

May 26, 1953

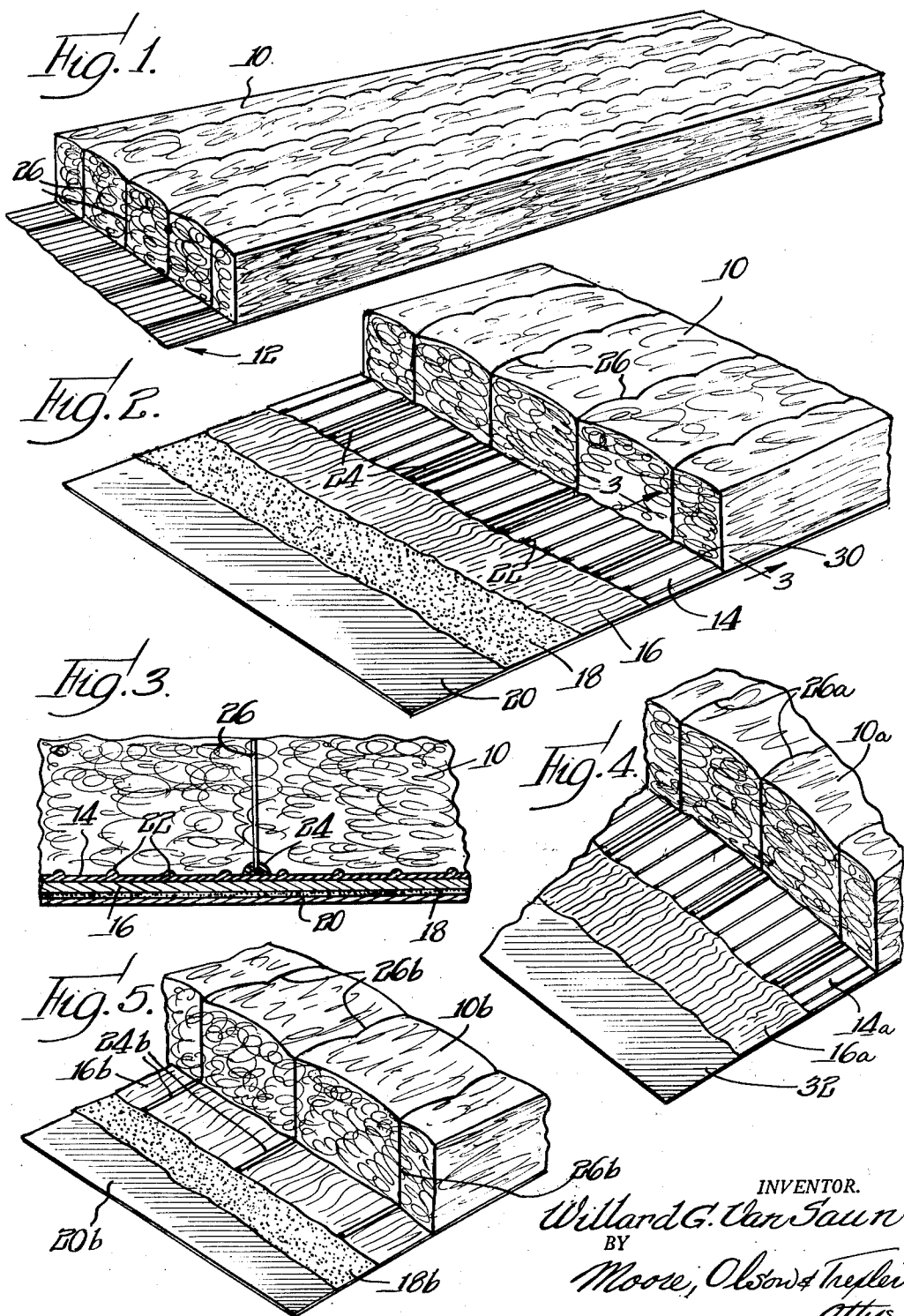
W. G. VAN SAUN

2,640,004

STRIP INSULATION AND METHOD OF MANUFACTURE

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2 Sheets-Sheet 1



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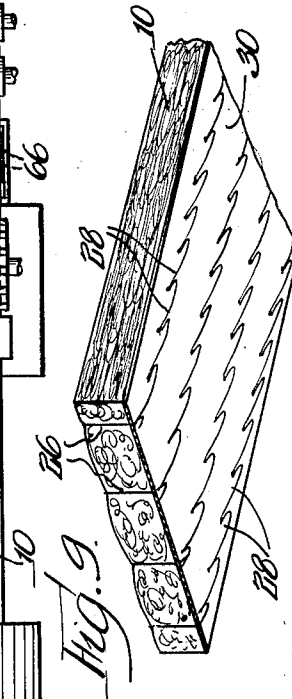
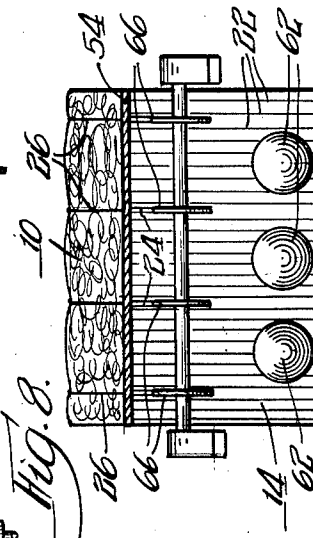
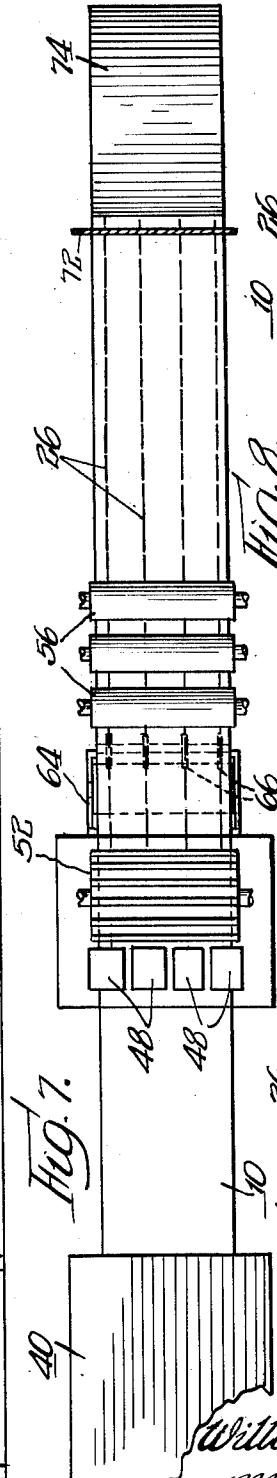
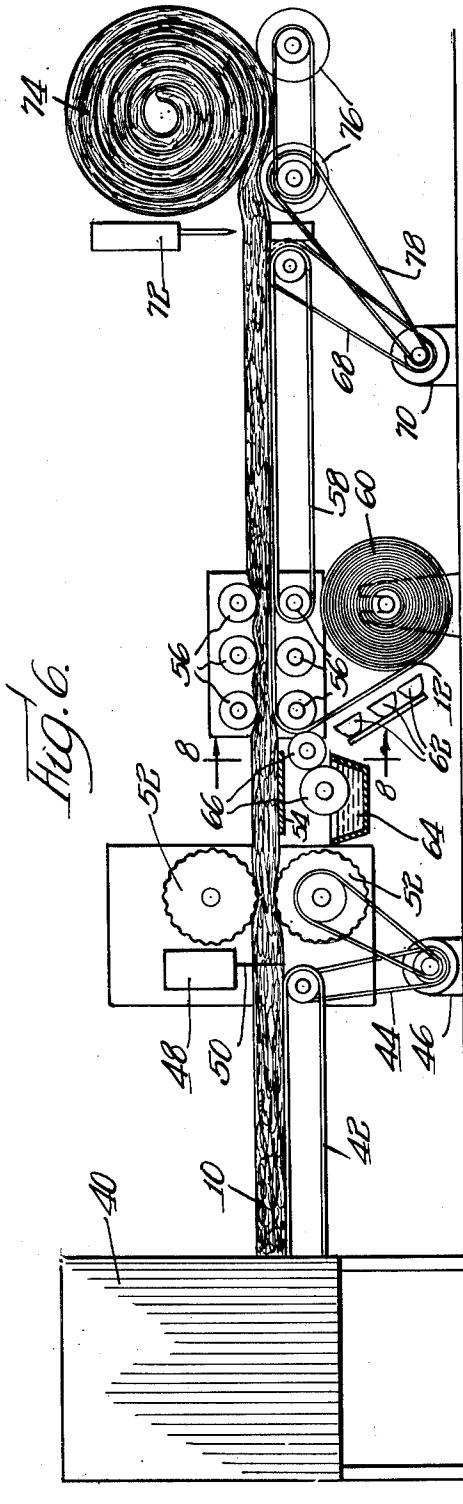
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STRIP INSULATION AND METHOD OF MANUFACTURE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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STRIP INSULATION AND METHOD OF
MANUFACTURE

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10 Claims. (Cl. 154—119)

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This invention relates to insulation of the fibrous strip type, commonly used in the thermal insulation of homes and other buildings, and to apparatus and methods for effecting the manufacture thereof.

One type of insulation used for homes and buildings comprises fibrous cotton or the like which is formed into elongated strips or batts and laid between the studs of the building wall structure. In this type of insulation, as well as in other types which may be employed, it is desirable that a moisture-impervious wall be provided along the inner face of the insulation to provide a moisture-barrier. More particularly, there is a temperature gradient through the insulation body between the inside and outside temperatures which, particularly in cold weather, causes a condensation and deposition of moisture within the body, if free circulation of air is permitted therethrough, which lessens the insulating qualities of the material.

An additional difficulty encountered, particularly with insulation of the fibrous batt type, is that the fibrous material or cotton tends to pull away from the backing material which may be provided as a part of the strip and to which the cotton mat may be adhesively secured. This delamination may become particularly troublesome in instances wherein the strip insulation is applied to vertical walls, and wherein the material is subjected to vibration or a substantial amount of handling during the installation process.

A still further consideration, in the fabrication of strip insulation of the type set forth, is the necessity for economy in the fabricating operations, due to the considerable amount of material which must be provided in relation to the funds usually available for the purpose.

In accordance with the present invention a strip insulation, and means and methods of manufacture therefor are provided, wherein the strip has effective resistance to moisture penetration, and to delamination tendencies, and wherein the strip may be readily and economically continuously fabricated, at low cost. These results are secured by a sewing process applied to the cotton mat or batt, as will hereinafter be more particularly described, followed by the adhesive application of what is in effect a single composite backing sheet to the cotton mass and to the sewing threads, the backing sheet serving the dual purpose of anchoring the threads and forming a moisture-barrier against penetration of moisture into the cotton mass in service.

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It is accordingly an object of the present invention to provide a strip insulation of the type defined, which is rugged in character and preserves its physical form in use, which provides an effective seal against the penetration of moisture and condensation, and which at the same time may be readily and continuously fabricated at a minimum cost.

More particularly stated, it is an object of the invention to provide an improved insulation strip of the cotton batt and sheet backing type, and improved means and methods for effecting the manufacture thereof, wherein securing means is provided within the cotton mass for preserving the physical integrity thereof, and wherein a single composite backing sheet effectively serves the dual purpose of anchoring the securing means and of providing a moisture-barrier for the cotton mass.

Various other objects, advantages and features of the invention will be apparent from the specification when taken in connection with the accompanying drawings wherein certain preferred embodiments are set forth for purposes of illustration.

In the drawings, wherein like reference numerals refer to like parts throughout:

Fig. 1 is an assembly perspective view of an insulation strip embodying and fabricated in accordance with the principles of the present invention, according to one preferred embodiment;

Fig. 2 is an illustrative perspective view of the structure shown in Fig. 1, on an enlarged scale, and more particularly illustrating the component parts;

Fig. 3 is a partial sectional view of the structure of Fig. 2, taken as indicated by the line 3—3 thereof;

Fig. 4 is a view similar to Fig. 2, but illustrating the modified form of structure;

Fig. 5 is a perspective view, also similar to Fig. 2, but illustrating a still further modified embodiment of the invention;

Fig. 6 is a side elevational view, diagrammatic in form, of an apparatus for effecting the manufacture of the strip;

Fig. 7 is a top view of the apparatus of Fig. 6;

Fig. 8 is an enlarged vertical sectional view of a portion of the apparatus of Fig. 6, and taken as illustrated by the line 8—8 thereof; and

Fig. 9 is a perspective view, more particularly showing the cotton batt or mass and the associated stitching, forming a part of the present invention.

Referring more particularly to the drawings,

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and first to the structures shown in Figs. 1-3, it will be seen that this structure includes, in general, a cotton mat or batt 10, and a composite backing sheet generally indicated by reference numeral 12. The latter more particularly comprises, in the embodiment shown, a layer of asphalt adhesive 14, a layer of kraft paper 16, an adhesive layer 18, and a thin sheet metal layer 20 such for example as aluminum foil or the like. The adhesive 18 may be of any suitable type, for bonding the paper layer 16 and metal layer 20 together into an integral sheet construction.

While the asphalt adhesive layer 14 may be variously constructed, in the improved embodiment shown this asphalt layer includes or is provided with a series of longitudinally extending relatively smaller ribs 22, and larger ribs 24, at suitable laterally spaced intervals.

The cotton mat 10 is provided with a series of longitudinally extending and laterally spaced rows of stitching 26, the latter being aligned with and secured in place by the adhesive ribs 24, as will more particularly hereinafter appear. The asphalt adhesive layer 14 firmly bonds the cotton batt to the sheet structure 12. The adhesive ribs 24 aid in performing this function, and more particularly function to lock the stitching 26 in place, and the stitching in turn functions to bind the cotton material together into a sufficiently rugged physical form so that it will not stratify or delaminate from the backing 12 when the product is in use.

The character of the stitching is more particularly shown in Fig. 9, wherein it will be seen that the stitching is so formed that loosely looped threads 28 overlie the bottom face 30 of the cotton batt, which face is engaged by the sheet backing, the loose looping of the threads in such manner providing a thread body sufficient for anchoring to the adhesive ribs 24. Chain stitching having such loose threads formed as a part thereof may be continuously formed by sewing machines, constituted for the purpose, as will hereinafter appear.

In the operation of the structure, the cotton batt 10 is held by the stitching 26 in such manner that the integrity of the batt is preserved when the structure is in use, even when applied to vertically extending wall surfaces, and even though subjected to vibration or relatively careless and extensive handling in connection with the installation of the product. As will be understood, the stitching 26 is relatively loose and does not effect the compression of the cotton batt fibers beyond their normal loose positioning which is most advantageous for insulation purposes. However, the adhesive bond between the ribs 24 and the loose extending loops 28 of the stitching sufficiently anchors the stitching in place so that although loosely sewn into the batt, the threads are prevented from shifting unduly or otherwise permitting the cotton fibers to break loose from position.

Although various adhesives may be used, an asphalt layer such as indicated at 14 between the kraft paper 16 and the cotton batt 10 is preferred, for adhesively uniting the batt and paper as an integral unit. Asphalt adhesive presents the advantage that it can be applied to the paper, and dried, prior to uniting with the cotton batt, and then softened sufficiently by the application of heat, just prior to the uniting of the paper and batt, so as to render the asphalt adhesive in character. The ribs 22 facilitate the heat softening process, as will subsequently appear. The adhe-

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sive asphalt layer 14 firmly unites the kraft paper with the adjacent surface 30 of the cotton batt, and the stitching 26 prevents the more remote cotton fibers from delaminating from the adhesively secured face fibers, as has been heretofore discussed.

While kraft paper provides some moisture-barrier, in and of itself, in the preferred structure described the function of the paper in this regard is augmented by the action of the metal foil layer 20, which is completely impervious to moisture, and which is adhesively united to the outer surface of the kraft paper by the adhesive layer 18.

It will be noted that the composite sheet structure 12 comprising the metal foil 20, the adhesive 18, the kraft paper 16 and the asphalt layer 14, in effect forms a single composite sheet structure, which can be fabricated and supplied in roll form to a machine for securing the composite sheet to the cotton batt in a single operation. This structural method facilitates economical fabrication and assembly. It will furthermore be noted that the stitching does not penetrate either the paper layer 16 or the metal foil 20, so that the moisture-barrier characteristics of these parts is not impaired.

In the embodiment of Fig. 4 the construction is essentially the same as previously described except that the metal foil 20, and associated adhesive 18, is replaced by a wax layer 32 applied to the lower or outer face of the kraft paper 16a, which paper layer is structurally and functionally the same as the layer 16 in the embodiment previously described. The remaining parts are the same as in the previously described embodiment, and function in a similar manner.

In the structure of Fig. 4 the wax layer 32 forms a moisture-proof barrier, in combination with the kraft paper to which it is applied, which in certain instances may suffice as compared with the metal foil construction.

In Fig. 5 an embodiment of the invention is shown which is generally similar to that previously described in reference to Figs. 1-3 except that the kraft paper layer 16b directly contacts the cotton batt, and the asphalt adhesive layer 14 is eliminated except for the provision of the ribs 24b, functionally and structurally similar to the ribs 24 previously described.

In the structure of Fig. 5 the adhesive ribs 24b which unite with the stitching 26b, in the manner previously described, are relied upon to secure the cotton batt to the backing; and while the structure thus provided is not as rugged as that shown in Figs. 1-3, in certain instances may suffice.

Referring to Figs. 6-8, means and methods are illustrated for fabricating the insulation strip or strips in a continuous manner, as previously described.

In the apparatus shown, a source of supply for the cotton batt is indicated at 40. Such supply source may be either a storage casing within which the cotton batt is stored in roll form, or it may be a Garnett machine or the like commonly used to fabricate cotton batts in elongated strip form from fibrous cotton material. The batt 10 issues from the supply source 40 horizontally, in elongated strip form, being transmitted from the supply source by suitable means such as an endless belt 42 driven by a drive belt 44 from electric motor 46. As the batt is transmitted horizontally in a continuous manner, it is subjected to the action of a plurality of sewing machines, dia-

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grammatically indicated at 48, the sewing machines being suitably spaced so as to provide the stitching 26 running longitudinally of the batt, at desired laterally spaced intervals. As previously stated, the sewing machines are preferably adjusted to provide the loose loops 28 extending from and overlying the lower face of the batt, and the stitching is preferably sufficiently loose so that the cotton is not materially compressed thereby.

As the cotton batt is transmitted from the sewing needles 50 it passes between a pair of corrugated feed rolls 52 driven from the motor 46, which feed rolls supplement the action of the support and feed belt 42 in transmitting the batt horizontally in a continuous manner.

From the corrugated feed rolls the batt passes over a table 54, and is transmitted to a series of driven compression rolls 56 driven by suitable gearing from a support and feed belt 58, presently to be described. As the batt reaches the compression rolls 56 it is united with the backing strip 12, of a structure as previously described, the backing strip being mounted upon and supplied to the machine from a supply roll 60. As previously described, preferably the composite backing strip has been previously fabricated as a unit upon other mechanisms, and may be supplied to the machine in roll form. As the backing strip leaves the supply 60 the asphalt adhesive layer is outermost, and is subjected to the action of a series of infra-red heating lamps 62 which function to soften the adhesive layer 14 sufficiently to render the asphalt adhesive in character.

An additional adhesive supply source 64 having applicator discs 66, Figs. 6 and 8, functions to apply the adhesive ribs 24, which may also be asphalt or other adhesive, to the layer 14 at laterally spaced intervals, and in alignment with the batt stitching.

The action of the compression rolls 56 unites the batt and backing, the composite structure being then further conveyed horizontally by the conveyor belt 58, previously mentioned, and driven from the drive belt 68 powered from electric motor 70. A knife mechanism diagrammatically indicated at 72, functions, either automatically or manually, to sever the strip at desired longitudinal intervals. The completely fabricated strip is assembled in roll form 74 upon a pair of driven accumulator rolls 76 which are powered from a drive belt 78 also driven from the motor 70.

By reason of the structure as described, it will be seen that the insulation strip of the invention may be continuously produced, in any desired length, by an assembly operation which involves the stitching of the batt and the application of what in effect comprises a single backing sheet to the batt; the joining of the batt and backing sheet locking the stitching immediately after it is applied and before it has a chance to work loose, and the moisture-barrier characteristics of the backing being in no way impaired by the stitching operations. The backing sheet may be easily handled without difficulty, and the ribs 22 of the adhesive layer function so that a relatively short pass of heating lamps may be employed to soften the asphalt and render it adhesive in character.

It is obvious that various changes may be made in the specific embodiments set forth without departing from the spirit of the invention. The invention is accordingly not to be limited to the

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specific embodiments shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. An insulation structure comprising an elongated batt of fibrous material, stitching extending longitudinally of the batt at laterally spaced intervals, and a backing sheet applied to the batt on one face thereof, said sheet having an adhesive layer secured to the batt and a plurality of spaced adhesive ribs extending outwardly from said adhesive layer and aligned with and secured directly to the stitching and with the batt material thereunder, the sheet constituting a moisture-barrier for the batt and a locking means for the stitching.

2. An insulation structure as defined in claim 1, wherein said adhesive layer is formed of a heat softenable material and is provided with spaced ridges intermediate the adhesive ribs and forming a heat absorbing means.

3. An insulation structure comprising an elongated batt of fibrous material, stitching extending longitudinally through the batt and along laterally spaced rows and in free contact with a face of the batt, and an adhesive backing sheet applied to said batt face and overlying the rows of stitching, the backing sheet additionally having adhesive ribs spaced in accordance with the rows of stitching and secured directly to said stitching and directly to the batt material coincident with the rows of stitching whereby the backing sheet constitutes a moisture barrier for the batt and a locking means for the stitching.

4. An insulation structure as claimed in claim 3, wherein the stitching provides loose loops on said batt face and with which the adhesive of the backing sheet is interlocked for securing the stitching.

5. An insulation structure comprising an elongated batt of fibrous material, stitching extending longitudinally through the batt and along laterally spaced rows and in free contact with a face of the batt, a backing sheet applied to said batt face and overlying the rows of stitching, said backing sheet having longitudinal ribs of adhesive material laterally spaced in accordance with the rows of stitching and each rib of adhesive directly engaging a corresponding row of stitching and also directly engaging the batt material thereunder and coincident with each said row of stitching whereby the backing sheet constitutes a moisture barrier for the batt and a locking means for the stitching.

6. The method of making an insulation structure which comprises forming an elongated batt of fibrous material, stitching the fibers of the batt together longitudinally thereof and at laterally spaced intervals, applying a backing sheet to the batt material with adhesive ribs spaced in accordance with the spacing of the stitching adhesively securing the sheet to the batt with the adhesive ribs directly engaging the stitching and batt material coincident therewith whereby the sheet constitutes a moisture barrier for the batt and interlocking means for the stitching.

7. The method as claimed in claim 6, wherein the batt fibers are loosely stitched together to provide loose loops on one face thereof with the adhesive ribs securing together the loops and batt material coincident therewith.

8. The method of making an insulation structure which comprises forming an elongated batt of fibrous material, stitching the fibers of the batt together longitudinally thereof and at laterally spaced intervals, applying a backing sheet

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with a heat-softenable adhesive to the batt on one face thereof, applying additional spaced adhesive ribs of increased thickness to the backing sheet in alignment with the laterally spaced stitching, heating the adhesive to soften the same, and pressing the backing sheet against the batt whereby to adhesively secure the backing sheet to the batt with the stitching and coincident batt material interlocked therewith by the adhesive of the ribs.

9. An insulation structure as claimed in claim 5, wherein a moisture-proofing material comprising a wax layer is applied to the backing sheet.

10. An insulation structure as claimed in claim 5, wherein a moisture-proofing material comprising a layer of metal foil is adhesively applied to the backing sheet.

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