

Nov. 15, 1966

A. GRUVRIS

3,285,147

APPARATUS FOR SPREADING ROAD MATERIALS

Filed Nov. 22, 1963

3 Sheets-Sheet 1

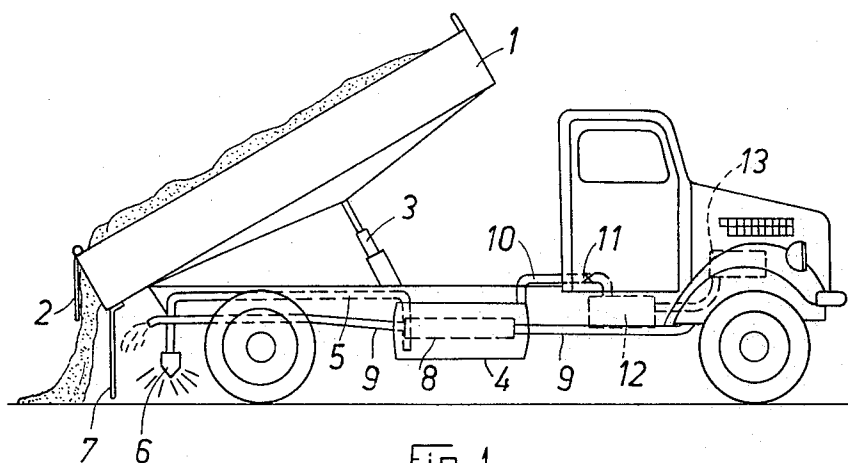


Fig. 1

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3 Sheets-Sheet 2

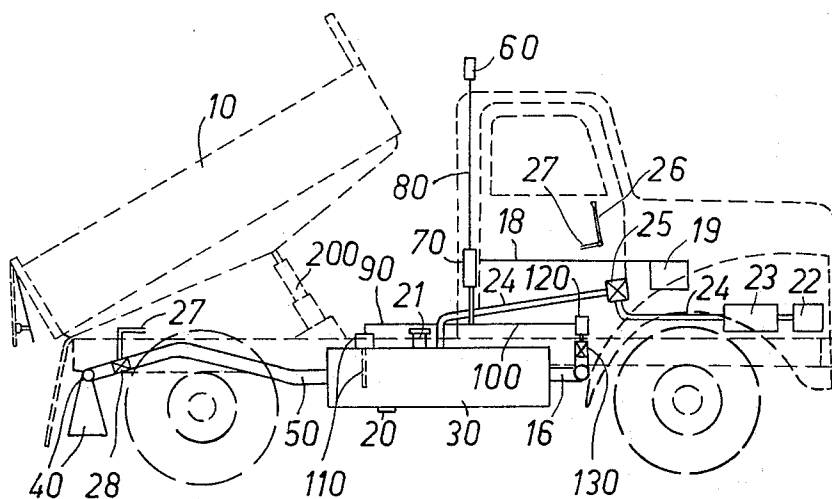


Fig. 2

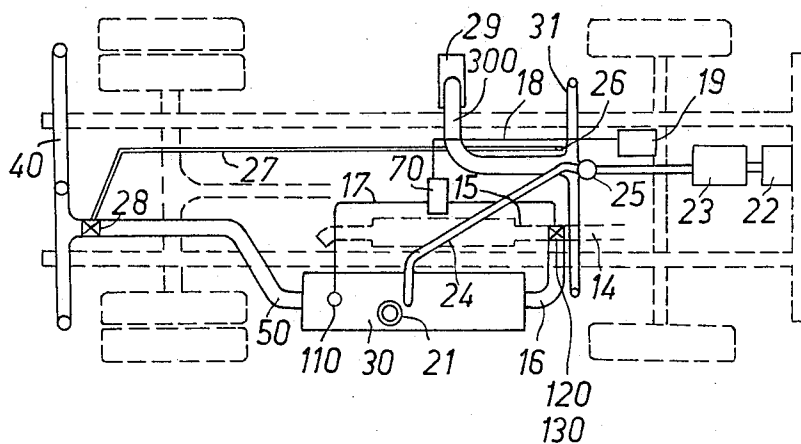


Fig. 3

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3 Sheets-Sheet 3

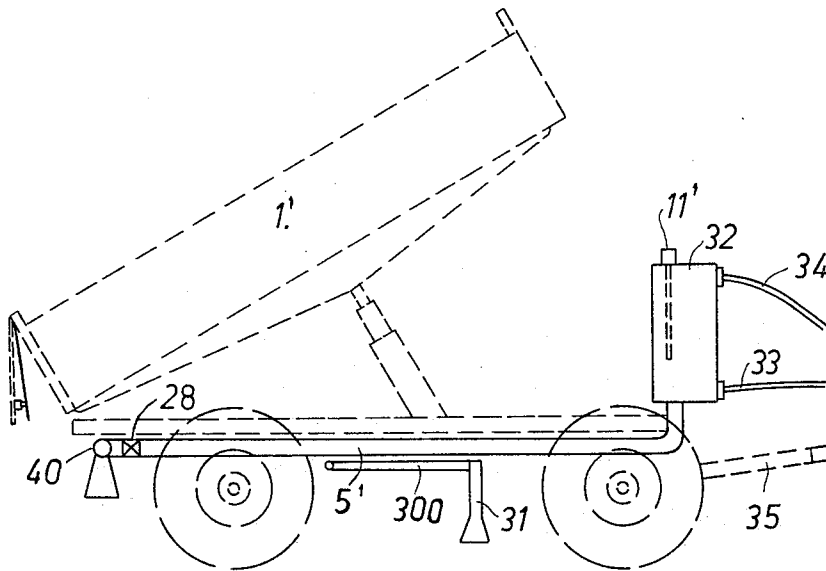


Fig. 4

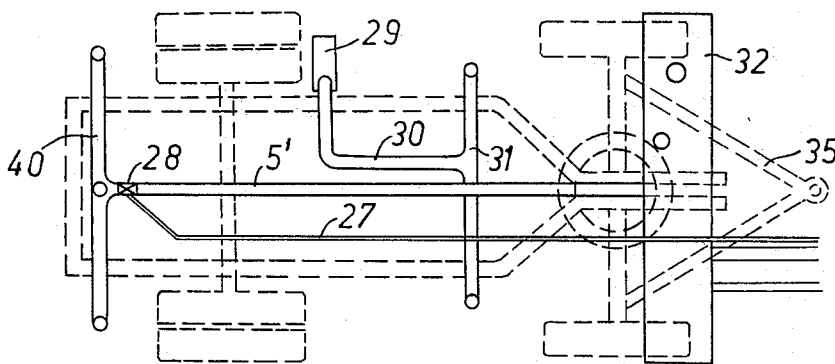


Fig. 5

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1

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APPARATUS FOR SPREADING ROAD MATERIALS

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7 Claims. (Cl. 94-44)

The present invention relates to a device for spreading materials such as gravel, sand and the like on the ground or road. The invention is characterized by a container and feeding device mounted on a truck to deliver the said materials, and a water tank preferably mounted in the same vehicle and provided with an outlet, e.g. having the form of a spraying nozzle, and adapted to deliver water onto the ground or the road in front of or adjacent to the material delivery mechanism.

When the weather is very cold and especially when it is also windy severe problems are involved, since the water is likely to freeze too rapidly, so that the water layer on the road is already frozen when it receives the sand and the sand cannot be fastened in the water layer. If very ample quantities of water are spread upon the ground or the road the freezing does not occur so rapidly, but instead the tank is emptied too rapidly.

The invention has for its object to eliminate the above indicated drawbacks and to provide a device through which the risk of too early a freezing of the water is completely eliminated even in the severest colds and through which the water consumption will be a minimum.

Freezing of the water at too early a stage is prohibited through the present invention through the fact that a water heating device is formed by the exhaust system of the vehicle, the exhaust system being arranged in, close to or adjacent to the water tank and/or in pipes or conduits leading from the tank to the water outlet.

By means of such heating device the water can be maintained at a high temperature without cost and the water consumption will thereby be minimized.

The water tank may be a boiler or steam generator which delivers water against the ground or the road in the form of steam. Hereby a strong warming action of the road is achieved, since the road will consume the evaporation heat, thus firmly fastening of sand particles through subsequent freezing will be obtained.

The water tank may be emptied either exclusively through gravity pressure or additionally by means of air pressure which may be introduced into the tank through a line from an air pump associated with the vehicle motor, the line comprising preferably a valve for regulating the draining rate.

The invention will be further described with reference to the accompanying drawings, in which:

FIGURE 1 is a side view of a truck including a device according to the invention.

FIGURE 2 is likewise a side view of a truck with a device according to the invention, regulated according to the temperature.

FIGURE 3 is a top view, seen in FIGURE 2, the tipping body and the cab being omitted for the sake of clarity.

FIGURE 4 is a side view of a trailer.

FIGURE 5 is a top view of the truck shown in FIGURE 4, with the tipping body with accessories being removed.

Reference is first made to FIGURE 1.

2

A container for gravel, sand or the like is formed by a tipping body 1, the sand being in operative position of the tipping body delivered out of the rear end of the body 1 through a slot formed between the rear side member 2 and the bottom member of the body. The delivery of sand is dependent upon the angular position of the tipping body and may be varied by means of the hydraulic apparatus 3 adapted to perform the tipping movement.

The same vehicle also has a tank with water or possibly any other liquid or water mixture with corresponding properties. A pipe or line 5 is leading from the tank 4 to a delivery or feeding device 6 which may have the form of sprayers or suitable nozzles extending across the road. The feeding device or outlet 6 is suitably located rather close in front of the sand delivering place. Even in very cold weather freezing will occur only after the sand particles have been wetted by the water on the road in order that they should be firmly secured in the freezing water layer.

7 designates a rubber mat which is fastened to the tipping body and located in front of the falling sand.

In order to eliminate the risk of having the water freeze too early on the road this tank is heated together with its contents by a heating device which in the embodiment shown in FIGURE 1 comprises the muffler 8 of the exhaust system, which is within the tank 4, the exhaust pipe 9 extending through the tank. A rather large heat exchanging surface is therefore provided in the tank, and the contents of the tank are rapidly and positively heated.

Embodiments are possible in which the tank is a boiler or a steam generator adapted to allow more or less heated or super-heated steam against the ground or the road. The contact with the cold road, which may be covered with ice or snow, will cause the steam to condensed, thereby melting at least a portion of the ice or snow. Thus a minimum of water will cause a very considerable action.

The delivery or feeding pipe 5 for the water may be drawn in close relation to the exhaust pipe 9, so that the heat of the exhaust pipe may be active also outside tank 4.

In order to obtain controllability and dependability of the water delivery out of the tank 4, a pipe 10 may lead to this tank to supply pressure air to the tank. The controllability may be obtained through a valve 11 in the pipe or line. The pressure air may be delivered from a container 12, e.g. any pressure container which may be substituted when empty. As an alternative, the container 12 may be fed with pressure air from a pump 13 suitably driven by the vehicle motor. In many trucks such pressure air pumps are fitted as a standard accessory for delivering pressure air to servo-devices, such as servo-brakes and servo-steering apparatus.

The containers 4 and 12 for water and pressure air, respectively, may be placed or mounted in any arbitrary way in the vehicle, e.g. under the tipping body or the floor of the driver's cabin as indicated in the drawing.

The delivery apparatus 6 for the water may likewise be mounted in various locations in the vehicle and in various positions to obtain spraying action in desirable directions. The apparatus may be adjustable, so that the direction of the sprays may be altered according to

3

circumstances. For the purpose this pipe 5 may be flexible or articulated, and it may be positioned such that steam or water will be sprayed against the falling sand in order to moisten the sand already before it contacts the ground.

The invention represents a considerable technical development making it possible to obtain an extremely efficient and durable sanding by a single vehicle under the worst weather conditions.

Other sand delivering devices may be used than the tipping mechanism shown in FIGURE 1. Thus, special delivering members mounted on rotatable shafts may be used, whereby a uniform sand delivery is ensured. The vehicle may be of another type than the truck shown, e.g. in order to accommodate a considerably larger water tank.

The water delivering device 6 is suitably located behind the rear wheels of the vehicle.

The invention also comprises means sensitive to ambient temperature in order to control the heating of the water in correspondence to the surrounding temperature in such a way that the water temperature will rise in correspondence to a dropping ambient temperature and vice versa. If the water temperature is too low, the water being spread will freeze too rapidly, having no time to melt or heat the road sufficiently to fix the sand particles. If the water temperature is too high, too much of the ice and snow on the road will melt and the water may flow away from the road, so that there is an insufficient backing left for positive binding of the sand grains or particles.

A device sensitive to the ambient atmosphere may be arranged to give impulses for setting a thermostat device in dependence on the ambient temperature in such a way that the temperature of the water will be raised if the ambient temperature is dropping, and vice versa.

Such a device is shown in FIGURES 2 and 3, where the sand containing tipping body is designated by 10, the tipping mechanism of the tipping body by 20, the water tank by 30, the water sprayer by 40 and the pipe from tank 30 to sprayer 40 by 50.

A device 60 sensitive to the ambient atmosphere delivers impulses for setting a thermostat device in dependence on the ambient atmosphere in such a way that the temperature of the water will be raised if the ambient temperature drops, and vice versa.

The device 60 is connected through line 80 to a regulator or controller 70 which is connected through lines 90 and 100 on one side to a relay 110 mounted in the tank 30. Relay 110 is responsive to the water temperature, and is connected to a motor 120 adapted to operate a valve 130. Together with motor 120 and valve 130, relay 110 the above mentioned thermostat device which is adapted to maintain a water temperature determined by device 60.

The regulator 70 may be of any suitable type, and therefore does not require any description here. The same may be said about device 60, relay 110, motor 120 and valve 130.

The valve 130 is located in a branching point where the exhaust pipe 14 is branched into two pipes 15 and 16, of which one (16) leads to the tank 30 and the other to a muffler 17. The valve distributes the exhaust gases in a variable ratio between tank 30 and muffler 17 in accordance with varying requirements of heating the water in the tank. As long as the ambient temperature remains constant, the temperature of the water in tank 30 will also remain constant, but as soon as the ambient temperature changes the water temperature will be altered to a lower or higher value as described above. This regulating process is performed automatically without any measures by the operator. Upon any change of the ambient temperature, the device 60 delivers an impulse via regulator 70 to relay 110, which is hereby set for an appropriate water temperature, and which accordingly sends a signal via the regulator to the motor 120, bringing the motor to set pump

4

130 for an increased or reduced flow of exhaust gases through water tank 30.

Of course, it is possible to dispense with the regulator 70, thus combining the above temperature-regulating components more directly with each other.

The electric current to the regulator 70 is obtained through a line 18 from the battery 19 of the vehicle.

The reference 20 designates the exit of the exhaust gases from the tank 30, and 21 designates a filling opening of tank 30. 22 designates a servo-motor driving an air pump 23 to obtain a sufficient pressure in the tank 30 through a pipe 24 in which a control valve 25 is incorporated. 26 designates a handle for operating through the link 27 a control valve 28 in the pipe 50 to the sprayer 40.

A blower or fan 29 may be adapted to deliver air through a pipe 30 to a ramp 31 in order to blow away loose snow and ice before spraying the water.

FIGURES 4 and 5 illustrate a water tank 32 mounted on a trailer and connected through flexible lines 33 and 34 to the exhaust and pressure-air systems of a truck (not shown). The operating link system 27 is extended and flexible in an arbitrary way for mutual movements between the truck and the trailer. Ramps 40 and 31, valve 28, fan 29 and line 30 are in this case mounted in the trailer. 35 is a coupling device for the trailer.

1' designates the tipping body, 5' and 11' designating the water line from tank 32 to ramp 40 and the relay in the tank, respectively.

It should be understood that the invention is not restricted to the shown embodiments, other arrangements and locations of the components of the device according to the invention being possible. However, a high and free location of the device 60 sensitive to the ambient temperature is always to be preferred.

A security relay may be mounted in the tank to control that the water temperature does not reach the boiling level. Such relay may be adapted to give impulses to motor 120 for setting valve 130 to a position involving freedom from boiling.

In FIGURE 2 the shafts of motor 120 and valve 130 are indicated to be co-axial or forming a common shaft. Of course, other combination are possible.

What I claim is:

1. In a motor vehicle for applying a fluid material to a roadway or the like and including fluid spreading means adapted to receive a fluid, store the fluid and apply the fluid to said roadway, the improvement comprising heat exchanger means connected between the exhaust system of said motor vehicle and said fluid spreading means to heat the fluid therein, first temperature responsive means attached to said motor vehicle to sense the ambient temperature, and temperature control means for varying the level of heat applied to said fluid in response to changes in the ambient temperature.

2. The combination defined in claim 1 wherein said fluid applying means includes a fluid storage tank, and wherein said heat exchanger means includes a heating conduit within said storage tank and means coupling said heating conduit to the exhaust system of said vehicle.

3. The combination defined in claim 2 wherein said temperature control means includes valve means in said means coupling said heating conduit to said exhaust system, said valve means being operable when actuated to vary the flow of exhaust gasses from said exhaust system to said heating conduit thereby varying the amount of heat applied to said fluid through said heating conduit.

4. The combination defined in claim 3 wherein said temperature control means also includes valve actuation means connected between said valve means and said temperature responsive means to actuate said valve in response to changes in the ambient temperature.

5. The combination defined in claim 4 and also including second temperature responsive means in said storage tank to sense the temperature thereof, and control means

5

connected between said first and second temperature responsive means and said valve actuation means to vary the flow of exhaust gasses from said exhaust system to said heating conduit in accordance of the temperatures sensed by said first and second temperature responsive means. 5

6. The combination defined in claim 5 wherein said control means is operable to increase the flow of exhaust gasses from said exhaust system to said heating conduit when the ambient temperature drops and to decrease the flow of exhaust gasses from said exhaust system to said heating conduit when the ambient temperature rises. 10

7. The combination defined in claim 5 wherein said control means is operable to decrease the flow of exhaust gasses from said exhaust system to said heating conduit 15

6

when the temperature of said fluid reaches a predetermined level.

References Cited by the Examiner

UNITED STATES PATENTS

1,397,045	11/1921	Finley	-----	94—44	X
1,613,051	1/1927	Napier	-----	94—44	
1,674,989	6/1928	Powell	-----	94—42	X
1,946,461	2/1934	Hurt	-----	94—44	
2,439,367	4/1948	Middlestadt	-----	94—44	

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