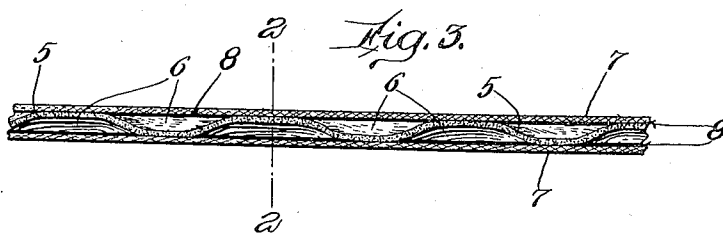
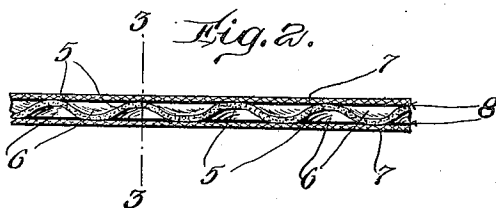
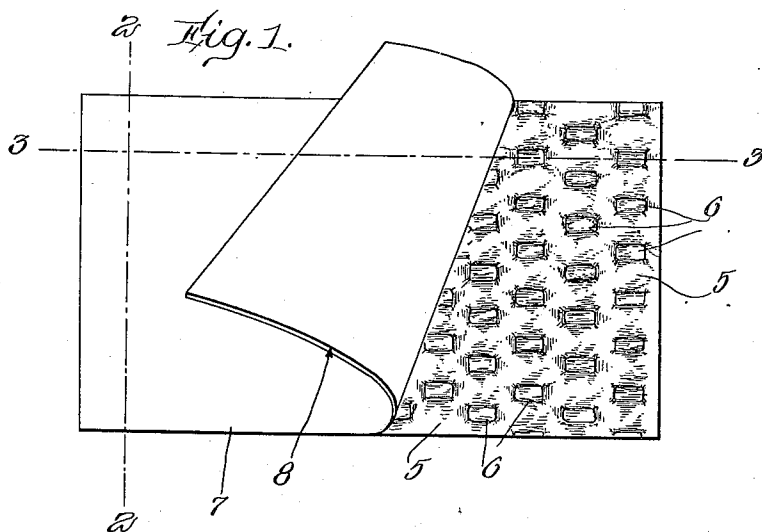


C. S. BIRD.  
 INSULATING SHEET.  
 APPLICATION FILED FEB. 14, 1910.

999,951.

Patented Aug. 8, 1911.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

CHARLES S. BIRD, OF EAST WALPOLE, MASSACHUSETTS.

## INSULATING-SHEET.

999,951.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed February 14, 1910. Serial No. 543,838.

*To all whom it may concern:*

Be it known that I, CHARLES S. BIRD, of East Walpole, in the county of Norfolk and State of Massachusetts, have invented a new and Improved Insulating-Sheet, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

This invention relates to improvements in insulating sheets formed of several layers of paper and adapted for use as insulation to retard the passage of heat and particularly for use in refrigerator cars or other refrigerating structures in which the temperature is considerably below the normal atmospheric temperature.

The object of the invention is to so construct a paper insulating sheet or structure having a multiplicity of air cells that the paper sheet having said air cells shall be protected from moisture.

The invention consists in the peculiar insulating sheet herein shown and described.

Figure 1, represents a plan view of a portion of a sheet of the new insulating material. Fig. 2, represents an enlarged sectional view taken on lines 2—2, Figs. 1 and 3. Fig. 3, represents an enlarged sectional view taken on lines 3—3, Figs. 1 and 2.

Similar numbers of reference designate corresponding parts throughout.

Insulating sheets or strips of the nature herein referred to are formed of paper and are used for the general purposes of insulating chambers or compartments from the heat of the atmosphere. Said sheets may, however, be used to advantage as non-conductors of heat in or on any suitable structure.

In refrigerating cars or compartments the temperature is considerably less than that of the atmosphere and, consequently, the walls of said compartment become heated sufficiently to effect the condensation of moisture contained in the cooler air within the compartment. Such moisture attacks and, ultimately, will injuriously affect ordinary paper insulation and particularly such insulation having air cells formed therein.

In carrying this invention into practice, I find that a satisfactory insulation may be formed by a compound structure formed by several layers of paper, one of which is fur-

nished with means for segregating a multiplicity of small bodies of air, and others of which form covers each common to all of the air cells at one side of the cellular sheet, but such insulation in actual use attracts moisture and the fibrous paper material absorbs such moisture and soon becomes pulpy and useless; tearing or falling away from its supporting means and leaving openings for heated air.

As shown in the drawings 5, represents the cellular paper sheet having at each side a multiplicity of air cells 6, 6, formed by indenting or embossing said sheet: 7, 7, are outer sheets of waterproof paper which are secured to the ridges or boundaries of the air cells 6, 6, by the comparatively thick coatings of asphaltic waterproof adhesive 8, 8, in which said ridges are partially embedded, said coatings 8, 8, being applied to the surfaces of the sheets 7, 7 before said sheets are brought against the sheet 5.

In insulation of this character one object is to secure the insulating qualities of air by furnishing means for segregating comparatively small bodies thereof, to avoid the circulation of the air. The more complete the layer of air surrounding the compartment to be insulated the more effective is the insulation and, therefore, the shape of the air cells 6, 6, is preferably such that the edges of the air cells at one side of the sheet overlap the similar cells 6, 6, at the other side of said sheet so that, in effect, as to its insulating properties, the sheet 5 forms continuous unbroken means for segregating small bodies of air without breaking the continuity of the layer of air, while the waterproof covers 7, 7, with their asphaltic layers 8, 8, protect the sheet 5 from moisture.

Having thus described my invention I claim as new and desire to secure by Letters Patent.

An insulating sheet comprising a body-portion formed of a sheet of paper provided on each side with rows of indentations to constitute cells, and a row of ridges between each pair of rows of cells, the cells and ridges of one row being alternately disposed with respect to the cells and ridges of the other row, a sheet of paper positioned against one side of said body to close the mouths of the cells on one side of the body-

portion, a sheet of paper positioned against the other side of said body to close the mouths of the other cells, the edges of said cells upon one side of the body-portion overlapping the edges of the cells upon the other side, and a heavy coating of asphaltic material upon the inner faces of each of said

outer sheets, said rows of ridges embedded in said coating.

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