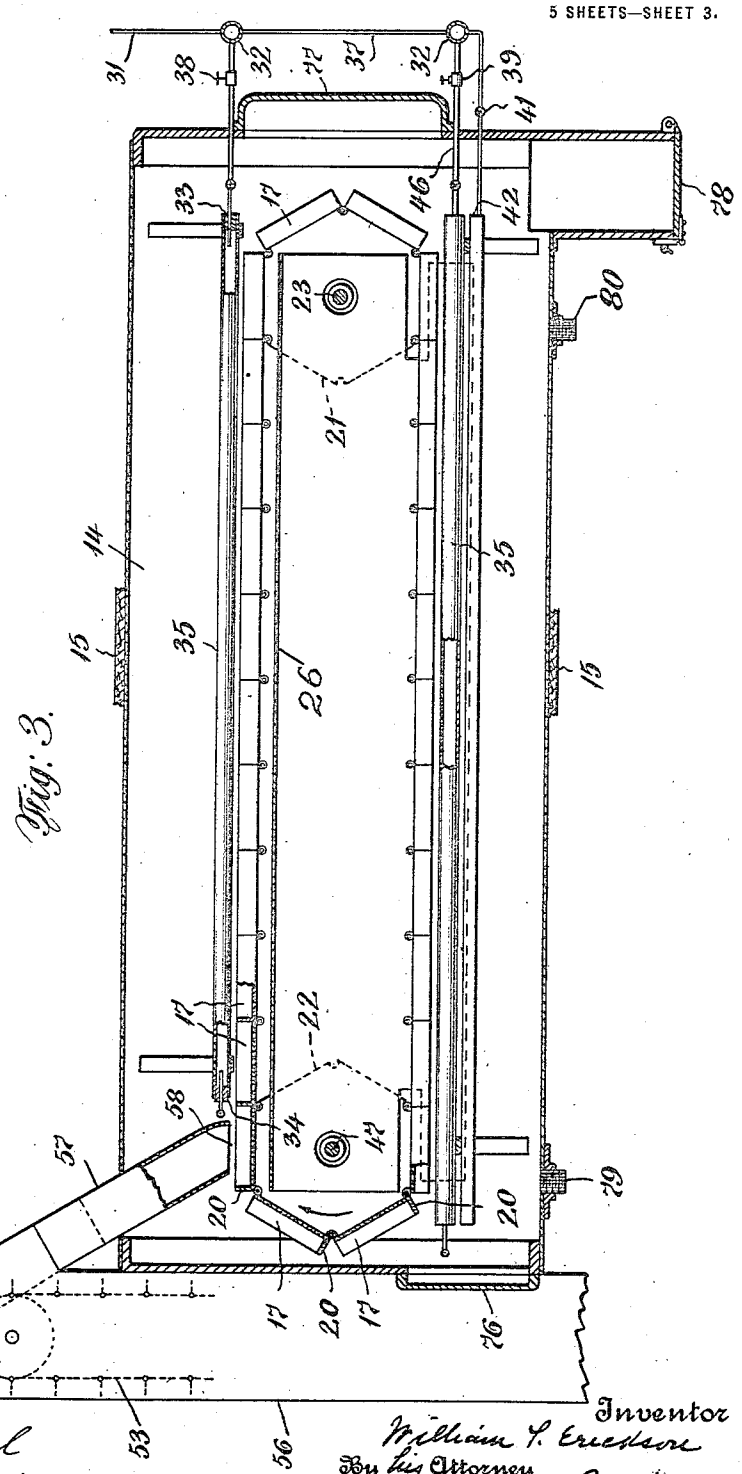

Fig. 3.

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5 SHEETS—SHEET 4.

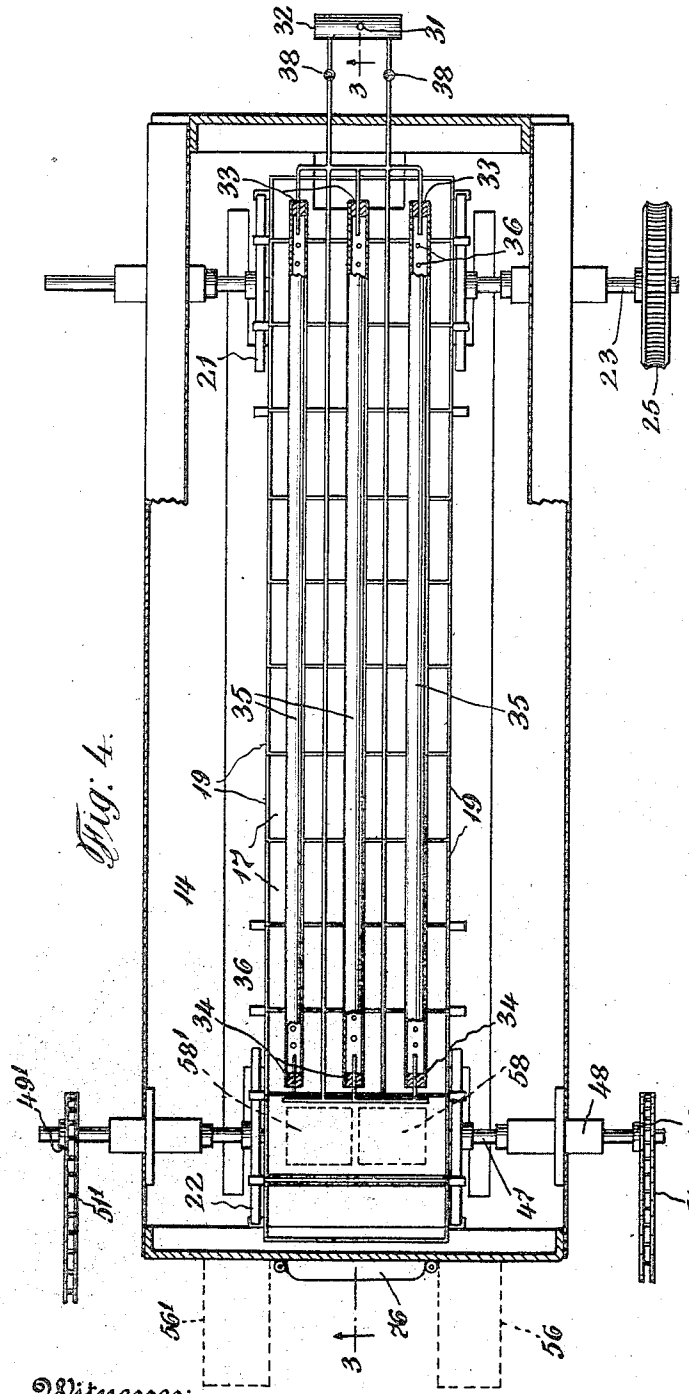

Fig. 4.

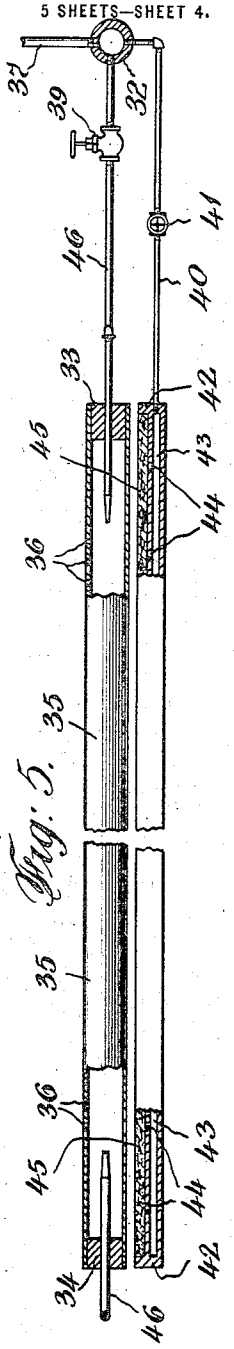

Fig. 5.

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5 SHEETS—SHEET 5.

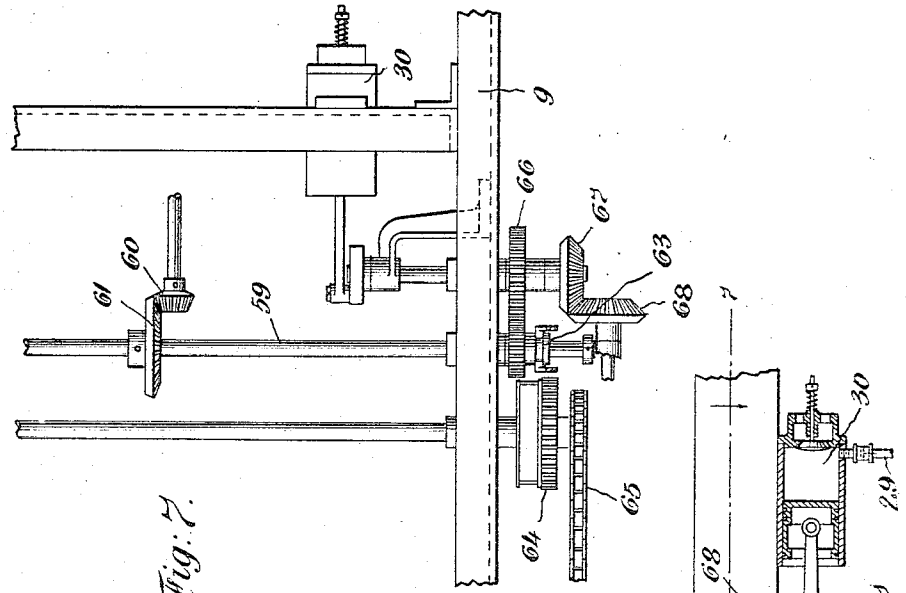

Fig. 7.

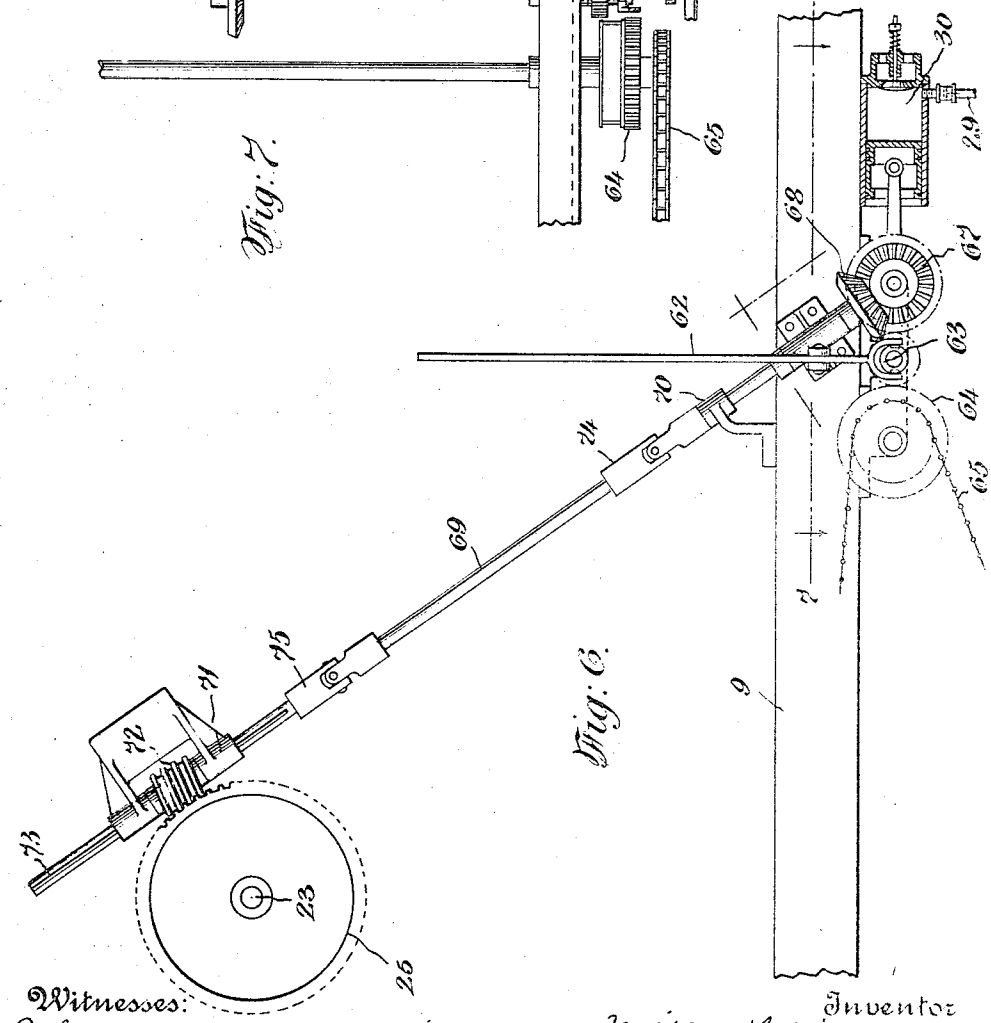

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM T. ERICKSON, OF NEW YORK, N. Y.

SNOW-MELTER.

1,243,497. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed January 26, 1915. Serial No. 4,515.

To all whom it may concern:

Be it known that I, WILLIAM T. ERICKSON, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Snow-Melters, of which the following is a specification.

My invention relates to snow melting device and has for its particular object a device whereby the snow is subjected to the direct heat of combustion in a combustion chamber itself.

Another object of my invention is a device in which the snow is introduced into and melted within a combustion chamber practically free from loss of heat by radiation or direct exit.

Another object of my invention is a power driven machine in which the power may be employed either for the propulsion of the machine or for the operation of the snow handling mechanism.

Another object of my invention is a device in which the passage of the snow through the combustion chamber may be so regulated as to insure complete conversion into water.

Another object of my invention is a device in which the snow is automatically lifted and deposited upon a movable distributing member for subjection to heat.

Another object of my invention is a device in which the separation of stones, wood, etc., from the melted snow may be readily accomplished.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application which will be indicated in the following claims.

It is generally admitted that the most effective work of disposing of snow is by an efficient melting thereof and numerous methods have been proposed for the accomplishment of this result.

It has been suggested that the snow be melted by means of hot air, hot water, steam, passage over heated surfaces, and other similar methods but their practicability has been of little value as in none of the devices has use been made of the double heat units of the combustible material. Loss of heat due to its absorption by the intermediary substances, to radiation, to the handling of the snow or to other causes, has proven them to be of no practical value, on account of the expense incident to their use or to their ineffectiveness upon the snow.

It is evident that the most effective and efficient method of melting snow is one in which the snow is subjected to the direct heat of combustion and in which practically all of the heat units are utilized for the desired purpose, without loss due to radiation and in which all of the heat is absorbed by the snow for its conversion into water.

My device overcomes all of the objections incident to the prior proposed methods and presents a method whereby the snow is continuously and automatically handled with a minimum of labor and expense, in which it is directly subjected to the intense heat of a combustion under pressure and in which the melted snow in the form of water is practically separated from the impurities not affected by the heat.

In the accompanying drawings in which is shown one of various possible embodiments of my invention similar reference characters refer to similar parts throughout the different views of the drawings.

In the accompanying drawings:

Figure 1 illustrates a longitudinal cross-section of the device.

Fig. 2 illustrates a cross-section through the line 2—2 of Fig. 1.

Fig. 3 illustrates a cross-section through the line 3—3 of Fig. 4.

Fig. 4 illustrates a top view partially broken away to show the heating device.

Fig. 5 is an enlarged view of the igniting means shown in Fig. 4.

Fig. 6 is a side plan view showing the means of connecting the power from the motor to the mechanically moving parts of the device.

Fig. 7 is a view through the line 7—7 of Fig. 6.

The particular form of my device as shown in the accompanying drawings comprises a truck composed of the two sections 8 and 9 pivotally connected at 10 and mounted upon wheels 11—11′, 12—12′,

13—13'. The truck section 8 carries a cylindrical snow melting chamber 14 which is entirely inclosed except at the points indicated in the further description. This snow melting chamber 14 is made preferably of iron or steel and covered with asbestos or other non-conductor of heat 15. Within the snow melting chamber 14 is a movable endless linked belt 16 capable of moving lengthwise of the chamber and composed of a series of linked tray shaped receptacles 17—17 each comprised of a perforated bottom 18, side walls 19—19 and a rear wall 20, the top and forward end of the trays being open. These tray members are so formed and situated with respect to each other that during the movement of the linked series the upper row will form a series of receptacles for receiving and carrying the snow, the unmelted snow, dirt, stones etc. being dropped from the trays through their open ends as they pass over the hexagonal wheel 21. Movement is imparted to the series of linked trays forming the movable belt by means of the revolving hexagonal wheel 21 which in turn receives its power from a motor source explained later. The rearward end of the linked belt is supported by and revoluble with the hexagonal wheel 22. The wheel 21 is supported by and revoluble with the shaft 23 carrying a fixed attached spur wheel 25 exterior to the snow melting chamber 14. The wheel 22 is similarly supported. In order that the water resulting from the snow melted in the upper portion of the linked snow carrying belt shall not fall through the perforations thereof upon the lower portion of the belt and cool the latter unnecessarily, an angular bevel plate 26 is introduced between the upper and lower portions of the linked belt in such a manner that the water will be diverted from contact with the lower series of the linked belt. Within the snow melting chamber 14 is a series of properly disposed burners 27—27 capable of producing intense heat from vaporized combustible liquids under pressure. These burners are so situated as to impinge their heat upon the snow carrying belt 16 and especially upon the snow carried therein, the object being to melt the snow in the upper series of linked trays during its passage through the chamber 14. The size, number and position of these burners may be varied but in the accompanying drawings they form three series of burners longitudinal of the chamber 14 above the snow melting belt 16 and three series below said belt. The means of operation of these burners is as follows: A tank 28 is devised to carry a vaporizable inflammable liquid, such as gasolene, kerosene, etc. The top of the tank 28 is connected by means of the pipe 29 with a compression pump 30, the means of operation of which will be explained later. The bottom of the tank 28 is connected by means of the pipe 31 with the two sets of burners, one above and one below the snow melting belt. As the means of connection is the same in the two sets, it will be sufficient to explain it as shown with one set, as illustrated in Figs. 4 and 5. The pipe 31 connects with the distributing pipe 32 which in turn is branched into a series of pipes entering the forward ends 33—33 and the rearward ends 34—34 of the combustion tubes 35—35 having perforations 36—36 through which the gas escapes and at which it is ignited. As Fig. 4 illustrates the upper series of burners, the perforations 36—36 are in the under side of the tubes 35—35, while the perforations in the lower series of burners are on the upper sides of the combustion tubes. The two series are connected by the pipe 37, valves 38 and 39, to allow the discontinuance of the liquid into the several series. In order to allow of the vaporizing and igniting of the liquid a pipe 40 (see Fig. 5) fitted with a valve 41 is connected with the tube 42 comprising a chamber 43 connected by means of the perforations 44—44 with a layer of asbestos or similar material 45. In operation the inflammable liquid from the tank 28 is forced by means of pressure from the pump 30 through the pipe 31. The valves 38 and 39 are closed and the valve 41 is open. The liquid is thus forced into the chamber 43 of the tube 42 and through the perforations 44 into the absorbent material 45, where it is ignited and heats the tube 35. When tube 35 is sufficiently heated, that is, above the vaporizing point of the liquid, the valve 39 is opened and the liquid forced through the nozzle end of the pipe 46, is vaporized, passes through the perforations 36—36 and is ignited.

The rear horizontal wheel 22 is fixedly attached to the axle 47 revoluble within the bearing 48 supported by the side wall of combustion chamber 14. Upon the outward end 49 of the shaft 47 is fixedly attached a toothed sprocket wheel 50 around which passes a chain belt 51, the chain belt also passing around a sprocket wheel 52 situated to the rearward of and external to the combustion chamber 14. The sprocket wheel 52 carries a linked bucket lift belt 53 carried around a sprocket wheel 54 revoluble within the bearing 55. This entire snow hoisting mechanism is surrounded by a casing 56 extending upwardly and then diagonally downwardly at 57 to within the combustion chamber 14, the object of the casing being to prevent the escape of the heated air from the chamber 14 and to act as a guiding means for the snow which is thus deposited through the open end 58 of the casing 56—57 upon the linked tray belt 16. A similar hoisting means is similarly attached to the other end 49' of

the shaft 47, thus providing two snow hoisting means for depositing snow upon the linked tray belt. The power mechanism comprises an ordinary suitable motor, not shown, whereby a rotation of the shaft 59 is accomplished through the bevel gears 60—61, and an ordinary power shifting lever 62 and mechanism 63 allows of the shifting of power from the spur gear 64 with the consequent rotation of the chain drive 65 and the rotation of the wheel 12 and resultant motion of the entire device, to the spur gear 66 which operates the pump 30 and to the bevel gears 67 and 68. The bevel gear 68 is fixedly attached to the end of the shaft 69 revoluble in the bearings 70—71. The worm gear 72 is slidably attached to the shaft 69, the worm thereof operating within the corrugations of the spur gear 25. The worm gear 72 is maintained slidably by means of a projection or key fixedly attached to the gear 72 and movable within the longitudinal recess 73 of the shaft 69. Two universal joints 74—75 in the shaft 69 allow of the revolution of the shaft when the two truck sections 8 and 9 are not in direct line due to their partial revolution upon the pivotal member 10. Suitable doors 76—77—78 are arranged for gaining access to the combustion chamber 14, and pipes 79—80 allow of the constant removal of the water resulting from the melting of the snow.

In operation the device is moved to its place of operation by means of the motor operating upon the spur gear 64, thus moving the vehicle by means of the chain drive 65. When the device has reached the place of operation the lever 62 is shifted so as to disconnect the motor power and set in operation the pump, snow melting chain and snow hoisting device. The vaporized combustible gases are then ignited as described above and when the interior of the combustion chamber 14 has reached a sufficiently high temperature the snow is shoveled upon the bottom trays of the snow hoisting apparatus, which raises the snow and deposits it upon the rearward end of the snow melting chain. As this snow melting chain moves forwardly the intense heat of the burning gases melts the snow and allows the water to fall down through the perforated bottoms of the trays upon the baffle board 26 into the bottom of the combustion chamber 14 where it runs off through the openings 79—80. Unmelted snow, dirt, stones, etc., are carried along by the snow melting trays and dropped off at the forward end of the combustion chamber 14 and withdrawn when necessary through the door 78.

I do not limit myself to the particular number, arrangement or forms of elements shown or described herein, all of which may be varied without going beyond the scope of my invention as described and claimed.

What I claim is:

1. In a device of the character specified, in combination, a practically inclosed combustion chamber, a linked belt system movable within the combustion chamber, means for moving the linked belt system, said means being independent of the means employed to move the device, means for melting the snow upon the upper portion of the linked belt system, means for impinging a flame upon the lower portion of the linked belt system, and means for removing the melted snow from the container.

2. In a device of the character specified, in combination, a practically inclosed combustion chamber, a linked belt system movable within the chamber, mechanical means for conveying the snow upwardly and depositing it upon the linked-belt system, means for moving the linked belt system, means for impinging a direct flame upon snow upon the upper portion of the linked belt system, means for impinging a direct flame upon the lower portion of the linked belt system, and means for separating the unmelted snow and solid impurities from the melted snow.

3. In a device of the character specified, in combination, a practically inclosed combustion chamber, a linked belt system movable within the chamber, mechanical means for conveying the snow upwardly and depositing it upon the linked-belt system, means for moving the linked belt system, said means being independent of the means employed to move the device, means for impinging a direct flame upon snow upon the upper portion of the linked belt system, means for impinging a direct flame upon the lower portion of the linked belt system, and means for separating the unmelted snow and solid impurities from the melted snow.

4. In a device of the character specified, in combination, a practically inclosed combustion chamber, a linked belt system movable within the chamber, mechanical means for conveying the snow upwardly and depositing it upon the linked-belt system, means for moving the linked belt system, means for impinging a direct flame upon snow upon the upper portion of the linked belt system, means for preventing the melted snow from coming into contact with the lower portion of the linked belt system, means for impinging a direct flame upon the lower portion of the linked belt system, and means for separating the unmelted snow and solid impurities from the melted snow.

5. In a device of the character specified, in combination, a practically inclosed combustion chamber, a perforated conveyer movable within the combustion chamber and

capable of carrying snow deposited upon the upper surface thereof, means for preventing the melted snow passing through the perforations to fall upon the sections of the movable conveyer beneath the snow carrying sections, a combustible material, means for causing the combustion of the combustible material, and means for submitting the snow upon the movable conveyer to the direct heat of combustion within the combustion chamber.

6. In a device of the character specified, in combination, a practically inclosed combustion chamber carrying a series of burners so arranged that the heat of combustion therefrom will be impinged upon a movable-linked belt system, a reservoir, conduits connecting the reservoir with the burners, a liquid combustible material within the reservoir, means for maintaining the pressure upon the liquid within the reservoir and forcing it through the conduits to the burners, means for igniting the combustible material at the burners, a movable linked belt system comprising a series of pivotally attached trays, the bottoms of which are perforated, the linked system being revoluble to carry snow deposited thereon until melted, and means for separating the unmelted snow and impurities from the melted snow.

7. In a device of the character specified, in combination, a practically inclosed combustion chamber carrying a series of burners so arranged that the heat of combustion therefrom will be impinged upon a movable linked belt system, a reservoir, conduits connecting the reservoir with the burners, a liquid combustible material within the reservoir, means for maintaining the pressure upon the liquid within the reservoir and forcing it through the conduits to the burners, means for igniting the combustible material at the burners, a movable perforated linked belt system, the linked system being revoluble to carry snow deposited thereon until melted, means for separating the unmelted snow and impurities from the melted snow, and means for preventing the melted snow from coming into contact with the sections of the linked belt system not carrying snow.

8. In a device of the character specified, in combination, a practically inclosed combustion chamber containing a series of burners connected by conduits with a reservoir, a liquid combustible material within the reservoir, pressure means for forcing the liquid from the reservoir to the burners, means for vaporizing the liquid combustible material within the burners, means for igniting the combustible material at the burners, a movable linked belt system comprising a series of pivotally connected trays with perforated bottoms, a linked belt hoist without the combustion chamber comprising a series of depositing and carrying surfaces for raising snow from a point below the linked belt system within the combustion chamber and depositing the snow thereon, and means for subjecting the snow upon the linked belt system within the combustion chamber to the direct heat of combustion, means for preventing the melted snow from coming into contact with the lower portion of the linked belt system, and means for separating the unmelted snow and solid impurities from the melted snow.

Signed at New York city, in the county of New York and State of New York, this twenty fifth day of January, 1915.

WILLIAM T. ERICKSON.

Witnesses:

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