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J. L. FINCK

2,091,918

INSULATING MATERIAL

Filed Oct. 17, 1932

Fig. 1.

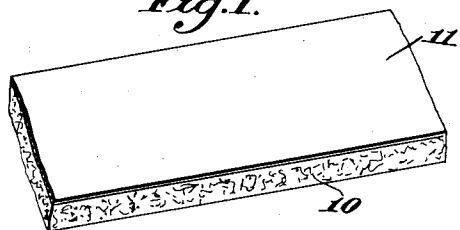


Fig. 2.

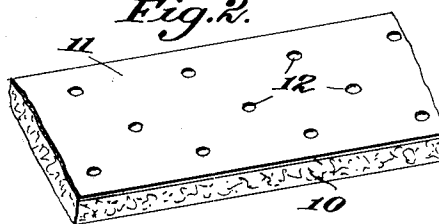


Fig. 3.



Fig. 4.

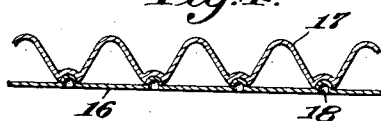


Fig. 5.

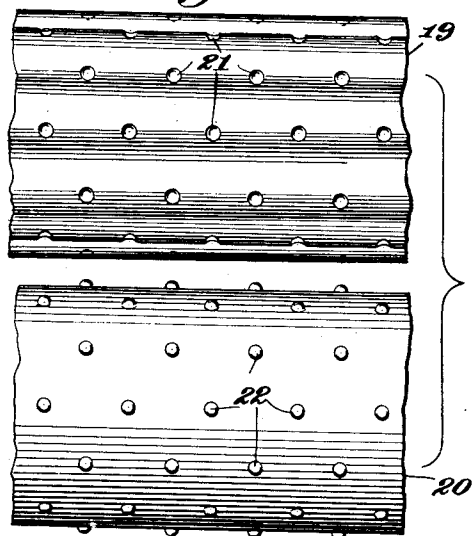


Fig. 8.

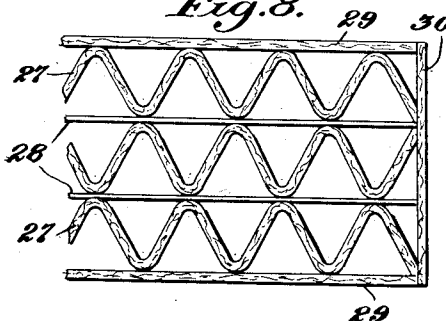


Fig. 6.

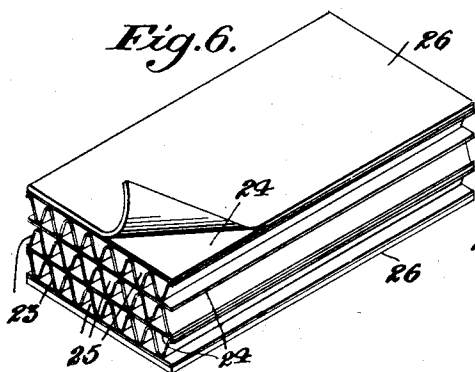
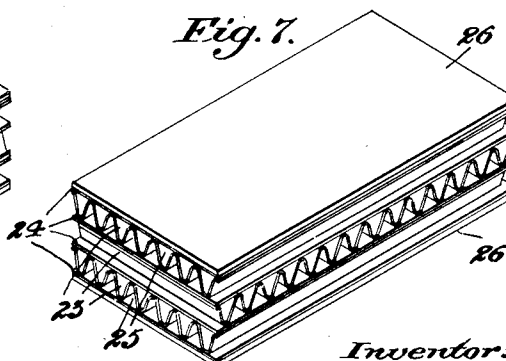


Fig. 7.



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UNITED STATES PATENT OFFICE

2,091,918

INSULATING MATERIAL

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Application October 17, 1932, Serial No. 638,234

1 Claim. (Cl. 154-45)

The present invention relates to a novel fabricated sheet insulating material that may be employed in a large variety of insulating spaces such as in the walls of refrigerator cabinets, refrigerator cars, in containers designed for housing perishable food materials, or in walls, ceilings or roofs of buildings and more particularly to such types of insulating material which form or are designed to form air spaces so that the resulting structure derives its resistance to heat flow at least in part from the presence of air spaces.

It is the object of the present invention to provide such fabricated material with a metal coating on the face disposed toward the air space so that the transfer of radiated heat across the air space is reduced to a minimum.

The present invention may be applied to or embodied in fabricated structural materials as are employed in buildings or the like against air spaces in the wall, in which case the material would be provided with a metal coating on the face disposed toward the air space. The invention may also be embodied in fabricated sheet insulating materials of the kind that are fabricated to embody air spaces within the fabricated material. Corrugated or indented paper or corrugated cardboard are examples of this type of material. When the invention is applied to this type of material a facing of metal foil is associated with the corrugated sheet material.

For a more detailed disclosure of the present invention reference is had to the accompanying drawing.

Fig. 1 shows a fabricated structural material having a metal facing;

Fig. 2 is a modified form of the embodiment shown in Fig. 1;

Fig. 3 shows a corrugated fabric having a metal foil facing;

Fig. 4 is a modified form of the embodiment shown in Fig. 3;

Fig. 5 illustrates an apparatus that may be employed in the manufacture of the embodiment shown in Fig. 4;

Fig. 6 shows an insulating material having several layers of corrugated paper or cardboard, the same being assembled so that the corrugations run in the same direction, and having metal foil interposed between adjacent layers;

Fig. 7 shows a similar assembly in which the corrugations of adjacent layers are perpendicular to each other, and

Fig. 8 shows another type of wall board embodying the present invention.

In the drawing Fig. 1 shows a fabricated building material 10 such as fibre board, plaster board or the like having a metal coating 11 preferably in the form of a metal foil. The foil may be of any suitable metal or alloy which is resistant to oxidation such as aluminum, tin, lead alloys, rust proof steel or the like. In the form of the invention shown in Fig. 1 the foil is pasted on one face of the sheet material.

In Fig. 2 the foil 11 is caused to adhere to the sheet material 10 by the aid of the indented portions 12. This is accomplished by feeding the material 10 and the metal foil 11 between a pair of rolls, the lower roll having a smooth face and the upper roll having spaced teats or projections thereon which serve to form the depressions 12 and cause the spaced portions of the metal foil to dig into the building material.

When the material shown in Figs. 1 and 2 is employed in wall constructions or the like, the same is disposed against air spaces in the wall with the metal coating disposed toward the air spaces thereby reducing thermal radiation to a minimum.

Fig. 3 shows corrugated paper or cardboard 13 faced with metal foil 14 and 15 of the kind described. As shown in Fig. 3 the corrugated fabric is provided with two facings 14 and 15 each of metal foil. If, however, a plurality of layers of the material are employed, as shown in Figs. 6 and 7, the corrugated fabric is provided with only one metal foil facing, and, if desired, one of the outer layers may have a metal foil facing on each side thereof.

In the manufacture of the metal lined corrugated paper any machine of the type commonly employed in the manufacture of lined corrugated paper or cardboard may be employed. More specifically, the type of machine which applies paste or other adhesive to the crowns of the corrugations and which will leave the portions of the metal foil facing the air space uncoated must be employed. Such machines are well known in the art and are exemplified by the machines shown in the U. S. patents numbered 212,723, 1,263,000, 1,473,096, and 1,835,816. These machines may be employed for the manufacture of a corrugated paper having either one metal lining or two as desired.

Fig. 4 shows a form of the invention in which the employment of paste or other adhesive is eliminated. In this form of the invention the metal foil 16 is held in permanent assembly with the corrugated paper or cardboard 17 by means of indentations or depressions 18 which cause

the metal foil to interengage with the crowns of the corrugations. Fig. 5 shows a pair of cooperating rolls which serve to produce the product shown in Fig. 4. The roll 19 corresponds to one of the corrugators commonly employed in the machines referred to hereinabove, and the roll 20 corresponds to the smooth faced pressure roll commonly employed to cooperate with the roll 19 to associate the lining or facing with the corrugated sheet. In the present form, however, the crests or crowns of the roll 19 are provided with depressions 21 at spaced intervals and the face of the roll 20 is provided with registering and cooperating teats or projections 22 similarly spaced on the face thereof. The depressions 21 do not in any way interfere with the step of corrugating the sheet material, and cooperate with the teats 22 so that when the corrugated sheet and the metal foil pass between the rolls 19 and 20 the metal foil will be depressed in spots into the crests of the corrugations, thereby giving the product shown in Fig. 4.

It will be understood that in the form of the invention shown in Figs. 6 and 7 either the material shown in Fig. 3 or Fig. 4 may be employed.

The foil that may be employed in the present invention should be of a metal that has a high reflectivity and low emissivity to radiated heat. Aluminum foil accomplishes this purpose although other metal foils which are difficultly oxidizable may be employed.

The material shown in Figs. 6 and 7 is intended largely as an insulating filler for refrigerator cabinets or the like or it may be employed for constructing cases or containers for the transportation of perishable foods or the like and for a variety of other purposes. This material consists of alternate layers of corrugated paper or cardboard 23 and metal foil 24 so that the air spaces 25 formed by the corrugations are faced with metal foil, thereby reducing the transmission of radiated heat to a minimum. If desired this material is covered with a layer of paper or cardboard on each face thereof merely to protect the outer layers of metal foil.

Fig. 8 shows a relatively rigid fireproof structural material which may be employed in the building of partitions in fireproof structures. This material embodies the principle of the present invention and is composed of alternate layers of corrugated sheet asbestos 27 and sheet metal or metal foil 28 and is preferably additionally provided with a layer of sheet asbestos 29 on each side thereof. It will be understood that other fireproof and heat resistant materials may be employed in lieu of asbestos.

The sheet asbestos employed in this product is of substantial thickness and any sheet asbestos may be employed. The metal foil employed in the products shown in Figs. 1 to 7 inclusive is not designed to add rigidity to the product and may be of the order of magnitude of one ten thousandth to one thousandth of an inch thick. The metal employed in the product shown in Fig. 8 may be of much heavier stock and may even be sheet metal of the type that will add rigidity to the product. It will be understood, however, that the corrugated sheet asbestos alone or taken together with the sheet asbestos 29 make a rigid structure in which case the metal 28 may be relatively thin metal foil. In all cases, however, the metal selected should be of the type which is difficultly oxidizable and which retains its low emissivity and high reflectivity throughout its life.

The product shown in Fig. 8 is therefore in the form of a rigid board that has high heat resistant and fireproof qualities. The provision of the sheet metal or metal foil layers 28 in this form of the product is particularly effective as fireproofing structural materials for the reason that at high temperatures the proportion of heat transferred across an air space by conduction and convection is small and the heat is transferred largely by radiation. The presence of air spaces faced with metal minimizes the transfer of heat by radiation, thereby reducing to a minimum the heat transfer across the air spaces.

The material shown in Fig. 8 may also be employed in the insulation of fireproof safes and other fireproof structures.

In the manufacture of the material shown in Fig. 8 water glass may be employed as an adhesive between the metal foil or sheet metal and adjacent sheet asbestos. It will be understood, however, that other means for attaching these together may be employed.

If desired the edges may be covered with strips of sheet asbestos 30 as shown in Fig. 8.

I claim:

As a new article of manufacture, a heat insulating material consisting primarily of corrugated fibrous sheet material and a facing consisting of a flat sheet of metal foil, the metal foil and the crowns of said corrugations having interengaging parts for holding the same in assembly, the said metal foil being exposed on both faces thereof except where it is in contact with the crowns of such corrugations.

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