

I. KENDRICK.

MACHINES FOR MELTING SNOW AND ICE.

No. 184,628.

Patented Nov. 21, 1876.

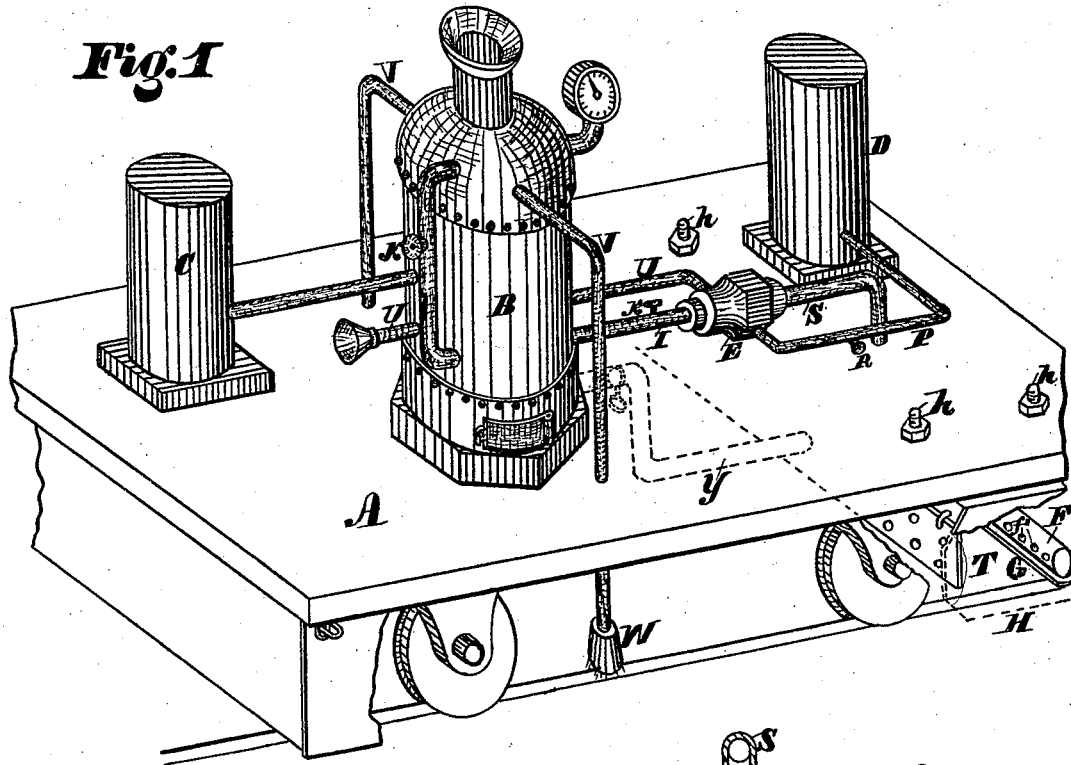


Fig. 2

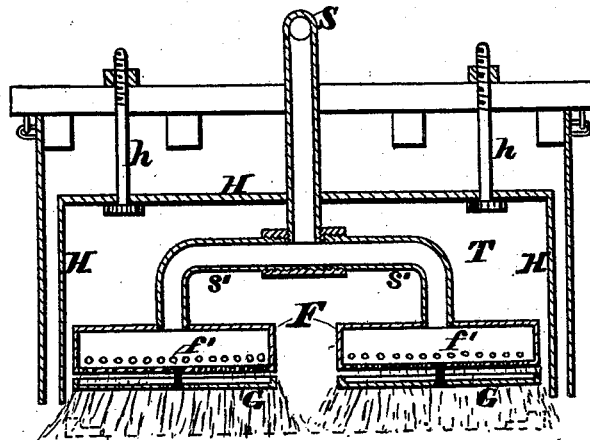
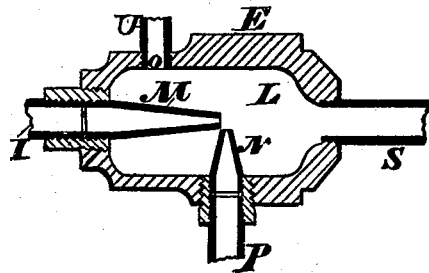


Fig. 3

Witnesses

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IMPROVEMENT IN MACHINES FOR MELTING SNOW AND ICE.

Specification forming part of Letters Patent No. **184,628**, dated November 21, 1876; application filed February 19, 1876.

To all whom it may concern:

Be it known that I, ISAAC KENDRICK, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Melting Snow or Ice; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a perspective, partly broken away. Fig. 2 is a vertical longitudinal section of the atomizer. Fig. 3 is a transverse vertical section through the retort-burner.

My invention relates to an apparatus for removing snow or ice from railway-tracks or highways by the direct action of flame applied by a portable machine moving on wheels or runners.

My improved machine consists of a suitable car, truck, or platform mounted on wheels or runners, having a boiler for generating steam, a water-tank, and oil-reservoir thereon, in combination with an apparatus for atomizing, vaporizing, and burning petroleum, or its products, in a gaseous form.

In carrying my invention into effect, I employ a hollow or chambered casting of iron or other metal, of any suitable form, preferably cylindrical, the walls of which are perforated with one or more inlet holes or openings, through which steam, oil, and air are admitted. The rear end of this chambered casting is closed by a screw-plug or other device, through which an opening is made, to the inner extremity of which is fixed a short pipe or nipple. Another nipple is fixed to the inner end of an opening through the side wall of the chamber. Steam is admitted through the first nipple, and liquid hydrocarbons through the other, said nipples being arranged at or about right angles to each other, with their outlets in close proximity, so that the steam will atomize and vaporize the liquid hydrocarbons. At the same time a current of air, preferably heated, is drawn into the vaporizing and atomizing chamber, and thoroughly commingled with the steam and hydrocarbon vapors therein.

I also employ a distributing-retort and burner, consisting of a vessel or chamber of iron or other metal, preferably cylindrical in form, perforated with drill-holes on its under or lower side, through which the commingled steam, hydrocarbons, and air are made to issue in a gaseous form at the point of combustion.

I further make use of a bottomless combustion-chamber, the walls of which are constructed of cast-iron plates, boiler-iron, or other sheet metal, of any desired form, preferably rectangular. The front wall of this chamber may be hinged to the ceiling, forming a swinging door for easy access to the retort and burner. The end walls are perforated with small drill-holes for the admission of air to support combustion, and both said end walls and the side walls are made to extend down nearly to the roadway, so that the flame from the retort-burner after direct action upon the snow or ice surface may be for some period of time confined within said chamber, and utilized as a melting medium. Said chamber is suspended beneath the car or platform by means of iron rods secured or passing up loosely through the bottom of said car, so that said chamber may be raised or lowered when desired. Within this combustion-chamber is placed the combined retort and burner already mentioned.

The highly-heated waste products of combustion may be, and in practice are, intended to be conveyed by a pipe from the rear end of the combustion-chamber to the fire-box of the boiler, and utilized for generating steam, thus greatly lessening the expense for fuel, or said waste products may be made to pass off under the rear wall, and thus aid in melting the snow or ice.

A in the drawings represents a railway-car, truck, or platform on wheels; B, a boiler for generating steam. C is a water-tank, and D a reservoir for liquid hydrocarbon or its products. E is the atomizer, having a chamber, L, in which the liquid hydrocarbons and steam, or steam and air, are commingled, the steam entering through nipple M, oil through nipple N, and air through inlet or inlets O. F is the retort-burner, and G represents a pan,

the purpose of which is to receive and retain any unvaporized oil that may escape from the retort, and prevent its being deposited along the roadway. H H show the walls which form the bottomless combustion chamber T, and h are iron rods by which said chamber is secured to and held in suspension beneath the car-body. I is a pipe for conveying steam from the boiler (preferably superheated by passing it through the fire-box) to the atomizer E. K K are valves for regulating the flow of the steam. P is a pipe through which oil is taken from the reservoir D to the atomizer E, the flow being governed by a cock, R. S is a pipe attached to the outlet of the atomizer, and through which, and branches s', the mixed oil, steam, and air, in a vaporic condition, are conveyed to the retort-burner. f' are drill-holes, through which the mixture issues in a gaseous form within the combustion-chamber. U is a pipe, through which air, preferably heated, so as to avoid condensation of the steam, is taken to the atomizer. V is a pipe, through which the excess or surplus steam from boiler B is conveyed to one or more rose-heads, W. Y is a pipe, by which the highly-heated waste products of combustion are conducted from chamber T to the fire-box of the boiler for generating steam.

The operation is as follows: A fire being started under the boiler, when steam of sufficient pressure is generated, the valves K are opened for the passage of steam through pipe I and nipple M. The cock R is then opened and oil admitted through pipe P and nipple N, and impinged and atomized by the steam entering through nipple M, and vaporized by the heat of the same in chamber L. At the same time a current of air is drawn in through pipe U and inlet O by the suction of the steam, and thoroughly mixed or commingled with the hydrocarbon vapors and steam, thus preparing it for purposes of fuel before reaching the point where ignited. The mixture is then conveyed by pipe S and branches s' to the retorts F, whence, after subjection to the heat of said retort, it issues through the drill-holes f' in a gaseous form, at the point of ignition, within the combustion-chamber, and not in the form of spray, thus securing perfect combustion, and avoiding all danger of accident by reason of the distribution of burning oil along the roadway.

The burning hydrocarbon gas, under pressure of the boiler, acts as a powerful steam and air blast, and is delivered with great force directly upon the snow or ice, at the same time filling the combustion-chamber with an intensely heated confined mass of flame, which also acts with great power upon an extended superficial area of snow-surface.

The highly-heated waste products of combustion pass off, at the rear end of the chamber T, by a pipe, Y, to the fire-box of the boiler, and are there utilized for generating steam, thus greatly lessening the cost of fuel for this

purpose; or, if preferred, they may be made to pass off by an outlet through the lower edge of the rear wall, and thus aid in melting the snow and the ice.

In order to get rid of all noise arising from excess steam, or blowing off, I connect a pipe to the steam-space of the boiler, and convey such surplus steam beneath the car, and discharge it in a divided condition, through one or more rose-heads, directly over the rails of a railway; or it may be discharged through a perforated pipe extending from side to side of the truck, and thus made to assist in melting the snow or ice. The melted snow, when desired, may be brushed away by an arrangement of revolving or stationary brooms upon the same or a separate truck.

I do not limit myself to the precise construction or arrangement of the devices above described, as it is manifest the same may be greatly varied and yet the principle of operation remain the same. For instance, the chambered atomizer may have more than one nipple for the admission of oil, and several air-inlets; or it may be varied in form without changing its action. So, too, more than one atomizer, retort, and combustion-chamber may be placed upon the same platform, one being arranged, if desired, at each end, so that two fires may be brought to act upon the snow or ice at the same time; or that the machine may be drawn from either end without turning around. Further, the retort may extend entirely across the combustion-chamber, instead of being in two sections, as shown in Fig. 3.

It will be observed that in this apparatus the hydrocarbon is thoroughly vaporized by the force and heat of the steam, and mingled with air before being brought to the point of combustion; and that the gaseous product or mixture is consumed by means of a burner-retort located in a combustion-chamber, so that said retort, being constantly enveloped by a flame of intense heat, will itself be of such a temperature, as to convey a certain degree of fixity to the gas, preventing condensation, and insuring results altogether different from those obtained by simply burning liquid hydrocarbons with steam in an open or exposed condition.

I claim—

1. The combination, with a portable machine for melting snow or ice, of an atomizer for liquid hydrocarbons for purposes of fuel, as herein set forth.
2. The combination, with a portable machine for melting snow or ice, of a retort-burner, constructed and operating substantially as shown and specified.
3. In a portable snow or ice melting machine adapted for the employment of liquid hydrocarbons as fuel, a bottomless combustion-chamber, T, constructed and operating substantially as shown and described.
4. In a portable machine for melting snow

or ice, the combination, with the hydrocarbon combustion-chamber and boiler, of a pipe for conveying the waste products of the former to the latter, and utilizing the same for purposes of fuel, as set forth.

5. In a portable snow and ice melting machine, the combination, with the boiler B, of pipe V and rose-heads W, for getting rid of excess steam and utilizing the same, as set forth.

6. In combination with the retort-burner F, the pan G, substantially as shown and described.

7. The combination, in a portable snow or ice melting machine, of a hydrocarbon-atomizer, retort-burner, and combustion-chamber, with connecting-pipes and flow-regulating cocks, arranged to operate as set forth.

8. The combination, in a portable machine for melting snow and ice, of a steam-generator, water-tank, oil-receptacle, liquid-hydrocarbon atomizer, retort-burner, and combustion-chamber, with connecting-pipes and regulating-valves, constructed and arranged for operation substantially as herein shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of February, 1876.

ISAAC KENDRICK.

Witnesses:

M. DANL. CONNOLLY,
CHAS. F. VAN HORN.