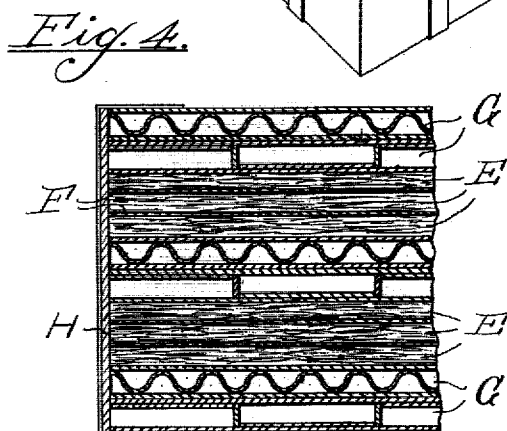
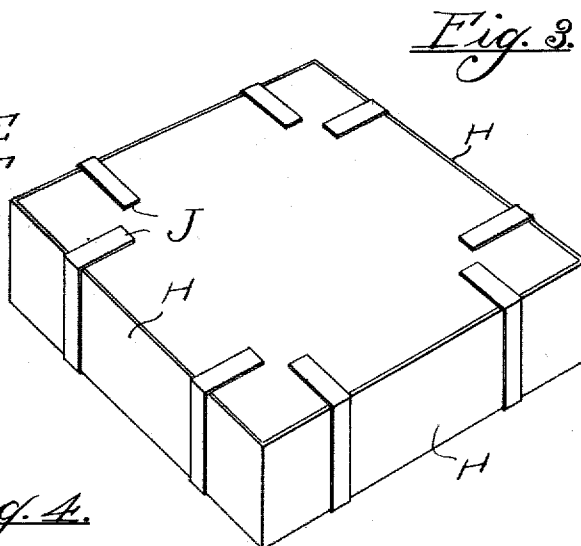
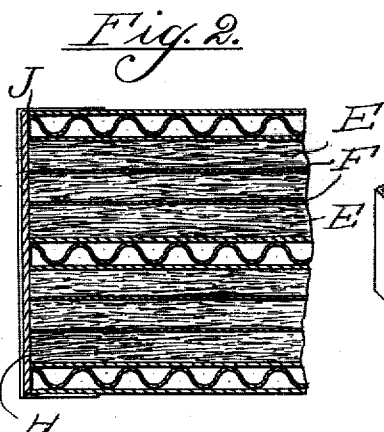
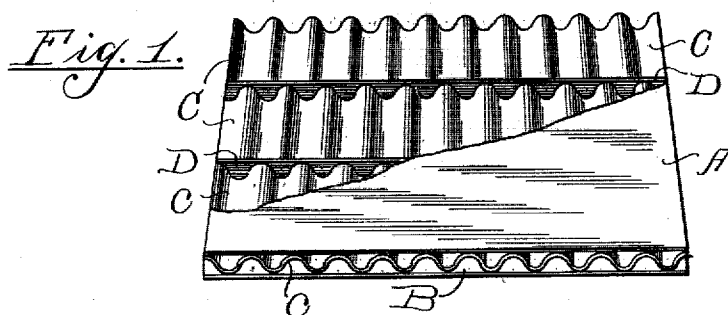


No. 822,848.

PATENTED JUNE 5, 1906.

E. KUNZ.
HEAT INSULATOR.

APPLICATION FILED SEPT. 16, 1904.



Witnesses:

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UNITED STATES PATENT OFFICE.

EMIL KUNZ, OF CHICAGO, ILLINOIS.

HEAT-INSULATOR.

No. 822,848.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed September 16, 1904. Serial No. 224,737.

To all whom it may concern:

Be it known that I, EMIL KUNZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have
5 invented certain new and useful Improvements in Heat-Insulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as
10 it appertains to make and use the same.

My invention relates to a novel construction in heat-insulators, the object being to provide simple and efficient means for insulating compartments, particularly refrigerators; and it consists in the features of construction and combinations of parts herein
15 after fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a perspective view illustrating a section of heat-insulating material constructed in accordance with my invention, part of same being broken away.
20 Fig. 2 is a fragmentary section of a composite heat-insulating wall or section thereof constructed in accordance with my invention.
25 Fig. 3 is a perspective view of a pad of heat-insulating material constructed in accordance with my invention. Fig. 4 is a section similar to Fig. 2, showing a modified form of construction.
30

An essential feature of my invention consists in providing heat-insulating material which is exceedingly light.

Another essential feature of my invention
35 consists in providing what I term "composite" heat-insulating material, in which a plurality of substances, all so-called "non-conductors" of heat, are employed, so that
40 to penetrate the body formed the heat will meet with various resistances to hinder its passage.

Another essential feature of my invention consists in forming such insulating material in pads or blocks of various forms and sizes,
45 which will enable it to be more readily handled and renders it stronger and more compact than if constructed to correspond in size and shape with the area to be covered or insulated thereby.

50 Another essential feature of my invention consists in providing in the insulating material a large number of small relatively isolated air-cells to so confine the air as to prevent it from serving as a vehicle to transmit heat
55 applied to or absorbed at one point in a wall

to other parts thereof, thus localizing such absorption or penetration.

To these and other ends my invention consists, primarily, in providing a heat-insulating sheet or wall which comprises two parallel
60 sheets A and B, of paper or other so-called "non-conductor" of heat, between which are mounted a plurality of parallel corrugated strips C of similar material, the ridges of the corrugations thereof being cemented to the
65 inner faces of the sheets A and B. Between adjacent strips C are provided partition-walls D, also of a similar material, the upper and lower edges of which are cemented to the inner faces of the sheets A and B. The edges
70 of said strips C abut against the said partition-walls, and the joints thus formed may be more completely hermetically sealed by introducing cement or glue or in any other convenient manner. The air-cells formed by
75 the concave recesses in the strips C are thus completely isolated from each other. It is advantageous in order to provide a perfectly tight joint between the ends of said strips C and the partition-walls D to so relatively dis-
80 pose said strips that the corrugations of adjacent strips are staggered.

A sheet of insulating material constructed as above is very efficient, for the reason that heat penetrating either of the outer sheets
85 cannot continue its passage, but is absorbed by the air in the cells therein, and its further passage is again resisted by the walls of said cell and by the air of adjacent cells, by which it is absorbed, so that penetration through
90 the sheet is exceedingly slow, thus rendering changes of temperature from exterior causes in a compartment lined with this material very slow, particularly by reason of the fact that the air contained in any one cell cannot
95 act as a vehicle to distribute any change of temperature except over a very small surface. This material is particularly adapted for lining refrigerator-compartments by reason of its very light weight and efficiency.
100 To render it more serviceable, the outer sheets A and B are coated with any suitable waterproofing material.

While insulating-sheets as above described are very efficient in themselves, it would be
105 expensive to form a thick insulating-wall therewith, particularly as the efficiency thereof becomes greater as the number of air-cells of smaller volume increases. Hence in the construction of thick insulating-walls it is
110

advantageous to use a cheaper filling, preferably of lighter materials. Such filling is preferably of a light fiber, and to produce the best results such fiber should be carded, for the reason that when all fibers extend in the same direction, so as to lie upon and overlap each other, the insulation is most effective.

In the animal kingdom it will be noted that hair or wool is always so arranged as to extend in one direction and overlapping and that nearly all animals have the power of raising the hair, this power being utilized by such animals in hot weather to cool the skin, so that it is reasonable to suppose that when the hair lies flat and overlaps the insulation is most complete. It will also be noted that such hair generally extends horizontally or downwardly—that is, that the free ends of the hairs are lowermost—so that the warm air contained in the fur cannot readily escape. Hence I prefer to employ a filling E, consisting of a plurality of layers of cotton wadding or similar material the fiber of which is carded, and this I arrange so that such fibers extend horizontally, the various layers of such fiber being separated by partitions of paper or similar material, as indicated at F. The cotton wadding which I prefer to use generally consists of two thin sheets of tissue-paper or calendered fiber, between which the carded fiber is held, and such thin paper or calendered fiber may form the partitions, or an additional sheet or sheets may be provided between the layers of such fiber. The said carded fiber is not sufficiently stiff for its own support, so that if loosely inserted between outer walls of stiff insulating material it would readily pack down in the lower portion of the space in which it is contained, so that the upper portion would form an air-space only. Hence to support such fiber properly the same is preferably slightly compressed between the outer walls and is cemented thereto by first coating the inner face of the outer wall with a suitable adhesive material and applying a sheet of wadding thereto while said adhesive material is moist. Additional sheets may be similarly cemented together and to any intervening partition-walls, so that such fiber is thus suitably supported. It will be obvious, however, that such support would not answer for large vertically-disposed areas of such fiber, and I prefer, therefore, to form relatively small blocks or pads as follows: Between two outer or double outer layers G of the cellular insulating material hereinbefore described I mount a plurality of sheets

of carded fibrous wadding, which may be alternated with additional sheets of said cellular insulating material and relatively stiff partition-walls, consisting of sheets of paper or the like. All of the sheets employed have a common area of, for example, one square foot, thus forming a block having such area and which is built up to any desired thickness. The edges of this block are bound or lined with stiff sheets H, of paper or cardboard or similar material, which have been previously coated on their inner faces with a suitable adhesive material by means of which the edges of all of the sheets contained in the block are cemented thereto, such blocks being further strengthened by strips J of tape or the like cemented at their free ends to the outer sheets G and passing over the sheets H.

The blocks formed are slightly compressed before the binding-sheets H are applied, so as to insure the retention of the wadding in proper relative position and exhausting part of the air contained therein. Such blocks may then be inserted in the walls of refrigerators and refrigerator-cars and used generally wherever insulation is desired, except, of course, where the same would be subjected to high temperatures.

I claim as my invention—

1. An insulating-wall comprising in combination, outer walls of relatively non-conducting material having small isolated air-cells therein, a filling comprising a plurality of layers of carded fibrous material, and intermediate walls of relatively non-conducting material interposed at intervals between said outer walls to support said filling.

2. As a new article of manufacture, an insulating-pad comprising in combination, parallel outer walls of a relatively non-conducting material provided with isolated air-cells, a filling of carded fiber interposed between said outer walls, a plurality of intermediate supporting-walls interposed in said filling, and a binding of relatively non-conducting material around the edges of said pad, said carded fiber and said outer and intermediate walls being cemented together and said binding being also cemented to the edges.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

EMIL KUNZ.

Witnesses:

RUDOLPH WM. LOTZ,
F. SCHLOTFELD.