

E. KUNZ.
HEAT INSULATOR.
APPLICATION FILED DEC. 17, 1904.

Fig. 1.

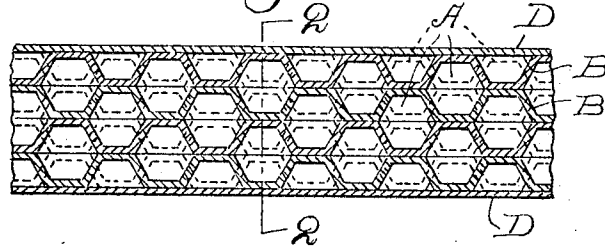


Fig. 2.

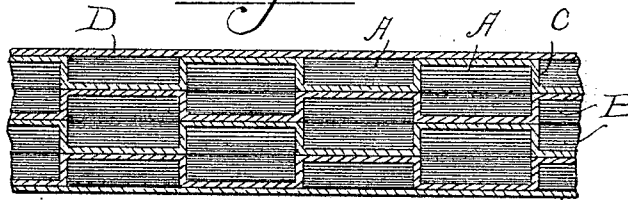


Fig. 3.

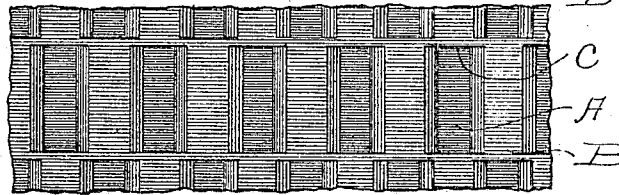
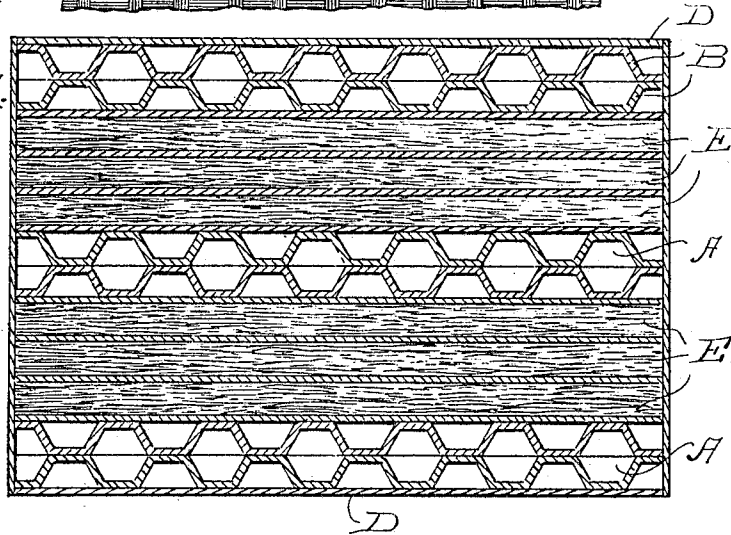


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

EMIL KUNZ, OF CHICAGO, ILLINOIS.

HEAT-INSULATOR.

No. 798,804.

Specification of Letters Patent.

Patented Sept. 5, 1905.

Application filed December 17, 1904. Serial No. 237,343.

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 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 will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a novel construction in a heat-insulator, the object being to provide simple and efficient insulation particularly adapted for refrigerator compartments, cars, &c.; and it consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a transverse section of a fragment of a heat-insulating wall constructed in accordance with my invention. Fig. 2 is a section of same on the line 2 2 of Fig. 1. Fig. 3 is a fragmentary top plan view of a corrugated sheet used in the construction of my heat-insulator. Fig. 4 is a transverse section of a heat-insulating pad constructed in accordance with my invention.

My said invention has for its main object to produce a heat-insulating wall or lining for walls containing maximum air-space divided into relatively small isolated cells and a minimum of solid substance.

A further essential object of my invention consists in providing means for building up a structure as above with the greatest possible ease and in such a manner as to insure the greatest possible strength in the whole and least possible proportionate weight and, furthermore, to provide means for readily hermetically sealing each of the air-cells, so as to obviate all communication between the same.

To these and other ends my invention consists in providing what I term a "honeycomb" structure of relatively non-conducting material—such, for instance, as paper—the cells of which are preferably hexagonal in cross-section and adjacent cells and adjacent rows of cells relatively staggered and isolated from each other to provide a large number of relatively isolated "dead-air" cells having no communication with each other and which are separated from each other by relatively thin non-porous walls.

I desire to call particular attention to the shape of the air-cells, as this is a most important feature of the invention by reason of the

fact that such shape permits of maintaining relatively more air-space per cubic foot of structure in proportion to the solid matter than any other shape, thus making the weight per cubic foot of structure less than that of any other "air-cell" insulation compared with the number of isolated cells embodied. In other words, the weight per thousand air-cells of a given size is less with my structure than with any other structure of a similar nature made of the same material.

Air which is not free to circulate is recognized as one of the best, if not the very best, insulating material. Hence a wall having a maximum amount of air-space divided into small isolated cells must necessarily offer great resistance to penetration of variations in temperatures. The walls of such air-cells serve only as a means for preventing circulation of the air; but as a solid material is, generally speaking, a better conductor than gaseous material it will be obvious that the less wall there is contained in the structure in proportion to the size and number of air-cells the greater will be its efficiency.

The hexagonal shape is further advantageous by reason of the fact that it provides greater strength in the structure than other shapes of cells, the greater strength being due to the relative angles and disposition of the dividing-walls between the cells, such strength being further enhanced by the relatively staggered disposition of the cells.

The hexagonal air-cells A are formed by superimposing upon each other two or more sheets B, of a non-conducting material, which are corrugated to provide a plurality of parallel rows of semihexagonal recesses, the recesses of each row being staggered relatively to the recesses of adjacent rows and being regularly spaced, so that between each pair of recesses or pockets in one side of the sheet there will be a similar oppositely-disposed recess in the other side of the sheet, so that each inclined wall forms the dividing-wall between two recesses on opposite sides of the sheet.

The end walls C of the recesses are relatively continuous over the entire length of the sheet and are flush with the raised surfaces on opposite sides thereof, the said end walls being relatively thick, so that when two sheets are superimposed upon each other sufficient surface will be provided on the edges of said end walls to receive sufficient adhesive material to insure a hermetically-sealed

joint. Said sheets are so superimposed upon each other that the raised surfaces are flush with each other and in contact, and by reason of the relatively large areas of plane surface provided sufficient adhesive material may be interposed to insure firm hermetically-sealed joints. Any number of said sheets B may be superimposed upon each other to form a honeycomb structure of any desired thickness and area. The outer faces of the structure are preferably covered with plane sheets D. The material used is preferably paper, which is easily handled and is a relatively poor conductor of heat. The paper is preferably coated with a suitable waterproofing compound and may also be impregnated with a fireproofing compound, as will be obvious. The said honeycomb structure may obviously be used in connection with other insulating means, such as a plurality of layers E of fibrous material, preferably carded, which is interposed between walls of said honeycomb structure and alternated with plane reinforcing-sheets, to which said layers of fibrous material are cemented.

I claim as my invention--

1. An insulator, comprising a honeycomb structure consisting of a plurality of sheets each provided with contiguous semihexagonal corrugations, said sheets being superimposed upon each other so that the ridges of the corrugations lie upon each other and the depressions register with each other to form hexagonal cells.
2. An insulator, comprising a honeycomb structure consisting of a plurality of sheets each provided with a plurality of rows of contiguous oppositely-disposed semihexagonal corrugations, the corrugations of adjacent rows being relatively staggered, said sheets

being superimposed upon each other so that the ridges of the corrugations lie upon each other and the depressions register with each other to form hexagonal cells.

3. An insulator, comprising a honeycomb structure consisting of a plurality of sheets each provided with a plurality of rows of contiguous oppositely-disposed semihexagonal corrugations, the corrugations of adjacent rows being relatively staggered, and partition-walls interposed between adjacent rows of corrugations, said sheets being superimposed and cemented upon each other so that the ridges of the corrugations and the edges of the partition-walls lie upon each other and the depressions register with each other to form relatively staggered hexagonal cells.

4. An insulator, comprising a honeycomb structure consisting of a plurality of sheets each provided with a plurality of rows of contiguous oppositely-disposed semihexagonal corrugations, the corrugations of adjacent rows being relatively staggered, and relatively thick partition-walls corresponding in height with the depth of the recesses of said corrugations interposed between adjacent rows thereof, said sheets being superimposed and cemented upon each other so that the ridges of the corrugations and the edges of the partition-walls lie upon each other and the depressions register with each other to form relatively staggered hexagonal cells, said cells being hermetically sealed by the cement interposed between the sheets.

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

EMIL KUNZ.

Witnesses:

RUDOLPH WM. LOTZ,
F. SCHLOTTFELD.