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HEAT INSULATION STRUCTURE

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Fig. 1

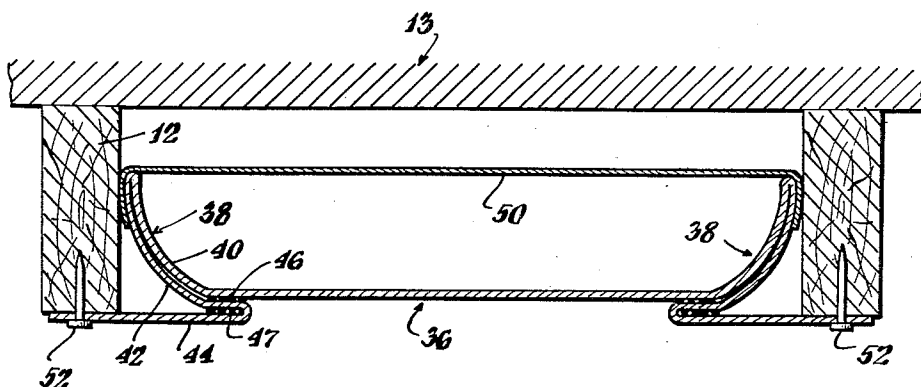
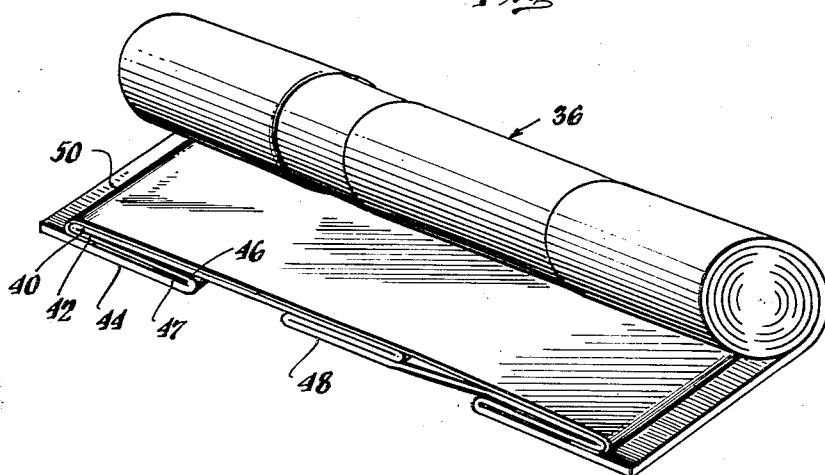


Fig. 2



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1

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HEAT INSULATION STRUCTURE

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Original application August 9, 1955, Serial No. 527,243, now Patent No. 2,782,914, dated February 26, 1957. Divided and this application October 12, 1956, Serial No. 615,552

1 Claim. (Cl. 206—59)

This application relates to thermal insulation of the type which is formed by paper and foil so constructed that the insulation can be rolled into a compact bundle for shipment but which opens up for application in building structures. One form of insulation of this general category is shown in Turner et al. Patent No. 2,312,301 dated March 2, 1943. The product of this patent has great value and has gone into extensive commercial use. It does, however, have certain drawbacks and the present invention relates to an improvement on that material.

In the structure shown in the Turner et al. patent, when the paper backing is drawn out, triangles are formed which project from the face of the backing sheet and aluminum foil runs across between these triangles to supply the insulating member. This gives excellent insulation for a large part of the area to be covered but the triangles leave a gap immediately adjacent to the studs of the buildings to which the insulation is attached, and the heat flow through these gaps is enough seriously to interfere with the effectiveness of the product as a whole. Overcoming this difficulty is very simple if substantially rigid materials such as paper board could be used, for these materials could be nailed to the inside of the studs and would be stiff enough to hold the foil practically up against the face of the stud. Unfortunately, however, from a commercial angle the use of these rigid members is not feasible, for one of the most important features of an insulation structure of this type is that it should be capable of being formed into compact rolls, that is, of being rolled about a core which ordinarily is no larger than approximately four inches in diameter.

In considering this problem, it must be borne in mind that even though the foil that runs across from one stud to the other is very light, nevertheless it has some weight and tends to exert a continuing pull on the support members. The problem which we are discussing is particularly important for foil that goes into the ceilings, and of course in the ceiling the foil that runs between the studs exerts a continuing tendency to sag and thereby pulls on the supports.

I have found that it is possible to solve this problem by using kraft paper which may be either fairly heavy kraft or asphalt laminated kraft (known as duplex paper) as the backing sheet and folding this sheet in such a way that when it is installed in the building structure, two layers of the paper extend in against the face of the stud and the structure is so built that as it is attached to the studs, relative movement between the two layers of paper that extend in alongside of the stud face is prevented. It is a fact that if paper is folded over on itself and the two layers are brought together and held against relative movement, the paper thus folded has a stiffness very much greater than simply the added stiffness of two sheets not connected together. In making the structure of the present invention, I take advantage of this fact and while utilizing it I am able to obtain a member which is stiff enough to hold the foil substantially to the face of the stud and yet the two layers of paper add little

2

in the way of thickness to the structure to prevent it being rolled along a line parallel with the folds referred to.

The present application is a division of my earlier application Serial No. 527,243, filed August 9, 1955, now Patent No. 2,782,914. The particular embodiment of my invention covered by this divisional application is illustrated in the accompanying drawing in which—

Fig. 1 is a sectional view taken through two studs of a building showing the insulating structure in place.

Fig. 2 shows the structure of Fig. 1 as it is folded in roll form.

In the embodiment of the invention illustrated in these drawings the structure of this invention is primarily intended to be nailed across the outer face of the studs of the building so that the main sheet lies substantially in a plane across the outer faces of the studs.

The numeral 12 indicates the studs of the building and 13 may be sheathing, a roof, or attic floor or the like. The insulating structure itself which embodies my invention comprises a main sheet 36 which, as stated, is formed of kraft paper or preferably a laminated sheet of kraft paper and asphalt. If kraft paper alone is used, it may be for example of a weight between 50 pounds per ream and 90 pounds per ream. The usual laminated sheet is made of two layers of kraft paper of 30 pounds per ream and 30 pounds of asphalt per ream are included in the center. The main sheet 36 includes a pair of support members 38. The support members 38 are formed by zigzag folds in the main sheet 36 and these are made by folding the paper inwardly over against the bottom of the body of the main sheet and the paper is again folded upwardly over against the bottom of the in-folded portion leaving a zigzag fold having three layers of paper, 40, 42 and 44 respectively in the fold. The two top layers of paper 40 and 42 are preferably glued together to form the stiffened support member 38 and the glue line indicated at 46 holds the two layers of paper 40 and 42 against relative movement in face-to-face contact. If desired, the entire surface of the two layers of paper in the support member may be glued together, and in the preferred form of my invention shown, I position a second glue line 47 for a portion of the distance between the two bottom layers of paper 42 and 44 in the zigzag fold for added strength. An expandible pleat 48 is positioned in the body of main sheet 36 between the zigzag folds, and a sheet of foil 50 is attached to the middle layer of paper 42 of support members 38.

As shown in Fig. 2, the collapsed structure is a compact one, and since the zigzag folds are symmetrically positioned in sheet 36 the collapsed structure may be readily rolled up tightly around a core as small as 4 inches in diameter or even less. The zigzag folds adjacent the margins of the sheet each have three layers of paper in them and a central pleat 48 is also formed in the sheet to be expanded as will later be explained. Since no portion of the collapsed structure has a thickness of more than three layers of paper, rolling of the sheet in collapsed form can readily be accomplished. Rolling the paper about the core tends to press and iron out the paper and the layers in the zigzag folds 38 are pressure-set and held against relative movement in face-to-face contact in the roll. It may also be noted that the foil 50 is positioned on top of the main sheet 36 so that the foil is rolled up inside the roll where it is protected by the main sheet which forms the exterior surface of the roll.

In the structure of the present application it is the sheet of foil 50 that causes the support members 38 to lift up above the level of main sheet 36 and this is done by making the sheet of foil short enough so that it will exert a pull on the support members and lift them up away from main sheet 10 when pleat 48 is expanded by pulling outwardly on the two bottom layers of paper 44

3

of the zigzag folds. After pleat 48 is expanded and the support members are in raised position the support members are pushed in between adjacent studs in the building, as shown in Fig. 1, and the structure is held in position by nailing, stapling, or otherwise affixing the bottom layer of paper 44 to the outer face of the studs, as indicated at 52 in Fig. 1. As there shown, the stiffened support members have a spring action and they tightly press the foil against the inner face of the studs.

As in the form claimed in the application of which this is a division, the two layers of paper 40 and 42 in support members 38 are held against relative movement in face-to-face contact so that I gain the advantage of the truss effect for stiffness, but in this case the support members are also bent and in addition to the truss effect this bending gives them a spring action for pressing the foil against the inner face of the stud. In this connection, it will be noted that the support members are bent up against the natural resiliency of the paper, and this in connection with the truss effect makes the spring action very pronounced, so that the foil is tightly pressed against the inner face of the stud. The length of the span of foil is preferably made long enough so that the foil is not actually under tension when the structure is installed in the building even though it initially serves to raise the support members 38.

It will be understood that I intend to cover all changes and modifications of the preferred embodiment of my invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of my invention.

What I claim is:

A roll of thermal insulation adapted to be opened up to form an insulating structure comprising spaced layers

4

of material to resist the flow of heat, which structure will be held so as to run from the inner face of one stud of a building to the inner face of an adjacent stud, such roll comprising a sheet of paper having symmetrical zigzag folds adjacent each side in which the paper is folded inwardly over against the bottom of the body of the sheet and then folded again outwardly over against the bottom of the infolded portion, each of the folded lines being sharply pressed by the rolling to hold the three layers of paper in face-to-face contact in the zigzag fold, means for holding the said layers against relative movement in face-to-face contact to form a pair of stiffened support members, a thin sheet of aluminum foil attached to the middle layer of paper in the zigzag fold and an expansible pleat positioned in the body of the sheet of paper between the zigzag folds which is adapted to expand when lateral force is applied across the paper sheet by pulling outwardly on the two bottom layers of paper in the zigzag folds, whereby the sheet of foil will cause the stiffened support members to lift and stand up along the length of the paper sheet near its edge when the body of the sheet of paper is expanded whereby the insulation structure may be installed between adjacent studs in a building by attaching the bottom layer of paper in the zigzag fold to the outer faces of adjacent studs of a building to hold said upright support members and the sheet of foil carried by them pressed against the inner faces of such studs.

References Cited in the file of this patent

UNITED STATES PATENTS

1,726,040	Olson	Aug. 27, 1929
2,312,301	Turner et al.	Mar. 2, 1943