United States Patent Application Publication	20250256685
Kind Code	A1
Publication Date	August 14, 2025
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VEHICLE AND BUILDING ROOF DEICING SYSTEMS

Abstract

A deicer system for distributing deicer solution along a structure. The deicer system includes a deicing solution reservoir that contains the deicer solution, a pump, and one or more emitters. The pump is in fluid communication with the deicer solution reservoir and the pump is configured to distribute the deicer solution. The one or more emitters are in fluid communication with the deicer solution reservoir and the pump. The one or more emitters are positioned in a housing that is integrally connected to the structure. The one or more emitters are configured to dispense the deicer solution along the structure.

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Appl. No.: **19/192473**

Filed: **April 29, 2025**

Related U.S. Application Data

parent US continuation-in-part 17861500 20220711 PENDING child US 19192473
us-provisional-application US 63220705 20210712

Publication Classification

Int. Cl.: **B60S1/66** (20060101); **E04D13/076** (20060101)

U.S. Cl.:

CPC **B60S1/66** (20130101); **E04D13/0762** (20130101);

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation in part application that claims priority to co-pending and commonly owned U.S. patent application Ser. No. 17/861,500, filed on Jul. 11, 2022, which claims priority to U.S. Provisional Patent Application Ser. No. 63/220,705, filed on Jul. 12, 2021, the entireties of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates generally to deicing. More particularly, the present disclosure relates to systems for preventing or limiting ice and ice dam formation along and around roof structures.

BACKGROUND

[0003] Residential vehicles and commercial trailer truck vehicles are often on the open road or parked outdoors during snow and ice storms, resulting in the roofs of such vehicles becoming loaded with ice and snow. The increase load of ice and snow decrease the fuel economy of the vehicles and poses a safety hazard during transit as the ice and snow may dislodge and cause traffic accidents involving following vehicles.

[0004] An ice dam is a ridge of ice that forms at the edge of a building's roof and prevents melting snow from draining off the roof. The ice dam backs up water that can leak into the building and damage the interior walls, ceilings, floors, insulation, etc.

[0005] Thus, there is a need for improved deicing systems that overcome the foregoing problems.

SUMMARY

[0006] According to aspects illustrated herein, there is provided a deicer system for distributing deicer solution along a structure. The deicer system includes a deicing solution reservoir that contains the deicer solution, a pump, and one or more emitters. The pump is in fluid communication with the deicer solution reservoir and the pump is configured to distribute the deicer solution. The one or more emitters are in fluid communication with the deicer solution reservoir and the pump. The one or more emitters are positioned in a housing that is integrally connected to the structure. The one or more emitters are configured to dispense the deicer solution along the structure.

[0007] In one embodiment, the structure is a vehicle and the housing is a rack that is integrally connected to a roof of the vehicle. The one or more emitters are configured to dispense the deicer solution over at least a portion of the roof.

[0008] In one embodiment, the structure is a vehicle and the housing is integrally connected to a side of the vehicle adjacent a peripheral edge of a roof of the vehicle. The one or more emitters are configured to dispense the deicer solution over at least a portion of the roof.

[0009] In one embodiment, the one or more emitters are configured to extend out from one or more openings in the housing over the roof of the vehicle when in a dispensing state, and to retract into the housing through the one or more openings when in a storage state.

[0010] In one embodiment, an uppermost portion of the housing is substantially flush with the roof of the vehicle when the at least one emitter is in the storage state.

[0011] In one embodiment, the structure is a building and the housing is a gutter system that is

integrally connected to one or more sides of the building and one or more peripheral edges of a roof of the building. The one or more emitters are configured to dispense the deicer solution within the gutter system and over at least a portion of the roof.
[0012] In one embodiment, the one or more emitters are spray emitters.
[0013] In one embodiment, the deicer solution is formed of a biodegradable liquid that is non-corrosive to metal materials.
[0014] Any of the foregoing embodiments may be combined.

Description

BRIEF DESCRIPTION OF THE DRAWING
[0015] Referring now to the Figures, which are exemplary embodiments, and wherein the like elements are numbered alike:
[0016] FIG. **1** is an isometric view of a deicer system according to an embodiment of the present invention;
[0017] FIGS. **2**A-**2**D are a side elevation view, a top plan view, a front elevation view, and a rear elevation view, respectively, of a deicer system according to an embodiment of the present invention;
[0018] FIG. **3** is an isometric view of a deicer system according to an embodiment of the present invention;
[0019] FIG. **4** is an enlarged view of Detail **4** of FIG. **3**, showing a partial cross section of the deicer system taken along section line G-G;
[0020] FIG. **5**A is a side elevation view of a deicer and snow removal system according to an embodiment of the present invention;
[0021] FIG. **5**B is an enlarged view of one embodiment of Detail **5**A, **5**B of FIG. **5**A;
[0022] FIG. **5**C is an enlarged view of another embodiment of Detail **5**A, **5**B of FIG. **5**A;
[0023] FIG. **6** is a side elevation view of a deicer and snow removal system according to another embodiment of the present invention;
[0024] FIG. **7** is a perspective view of another embodiment of the present invention;
[0025] FIG. **8** is a side elevation view of a deicer and snow removal system according to another embodiment of the present invention; and
[0026] FIG. **9** is a schematic view of an embodiment of the deicing system including a heat exchanger for heating the deicing solution and/or a gas.
DETAILED DESCRIPTION
[0027] As shown in FIG. **1**, a deicer system is generally designated by the number **10**. The deicer system **10** includes a deicing solution reservoir **12** that contains a deicing solution **14**. The deicing solution **14** is biodegradable, environmentally friendly, and is non-corrosive of metal materials. Preferably, the deicing solution **14** is a liquid solution that does not contain corrosive salts or glycols such that the deicing solution **14** is safe for use on concrete, asphalt, brick, rubber, stone, and wood surfaces. In some embodiments, the deicing solution **14** has a freezing point of about −72° F. (about −58° C.). A pump **16** is in fluid communication with the deicing solution reservoir **12** via tubing **15** and is configured to pump, or distribute, the deicer solution **14**. The pump **16** may be, for example, an electrical pump, a pneumatic pump, a hydraulic pump, or a mechanical pump such a belt driven pump, a gear driven pump, an axle driven pump, or a pump driven by air flow caused by a vehicle in motion, etc. One or more emitters **18** are in fluid communication with the deicer solution reservoir **12** and the pump **16** via tubing **15**. The emitters **18** are configured to dispense the deicer solution **14** pumped from the deicer solution reservoir **12** onto a surface (e.g., the roof of a structure). Preferably, the emitters **18** are spray emitters (e.g., spray nozzles). In some embodiments, the emitters **18** dispense the deicer solution **14** at a pressure in the range of about 10

psi to about 70 psi. In some embodiments, the emitters **18** dispense the deicer solution **14** at a pressure of about 40 psi. In some embodiments, the emitters **18** dispense the deicer solution **14** at a pressure of less than 40 psi. In some embodiments, the emitters **18** dispense the deicer solution **14** with an angle of deployment in the range of about 30 degrees to about 60 degrees as measured upward from a horizontal plane. In some embodiments, the emitters **18** dispense the deicer solution **14** with an angle of deployment of about 45 degrees as measured upward from the horizontal plane. In some embodiments, the emitters **18** are configured to pivot to dispense the deicer solution **14** with an angle of deployment that is variable in the range of about 30 degrees to about 60 degrees as measured upward from the horizontal plane.

[0028] In some embodiments, the emitters **18** are positioned within a housing **20** that is integrally connected to a roof of a structure. For example, as shown in FIG. **1**, the emitters **18** are positioned within a rack **20**R (e.g., a luggage rack) that is integrally connected to the roof **32** of a vehicle **30**, (e.g., an automobile, SUV, a truck, a tractor trailer truck, an off road vehicle, or other motor vehicle). The emitters **18** are configured to spray the deicer solution **14** out through openings **22** in the rack **20**R onto the roof **32** of the vehicle **30** to prevent ice from forming thereon while also melting snow accumulations. In some embodiments, the emitters **18** are movable between a dispensing state and a storage state. When in the dispensing state, the emitters **18** are configured to extend out, or pop up, from the openings **22** to spray the deicer solution **14** over the roof **32**. When in the storage state, the emitters **18** are configured to retract through the openings **22** for storage within the rack **20**R when not in use. The emitters **18** extend/retract through the openings **22** via, for example, resilient members (e.g., springs), biasing units (e.g., mechanically, electronically, or hydraulically driven telescoping or rotating members), fluid pressure within the tubing **15**. In some embodiments, the extension/retraction of the emitters **18** is separately controlled, either manually or automatically, by a controller **60**. In some embodiments, the extension/retraction of the emitters **18** occurs in direct response to the pressure flow of the deicer solution **14** within the tubing **15**. In some embodiments, the emitters **18** are positioned within two racks **20**R on opposing edges of the roof **32** to provide better roof coverage of the deicer solution **14**. The deicer solution reservoir **12** and the pump **16** may be mounted, for example, under the hood of the vehicle or underneath the vehicle. The tubing **15** may be run throughout the frame of the vehicle **30** and into the rack **20**R such that the deicer system **10** is not readily visible when not in use.

[0029] In some embodiments, the emitters **18** are positioned within a housing **20** that is integrally connected to a side of a structure. For example, as shown in FIGS. **2**A-**2**D, the emitters **18** are positioned within a side mount **20**S that is integrally connected to a side **44** of a trailer **42** adjacent a peripheral edge of the roof **46** of the trailer **42**. The trailer **42** is attached to a truck **40**, such as a semi-tractor-trailer truck (i.e., an 18-wheeler truck). The emitters **18** are preferably movable between a dispensing state and a storage state. When in the dispensing state, the emitters **18** are configured to extend out from openings **22** in the side mount **20**S to spray the deicer solution **14** onto the roof **46** to prevent ice from forming thereon while also melting snow accumulations. When in the storage state, the emitters **18** are configured to retract through the openings **22** into the side mount **20**S such that an uppermost portion of the side mount is substantially flush with the roof **46** when not in use. Thus, the truck **40** can travel under a snow scraper at a Truck Stop without damaging the deicing system **10**. The emitters **18** extend/retract through the openings **22** via, for example, resilient members (e.g., springs), biasing units (e.g., mechanically, electronically, or hydraulically driven telescoping or rotating members), fluid pressure within the tubing **15**. In some embodiments, the extension/retraction of the emitters **18** is separately controlled, either manually or automatically, by a controller **60**. In some embodiments, the extension/retraction of the emitters **18** occurs in direct response to the pressure flow of the deicer solution **14** within the tubing **15**. In some embodiments, the emitters **18** are positioned within two side mounts **20**S on opposing sides **44** of the trailer **42** to provide better roof coverage of the deicer solution **14**. The deicer solution reservoir **12** and the pump **16** may be mounted, for example, behind the cab **48** of the truck **40** or

underneath the trailer **42**. The tubing **15** may be run throughout the frame of the trailer **42** and into the side mount **20**S such that the deicer system **10** is not readily visible when not in use.

[0030] In some embodiments, the emitters **18** are positioned within a housing **20** that is integrally connected to multiple surfaces of a structure. For example, as shown in FIG. **3**, the emitters **18** are positioned within a gutter system **20**G that is integrally connected to one or more sides **52** and one or more peripheral edges of a roof **54** of a building **50**. The emitters **18** are mounted inside the gutter system **20**G via mounting members **19** (e.g., brackets, fasteners, etc.) that are attachable to an interior wall **24** of the gutter system **20**G, as shown in FIG. **4**. As shown in FIG. **3**, the emitters **18** are configured to spray the deicer solution **14** within the gutter system **20**G and onto the roof **54** to prevent ice from forming and ice damming from occurring. As shown in FIG. **4**, the emitters **18** are configured to spray the deicer solution **14** along the interior walls **24** of downspout portions of the gutter system **20**G to prevent ice from forming within the gutter system **20**G. The deicer solution reservoir **12** and the pump **16** may be installed, for example, in the basement of the building, on or under the ground adjacent the building, or in an adjacent structure, such as a garage. As shown in FIG. **4**, the tubing **15** is run throughout the gutter system **20**G such that the deicer system **10** is not readily visible when not in use.

[0031] In some embodiments, the deicer system **10** includes a controller **60** that is in electrical communication with the pump **16** and is positioned within the structure (e.g., the vehicle **30**, the cab **48** of the truck **40**, the building **50**) such that a user can manually operate the deicer system **10**. In some embodiments, the deicer system **10** includes one or more sensors (e.g., temperature sensor, pressure sensor, water sensor, etc.) (not shown) in electrical communication with the controller, which is configured to automatically operate the deicer system **10** when predetermined conditions are detected by the sensors.

[0032] As shown in FIGS. **5**A and **6**, a system **10** for detecting and removing snow and ice from a roof **46** of a road traveling vehicle **44** (e.g., a trailer) includes a deicing solution reservoir **12** secured to the road traveling vehicle **44**. The deicing solution reservoir **12** contains a deicer solution. The system **10** also includes a pump **16**F secured to the road traveling vehicle **44** and being in fluid communication with the deicer solution reservoir **12**. The pump **16**F is configured to distribute the deicer solution. The system **10** includes a gas source **16**A (e.g., a compressor or pressurized gas cylinder) secured to the road traveling vehicle **44** and configured to discharge a compressed gas (e.g., air or heated air) therefrom. The system **10** includes an emitter arrangement **14**X that is in fluid communication with the deicer solution reservoir **12**, the pump **16**F and the gas source **16**A. The emitter arrangement **14**X is retractably mounted in a housing **14** secured to the road traveling vehicle **44**. The emitter arrangement **14**X is configured to dispense (e.g., selectively discharge) the deicer solution and the compressed gas along the roof **46**.

[0033] As shown in FIG. **5**B, in some embodiments, the emitter arrangement **14**X has a single nozzle **14**N that is configured to dispense the deicer solution and the compressed gas along the roof **46**. The single nozzle **14**N is in communication with a common branch **14**C of a Y-connector which has a gas branch **14**A and a fluid branch **14**F that each merge into the common branch **14**C. The gas branch **14**A has a first check valve **14**VA therein and the fluid branch **14**F has a second check valve **14**VF therein. The gas branch **14**A is in communication with the gas source **16**A via a first conduit **14**A; and the fluid branch **14**F is in fluid communication with the pump **16**F via a second conduit **14**F.

[0034] As shown in FIG. **5**C, in some embodiments, the emitter arrangement **14**X has a first nozzle **14**N**1** that is configured to dispense the deicer solution along the roof **46** and a second nozzle **14**N**2** that is configured to dispense the compressed gas along the roof **46**. The first nozzle **14**N**1** is in communication with the gas supply **16**A via a first conduit **14**A and the second nozzle **14**N**2** is in communication with the pump **16**F via a second conduit **14**F. While the first conduit **14**A, and the second conduit **14**F are shown and described, the present invention is not limited in this regard as a dual port manifold that is integrally formed with the wall post **44**P and/or the roof rail **46**R may be

employed to transport the deicer solution and the gas to the respective nozzle **14**N, **14**N**1**, or **14**N**2**.
[0035] In some embodiments, the emitter arrangement **14**X is configured to pivot relative to the roof **46** and oscillate to sweep an angle horizontally and vertically relative to the roof **46**.
[0036] In some embodiments, the housing **14** removably secured to roof **46** of the road traveling vehicle **44** along a roof rail **46**R via a magnet **20**M. Hosing and/or the retractable nozzles **14**N, **14**N**1**, **14**N**2** are magnetic, making this system **10** completely portable. The system **10** can be taken off and put onto another trailer if needed and retrofit on to existing road traveling vehicles **44**. The hosing and retractable nozzles **14**N, **14**N**1**, **14**N**2** are placed on the inside of the roof rail **46**R (see FIG. **6**) that runs along the top of the road traveling vehicle **44**. There is enough space to fit the hosing and the nozzles **14**N, **14**N**1**, **14**N**2**.
[0037] In some embodiments, the housing **14** is fixedly secured proximate the roof **46** of the road traveling vehicle **44** in a wall post **44**P of the road traveling vehicle **44**.
[0038] As shown in FIG. **8**, in some embodiments, the housing **14**′ is fixedly or removably secured to an air deflector **48**A attached to a cab **48** of a truck **40** that is configured to tow the road traveling vehicle **44**, the housing **14**′ is mounted proximate the roof **46** such that the compressed gas and the deicing solution are dischargeable over the roof **46**.
[0039] In some embodiments, a camera system **70**, **70**′ is retractably mounted to the roof **46**, a wall post **44**P of the road traveling vehicle **44**, and/or an air deflector **48**A attached to a cab **48** of a truck **40** that is configured to tow the road traveling vehicle **44**.
[0040] In some embodiments, the emitter arrangement **14** is configured to extend outwardly from at least one opening in the housing **14**, and over the roof **46** when in a dispensing state, and to retract into the housing **14** through the at least one opening when in a storage state.
[0041] In some embodiments, an uppermost portion of the housing **14** is substantially flush with the roof **46** of the vehicle when the emitter is in a storage state.
[0042] In some embodiments, the deicer solution is a biodegradable liquid that is non-corrosive to metal materials.
[0043] As shown in FIGS. **5**A, **6**, **7** and **8**, in some embodiments, a controller **60** is in communication with the pump **16**F, the gas source **16**A and the camera system **70**, **70**′ for automatic control thereof.
[0044] As shown in FIG. **5**A, for example, a sensor system **90** is mounted proximate or on the roof **46**. The sensor system includes a plurality of sensors including but not limited to temperature sensors, and proximity probes configured to measure the depth or presence of snow or ice on the roof. The controller **60** includes an artificial intelligence processing unit that is configured for one or both of machine learning or being trained based upon information received from the sensor system **90** and the camera system **70**, **70**′. The artificial intelligence processing unit is configured to communicate with a person to automatically report snow and ice conditions on the roof **46** to the person and control the pump **16**F and the gas source **16**A to mitigate ice and snow accumulation on the roof **46**, on a real time basis. For example, the artificial intelligence processing unit is configured to communicate with the person while the person is driving a truck **40** that is towing the road traveling vehicle **44**, with the person while the person is in a cab **48** attached to the truck **40**, and/or with the person's mobile communication device (e.g., cell phone or i-pad) or computer device. The artificial intelligence processing unit improves the process of operating the system **10** which would be difficult or impossible to do because of the significant height of the road traveling vehicle **44** (e.g., 15 feet or more) that would result in the person not being able to view the roof **46** of the vehicle, In addition, the artificial intelligence processing unit improves the process of operating the system **10** by taking over automatic control of the system for example while the person is driving the truck **40**. The artificial intelligence processing unit includes tangible, non-transitory memory for storage of historical data of performance and ability of the system **10** to mitigate and remove ice and snow from the roof and to learn from this historical data to operate the system **10** in the future, depending on the current conditions. The artificial intelligence processing

unit determines (and controls) if the deicing solution should be used to melt the ice or snow or if it the gas source should be used to blow the snow off of the roof. The artificial intelligence processing unit also determines and controls the operation of the heat exchange **99** depending on historical data and the operating conditions of the truck **40**.

[0045] As shown in FIG. **9**, in some embodiments, a heat exchanger **99** is in fluid communication with the pump **16**F and/or the gas source **16**A. The heat exchanger **99** is in communication with an engine coolant system or exhaust system of a truck **40** that is configured to tow the road traveling vehicle **44**. The heat exchanger is configured to heat the gas or deicing fluid transported through the heat exchanger **99**. In some embodiments, the heat exchanger **99** is located in the storage tank **12** to heat the deicer solution.

[0046] Hosing and retractable nozzles **14**N, **14**N**1**, **14**N**2** are built into the walls (e.g., inside wall support posts **44**P of the road traveling vehicle **44** (e.g., the trailer). This embodiment has utility in new trailer construction. The posts **44**P are steel with an inside channel with adequate space for hosing and retractable nozzles **14**N, **14**N**1**, **14**N**2** at the top, thereby keeping the aesthetic beauty of the trailer. The pump **16**F and storage tank **12** are located, for example, underneath the trailer body or in the air deflector **48**A.

[0047] While the present invention and embodiments disclosed herein and described with reference to FIGS. **5**A, **5**B, **5**C, **6**, **7**, **8**, and **9**, for use with road traveling vehicles **44** and truck configured to tow the road traveling vehicle **44**, the present invention is not limited in this regard, as the invention may be adapted for use in stationary buildings such as one or more peripheral edges of a roof **54** of a building **50**, as shown in FIG. **3**.

[0048] As shown in FIG. **8**, an air deflector for a cab of a truck includes an aerodynamic outer surface **48**A that extends from a first mounting flange and the air deflector having an upper mounting flange formed thereon or attached thereto. The air deflector has an equipment compartment located in an interior area thereof. The equipment compartment includes: (a) a deicing solution reservoir **12** secured to the equipment compartment, the deicing solution reservoir containing a deicer solution; (b) a pump **16**F secured to the equipment compartment and being in fluid communication with the deicer solution reservoir **12**, the pump **16**F being configured to distribute the deicer solution; (c) a gas source **16**A secured to equipment compartment and configured to discharge a compressed gas therefrom; (d) camera system **70**, **70′** retractably mounted to the upper flange; and (e) a controller **60** mounted in the equipment compartment and in communication with the pump **16**F, the gas source **16**A and the camera system **70′**. The air deflector includes an emitter arrangement **14**X that is in fluid communication with the deicer solution reservoir **12**, the pump **16**F and the gas source **16**A. The emitter arrangement **14**X is retractably mounted in a housing **14** secured to the upper flange. The emitter arrangement **14**X is configured to dispense the deicer solution and the compressed gas therefrom. In some embodiments, the air deflector includes a heat exchanger located in an interior area of the air deflector and in communication with at least one of the deicer solution and the gas.

[0049] While the present disclosure has been described with reference to various exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the appended claims.

Claims

1. A system for detecting and removing snow and ice from a roof of a road traveling vehicle, the system comprising: a deicing solution reservoir secured to the road traveling vehicle, the deicing solution reservoir containing a deicer solution; a pump secured to the road traveling vehicle and being in fluid communication with the deicer solution reservoir, the pump being configured to distribute the deicer solution; a gas source secured to the road traveling vehicle and configured to discharge a compressed gas therefrom; and an emitter arrangement in fluid communication with the deicer solution reservoir, the pump and the gas source, the emitter arrangement is retractably mounted in a housing secured to the road traveling vehicle, the emitter arrangement is configured to dispense the deicer solution and the compressed gas along the roof.

2. The system of claim 1, wherein the emitter arrangement comprises a single nozzle that is configured to dispense the deicer solution and the compressed gas along the roof.

3. The system of claim 1, wherein the single nozzle is in communication with a common branch of a Y-connector which has a gas branch and a fluid branch that each merge into the common branch; the gas branch having a first check valve therein and the fluid branch having a second check valve therein; the gas branch being in communication with the gas source via a first conduit; and the fluid branch being in fluid communication with the pump via a second conduit.

4. The system of claim 1, wherein the emitter arrangement comprises a first nozzle that is configured to dispense the deicer solution along the roof and a second nozzle that is configured to dispense the compressed gas along the roof.

5. The system of claim 4, wherein the first nozzle is in communication with the gas supply via a first conduit and the second nozzle is in communication with the pump via a second conduit.

6. The system of claim 1, wherein the emitter arrangement is configured to pivot relative to the roof and oscillate to sweep an angle horizontally and vertically relative to the roof.

7. The system of claim 1, wherein the housing removably secured to roof of the road traveling vehicle along a roof rail via a magnet.

8. The system of claim 1, wherein the housing is fixedly secured proximate the roof of the road traveling vehicle in a wall post of the road traveling vehicle.

9. The system of claim 1, wherein the housing is fixedly or removably secured to an air deflector attached to a cab of a truck that is configured to tow the road traveling vehicle proximate the roof such that the compressed gas and the deicing solution are dischargeable over the roof.

10. The system of claim 1, further comprising a camera system retractably mounted to at least one of the roof, a wall post of the road traveling vehicle, and an air deflector attached to a cab of a truck that is configured to tow the road traveling vehicle.

11. The system of claim 1, wherein the emitter arrangement is configured to extend out from at least one opening in the housing, and over the roof when in a dispensing state, and to retract into the housing through the at least one opening when in a storage state.

12. The system of claim 1, wherein an uppermost portion of the housing is substantially flush with the roof of the vehicle when the emitter is in a storage state.

13. The system of claim 1, wherein the deicer solution comprises a biodegradable liquid that is non-corrosive to metal materials.

14. The system of claim 1, further comprising a controller in communication with the pump, the gas source and the camera system for automatic control thereof.

15. The system of claim 14, further comprising a sensor system mounted proximate or on the roof; the controller comprising an artificial intelligence processing unit configured for one or both of machine learning or being trained based upon information received from the sensor system and the camera system; wherein the artificial intelligence processing unit is configured to communicate with a person to automatically report snow and ice conditions on the roof to the person and control the pump and the gas source to mitigate ice and snow accumulation on the roof, on a real time basis.

16. The system of claim 1, further comprising a heat exchanger that is in fluid communication with the pump or the gas source, the heat exchanger is in communication with at least one of an engine coolant system or exhaust system of a truck that is configured to tow the road traveling vehicle, the heat exchanger being configured to heat the gas or deicing fluid transported through the heat exchanger.

17. An air deflector for a cab of a truck; the air deflector comprising: an aerodynamic outer surface extending from a first mounting flange and the air deflector having an upper mounting flange formed thereon or attached thereto; an equipment compartment comprising: (a) a deicing solution reservoir secured to the equipment compartment, the deicing solution reservoir containing a deicer solution; (b) a pump secured to the equipment compartment and being in fluid communication with the deicer solution reservoir, the pump being configured to distribute the deicer solution; (c) a gas source secured to equipment compartment and configured to discharge a compressed gas therefrom; (d) camera system retractably mounted to the upper flange; and (e) a controller mounted in the equipment compartment and in communication with the pump, the gas source and the camera system; and an emitter arrangement in fluid communication with the deicer solution reservoir, the pump and the gas source, the emitter arrangement is retractably mounted in a housing secured to the upper flange, the emitter arrangement is configured to dispense the deicer solution and the compressed gas therefrom.

18. The air deflector of claim 17, further comprising a heat exchanger located in an interior area of the air deflector and in communication with at least one of the deicer solution and the gas.