Sept. 26, 1933. A. L. SPAFFORD 1,927,879

INSULATION SLAB

Filed Nov. 16, 1931

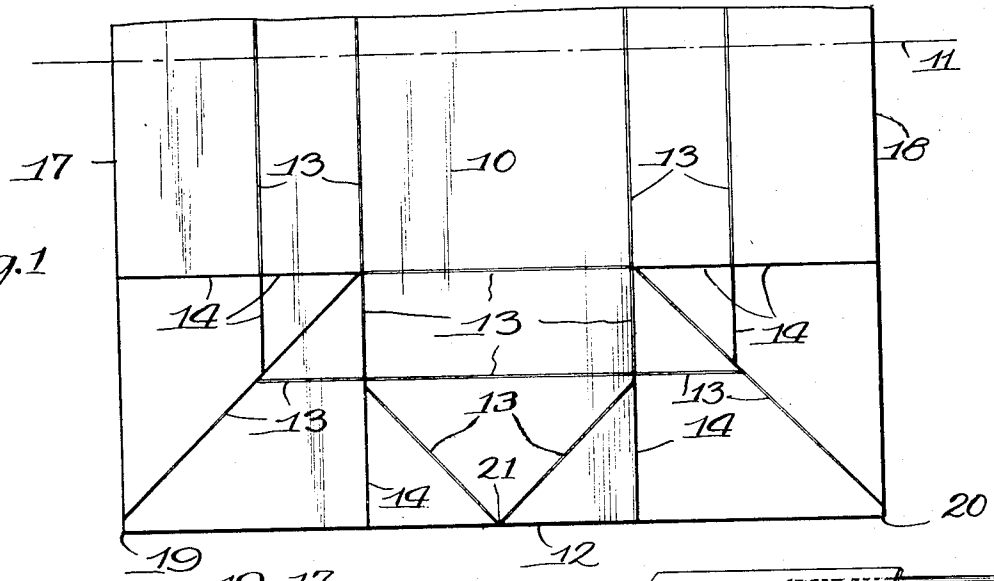


Fig. 1

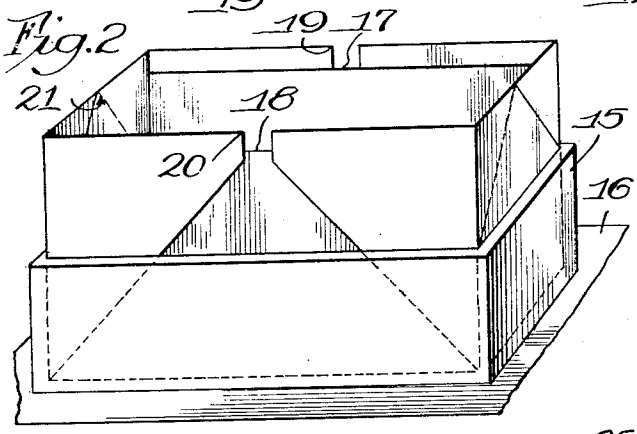


Fig. 2

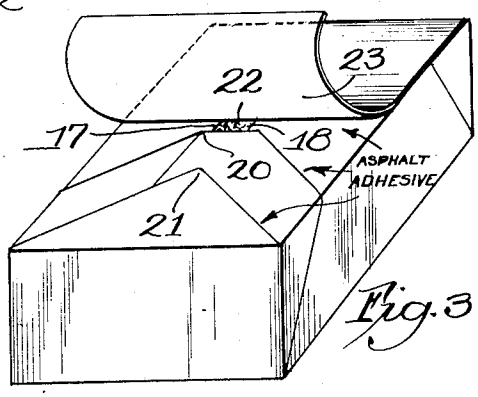


Fig. 3

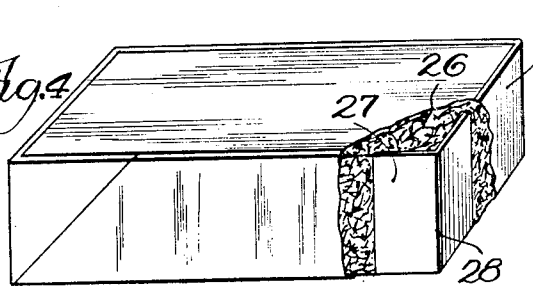


Fig. 4

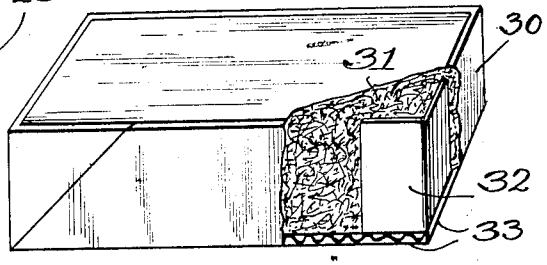


Fig. 5

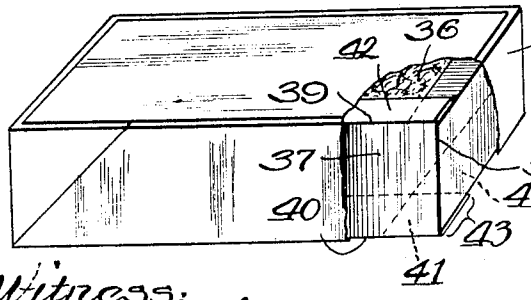


Fig. 6

Witness:
Chas. L. Lorch.

Inventor,
Allen L. Spafford,
By W. Bartlett Jones, Atty.

Patented Sept. 26, 1933 1,927,879

UNITED STATES PATENT OFFICE

1,927,879

INSULATION SLAB

Allen L. Spafford, Cloquet, Minn., assignor to Wood Conversion Company, Cloquet, Minn., a corporation of Delaware

Application November 16, 1931
Serial No. 575,171

6 Claims. (Cl. 154—44)

The present invention relates generally to insulation units or slabs, and in particular to sealed slabs, or packages containing packed fibers.

In the construction of many articles, such as walls, floors and ceilings in buildings, articles such as refrigerators, or sound proof closets, or cooling chambers, insulated vehicles, etc., recesses are provided between structural elements into which recesses sound or heat insulation is inserted. The recesses may have standard dimensions. To facilitate the insertion of insulation and to assure uniformity of insulation qualities in the finished structure it is desirable to have a previously prepared insulation unit which may be readily inserted into the various recesses. The present invention relates to improvements in the structures of such units and to methods of building such units.

The present invention has particular relation to structure primarily for special uses of the slabs. Slabs are used in insulating refrigerators. The small cabinet sizes, such as the household type comprise an outer casing into which an inner casing or tank is slipped, leaving a space between the two. The slabs normally reside in the spaces, and fit snugly against both casing. Paper wrap-wrapped slabs containing substantially non-rigid insulating filler have a tendency to "pillow" as casing or tank edge rides along the surface of a properly positioned full-sized slab, the filler and/or the paper tend to bunch up or "pillow" ahead of the advancing tank, and frequently the slab is punctured, torn, or its normal form distorted, so that its insulation function is impaired. Where a sealed and water-proofed slab is used, the puncture permits the entry of moisture.

Another difficulty is encountered in slabs for the purposes above described. When such slabs are shipped or handled in unconfined form, in which they are subject to bulging, the fibers may move about, or settle so that they become compacted in the bulged area and are supplied from another part of the slab which thereby becomes deficient. In refrigerators where such slabs are usually used with the thinner dimensions in a horizontal direction, loose pulp may settle downward, leaving the top devoid of filler, and hence not of insulative character. The present invention aims to overcome this defect.

While other forms of insulation may be used, the cost may be greater. Using a cheap but efficient bulky filler, and a cheap but efficient paper wrapper, the total cost of a slab is low and such low priced slabs are quite desirable and necessary for low-priced refrigerators.

The present invention aims to prevent pillowing in such slabs as above described.

A particular object of the invention is the provision of a slab of bulk fiber filler housed within in such compacted form that it has a suppressed expansibility.

One object of the invention is to so form the wrapper that it contributes to the prevention of pillowing.

Another object of the invention is the reinforcement of a face to prevent pillowing.

Another object of the invention is the reinforcement of the corners or edges to prevent pillowing.

Various other and ancillary objects and advantages of the invention, which in part contribute to reduction of labor, cost, and material, will appear hereinafter, from the description and explanation of the invention hereinafter given in reference to the accompanying drawing.

Fig. 1 illustrates a developed fragmentary end of a wrapper of flexible sheet material, showing the folds therein produced in one method of forming a bag-like structure from a plane sheet.

Fig. 2 illustrates an open-ended bag-like structure housed in a form retaining device, ready for insertion of filling material.

Fig. 3 illustrates a package which is formed after filling the bag of Fig. 2 and after folding in the extending sides of the bag.

Fig. 4 illustrates a package with one corner of the wrapper cut away to expose a corner reinforcement therein.

Fig. 5 is a view similar to Fig. 4 showing a bottom face reinforcement and a corner reinforcement.

Fig. 6 is a view similar to Fig. 4 showing a channel-form reinforcement at sides of the package.

The invention as it is preferably practiced consists in folding a piece of sheet material into a box-like form or bag-like structure and placing the same in a protecting form-retaining frame with bottom of a height preferably equal to the desired thickness of the ultimate package. Above the frame the sheet wrapper will extend on four sides, as a bag top, and provide an opening for the insertion of bulk fiber. Fiber is packed therein and compressed to below the level of the frame, and then released so that a natural resiliency of the packed mass will quickly swell it to the top level of the frame. Then the extending sides are neatly folded to seal the top, and if

desired other sealing means may be added. The closed package is removed from the frame as an article of predetermined size and form.

As sheet material I prefer a cheap strong substance which can be readily folded, such as kraft paper. It may be water-proofed on one or both sides, or by impregnation. The sheet material may be a duplex one, comprising two sheets, as of paper, cemented together with asphalt. Cloth or film material may be employed, The paper may be of any fiber such as cellulose fibers, or asbestos fibers and if desired it may be reinforced with threads or with woven fabric. In the drawing it is represented generally as sheet material without any attempt to designate a particular material.

The insulation fiber may be asbestos, feathers, hair, eel grass, kapok, cotton, mechanical or wood pulp, chemical pulp, partly fiberized wood, or any fibrous packing having a loose or bulky form, as distinguished from thick felted sheets or mats, which might be piled as such, in layer form, into a similar package. The loose bulky material has advantages in that by packing it and compressing it, a pressure is exerted in all directions, and the insulation qualities are more uniform in all directions, than where layers of exact size are employed, or where preformed mats are cut to size and piled. I prefer to use a wood fiber which may be made by partially cooking wood waste, or wood chips, to soften the lignocellulose, so that the fibers may be more readily separated. It is not necessary to separate all the fibers individually. Groups of fibers from a softened wood chip may hang together loosely, presenting fibers with free ends. A mechanical bruising, rolling, picking or beating of chemically softened wood waste or chips makes a suitable bulk fiber. It has a characteristic such that a handful of fibrous material may be picked easily from a larger supply, and be easily sprinkled or distributed inside the package without remaining in a ball or mass, like cotton for example. Such a character in pulp is not necessary for use in this invention, but is desirable in assisting workmen to distribute the fibers uniformly into a package where hand labor is employed in filling.

In practicing the invention a bag-like container, in character like the well known square-bottom paper bag, may be made in any desired manner. I prefer to make it from a sheet of flexible material by folding the same. One way in which this can be done is illustrated in the drawing. A sheet of wrapper material 10 (Fig. 1) is folded so as to contain ultimately the folds indicated in the Fig. 1. One end of an opened wrapper is shown. The line 11 indicates what may be a median line for the wrapper, and duplicating the structure, as by a mirror image on the other side of the line, would indicate a complete wrapper. The line 12 represents one end of the length of wrapper material. The body of the wrapper at the line 11 may be elongated or shortened according to the desired length for the package. Folds 13 with a crease pointing downwardly from the plane of the drawing, are shown in double lines. Folds 14, with a crease pointing upwardly from the plane of the drawing, are shown in heavy single lines 14.

An open bag, such as may be produced by the folded wrapper of Fig. 1 is placed in a form, such as a frame 15, resting on a surface 16. The numerals 12, 17, 18, 19, 20 and 21 on the wrapper of Fig. 1 correspond to the same parts with similar numbers found elsewhere in the drawing. For best results with the type of fiber described as preferable, loose fiber is placed into the bag to about twice the height of the ultimate thickness, more or less. This amount will about fill the extended sides of the bag. If necessary an auxiliary frame (not shown) may be placed over the frame 15 to aid in holding the extended sides during compression. Any flat plate or other means may be used to compact the fibers to a level below the ultimate level. When the plate is removed the fiber yields quickly to some extent by reason of a slight resilience, and attains the ultimate level. The sides are then folded in and sealed down to close the package.

Where the package is short the in-folded ends may overlap. Edges 17 and 18 may or may not overlap. Fig. 3 illustrates a package showing how the folded end appears. The sides are first folded in, and then the ends are folded over the in-folded sides. Edges 17 and 18 are shown as not overlapping, and pulp 22 is illustrated as visible in the space between them. A cover sheet 23 of material, preferably like the wrapper material, is sealed onto the folded face of the package. Asphalt is an excellent cement to use in holding down the folds and in sealing on the cover sheet, but others may be used. The cover sheet is shown turned up to expose the folds below it, to which the cover sheet is ultimately cemented.

Because the fiber is compressed and sealed quickly after the compression, the package made as described is somewhat subject to pillowing, more so at the bottom than at the top, because of the several thicknesses of wrapper at the top, especially at the ends. Accordingly, it is used with the top side, which is reinforced by several layers, presented to the sliding part in installing it, as in refrigerators.

In Fig. 4 a package is shown with wrapper 25, fiber 26 and with corner reinforcements 27, which may be of chipboard or other more rigid material folded at 28 on the corner. Four of these may be inserted at the corners in the open bag before filling with fiber.

In Fig. 5 a package is shown with wrapper 30, fiber 31, corner reinforcements 32, and a bottom reinforcement 33 in the form of a rigid sheet or plate, such as double-faced corrugated fiber board. In this case, the bottom face is preferably exposed to the sliding part. A similar reinforcement may be placed at other faces where they are particularly extensive in area, and protected from pillowing only by the single layer of wrapper material. It will be noted that in the structure herein specifically described, the bottom is the only large face which has but a single layer of wrapper over its entire area. The ends likewise have but one layer, but these are the smallest faces of the package, and therefore are less subject to pillowing.

In Fig. 6 a package is shown having wrapper 35, fiber 36, and a channel-form reinforcement 37. The channel-form may be made of a continuous length of rigid material, like chip board, folded at 38, for the corners, and folded on parallel creases 39 and 40 to form reinforced edges all about the package. The width of faces 41 and 42 may be the same or different, and face 41 is shown wider at 43, because of the weaker character of the bottom face of the wrapper. By employing a channel-form, or any other device forming a reinforcing edge, at the meeting line of adjacent faces, like folded edges 39 and 40, the channel sides 41 or 42 extending inwardly of the

package reduce the area of the wrapper faces which is exposed to the pillowing force, without making necessary the expense of sufficient material to cover the whole area, as is done by the corrugated board in Fig. 5. The channel-form is preferably continuous perimetrically, to provide a rigid frame in the slab.

The manner of incorporating the various reinforcing means in the combinations shown, or in modifications, or in other combinations, will be dictated practically by the size of package, the kind of wrapper, the kind of fiber, the degree of compression thereof, and the use for which the package is desired. The means may be placed inwardly from the wrapper and inside the fiber, but this is not practical for the method of making herein described. I prefer to have it interposed between the fiber and the wrapper.

Although the unit is primarily intended for heat insulation, its characteristics adopt it for use in sound deadening. It may be so used in floors, walls, ceilings and the like, where it will function as an insulator for heat and cold, and as an insulator for or absorber of sound. Therefore, in the accompanying claims it is to be understood that the term "insulation" or "insulator" refers to either function or to both functions.

From the foregoing description of the invention those skilled in the art may readily adapt it to certain constructions not specifically described and illustrated herein, but nevertheless contemplated by this invention as defined in the appended claims.

I claim:

1. An insulation unit in the form of a package of predetermined form comprising a closed containing wrapper of sheet material, a filler of packed bulk fibers, and reinforcing means at an edge defined by adjacent faces of the package, said means being interposed between the fiber and the wrapper.

2. An insulation unit in the form of a package of predetermined form comprising a closed containing wrapper of sheet material, a filler of packed bulk fibers, and a rigid reinforcing sheet at a face of the package interposed between the fiber and the wrapper.

3. An insulation unit in the form of a package of predetermined form comprising a closed containing wrapper of sheet material, a filler of packed bulk fibers, a rigid reinforcing sheet at one face of the package between the fiber and the wrapper, and corner reinforcements from said sheet to the opposite face of the package, said corner reinforcements being positioned between the fiber and the wrapper.

4. An insulation unit in the form of a package of predetermined form comprising a closed containing wrapper of sheet material, a filler of packed bulk fibers, and a channel form reinforcement at an edge of the package interposed between the fiber and three adjacent faces of the package.

5. An insulation unit in the form of a package of predetermined form comprising a closed containing wrapper of sheet material, a filler of packed bulk fibers, and a perimetric channel form reinforcement about the inside of the package between the fiber and the wrapper.

6. An insulation unit in the form of a rectangular package of predetermined form comprising a wrapper of sheet material, and a filler of packed bulk fibers, said wrapper being a folded form of a plane sheet forming in the package three faces having a single thickness of said material and three faces having in part more than one thickness of said material as a reinforcement for said faces.

ALLEN L. SPAFFORD.

CERTIFICATE OF CORRECTION.

Patent No. 1,927,879. September 26, 1933.

ALLEN L. SPAFFORD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 26, for "casing" read casings; and strike out the word "wrap-"; line 28, after "as" insert the words the inner casing slips along the slab. As the; and line 45, for "dimensions" read dimension; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of November, A. D. 1933.

F. M. Hopkins

(Seal) Acting Commissioner of Patents.