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3,242,034

DE-ICING PAD

Filed July 18, 1962

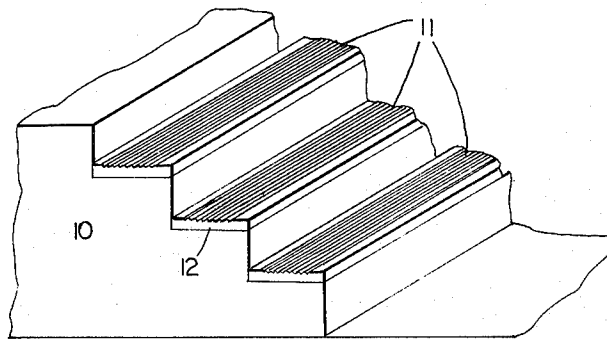


FIG. 1

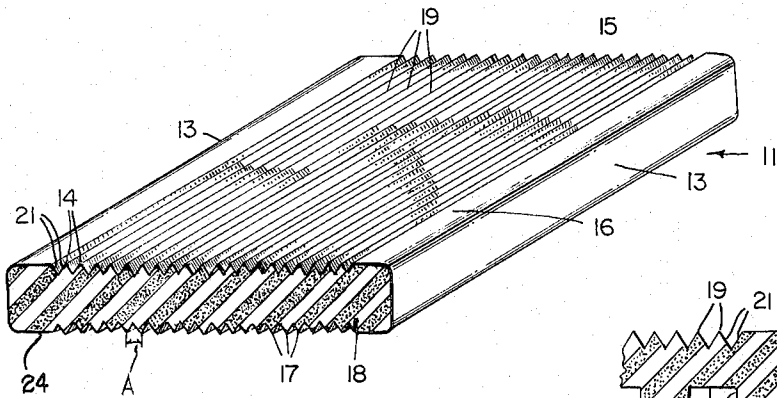


FIG. 2

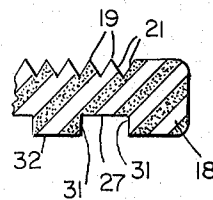


FIG. 4

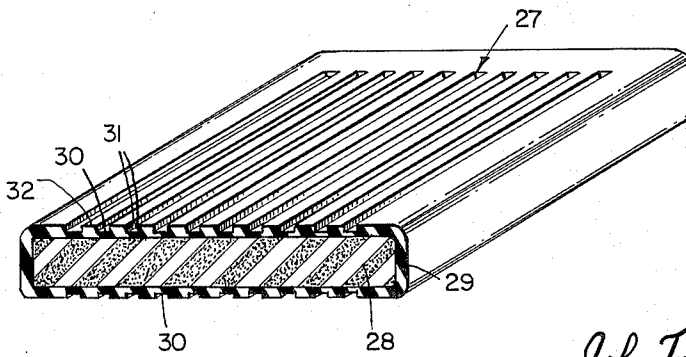


FIG. 3

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1

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DE-ICING PAD

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4 Claims. (Cl. 161-123)

The present invention relates to a de-icer safety means and in particular to a pad for quickly and easily shattering overlying ice layers.

In the colder climates layers of ice frequently form, covering outdoor surfaces during the winter months, and are a constant source of danger to pedestrians particularly in the case of ice formation on outdoor stairways. A tremendous amount of time and labor is expended removing hazardous ice or rendering it safe. Chopping and scraping of ice layers is effective to remove ice however the cost in terms of time and physical health are frequently exorbitant. The spreading of ashes, sand or salt to melt or render harmless ice layers is common. This expedient is frequently undesirable in that pedestrians using the sanded or salted areas frequently spread these materials inadvertently into indoor areas.

Accordingly, it is an object of this invention to provide a means for shattering ice layers which is inexpensive, free from complexity and may be used with a minimum of physical energy.

It is another object of this invention to provide a means and method in accordance with the preceding object which is particularly useful on outdoor stairways yet is universal and portable allowing usage, in varying outdoor locations.

It is a further object of this invention to provide a device in accordance with the preceding objects which prevents slipping and/or falling when used either before or after an initial layer of ice has formed on an outdoor surface.

It is a still further object of this invention to provide a device in accordance with the preceding objects which positively remains in position and is not easily tracked into indoor areas. Thus, indoor floors and expensive floor coverings adjacent to outdoor stairways and walks, are not tracked up and marred by abrasive or corrosive action of ashes, salt and sand which might normally be used to cover outdoor ice layers.

A device of this invention comprises a pad having a substantially flat body of resilient, elastically compressible organic foam material having high resistance to abrasion and weathering. The pad body has an upper surface and a lower surface. The thickness of the pad and the foam material of the pad are selected so that the upper surface can be deformed by applying pressure and compressing the body without substantially deforming the lower surface of the pad. In a preferred embodiment of the invention the pad has an outer perimeter corresponding to the outer perimeter of a step of an outdoor stairway. The organic foam material is a closed cell foam rubber. Preferably the upper and lower surfaces of the pad have depressions extending downwardly into the body. Preferably the depressions are corrugations which have upper lips defining a cross-sectional area greater than a cross-sectional area of the corrugations extending into the body. In an alternate form of the invention, a resilient covering or thick skin is provided for the compressible organic foam body.

Numerous other features, objects and advantages of the present invention will become apparent from the following specifications when read in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view showing an outdoor stairway provided with de-icing pads of the present invention;

FIG. 2 is a perspective view of a preferred embodiment of a de-icing pad of this invention showing one end thereof in cross-section;

2

FIG. 3 is a perspective view showing an alternate form of the invention and having one portion thereof in cross-section; and

FIG. 4 is a fragmentary cross-sectional view of a further alternate form of the invention.

According to the invention, a flight of stairs designated generally at 10 in FIG. 1 having horizontally extending substantially rectangular upper step surfaces 12, is protected by a plurality of de-icing pads 11 of this invention. Preferably the outer perimeter of each pad corresponds to the outer perimeter of each upper surface 12. It should be understood however that in certain applications, the pad may not cover the entire surface area. Thus, the dimensions of the pad normally are at least sufficient to enable a user to place both feet on an upper surface of the pad. Preferably a 15 x 36 inch rectangular pad is desirable, however, the pads may be as small as 10 x 12 inches.

A preferred embodiment of the invention is illustrated in FIG. 2 with the pad designated generally in 11. The pad 11 is an integral unit having a body 18 formed of an organic foam material which is resilient, elastically compressible and has high resistance to abrasion and weathering. Preferably the de-icing pad 11 is substantially flat and rectangular in shape having an outer perimeter corresponding in size to the outer perimeter of the area on which the pad is to be used. As illustrated in FIG. 2, the pad 11 has parallel sides 13 joined by parallel front and rear edges 15.

Natural and synthetic rubber materials are preferred for usage in this invention. For example, caoutchouc, neoprene, polybutadiene, copolymers of butadiene and acrylonitrile may be formed into foams and used in the present invention. The foams used are preferably of the "closed or non-interconnecting" cell construction. This closed cell structure is particularly advantageous for outdoor usage since moisture does not deeply penetrate the pad and freeze within the body 18. However, in some embodiments of the invention open cell foam may be employed. In the latter case it is normally desirable to form an outer skin or protective layer over the body 18.

Upper and lower surface 16 and 17 respectively of the body 18 are provided with depressions such as V-shaped corrugations 19 having angular side walls 21 meeting at acute angles extending thruout the length of the body 18. Preferably side walls 21 are arranged at an acute angle to each other. The corrugations 19 provide a means for increasing the coefficient of friction of the surfaces 16 and 17 of the pad thereby increasing non-skid properties and respectively aid in shattering ice formed on the top surface 16 and anchoring bottom surface 17 to a stair surface as will be described more fully. The particular form or shape of the depressions may vary considerably, however, it is preferred that the depressions have an opening or lip area designated generally at "A" of larger dimension or at least equal to any width of the depression spaced from the surface within the body 18. This feature enables ice formed within the depressions or corrugations to be easily removed.

The particular dimensions of the pad 11 may vary considerably depending upon requirements of usage and the particular foam material employed. Generally it has been found that a thickness of at least 1/2 inch is desirable. In the specific embodiment shown in FIG. 2 the pad 11 has an overall thickness of 3/4 of an inch. It is only necessary that the pad be sufficiently thick that pressure may be applied to a portion of the upper surface 16 to deform the surface and resiliently compress the body 18 without substantially deforming the lower surface 17 as will be more fully described.

The pads of this invention may be made by conventional foam rubber manufacturing procedures. They may be cut from a slab of foam rubber or may be molded individually to the desired form. The molding procedure is particularly advantageous in that a thin moisture impermeable skin 24 is normally formed during such procedures. The skin 24 is extremely thin and adds a decorative effect to the pad. In addition the skin 24 on foam bodies having opened or interconnecting cells, prevents moisture entrance into the cells of the body 18. When the pads are manufactured by machining operation and cut from large blocks, the thin skin may be formed on the body 18 by conventional procedures such as flame treating. Alternatively the skin may be a laminated sheet containing the corrugations 19 and adhered to the body 18.

An alternate form of the invention is illustrated generally in FIG. 3 and has a foam rubber body 28 composed of the same material as body 18. A resilient elastic skin 29 having a thickness of approximately $\frac{1}{4}$ of an inch entirely surrounds the $\frac{3}{4}$ inch thick body 28 and increases wear resistance of the pad. The skin 29 preferably comprises a solid hard rubber material of the same type as the foam body 28. The skin 29 may be adhered to the foam body by conventional laminating procedures such as the use of compatible adhesives. In some cases the thick skin 29 may be formed by molding of the pad. Substantially U-shaped grooves 27 are formed on upper and lower surfaces of the pad and perform substantially the same function as corrugations 19 as described above. The grooves 27 have vertical walls 31 and horizontal walls 30 and are provided with flat surfaces 32 between grooves.

In the embodiment of FIG. 4 a foam pad body 18 has a foam rubber composition as described above with relation to body 18. However, angled side wall corrugations 19 are provided on an upper surface while U-shaped corrugations 27 are provided on the lower body surface.

The use of the pad of this invention to provide safe, non-slip outdoor walking surfaces is extremely simple. Preferably the pads are positioned with their lower sides down on any outdoor or other surface where icy conditions are likely to occur. Normally the corrugations 19 on the lower surface 17 are sufficient to prevent skidding of the pad when placed on a dry surface. When the pad 11 is exposed to water during freezing conditions, for example, during a freezing rainstorm, water tends to flow into the corrugations 19 under the lower surface 17 and freeze within the corrugations thereby locking the corrugations to the surface to be protected and anchoring the pad. Ice normally forms on the entire upper surface and sides of the pad 11. This ice can be removed with a minimum of effort. Normally a thin layer of ice can be shattered by merely pressing on the ice layer downwardly towards the surface 16. Preferably the pressure is mere foot pressure, i.e., merely walking over the pad will tend to crack a thick layer of ice. Surprisingly even layers of ice several inches thick may be shattered by applying foot pressure. In effect, the upper surface 16 is depressed and the body 18 yields while the lower surface 17 retains its original configuration. In some cases the lower corrugations are slightly deformed by the applied pressure but effectively the lower surface 17 remains in close contact with the underlying surface. The yielding action of the surface 16 and body 18 in conjunction with the pressure cracks the ice between the surface 16 and the force applied. It should be noted that an uneven pressure must be applied or pressure applied only over a restricted portion of the pad. This is necessary since if an equal pressure is applied to all points above the upper surface 16, a layer of ice formed thereover will tend to move downwardly and then upwardly without cracking. After the shattering, particles of ice may be removed from the upper surface by brushing or a simple sweeping technique such

as merely sweeping the upper surface with a conventional house broom.

The corrugations 19 aid in the ice shattering action of the pad by providing a means for applying forces over a large underlying surface area of the ice. Thus, it can easily be seen from the drawings that the corrugations increase the underlying surface area of ice exposed to the top surface 16 of the pad 11. Further, the lips 14 and associated side walls 21 have a spring like action and effectively act to pinch ice formed in the corrugations when the pad 11 is depressed. This pinching action acts to loosen the ice layer from the surface 16 and aids in the shattering procedure. The pinching action is partially a result of outward bulging of walls 21 due to pressure applied to the upper surface 16 of the pad.

The walls 31 and base 30 of corrugations 27 on the upper surface of pad body 28 act in the same manner as elements 19 described above. Moreover, the flat areas 32 on the lower surfaces of the pad of FIG. 3 are particularly adapted to grip the ground with positive action. The flat areas 32 have increased frictional engagement with a ground surface as compared to the lips 14 of pad 11.

The device of FIG. 4 is designed so as to have both the advantageous ice shattering properties of pad 11 and the outstanding ground gripping properties of the device of FIG. 3. Preferably walls 31 extend $\frac{1}{4}$ inch into body 18 while corrugations 19 extend $\frac{1}{4}$ inch into the top of body 18 with walls 21 meeting at an angle of 30 degrees. Flat walls 32 are preferably 1 inch wide and the pad has an overall thickness of 1 inch, a length of 36 inches and a width of 15 inches. In use, ice layers formed on the top surface of the pad of FIG. 4 are easily shattered while the lower surface prevents sliding of the pad with respect to an outdoor surface.

It is a feature of this invention that the de-icing pads are portable and reversible. Thus, the pads may be moved from one location to another as desired. The pads are normally left in a single location as on a flight of stairs for sustained periods of time. Normally the pads are highly resistant to abrasive action caused by people walking on the pads. However, if wear should occur the pads may be simply reversed by turning them upside down and presenting the lower surface 17 as the upper surface of the pad.

While the pads of this invention are preferably positioned over areas to be protected before the occurrence of icy conditions, they may be advantageously employed after an ice layer has formed over a surface. Normally foam rubber material of the pads may be kept in a room at normal room temperatures, i.e., 20 degrees C. When a pad is taken out of this temperature environment and placed on a ice covered surface heat retained within the pad tends to melt the portion of the ice surface directly below the lower surface 17 of the pad. This causes the corrugations to interlock with the underlying ice layer and prevents slipping of the pad. Furthermore, if the weather conditions are below the freezing point, ice underlying the pad tends to melt and may later re-freeze. The re-frozen ice underlying the pad may tend to stick to the pad and further anchor the pad to the icy surface.

The specific embodiments of this invention as described above are by way of example only. Those skilled in the art may now make numerous variations. For example, the pads may have varying outer peripheral configurations such as circles, ovals, etc. Therefore, while there have been described what are at present considered to be preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the spirit and scope of this invention, and it is therefore aimed in the appended claims to cover all such changes and modifications as are inherent in the true spirit and scope of this invention.

What is claimed is:

1. A de-icing pad having a rectangular outer configuration and constructed and arranged to lay over an outdoor surface and protect said surface from unwanted buildup of ice layers,

said pad comprising a resilient organic closed cell foam rubber body having an upper and lower surface and a substantially moisture impermeable skin layer covering said upper and lower surface, said pad having a thickness of at least $\frac{3}{4}$ inch enabling the upper surface of said body to be elastically depressed to shatter ice while said lower surface is supported on an outdoor surface,

said rubber body being resiliently and elastically compressible at temperatures below the freezing temperature of water,

said pad having an outer perimeter defining a pad lower surface adapted to overlie an outdoor stairway step,

said skin and upper and lower surfaces having a plurality of parallel corrugations of substantial depth whereby said corrugated upper surface provides a wear resistant and ice shattering means and said corrugated lower surface permits flow of water under said pad when said pad is positioned on a level surface and whereby precipitation may flow under said pad and freeze in said corrugations to anchor said pad to an outdoor surface.

2. A de-icing pad in accordance with claim 1 wherein

said corrugations extend into said pad for a distance of at least $\frac{1}{4}$ inch.

3. A de-icing pad in accordance with claim 1 in which said organic closed cell foam is selected from the group consisting of caoutchouc, neoprene, polybutadiene, and copolymers of butadiene and acrylonitrile.

4. A de-icing pad in accordance with claim 1 wherein said resilient organic closed cell foam is neoprene.

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EARL M. BERGERT, *Primary Examiner*.