ABSTRACT: A snow stopper to be placed on a roof, which is provided with an electric heater.
HEATED SNOW STOPPER


This invention relates to a snow stopper adapted to be mounted on a roof, which is provided with an electric heater.

One of the serious problems still to be solved in snowy climates is how to dispose of snow which has accumulated on roofs. People there are forced to consider substantial amounts of money and labor for removing snow from the roof of their houses in order to protect their houses from collapsing under the load of snow, or to prevent a passer-by from being injured by a mass of snow sliding off the roof. A further problem involved with snow on a roof is that of leaking water. The layer of the snow adjacent to the surface of the roof will be melted by heat transmitted from the underlying room through the roof, and the melted snow, that is, water flows down along the surface of the roof. However, when the water reaches the eaves which is exposed to cold air, it freezes again and a block of ice will be formed there. Such a block of ice is called an ice bank. The ice bank will gradually grow and prevent the water from draining properly. Thus, a portion of the water held by the ice bank will leak into the room through gaps in folded joints of two zinc roof sheets. Such leakage has been a great annoyance to people in snowy countries, as it not only hampers their daily living but quickens decay of timbers under the roof. This trouble has also been able to be avoided only by removing the snow from the roof. However, to remove a great amount of snow from a roof not only requires considerable man-hours, but is very dangerous for persons engaging in the operation.

The present applicant has proposed a snow melting heater of a planar type which is suitable to effectively remove snow from a roof. However, such an electric heater is comparatively high in both the manufacturing cost and the installation cost. Therefore, if the whole roof should be covered with such electric heaters, the cost will be tremendous. Accordingly, it is a very effective measures for saving the cost to use such a planar heater in combination with an appropriately designed snow stopper which supplements the insufficient capacity of the planar heater. In fact, various types of primitive snow stoppers have been used in some towns. Such conventional snow stoppers, however, are only effective to hold snow on the roof and merely reduce the frequency of having to remove snow from the roof. With such snow stoppers, people cannot be relieved of the laborious and dangerous work for removing snow.

Therefore, an object of this invention is to provide a heated snow stopper which is especially effective when used in combination with a planar snow melting heater.

In order to achieve the above object, a snow stopper of this invention comprises a longitudinal structure adapted to be transversely mounted on the roof and an electric heater disposed to heat said structure.

This invention will be clarified by the following description given with reference to the accompanying drawings, in which:

FIG. 1 is a schematic drawing of a part of a roof covered with snow, which is not equipped with any snow melting device;

FIGS. 2a and 2b are perspective views of roofs having conventional snow stoppers thereon;

FIG. 3 is a sectional view of an embodiment of the snow stopper of this invention;

FIG. 4 is a perspective view of another embodiment similar to the one shown in FIG. 3;

FIG. 5 is a perspective view of still another embodiment of this invention;

FIG. 6 is a schematic drawing of an example of the heating element used in the snow stopper of this invention; and

FIG. 7 is a schematic illustration showing how snow is dispelled with the snow stopper of this invention used in combination with a planar heater.

Referring to FIG. 1 which illustrates the cause of leaking water in a snow-covered house, numeral 1 designates a water, 2 water produced from melted snow, 3 the ice bank growing on the eaves of the roof, and 4 a joint of zinc sheets. The arrows represent the heat from the warmed room. The course in which snow causes leaking water has been described previously.

Referring to FIGS. 2a and 2b, most of the conventional snow stoppers 5 are made of logs or square timbers and are only intended to hold snow until snow unloading operation can be started, in order to prevent a mass of snow from abruptly sliding off the roof and injuring a chance passer-by.

As shown in FIGS. 3 and 4, the snow stopper of this invention which is provided with an electric heating element, preferably has a substantially triangular profile for improved effectiveness of snow melting ability. Though whatever profile of sectional form may be effective, the triangular section is advantageous in economy of materials, easiness of fabrication and effective disposition of the heater. With such a shape, even if snow lies over the snow stopper, the snow over the ridge of the triangular snow stopper is melted as the heating element is disposed also in that part of the snow stopper; and the resultant water runs down the slope, thus dividing the snow into two parts about the ridge line 15, 16, snow stopper. Therefore, it prevents formation of a snow-bridge over the snow stopper. Further, the heating element is disposed also in the bottom side of the triangular snow stopper as shown in FIG. 3, lest the water created from snow in the vicinity of the top and the vertical side should freeze in the clearance between the bottom of the snow-stopper and the surface of the roof when said water runs down through the said clearance.

This snow stopper is constructed into a closed formation by an appropriate process using suitable materials to prevent electric wires and other accessory control apparatuses from being exposed to the weather. That is, first, a prism-shaped frame 6 which is open on the sloped side and at both ends, is formed with any suitable material and by any appropriate method; then, a heat insulating member 7 is attached to said frame if necessary; next, heating element 8 is placed on the top portion, vertical side and bottom side of the frame; and then, cover 9 is fitted over the heating elements. After wiring operation has been carried out with access to the interior through the opening in the sloped side, this opening and the ones at both ends are closed with lids 10 and 11. Lead wires 12 are introduced into the snow stopper through a conduit pipe 13 attached to the end lid 11. Fixing plate 15, bases 16, reinforcing member 14 and supporting rods 17 are also shown in FIG. 4. The snow stopper 5 is secured to the bases 16 by means of the fixing plates 15 and placed at any desired position of the roof with the bases resting on the roof, and is then suspended from the top of the roof by the supporting rods 17. Such construction ensures on the spot easy mounting without danger of breaking the roof. Further, the bottom of the snow stopper is readily accessible by removing the lid 10 on the sloped side. The device of this invention is electrically safe, because the lead wires are completely protected from the ambient conditions by the frame 6 and the conduit tube 13. Moreover, good appearance is ensured, as this device is to be fabricated from standardized parts in the manufacturer's plant.

In the above explanation, an embodiment of the snow stopper having a triangular profile has been described. However, it will be understood that a similar effect can be obtained with other shapes. For example, a snow stopper having a round profile will be explained hereunder referring to FIG. 5.

In FIG. 5, stop member 18 which constitutes the snow stopper 5 is surrounded with heating element 8 which is covered with heat-and-cold-resistant insulating material 19. Then, the heating element 8 along with the insulator are secured to the stop member 18 with tightening members 20 such as iron bands. Such type of snow stopper may be obtained at a very low cost, as it can be fabricated utilizing an existing stop member. Though two stoppers 5 per se are effective for melting snow, they will work more effectively if a planar heater 25 is placed opposite the bottom of the snow stopper on the roof as shown in FIG. 3.
With such an arrangement, water flowing down between the snow stopper 5 and the roof 1 is prevented from freezing again in the gap between them, thus continuous melting of the snow being ensured.

As to the heating element, various types of planar heater may be used. FIG. 6 shows an example of such a heating element which has a clothe-like structure woven with weft 21 and warps 22 of heat-resistive dielectric fibers such as cotton, synthetic fiber of glass fiber and a length of heating wire 23 being woven into said clothe-like structure along the wefts 21 in the pattern of a meander line. Reference numeral 24 designates lead wires from which the heating wires are branched.

Finally, the manner in which snow is eliminated from the roof by use of a snow stopper of this invention will be explained with reference to FIG. 7. The snow 27 upward of the snow stopper 5 is melted by the heat from the vertical side of the snow stopper 5 and the resultant water flows down through the narrow gap between the snow stopper 5 and the roof. As the snow is always being pushed against said vertical side of the snow stopper by a component of its gravitational weight and moreover receives heat from the underlying room, new snow is successively melted at said vertical side of the snow stopper, thus the snow moves down the roof, for example, from position a to position b. Therefore, the danger of an abrupt slide of the snow is prevented. The snow from the snow stopper down to the edge of the roof is kept being melted by the planar snow heater 26 provided there. Further, said planar heater 26 may be omitted by appropriately positioning the snow stopper 5.

What we claim is:

1. A heated snow stopper mounted transversely on a roof and adjacent to the eaves of the roof, comprising a longitudinal structure having top, bottom and back side portions, means supporting said structure in a spaced apart relationship with the roof, and an electric heater disposed at least along the top, the bottom and the back side of said structure, said back side facing the top of the roof.

2. A heated snow stopper as defined in claim 1, wherein said longitudinal structure has a triangular profile, a longitudinal surface thereof being at bottom.

3. A heated snow stopper as defined in claim 2, wherein said longitudinal structure has a hollow extending lengthwise along said structure for accommodating electric wires therein.

4. A heated snow stopper as defined in claim 1, wherein said electric heater comprises a clothe-like structure woven with wefts and warps of heat-resistive dielectric fibers, and a length of heating wire is woven into said clothe-like structure along the wefts in a zigzag pattern.

5. A heated snow stopper as defined in claim 2, wherein a planer heater is mounted on the roof adjacent to said bottom surface of said longitudinal structure.

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