June 5, 1928. 1,672,639

E. W. DAVIS

ELASTIC INSULATING MATERIAL

Filed May 9, 1925

Fig. 1

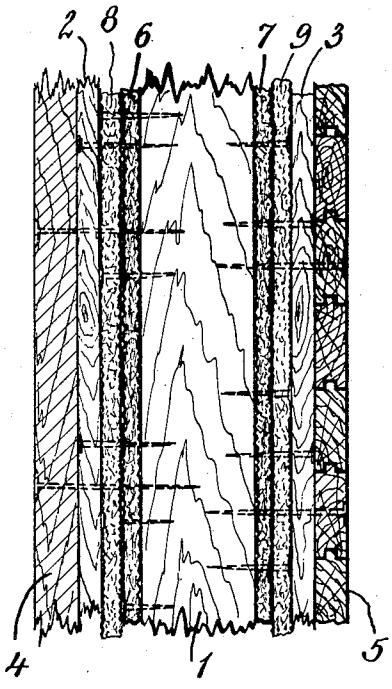


Fig. 2,

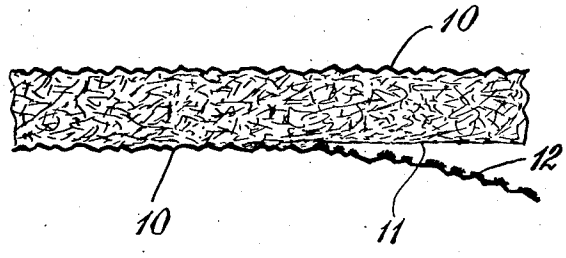
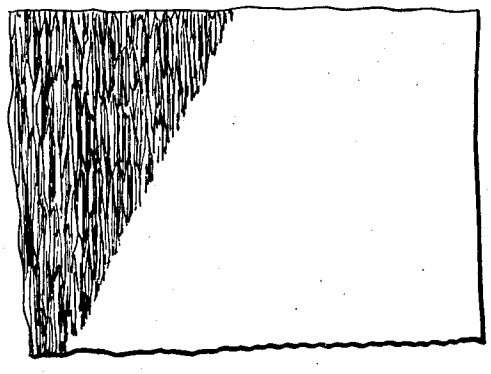


Fig. 3,



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UNITED STATES PATENT OFFICE.

EDWIN W. DAVIS, OF CLOQUET, MINNESOTA, ASSIGNOR TO WOOD CONVERSION COMPANY, A CORPORATION OF DELAWARE.

ELASTIC INSULATING MATERIAL.

Application filed May 9, 1925. Serial No. 29,037.

This invention relates to heat insulation, and more particularly to the insulation of refrigerator cars. It is an object of the present invention to provide a composite elastic sheet, light and flexible in nature and capable of use to excellent advantage as a heat insulating medium. To attain this object I utilize a flexible type of insulation (as distinguished from the stiff board-like type), and I face the insulation with an elastic and pliable liner or covering capable of expanding and contracting, and not likely to tear nor split when subjected to rough usage, as when used as insulation for refrigerator cars. I have found that creped paper in single or multiple thicknesses will serve well as the pliable liner. Saturated crepe paper in single or multiple plies can be used, and asphalt can be used to fasten multiple plies of paper together before creping, and also can be used for securing the liner to the more porous body of insulation. Also the liners can be stitched to the porous layer.

In the manufacture of refrigerator cars, it is customary to line the floors, walls and roof with some sort of heat insulating material. This material is usually nailed to the frame-work of the car and generally two or more layers of insulation are used. The insulation thus used in refrigerator cars is subjected to much rougher usage than when used for stationary structures, such as domestic refrigerators, dwelling houses, etc., because refrigerator cars, in rolling over the track, vibrate considerably due to the unevenness of the track, and, furthermore, are subjected to sudden impact, as when they bump together, or the brakes are applied quickly, or the train starts suddenly. In some cases the swaying or racking of the car may cause the top to be as much as 6″ or 8″ out of plumb with the bottom.

I have found that any rigid or inelastic form of insulation, when thus used in refrigerator cars, will tear out at the nails or fastenings, or the insulation itself will tear across. I have also found that stitching the insulation between paper to hold the insulation in place on the wood frame-work of the car results in a weak product, because the stitches perforate the paper and produce a line of weakness along which it is easy for the threads to cut the paper when the composite insulating material is subjected to the stresses above mentioned. Furthermore, even when the paper liners are not stitched to the insulating material contained between them, but are cemented to it, the paper is likely to tear, because of the stresses referred to above.

To overcome these and other difficulties, I have devised a very elastic and flexible insulating product which can be readily nailed to the frame-work of a refrigerator car, with the assurance that it will in no way become injured through racking of the car during its normal use. Since the material is highly elastic, the vibration and distortion of the car do not have any tendency to tear the material—the material simply stretching and contracting to conform to the relative movements of the parts to which the material is secured.

My invention contemplates the use of an elastic material, such as creped paper, in one or more layers, and in combination with an insulating material, such as wood fibre, hair felts, flax fibre, eel grass, or what not. Materials such as wood cotton are naturally quite elastic, and, therefore, the feature which renders my invention of considerable value is the use of an elastic medium in conjunction therewith, which not only serves as a means for protecting and holding the wood cotton or equivalent material in position, but also serves in itself as a heat insulator. The creped paper sheet is preferably cemented to the layer of wood cotton, or the like, so as to form a unitary product possessing superior heat insulating properties and considerable elasticity. These characteristics render it of particular value as a means for insulating the walls of refrigerator cars. The creped paper can be stitched to the layer of wood cotton, if desired.

My invention may be best understood by referring to the following detailed description which is to be considered in conjunction with the accompanying drawings in which I have illustrated the preferred embodiment of my invention. In these drawings:

Fig. 1 is a fragmentary vertical sectional

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view of a portion of a refrigerator car wall, constructed in accordance with my invention;

Fig. 2 is an enlarged sectional view of one embodiment of the insulation;

Fig. 3 shows the surface of the creped paper.

In Fig. 1, I have illustrated a portion of the wall of an ordinary refrigerator car. In the illustration, the wall, which is of wood, comprises frame members 1, furring strips 2 and 3, and outer and inner wood faces 4 and 5, respectively. Flexible elastic sheets 6 and 7 of insulating material, of the kind hereinafter described more in detail, are tacked to the frame members 1 before the furring strips 2 and 3 are nailed in place. Similarly, insulating layers 8 and 9 may be tacked in position over sheets 6 and 7 respectively before the furring strips 2 and 3 are nailed to the frame work. Faces 4 and 5 are nailed, through the insulating sheets, to the frame member. The particular manner of fastening the insulating layers to the frame work, and to one another, is of no particular importance provided the material is left free to expand and contract in accordance with the relative movement of the wall members to which it is attached. It will be understood that the floor and roof of the refrigerator car are also insulated in similar manner.

The nature of the insulating material proper can be best understood by considering Figs. 2 and 3. In Fig. 2, I have shown two layers 10 of creped kraft paper cemented to layer 11 of wood-wool. The layer of material is torn apart so as to reveal the layer 12 of cement on one of the sheets of creped paper. The wood-wool or wood-cotton, which I prefer to use, can be made in accordance with the process described in the H. F. Weiss Patent No. 1,336,402. In general this process consists in separating wood fibers by shredding and then blowing the loose fibers through a mist or spray of adhesive to a traveling belt or conveyor on which they arrange themselves in a soft and resilient mass with the fibers in heterogeneous arrangement and extending in all three cubical dimensions and cemented to one another, particularly at their points of intersection, by beads of the adhesive through which they have passed. This layer of loose fibers, which have been preferably cemented together, is then lined on one or both sides with an elastic liner, such as creped paper. This paper is preferably heavy and may be waterproofed with a suitable saturant so as to prevent the entrance of moisture into the material adjacent to the paper. The paper liner on each side of the fiber mat may consist of two or three layers cemented together with asphalt, the creping having been done after the sheets were cemented together. The paper liners are preferably cemented to the porous fibrous material so as to form a substantially unitary product which can be readily stretched. It may be desirable to provide the loose material with only one layer of creped paper, or a layer may be applied to both sides. The layers can be cemented to the insulating fiber mat with asphalt cement or some other suitable composition, or they may be stitched to it.

Instead of using the wood cotton described above, I may use any other flexible heat insulating material, such as hair felt, flax fibres, or eel grass.

The improved product which I have devised, whether in the form shown in the figures of the drawings, or any other form, can be appreciably stretched without injury. This makes the product of great value as a heat insulating medium in refrigerator cars.

It is to be understood that my invention is not limited to the particular embodiments illustrated and described, but includes such modifications thereof as fall within the scope of the appended claims. My invention contemplates the use of a light resilient heat insulating material having cemented or stitched thereto one or more sheets of elastic material such as creped paper. By creped paper, I have reference to the paper which is commonly known to the trade by that name, and also to any paper or thin lining material which possesses a degree of elasticity such that it will not rupture when secured to the walls of a refrigerator car, where the tendency to tear ordinary paper is pronounced.

I claim:

1. A heat insulating wall comprising a frame subject to racking and at least one sheet of fibrous composite insulating material, attached thereto, adapted to yield without rupture with said frame, said sheet comprising a layer of elastic material and a layer of fibrous material.

2. A heat insulating wall comprising a frame subject to racking and at least one sheet of fibrous composite insulating material, attached thereto, adapted to yield without rupture with said frame, said sheet comprising a plurality of layers of elastic material and an adherent layer of fibrous insulating material therebetween.

3. A heat insulating wall comprising a frame subject to racking and at least one sheet of fibrous composite insulating material, attached thereto, adapted to yield without rupture with said frame, said sheet comprising a plurality of layers of waterproofed creped paper and an adherent layer of wood-cotton therebetween.

In testimony whereof I affix my signature.

EDWIN W. DAVIS.