SYSTEM OF ROLLERS HEATED BY INTERNAL COMBUSTION

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SYSTEM OF ROLLERS HEATED BY INTERNAL COMBUSTION

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This invention relates to devices comprising rollers and to means for heating the same. The devices are especially useful for removing deposits of snow and ice from surfaces upon which the same have been formed or deposited, such as pavements, airport runways and the like, and over which the heated rollers are intended to be rolled for removing such deposits.

Hereinafter, snow and ice formed or deposited on surfaces, such as airport runways have constituted an extremely dangerous hazard. For example, an aircraft attempting to land on such a runway may not be cleared away from the runway. Thus, the rollers are heated from within by the products of combustion recirculated within the rollers.

The objects of the invention illustrated in the drawings are to provide a system of heated rollers for melting snow and ice deposited on runways and similar structures, for tempering the overall temperature and controlling the combustion.

Thus, the rollers are heated from within by the products of combustion recirculated within the rollers.

The objects of the invention will be apparent from the following description of an embodiment thereof which will be made with reference to the accompanying drawings in which:

FIGURE 1 is a top plan view of the system of rollers. FIGURE 2 is a front elevation of the system. FIGURE 3 is an end view of the system. FIGURE 4 is a diagrammatic sectional view of the system, in part, illustrating features which will be described in greater detail.

FIG. 5 is a diagrammatic representation of the manner in which gases flow through the system.

The embodiment of the invention illustrated in the drawings is a device comprising a system of heated rollers for melting snow and ice deposited on runways and similar structures, for tempering the overall temperature and controlling the combustion.

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to the other burner spaces through pipes 32 and 33. The outer ends of the pipes 21 and 23 at one side receive exhaust gas from the corresponding inner burners through the U-shaped connecting pipes 24, and the outer ends of the pipes on the other side receive the exhaust gas from their corresponding inner burners through the U-shaped pipes 25 which are connected through the end caps to the outer ends of the rollers 21 and 23 respectively. The manifolds introducing the exhaust or diluent gas to the burner space is illustrated in FIG. 4 and the gas flow is illustrated in FIG. 5. Exhaust inlet pipe 22 is arranged to introduce an amount of the products of combustion being withdrawn from the other end of the series of pipes for equalizing the temperature of the exhaust gases and hot combustion gases. This is further understood by reason of the fact that as the exhaust gases are recirculated throughout the system and new amounts of hot combustion gases are introduced and mixed with the circulating exhaust gases, an intermediate temperature of the hot gases is accomplished. This, for example, may be in the order of 300 degrees F. to 900 degrees F. as desired as against a combustion temperature of approximately 1500 degrees F. at the burner. It is seen, therefore, that the recirculation of the gases aids in eliminating hot spots at one end of a roller, while maintaining a more uniform temperature along the roller. Ignition means and thermostat control means, not shown, are also adapted to be placed at or near the burner. The whole system is mounted on a suitable frame such as angle iron or tubular metal construction having wheels adapted to be jumped forward out of the way so that the surface to be cleaned of ice and snow may be engaged by the rollers. The wheels are jacked down wardly to lift the rollers off the surface when the apparatus is not in use.

In operation the entire device is adapted to roll along a surface to be rid of water, snow or ice on the bearing-supported heated pipes 21 and 23, and may be arranged as a trailer which is attached to a propelling vehicle (not shown) by means of the trailer hitch 28. The burners 42 are connected to a convenient source of combustible fuel-air mixture (not shown) and the exhaust pump 27 is put in operation to reduce the pressure in the system to the desired subatmospheric operating pressure. The flow of the fuel-air mixture through the supply pipe 42 is aided by this reduced pressure. The mixture is ignited at the burners 42 and the products of combustion pass through the leading tubular rollers 21, conductors 24, follower burners, spaces of the following burners 42, following tubular rollers 23, manifold units 30 and 29 and exhaust pump 27 to the exhaust pipe 31. On the other side the products of combustion pass from the burners 42 through leading tubular rollers 23, connections 25, following burners 42, following tubular rollers 23, connections 33, manifold units 30 and 29 to the exhaust pump 27. Arrows in Figs. 4 and 5 indicate the directions of flow within the system. The continuous combustion at the burners 42 may desirably be arranged to maintain the revolving tubular rollers 21 and 23 at temperatures of the order of 300 degrees Fahrenheit, whereupon the water on the surface to be cleared, or that resulting from the melting of ice or snow, may be converted partly or wholly into steam; but it is evident that arrangements for maintaining higher or lower temperatures may be made by suitable adjustments.

It is evident that pipes 21 and 23, being constructed of steel or other strong heat conductive material, which is inherently adapted to flex slightly and conform to the variations in the surface of the runway or the like, will come into contact with much, if not the entire surface to be cleared when the device is rolled over the surface, thus removing all snow and ice thereon. A further modification of the rollers, not shown, provides for an insulated jacket surrounding a major portion of the circumference of each roller, leaving a smaller portion of the roller uncovered for contacting the surface to be cleaned of ice and snow. The jacket, being in spaced relationship with the roller aids in recovering surface temperature of the roller which is lost due to contact with the ice and snow. The continuous recirculation of gases causes a gradual decrease of temperature from the burner end of each roller to its exhaust end. A second burner being in the contiguous end of the next roller, the effect of the decrease in temperature from the burner end of the roller is minimized to the extent of the jacket. It is therefore seen that a substantially uniform temperature is maintained within the surface contact area.

While the above description of the invention and accompanying drawings illustrate a specific modification of the invention, it will be recognized that the invention is susceptible of other modifications without departing from the spirit and scope thereof, and it is to be understood that in the absence of specific limitations, the claims are not to be construed as limiting the same to the modification shown.

I claim:

1. A device for removing snow from a surface which comprises a pair of rectilinear tubular non-contiguous rollers having outer and inner ends, the axes of said rollers being in parallelism in a single plane for contacting and rolling along said surface; bearing members at the outer and inner ends of each of said tubular rollers, said bearing members being disposed to maintain the rollers in rotatable position; outer and inner elements to close the ends of said tubular rollers, sufficient to enable the maintenance of a pressure below that of the surrounding atmosphere; curved tubular means mounted on the outer pair of said closure elements for connecting the outer ends of the pair of tubular rollers thereby forming a tubular U-shaped loop, one leg of which constitutes a leading conduit and the other constitutes a following conduit of a gas circulatory system; a first burner disposed within and at the leading end of said leading conduit of the loop; a second burner disposed within and at the leading end of said following conduit of the loop; a tubular tail pipe discharging to the atmosphere; an exhaust pump connected to said manifold to evacuate the exhaust gas from the system and reduce the pressure within said loop below that of the atmosphere, said exhaust pump being connected to discharge into said tail pipe; a restricted conduit connected with said tail pipe and said first burner for supplying non-combustible gas to the first burner, said non-combustible gas being only a portion of the gas discharged by said pump to the tail pipe; said curved tubular means being connected to said second burner and conducting all the non-combustible gas from said first burner to the combustion space of said second burner; said non-combustible gas conductors being sufficiently restricted to retain said reduced pressure upon operating said exhaust pump; and means for supplying a combustible gas mixture to said burners.

2. A device in accordance the claim 1 which comprises a plurality of the tubular U-shaped loops arranged in parallelism in said plane.

5. A device in accordance with claim 1 in which the rollers are located in a lower plane and adapted to be in contact with the ground, the exhaust manifold being located in an intermediate plane above the rollers and the discharge pipe is in a plane above both the rollers and the exhaust manifold; and said tubular means for connecting the following conduit of the loop to the manifold and the restricted tubular means for connecting the tail pipe to the first burner extend upwardly from the lower plane of the loops, are rigidly secured to the closure members at their ends and to the manifold and tail pipe respectively at their upper ends, thereby constituting a rigid framework supported by the bearings.

4. A device in accordance with claim 1 in which the framework comprises a connection for attaching means for hauling the device across the surface from which
snow is to be removed; and means on said framework for mounting said exhaust means.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>232,225</td>
<td>Angamar</td>
<td>Sept. 14, 1880</td>
</tr>
<tr>
<td>627,128</td>
<td>Mijamlin</td>
<td>June 20, 1899</td>
</tr>
<tr>
<td>1,168,171</td>
<td>Crumbaugh</td>
<td>Jan. 11, 1916</td>
</tr>
</tbody>
</table>

5

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,634,353</td>
<td>Frantz</td>
<td>July 5, 1927</td>
</tr>
<tr>
<td>2,041,930</td>
<td>Houlis</td>
<td>May 26, 1936</td>
</tr>
<tr>
<td>2,201,385</td>
<td>Woodson</td>
<td>May 21, 1940</td>
</tr>
<tr>
<td>2,430,101</td>
<td>Campbell et al.</td>
<td>Nov. 4, 1947</td>
</tr>
<tr>
<td>2,474,759</td>
<td>Schmitz</td>
<td>June 28, 1949</td>
</tr>
<tr>
<td>2,763,477</td>
<td>Marks</td>
<td>Sept. 18, 1956</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,161</td>
<td>Germany</td>
<td>Aug. 10, 1878</td>
</tr>
</tbody>
</table>