

Oct. 12, 1926.

1,602,476

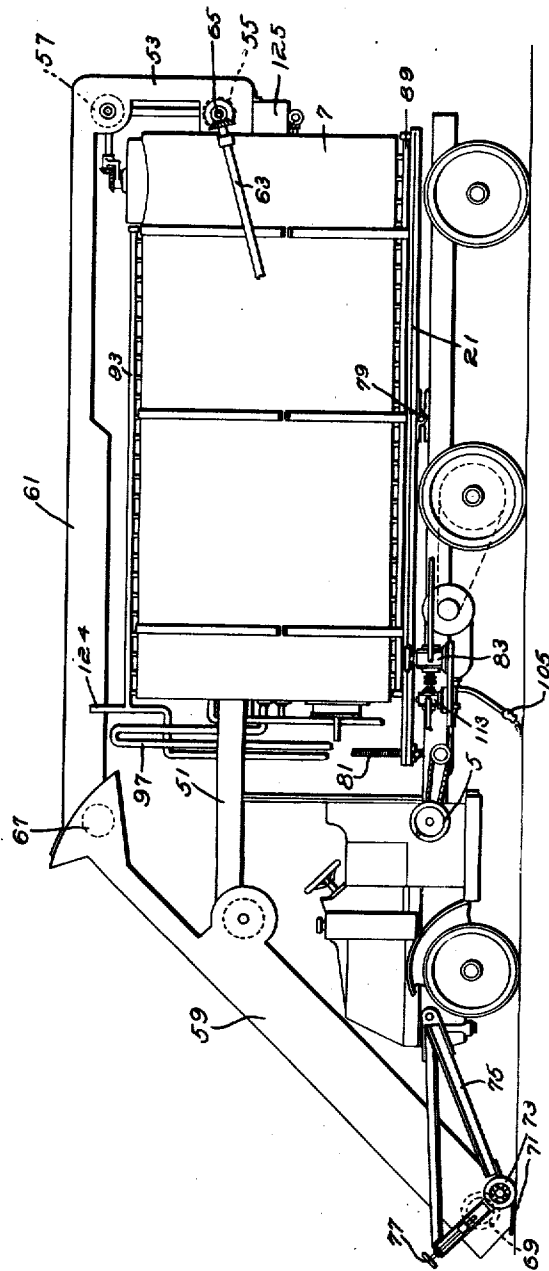
A. H. BALLARD

SNOW REMOVING AND MELTING APPARATUS

Filed Feb. 6, 1925

3 Sheets-Sheet 1

Fig. 1.



Inventor:
Arthur H. Ballard.
By Mary Booth Jamney, Attorney.

Oct. 12, 1926.

1,602,476

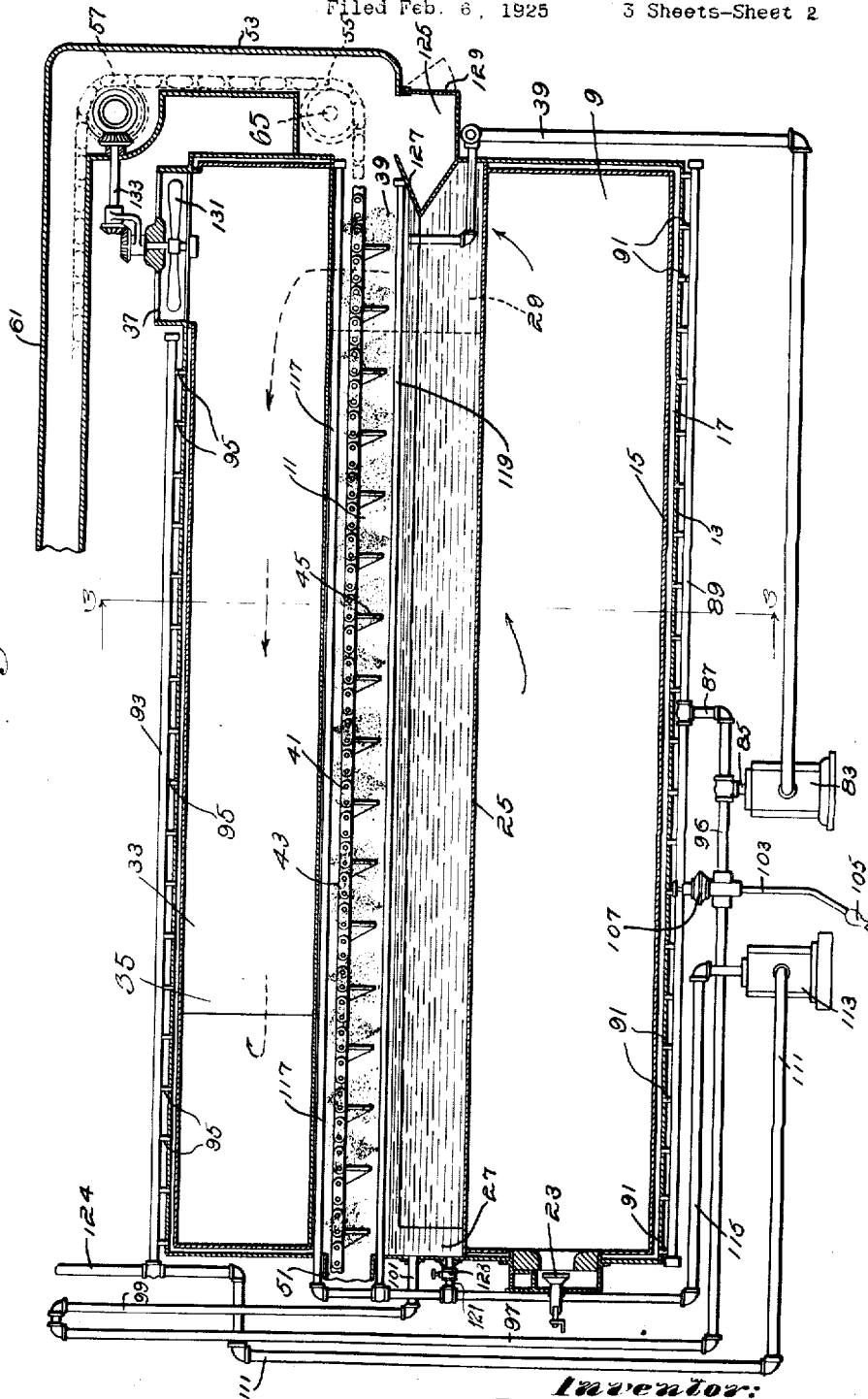
A. H. BALLARD

SNOW REMOVING AND MELTING APPARATUS

Filed Feb. 6, 1925

3 Sheets-Sheet 2

Fig. 2.



Oct. 12, 1926.

1,602,476

A. H. BALLARD

SNOW REMOVING AND MELTING APPARATUS

Filed Feb. 6, 1925

3 Sheets-Sheet 5

Fig. 3.

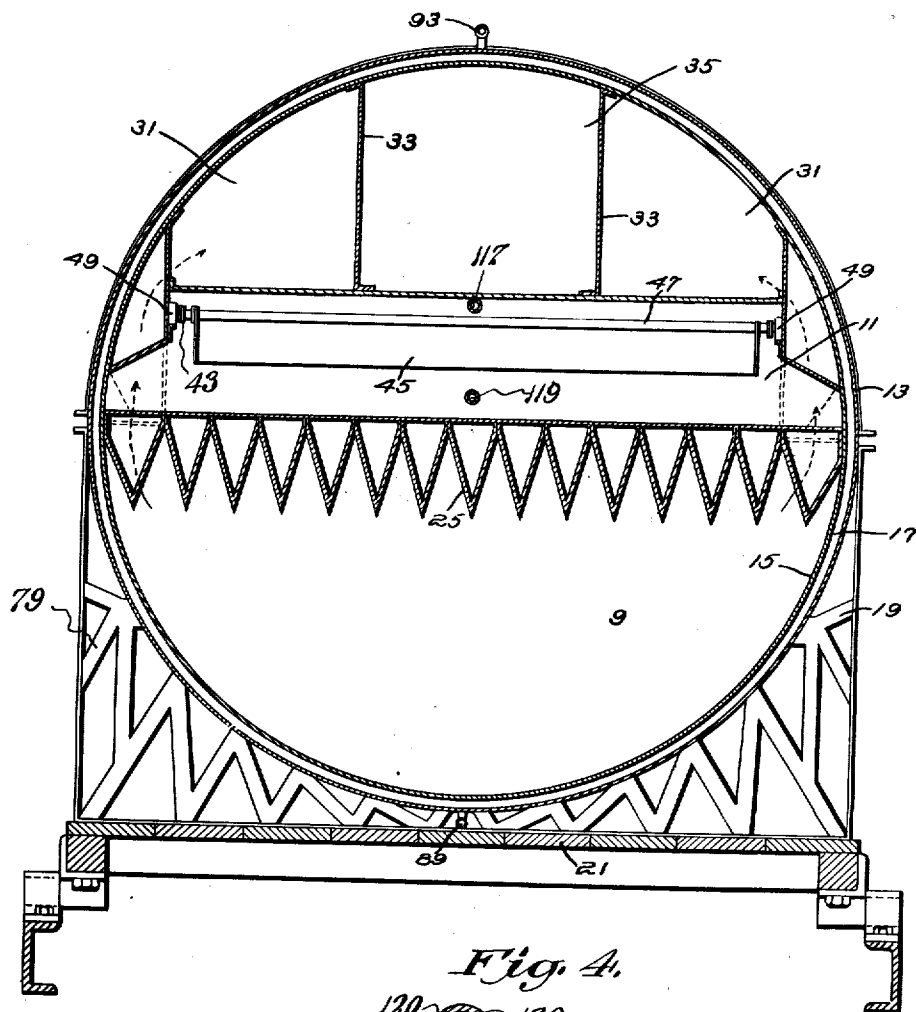


Fig. 4.



Inventor:
Arthur H. Ballard,
by Emily Booth Jaume Harney
Atty's.

UNITED STATES PATENT OFFICE.

ARTHUR H. BALLARD, OF BOSTON, MASSACHUSETTS.

SNOW REMOVING AND MELTING APPARATUS.

Application filed February 6, 1925. Serial No. 7,288.

This invention relates to apparatus for removing and melting snow, it being intended to provide means for removing accumulated snow from the public highway or from other areas and to dispose of the same by melting through the application of heat in an effective and economical manner.

While the invention may have useful application to other forms of fuel, it is particularly adapted to use with liquid fuel where an intense heat is created, and provision should be made for usefully applying to the melting of the snow all heat generated by the liquid fuel burner.

The invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings,—

Fig. 1 shows a truck or automotive device equipped with a snow removing conveyer and a snow melting apparatus embodying one form of my invention;

Fig. 2 is a longitudinal sectional elevation with the parts omitted taken through the snow melting apparatus, some of the pipe connections, pumps, etc., being indicated more or less diagrammatically by dotted lines;

Fig. 3 is a transverse sectional elevation with parts omitted on line 3—3 in Fig. 1; and

Fig. 4 is a cross-section through one of the hot water spray pipes in the melting chamber.

Referring to the drawings and to the illustrated embodiment of the invention therein shown, the apparatus comprises a snow melting unit by means of which heat, preferably supplied by oil or other liquid fuel, is utilized to reduce the snow to liquid and a conveying mechanism by which the snow is conveyed to the melting chamber, both being preferably portable and the conveying mechanism being so arranged that it can work progressively along the street or other snow covered area and remove the snow therefrom and convey it to the melting apparatus.

For this purpose the mechanism is conveniently mounted on a truck or other self-propelled automotive device 5 equipped with

a suitable steering mechanism and the usual power plant which may be used to provide locomotion and also to supply the necessary power for driving the conveyer, pumps or other motor units required for the snow removing and melting apparatus. Since the power plant may be of any usual or suitable construction and the conveyer pumps and other power driven devices may be connected thereto by simple power take-offs readily understood by those skilled in the art, for the purpose of simplification the details of these driving devices are not herein shown.

The principal parts of the snow melting apparatus are embodied in the structure comprising a cylindrical sheet-metal, boiler-shaped structure 7 mounted on the body of the truck and including a combustion chamber 9 (Figs. 2 and 3), a melting chamber 11 and suitable flue passages, to be described, above the melting chamber.

Referring more particularly to Figs. 2 and 3, the structure 7 includes an outer shell 13 and an inner shell 15 providing between them a water space or jacket 17, the outer shell being held at suitable intervals by a lattice-like support 19 which rests on the platform 21. The combustion chamber 9 extends the entire length of the structure, occupying the lower part thereof, and is provided at the forward end with an oil or other liquid fuel burner 23. The latter may be of any desired type, but is preferably in the form of a nozzle, to which oil is supplied under pressure from a supply tank, the tank and pump and other usual and well understood burner equipment not being herein shown.

The combustion chamber 9 is separated from the melting chamber 11 by a heat transmission wall 25 which, for the greater part of its length, is channeled or corrugated as shown in Fig. 3, so as to provide a heat transmission wall of greatly expanded area, many times greater than that of a flat surface, and permitting an efficient transmission of heat produced by the intense combustion of the oil in the combustion chamber 9 to the body of liquid which is maintained in the melting chamber while the apparatus is in operation. These channels or corrugations which extend lengthwise the melting chamber and combustion chamber prevail over the entire width and

length of the heat transmission wall except for a short space at the front of the apparatus where the wall is left flat so as to provide a space 27 for free circulation of the liquid from one channel to another.

At the rear end of the combustion chamber the corrugated wall is cut away at each opposite side of the structure to provide flue exit passages 29 for the products of combustion, so that the latter take the path indicated by the arrows (Figs. 2 and 3) and pass upward at the side of the inner shell 15 to an overhead flue passage 31 (Fig. 3) where they enter the rear or horizontal passages which are contained within the upper part of the shell and extend longitudinally from the rear to the front at either side thereof. Longitudinal partition walls 33 terminating short of the front end of the shell are provided in this overhead flue chamber to provide a return flue passage 35 leading to a flue exit 37 at the rear, so that the products of combustion, after escaping from the combustion chamber, pass upward at the rear thereof, thence toward the front, and finally to the rear of the shell before escaping therefrom, this giving opportunity to absorb a large portion of the excess heat therefrom which would otherwise be wasted.

When the apparatus is in operation a bath of liquid is maintained somewhat above the level of the plates 25 by means of one or more suitably located overflow pipes 39 and the chamber is open at each end above the level of the liquid to permit the entrance and passage from front to rear of the melting chamber of one run of the endless conveyer 41. The conveyer, therefore, passes through a space in the melting chamber which is heated from below through the combustion chamber and from above through the heat radiated from the flue chamber.

The conveyer 41 comprises opposed sprocket chains 43 with connected snow removing and conveying plates 45 mounted on the transverse rods 47 carrying the rollers 49 which are guided by a suitable trackway contained within the connected structure. The conveyer enters the entrance end of the melting chamber through a housing 51 and leaves it through the housing 53, being guided by the sprocket wheels 55 and 57, and returning to the conveying chute 59 through the housing 61 which is arranged above the melting shell.

The conveyer is driven from the power plant of the automobile through any suitable power transmission device, there being shown for this purpose the power drive shaft 63 connected through bevel gearing to drive the shaft 65 on which is carried the sprocket wheels 55. The conveyer in entering the chute 59 passes over the sprocket wheel 67, thence down the inclined chute

and, at or near the ground surface, is carried over the guiding sprocket wheel 69 near the open end of the chute. At that point the plates in reversing their movement are caused to cooperate with a scraper plate 71 to scrape up and remove the snow from the surface and convey the same up the chute and into the melting chamber as the apparatus is progressively advanced.

The bottom of the chute has a wheeled support 73 through which it is connected and braced to the frame of the truck by the truss frame 75, there being preferably provided an adjusting device 77 by which it may be raised or lowered relatively to the ground. The housings 51 and 61 are so connected to the chute as to permit of necessary adjustment of the latter and also a slight tipping adjustment of the melting unit about a horizontal axis to permit the maintenance of a proper working level of the bath in the melting chamber and to keep the heat transmission wall 25 covered with liquid under varying gradient conditions. For this purpose the middle of the platform 21 has jointed support 79 and the front thereof is supported on jacks 81 operated from a power take off on the vehicle by means of which the shell can be tipped in one direction or the other to neutralize the effect of different grades.

To utilize in full the heat of the burning fuel, water from the melting chamber is caused to circulate through the water space about the combustion chamber and thence to be returned to the melting chamber. While this circulation might be secured by other arrangements and the water thus heated returned directly to the liquid body in the melting chamber, herein circulation is provided by water withdrawn through the overflow pipe 39, passed through the water jacket 17, and finally in its heated state discharged in the form of a hot spray against snow carried into the chamber by the conveyer. The arrangement of pipes which controls the distribution of this water is indicated more or less schematically in Fig. 2.

For this purpose the overflow pipe 39 is connected to the intake of a power driven pump 83 and thereby delivered to the water jacket 17 through the discharge pipe 85 and connection 87 to a manifold or header 89 extending longitudinally beneath the shell and having a plurality of connections 91 to the jacket distributed at intervals lengthwise the same so that the water is evenly distributed to all parts of the jacket. The jacket 17 extends entirely around the shell as well as about the ends thereof. The liquid entering the bottom of the water space passes upward through the same absorbing excess heat both from the bottom and sides of the combustion chamber, as well as from the flue passages at the top of the shell. At the

top thereof the heated liquid is discharged through a discharge manifold or header 93 similar to the manifold 89 and connected at intervals with the water space through the connections 95.

To limit the pressure which the water forced into the water jacket may exert against the walls thereof, the pump discharge 85 is also connected to a bypass pipe 96 leading to a standpipe 97, the latter carried to a height preferably but slightly exceeding the height of the manifold 93. Water delivered through the standpipe passes down the discharge pipe 99 and is thence delivered to the body of liquid in the melting chamber through the connection 101 where it assists in maintaining a circulation through the liquid bath.

The bypass pipe 96 is further connected to a discharge pipe 103 which in turn is connected to a nozzle or a series of nozzles 105 and arranged beneath the vehicle to discharge the surplus water forcibly down into the street and through the pressure thereof and the heat contained therein to assist in washing away and reducing to water as much as possible of the snow remaining behind the scraper 71. The discharge of the water through the street flushing nozzles is preferably controlled automatically by a valve 107 such that all water discharged from the pump in excess of the capacity of the manifold 89 and the standpipe 97 is diverted to the flushing nozzles.

Referring now to the discharge of heated water from the discharge manifold 93, the latter is delivered through the pipe 111 to the intake of the pump 113 and by the latter discharged under pressure through the pipe 115 and delivered back to the melting chamber, preferably in the form of a shower or spray, through one or more spray pipes 117 extending lengthwise the melting chamber directly above the conveyer 41. Each spray pipe 117 is provided with downwardly directed discharge openings distributed throughout its length so that a spray or shower of hot water is forcibly discharged down upon the conveyer plates and upon the snow carried thereby, washing the plates free from accumulated snow and carrying the latter into the underlying heated bath and at the same time effectively reducing and assisting in melting the snow.

If desired, other hot water sprays may be supplied from the pump 113, there being shown for this purpose one or more spray pipes 119 also connected to the hot water delivery pipe 115 and extending lengthwise the melting chamber and beneath the conveyer but having upwardly directed discharge openings such that the hot water spray is forced up from below against the under side of the conveyer and the snow thereon.

The pipes 117 and 119, as will be understood by those skilled in the art, may be provided with perforations 120 for forming the sprays in the melting chamber.

Any surplus hot water from the pump 113 may be discharged directly to the liquid bath in the melting chamber through the pipe 121 controlled by the valve 123.

Preferably there is provided a vent pipe open to the atmosphere, such as 124, between the manifold 93 and the hot water supply pipe 111 and extended above the manifold so that only the overflow from the manifold can be drawn out of the jacket by the pump 113.

In the operation of the apparatus, as the truck is advanced the snow dislodged by the scraper and the cooperative action of the conveyer plates is carried up by the latter through the chute 59 and the housing 51 and delivered directly into the melting chamber. There it is dropped into the hot bath maintained over the top of the corrugated or channeled bottom, the sprays of hot water discharged against the conveyer serving both to reduce more or less of the snow to water and to wash the plates free from all accumulations of snow. The channeled bottom of the melting chamber affords an immensely expanded area of heating surface so that the intense heat of the combustion chamber is effectively transmitted to the bath, maintaining the latter at a temperature sufficient to quickly melt the snow after the delivery thereto. The unmelted snow delivered to the bath is carried through the same until melted, this action being assisted by the movement of the conveyer, the plates 45 of which agitate the snow, and the circulation induced in the bath by the effect of the heat, the several sprays, and the water from the overflow pipes 101 and 121.

The overflow pipe 89 maintains the bath at a substantially constant and suitable level above the channeled bottom 25 and conducts a portion of the overflow to the jacket 17 where it absorbs excess heat which would otherwise be wasted from the sides and bottom of the combustion chamber as well as from the sides and top of the flue passages. This being delivered back to the melting chamber, all possible heat units from the fuel combustion are usefully applied in melting the snow. This is of particular importance in the case of a liquid fuel burner where the conduction of heat from the sides and bottom of the combustion chamber is apt to be very great. While this provides means to conserve the maximum number of heat units in the fuel, the connection is such that eventually all snow reduced to water is pumped through the street flushing nozzles 105, washing and reducing to water more or less of the snow remaining in the street.

For the purpose of removing any foreign

matter that may be carried up into the melting chamber, a trap 125 is provided at the end of the melting chamber such that matter of any bulk carried into the chamber by the conveyer will be propelled or worked along through the chamber, up the inclined wall 127 thereof, and into the open top of the trap 125, from which it may be dropped automatically or by opening the hinged door 129.

To assist in inducing a draft through the combustion chamber to remove the products of combustion, the discharge end of the flue may be provided with one or more fans 181 which are driven in any suitable way, as by the drive shaft 133 connected to the drive shaft for the conveyer sprocket wheel 57.

While I have herein shown for the purpose of illustration one specific embodiment of the invention, it is to be understood that extensive deviations may be made therefrom and changes in the form and relative arrangement of parts may be had, all without departing from the spirit of the invention.

Claims:

1. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber above the heating chamber, conveyer means traversing the melting chamber to deliver snow to the melting chamber, and means forming a water space contacting with the sides of the heating chamber to receive liquid from the melting chamber and absorb excess heat from the heating chamber.

2. A snow removing and melting apparatus comprising a combustion chamber having a liquid fuel burner, means forming a melting chamber having a wall heated by the products of combustion, conveyer means traversing the melting chamber for delivering snow to the melting chamber, and means forming a water space communicating with the sides and bottom of the combustion chamber to receive liquid from the melting chamber and absorb excess heat from the combustion chamber, said apparatus having provision for returning the heated water from the water space to the melting chamber.

3. A snow removing and melting apparatus comprising means forming a heating chamber, a liquid fuel burner for said heating chamber, means forming a snow melting space above the heating chamber, snow removing means comprising a conveyer traversing said snow melting space, and water jacketed walls for the heating chamber.

4. A snow removing and melting apparatus having means forming a combustion chamber, means forming an elongated melting chamber separated from the combustion chamber by a wall having an enlarged heat-

ing surface, conduit means for conducting products of combustion from said combustion chamber and separated from said melting chamber by a wall opposite said enlarged heating surface, means including a conveyer traversing the melting chamber for delivering snow to the melting chamber, water jacketed walls for the combustion chamber, and means for circulating melted snow water through the jacket space of said walls and discharging said water on the snow in said melting chamber.

5. A snow removing and melting apparatus comprising means forming a heating chamber, said heating chamber having fuel burning means, means forming a melting chamber in heat transferring relation to said heating chamber, means for delivering snow to said melting chamber, means for automatically maintaining a liquid bath of substantial depth in said melting chamber, said bath extending substantially over all the wall separating said melting chamber from the heating chamber, said apparatus having provision for circulating the water from the melting chamber to absorb excess heat from the heating chamber and return the heated water to the liquid bath maintained above the heating chamber.

6. A snow removing and melting apparatus comprising means forming a combustion chamber, means forming a melting chamber, having a generally horizontal wall separating it from said combustion chamber, means for delivering snow to said melting chamber, means for maintaining a liquid bath in said melting chamber, said bath extending substantially over all of said horizontal wall, and means for withdrawing the water from the upper part of the liquid bath and circulating the same to absorb the excess heat from the products of combustion and return the heated water to the snow delivered to the melting chamber.

7. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber in heat transferring relation to said heating chamber, a conveyer traversing said melting chamber for delivering snow to the melting chamber, water circulating means for circulating water from the melting chamber to absorb excess heat from the heating chamber, and means to deliver said heated water to said melting chamber forcibly in the form of sprays both from above and below said conveyer.

8. A snow removing and melting apparatus comprising means forming a heating chamber and a superimposed melting chamber separated from each other by a wall, means for maintaining in said melting chamber a liquid bath of substantial depth over substantially all of said wall, conveyer means traversing the melting chamber to

deliver the snow to said chamber and agitate the same therein, means for circulating the water from the melting chamber to absorb excess heat from the heating chamber, and means to return the heated water in the form of a spray forcibly discharged against the conveyer.

9. A snow removing and melting apparatus comprising means forming a heating chamber, conduit means for conducting the products of combustion from said heating chamber, means forming a melting chamber separating said heating chamber from said conduit means, means for conveying snow to said melting chamber including a conveyer traversing said melting chamber, and water circulating means for circulating water from the melting chamber in contact with the walls of the heating chamber for jacketing said walls and returning the water to the melting chamber and spraying it over said conveyer.

10. A snow removing and melting apparatus comprising means forming a combustion chamber, a liquid fuel burner for said combustion chamber, flue-exit passages above the combustion chamber, means forming a melting chamber above the combustion chamber means for delivering snow to the melting chamber, said melting chamber having means adapted automatically to maintain therein water of a substantial depth to form a liquid bath to receive the snow, means forming a water circulating space in contact with both the walls of the combustion chamber and the flue-passages for absorbing excess heat, and provision for returning the heated water from the water circulating space to the liquid bath in the melting chamber.

11. A snow removing and melting apparatus having means forming a combustion chamber, conduit means for conducting the products of combustion from the combustion chamber, means forming a melting chamber between the combustion chamber and conduit means, means for delivering snow to the melting chamber including a conveyer traversing said chamber, means forming a water circulating space in contact with the walls of the combustion chamber for absorbing excess heat therefrom, and means for withdrawing the water from the melting chamber, circulating the same through the water space, and delivering it in the form of a spray to the snow delivered to the melting chamber.

12. A snow removing and melting apparatus having a liquid fuel burner, means forming a combustion chamber, means forming a melting chamber above the combustion chamber, means forming a water circulating space exposed to the excess heat of the combustion chamber, means for withdrawing the water from the melting chamber and

circulating the same through the water space, a conveyer passing through the melting chamber, and means for delivering the heated water from said water space in the form of a forcible spray to the snow in said melting chamber on said conveyer.

13. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber in heat transferring relation to said heating chamber, snow delivery means traversing the melting chamber, means forming wall cooling water passages arranged to absorb excess heat from the heating chamber, and means for circulating water from the melting chamber through said passages and delivering the heated water back to the melting chamber for discharge against said snow delivery means.

14. A snow removing and melting apparatus comprising means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to said heating chamber, snow delivery and distributing means traversing the melting chamber, and means forming water passages arranged to circulate water from the melting chamber and back again for discharge against said snow delivery means while absorbing excess heat from the heating chamber.

15. A snow removing and melting apparatus comprising means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to said heating chamber, snow delivery and distributing means traversing the melting chamber, and means forming water passages arranged to absorb excess heat from the heating chamber and circulate the water from the melting chamber and deliver the same with the absorbed heat against the unmelted snow.

16. A snow removing and melting apparatus comprising means forming a heating chamber with flue chambers, means forming a melting chamber separating said heating chamber from said flue chambers and being in heat transferring relation therewith, snow delivery means for the melting chamber including a conveyer for traversing the same, means forming water passages arranged to absorb excess heat from the flues, and means for circulating the water through said passages from the melting chamber and discharging it on the snow in the melting chamber.

17. A snow removing and melting apparatus comprising means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to said heating chamber, an endless conveyer traversing the melting chamber for delivering snow to the melting chamber and distributing it therein, means forming wall

cooling water passages for absorbing excess heat from the heating chamber, and means for circulating the water from the melting chamber through said passages and for discharging the heated water therefrom on the snow delivered to the melting chamber.

18. A snow removing and melting apparatus comprising means forming a combustion chamber, a flue for conducting the products of combustion from said combustion chamber, means forming an elongated melting chamber with means for delivering snow thereto and distributing it along the length of the chamber, a heat conducting wall separating said flue from said melting chamber, and means forming a heat conducting wall with an enlarged heating surface separating the combustion chamber from the melting chamber.

19. A snow removing and melting apparatus comprising means forming a combustion chamber, means forming an elongated melting chamber with means for delivering snow thereto and distributing it along the length of the chamber, means forming an enlarged heating surface for the melting chamber comprising a corrugated or channeled heat conducting bottom wall for the melting chamber separating the latter from said combustion chamber, and a flue for the products of combustion separated from the melting chamber by a heat conducting top wall for said melting chamber.

20. A snow removing and melting apparatus having means forming a heating chamber, an elongated means forming a melting chamber above the heating chamber in heat transferring relation therewith, an endless conveyer passing through the melting chamber, and a flue chamber connected to the heating chamber and extending over the conveyer in heat transferring relation to the conveyer.

21. A snow removing and melting apparatus having means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to the heating chamber, an endless conveyer for delivering snow to the melting chamber and advancing the snow through the same, and a trap in communication with the end of the melting chamber toward which the conveyer travels to receive from the melting chamber foreign material delivered thereto.

22. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber in heat transferring relation to said heating chamber, means forming water circulating passages exposed to the heat of the heating chamber, means including a pump for withdrawing water from the melting chamber and circulating the same through said passages at low pressure, and means including a pump for withdrawing heated wa-

ter from said passages and forcing the water into the melting chamber at high pressure.

23. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber, in heat transferring relation to said heating chamber means forming water circulating passages exposed to the heat of the heating chamber, means for withdrawing water from the melting chamber and circulating the same through said passages under relatively low pressure, an endless conveyer traversing said melting chamber for delivering snow to the melting chamber, a pump for forcing said heated water under relatively high pressure into the melting chamber and delivering the same in the form of a hot water spray against the snow delivered by the conveyer.

24. A snow removing and melting apparatus comprising means forming a heating chamber, means forming a melting chamber in heat transferring relation to said heating chamber, means forming water circulating passages exposed to the heat of the heating chamber for heating water in said passages, means for withdrawing water from the melting chamber and circulating the same through said passages under relatively low pressure, an endless conveyer traversing the melting chamber for delivering snow to the melting chamber, conduit means including a pump and connections to said water circulating passages for forcing heated water from said water circulating passages into the melting chamber and delivering the same in the form of a hot water spray against the snow delivered by the conveyer and for delivering the heated water both upwardly and downwardly against the conveyer within the melting chamber.

25. A snow removing and melting apparatus having means forming a combustion chamber, means forming an elongated melting chamber separated from the combustion chamber by a heating wall having an enlarged area, means for delivering snow to said melting chamber and distributing it along its length, means forming flue passages above the heating chamber and extending lengthwise thereof, a wall-cooling water space for absorbing excess heat from the combustion chamber and from the flue passages, and a pump for forcing water from the melting chamber through said water space and utilizing the heated water for assisting in melting the snow.

26. In a snow removing and melting apparatus, the combination with means forming a combustion chamber, of fuel burning means in said chamber, means forming a melting chamber in heat transferring relation to said combustion chamber and with an

endless conveyer traversing the same for delivering and distributing the snow thereto, and means forming a water jacket supplied with water from said melting chamber surrounding the sides and bottom of the combustion chamber.

27. A snow removing and melting apparatus comprising means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to said heating chamber, a conveyer traversing the melting chamber for delivering snow to the melting chamber and distributing it therein, a pump for forcing and delivering water along the length of the melting chamber against the snow delivered by said conveyer, and means for heating the water so delivered from the heating chamber.

28. A snow removing and melting apparatus having means forming a chamber for receiving the snow, means for heating said

chamber for melting the snow, means forming a chamber to receive water from the melted snow, a pump for withdrawing water from the water chamber and forcibly discharging it into the street, and a connection through which said pump diverts a portion of the water and forcibly discharges it against the snow in said first mentioned chamber.

29. A snow removing and melting apparatus comprising a truck, means forming a heating chamber, means forming a melting chamber in which there is maintained a body of melted snow of substantial depth above the heating chamber, and means for adjustably tilting the melting chamber to adapt the level of the water therein to differing grades.

In testimony whereof, I have signed my name to this specification.

ARTHUR H. BALLARD.

endless conveyer traversing the same for delivering and distributing the snow thereto, and means forming a water jacket supplied with water from said melting chamber surrounding the sides and bottom of the combustion chamber.

27. A snow removing and melting apparatus comprising means forming a heating chamber, means forming an elongated melting chamber in heat transferring relation to said heating chamber, a conveyer traversing the melting chamber for delivering snow to the melting chamber and distributing it therein, a pump for forcing and delivering water along the length of the melting chamber against the snow delivered by said conveyer, and means for heating the water so delivered from the heating chamber.

28. A snow removing and melting apparatus having means forming a chamber for receiving the snow, means for heating said

chamber for melting the snow, means forming a chamber to receive water from the melted snow, a pump for withdrawing water from the water chamber and forcibly discharging it into the street, and a connection through which said pump diverts a portion of the water and forcibly discharges it against the snow in said first mentioned chamber.

29. A snow removing and melting apparatus comprising a truck, means forming a heating chamber, means forming a melting chamber in which there is maintained a body of melted snow of substantial depth above the heating chamber, and means for adjustably tilting the melting chamber to adapt the level of the water therein to different grades.

In testimony whereof, I have signed my name to this specification.

ARTHUR H. BALLARD.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,602,476, granted October 12, 1926, upon the application of Arthur H. Ballard, of Boston, Massachusetts, for an improvement in "Snow Removing and Melting Apparatus," errors appear in the printed specification requiring correction as follows: Page 5, line 29, claim 10, before the word "means" insert a comma; page 6, line 36, claim 20, for the words "an elongated means forming a" read *means forming an elongated*; same page, line 72, claim 23, after the word "chamber" strike out the comma and insert the same to follow after the word "chamber" in line 73, same claim; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of November, A. D. 1926.

[SEAL]

WM. A. KINNAN,
Acting Commissioner of Patents.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,802,476, granted October 12, 1926, upon the application of Arthur H. Ballard, of Boston, Massachusetts, for an improvement in "Snow Removing and Melting Apparatus," errors appear in the printed specification requiring correction as follows: Page 5, line 29, claim 10, before the word "means" insert a comma; page 6, line 36, claim 20, for the words "an elongated means forming a" read *means forming an elongated*; same page, line 72, claim 23, after the word "chamber" strike out the comma and insert the same to follow after the word "chamber" in line 73, same claim; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of November, A. D. 1926.

[SEAL.]

WM. A. KINNAN,
Acting Commissioner of Patents.