Form1

606868

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 27 11 90

COMMONWEALTH OF AUSTRALIA

Patents Act 1952

PATENT OFFICE
360
03 17 7
Collection of Moneys

APPLICATION FOR A STANDARD PATENT

(Combined Form – Convention and Non–Convention)

I/We RENOUF INDUSTRIES PTY. LTD., a Victorian company, of 7 Corr Street, Moorabbin 3189, Victoria, Australia,

hereby apply for the grant of a Standard Patent for an invention entitled "IMPROVEMENTS IN REFLECTIVE FOIL INSULATION"

which is described in the accompanying Provisional ~~Complete~~ Specification.

Strike our para.2. for non-convention

~~2. This application is a convention application and is based on the application(s) for a patent or similar protection made –~~

~~in .....~~

~~on ....., numbered ....., and~~

~~on ....., numbered ....., and~~

~~on ....., numbered .....~~

3. My/Our address for service is: Care of COWIE, THOMSON & CARTER, Patent Attorneys, of 71 Queens Road, Melbourne, Victoria 3004, Australia.

DATED this 12th day of June, 19 86.

To The Commissioner of Patents
COMMONWEALTH OF AUSTRALIA

LODGED AT SUB-OFFICE
13 JUN 1986
Melbourne

COWIE, THOMSON & CARTER
Patent Attorneys
71 Queens Road, Melbourne,
Victoria, 3004, Australia

COWIE, THOMSON & CARTER
By:
Patent Attorneys for
RENOUF INDUSTRIES PTY. LTD.

COWIE, THOMSON & CARTER
Patent Attorneys
71 Queens Road,
Melbourne, 3004
Australia

COMMONWEALTH OF AUSTRALIA
Patents Act 1952-1962

Forms 7 and 8
(Combined Form)

Declaration in Support of an Application for a Patent

In support of the ~~Convention~~* application made by RENOUF INDUSTRIES PTY. LTD.

for a patent for an invention entitled: "IMPROVEMENTS IN REFLECTIVE FOIL INSULATION"

I, HILTON EDWARD RENOUF, MANAGING DIRECTOR.
(INSERT FULL NAME) (CAPACITY)

of and care of the applicant company do solemnly and sincerely declare as follows:

1. ~~I am~~ We are ~~the applicant(s) for the patent~~.

or

I am authorised by the applicant for the patent to make this declaration on its behalf.

Strike out Para 2. for non-convention

~~2. The basic application(s) as defined by section 141 of the Act~~ was / were made

in .....

on the .....day of.....19 ....., No.....,

by ....., and

in .....

on the.....day of.....19 ....., No.....,

by ....., and

in .....

on the.....day of.....19 ....., No.....,

by .....

The basic application(s) referred to was / were the first application(s) made in a Convention country in respect ~~of the invention the subject of the application~~.

3. ~~I am~~ We are ~~the actual inventor(s) of the invention~~.

or

.....Hilton Edward Renouf.....

of 7 Corr Street, Moorabbin, Victoria 3189, Australia,

.....

.....

.....

.....

is / ~~are~~ the actual inventor~~(s)~~ of the invention and the facts upon which the applicant is entitled to make the application are as follows:-- Applicant is the assignee of the invention from the said actual inventor.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-73334/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 606868

(54) Title
REFLECTIVE FOIL INSULATION

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(60) Related to Provisional(s) : PH6389

(71) Applicant(s)
RENOUF INDUSTRIES PTY. LTD.

(72) Inventor(s)
HILTON EDWARD RENOUF

(74) Attorney or Agent
COWIE CARTER & HENDY, 71 Queens Road, MELBOURNE VIC 3004

(56) Prior Art Documents
AU 67699/87 B32B 15/04, 15/20, 15/08
AU 575952 43561/85 C04B 35/04, B32B 33/00, C09D 5/18
AU 551702 29834/84 B32B 27/04, 27/16, 33/00

(57) Claim

1. A foil laminate material comprising at least one thermally insulating lamina and at least one strengthening lamina bonded by an adhesive layer to said thermally insulating lamina wherein said strengthening lamina comprises a flame retardant paper.

2. A foil laminate material comprising a first thermally insulating lamina bonded by an adhesive layer to one surface of a strengthening lamina and a second thermally insulating lamina bonded by a further adhesive layer to the opposite surface of the strengthening lamina wherein said strengthening lamina comprises a flame retardant paper.

7. A foil laminate material comprising first and second aluminium foil laminae, a flame retardant paper lamina bonded by a non-toxic and non-flammable adhesive layer to said first aluminium foil lamina, and a fiberglass reinforcing mesh bonded between said second aluminium foil lamina and said flame retardant paper lamina by a further non-toxic and non-flammable adhesive layer.

P/00/011

AUSTRALIA 606868

Form 10

PATENTS ACT 1952–1973

COMPLETE SPECIFICATION

(ORIGINAL)

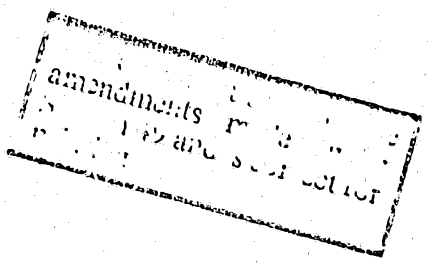
FOR OFFICE USE

Class:

Int. Cl:

Application Number: 73334/87

Lodged:



Complete Specification—Lodged:

Accepted:

Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: RENOUF INDUSTRIES PTY. LTD., a company incorporated under the laws of the State of Victoria, Australia,

Address of Applicant: of 7 Corr Street, Moorabbin, Victoria 3189, Australia.

Actual Inventor: HILTON EDWARD RENOUF

Address for Service: **COWIE, THOMSON & CARTER**
PATENT & TRADEMARK ATTORNEYS
71 QUEENS ROAD
MELBOURNE, 3004, AUSTRALIA

Complete Specification for the invention entitled:
"IMPROVEMENT IN REFLECTIVE FOIL INSULATION"

The following statement is a full description of this invention, including the best method of performing it known to me:—*

*Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

11710/76-L C. J. THOMSON, Commonwealth Government Printer, Canberra

IMPROVEMENTS IN REFLECTIVE FOIL INSULATION

This invention relates to thermal insulation and more particularly to reflective foil insulation. It is most particularly concerned with improvements in the fire retardant properties of such insulation.

Reflective foil insulation has been used in Australia for some thirty years to provide an effective barrier which significantly reduces heat flow into and out of a building, commercial, industrial or domestic, into which it has been incorporated. The use of reflective foil insulation results in a greater effectiveness of heating and cooling appliances thus reducing energy consumption required to produce the same heating or cooling effect when compared to an un-insulated building.

As stated above reflective foil insulation finds application in the insulation of many varied and different structures including the insulation of domestic dwellings and it will be convenient to hereinafter describe the invention with reference to such use. It will however be appreciated that the application of the reflective foil insulation of the present invention is not limited thereto.

To gain maximum effect against heat loss during winter and conversely heat gain during the summer months, it is preferable to have insulation applied to the ceiling space, walls and floors of the dwelling. In an existing dwelling it is usually not practicable to insulate the walls and this is preferably done during the actual construction of dwelling.

In the thirty years since reflective foil insulation was introduced into the Australian market there have been relatively few changes to its construction. Thermal insulation of this type is a composite structure formed entirely of, or a combination of, material such as paper, particularly kraft paper, and metal foil, particularly aluminium. The materials are bonded together to form an insulating sheet that is foldable and adapted to be rolled into a compact form. In

use the sheet is un-rolled or unfolded and cut to the required length and attached by staples, nails, or the like to the dwelling in a known manner.

Whilst laminates comprising a single sheet of aluminium foil bonded to paper are known and used, it is preferred that a second sheet of aluminium be bonded to the paper to form a sandwich structure with the paper comprising the middle layer. This double sided reflective foil laminate is more efficient and is resistant to water and therefore has a potentially longer life.

The paper or other material forming the laminate provides rigidity and strength to the aluminium foil which, by itself, is relatively flimsy and fragile and unable to withstand rough treatment experienced in installation and use.

The basic reflective foil insulation material referred to above may be modified by the inclusion of reinforcing mesh or threads, generally fiberglass, between the paper layer and at least one of the aluminium foil layers. The reinforcing mesh or threads increases tear resistance of the laminate.

It is also common practice to provide the external surface of one of the aluminium foil layers with an "anti-glare" coating. This treatment reduces the discomfort often experienced by brick-layers and tilers when reflective foil insulation has been installed.

In recent times a public and corporate awareness of potentially hazardous building materials has manifested itself. This awareness has included a consideration of the flammability characteristics of building materials including insulation.

In reflective foil insulation commercially available in Australia the foil is generally laminated to the paper by means of a hot melt adhesive such as poly-ethylene. Whilst such a composite has the advantage of being of lightweight, waterproof, and of satisfactory strength characteristics, the polyethylene adhesive

is flammable, thus imparting to the foil composite a flammability index of approximately 17 (AS-1530:2:1973). Whilst current domestic building regulations specify a maximum flammability index of 26, such a product as described above may not satisfy future, more stringent, regulations.

In an attempt to decrease the flammability index, non-flammable adhesives, such as the chlorinated paraffins, were proposed. Reflective foil insulation incorporating such adhesives has a flammability index of less than 5 but has two major disadvantages. To satisfactorily bond the foil to paper, and to prevent the paper from burning, substantial quantities of adhesive are required. This results in a product significantly heavier than the polyethylene bonded laminates. The increase in weight, however, does not significantly increase the strength characteristics of the laminate. Further, the fire retardant property of the chlorinated paraffins results from voluminous evolution of gas on heating. This gas effectively smothers or prevents the paper layer from burning. Unfortunately, the gas produced may be toxic.

It is an object of the present invention to provide an improved reflective foil laminate insulation material which alleviates or ameliorates at least some of the problems associated with prior art reflective foil laminates.

It is a particular object of the present invention to provide a reflective foil laminate insulating material having a low flammability index, preferably less than 5, whilst maintaining satisfactory strength and durability characteristics.

It is a further object of the present invention to provide a lightweight, low flammability index foil laminate insulating material.

According to one aspect of the present invention there is provided a foil laminate material comprising at least one heat reflective lamina and at least one strengthening lamina bonded by an adhesive layer to said heat reflective lamina wherein said strengthening lamina comprises a flame retardant paper.

According to a second aspect of the present invention there is provided a foil laminate material comprising a first heat reflective lamina bonded by an adhesive layer to one surface of a strengthening lamina and a second thermally insulating lamina bonded by a further adhesive layer to the opposite surface of the strengthening lamina wherein said strengthening lamina comprises a flame retardant paper.

According to a further aspect of the present invention there is provided a foil

laminate material comprising first and second aluminum foil lamina, a flame retardant paper lamina bonded by a non-toxic and non-flammable adhesive layer to said first aluminum foil lamina, and an approximately 12 mil fiberglass reinforcing mesh bonded between said second aluminum foil lamina and said flame retardant paper lamina by a further non-toxic and non-flammable adhesive layer.

The essential features of the invention, and further optional features, are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings, however, are merely illustrative of how the invention might be put into effect so that the specific form and arrangement of the features shown (whether they be essential or optional features), is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is an exploded view of a preferred form of reflective foil laminate according to the present invention,

Figure 2 is an exploded view of a basic reflective foil laminate according to the present invention, and

Figure 3 is an exploded view of a heavy duty reflective foil laminate according to the present invention.

The reflective foil laminate 1, shown in Figure 1 has a first insulating lamina 2 of reflective aluminum foil bonded by conventional techniques to a flame retardant paper lamina 3 with an adhesive layer 4.

A reinforcing mesh 5 is bonded by an adhesive layer 6, between said flame retardant lamina 3 and a second insulating lamina 7 of reflective aluminum foil.

Such a reflective foil laminate 1 could employ a flame retardant paper lamina 3 with a weight of approximately 100g/m^2, with the overall weight of the laminate 1 being of the order of 175g/m^2.

The reflective foil laminate 1 of Figure 2 is essentially the same as that described above with reference to Figure 1 except that reinforcing mesh 5 has been omitted. In such a laminate the flame retardant paper lamina 3 would usefully have a weight in the range of 120-160 g/m^2 providing a laminate weight of approximately 200g/m^2.

In Figure 3, the reflective foil laminate 1 includes two flame retardant paper

laminae 7 disposed one on either side of reinforcing mesh 5 between first and second reflective aluminum foil insulating laminae 2 and 7. A paper weight of approximately 75g/m^2 with a laminate weight of approximately 233 g/m^2 could be expected from a laminate constructed in accordance with Figure 3.

Aluminum foil laminate insulating according to the present invention is characterized in that the strength providing paper layer of conventional aluminum foil laminates is replaced by a flame retardant lamina.

As shown in the drawings, the flame retardant lamina is a flame retardant paper. The flame retardant properties of the paper may be imparted during the manufacture of the paper. Alternatively they may be imparted by coating or otherwise treating finished paper before it is bonded to the aluminum foil. Among convenient conventional agents for imparting flame retardant properties to paper may be mentioned the ammonium phosphates (monoammonium and diammonium phosphate), ammonium sulphonate, barium metaborate, zinc chloride, antimony trioxide, aluminum hydroxide and the chlorinated phosphates.

To maintain lightweight characteristics of the aluminum foil laminate the flame retardant paper lamina will preferably have a weight of about 50-160 g/m^2. As different grades of aluminum foil insulation are used for different purposes the paper weight employed will also vary. For example, a lightweight, flexible insulation is particularly suitable for cladding air-conditioning ductwork whereas a heavier and more stiffer product is required for sarking under roof tiles.

It is also envisaged that a flame retardant adhesive will be used to bond the flame retardant lamina to the aluminum foil. Such adhesives include neoprene (chlorinated rubber), polyvinyl chloride (PVC) or specially treated flame retardant polyethylene.

In a preferred composite according to the present invention there is provided an aluminum foil bonded by conventional techniques to a flame retardant paper using a flame retardant adhesive. Reinforcing mesh, approximately 12 mil square, and an outer layer of aluminum foil are then bonded to the flame retardant paper also by means of a flame retardant adhesive preferably the flame retardant adhesive used in the two bonding steps is the same.

It will be appreciated that modifications to this preferred composite may be

made without departing from the spirit or ambit of the invention. For example the mesh size may be varied or the mesh may be dispensed with altogether. Also a second layer of flame retardant paper may be introduced to provide additional strength.

The invention also contemplates the incorporation of flame retardant additives into conventional adhesives for use in bonding the insulating and flame retardant laminae.

The laminate insulation material in accordance with the embodiments described exhibit a flammability index of less than 5 which conforms to building regulations. Importantly, fumes emitted by the laminate during attempts to induce burning are non-toxic and, therefore, the laminate material is safe to use in any building structure.

Further, reflective foil laminates according to the present invention exhibit substantially equivalent strength characteristics at lower laminate weight when compared with conventional reflective foil laminates available in the range of 250-370g/m^2.

The claims defining the invention are as follows:

1. A foil laminate material comprising at least one thermally insulating lamina and at least one strengthening lamina bonded by an adhesive layer to said thermally insulating lamina wherein said strengthening lamina comprises a flame retardant paper.

2. A foil laminate material comprising a first thermally insulating lamina bonded by an adhesive layer to one surface of a strengthening lamina and a second thermally insulating lamina bonded by a further adhesive layer to the opposite surface of the strengthening lamina wherein said strengthening lamina comprises a flame retardant paper.

3. A foil laminate material according to claim 1 or claim 2 wherein the thermally insulating lamina or each of the first and second thermally insulating laminae comprises aluminium foil.

4. A foil laminate material according to any one of the preceding claims wherein the flame retardant paper has a weight of about 100 g/m^2.

5. A foil laminate material according to any one of the preceding claims wherein the adhesive layer or each of the adhesive layers comprises a layer of non-toxic and non-flammable adhesive.

6. A foil laminate material according to any one of the preceding claims which further includes at least one layer of reinforcing mesh between said flame retardant lamina and said thermally insulating lamina or at least one of said first and second thermally insulating laminae.

7. A foil laminate material comprising first and second aluminium foil laminae, a flame retardant paper lamina bonded by a non-toxic and non-flammable adhesive layer to said first aluminium foil lamina, and a fiberglass reinforcing mesh bonded between said second aluminium foil lamina and said flame retardant paper lamina by a further non-toxic and non-flammable adhesive layer.

8. A foil laminate material wherein the fiberglass reinforcing mesh is approximately 12 mil mesh.

9. A foil laminate material according to any one of the preceding claims which is lightweight and exhibits a flammability index of less than 5.

10. A foil laminate material substantially as hereinbefore described with reference to any one of the Figures of the accompanying drawings.

DATED this 21st day of November, 1990.

RENOUF INDUSTRIES PTY. LTD.

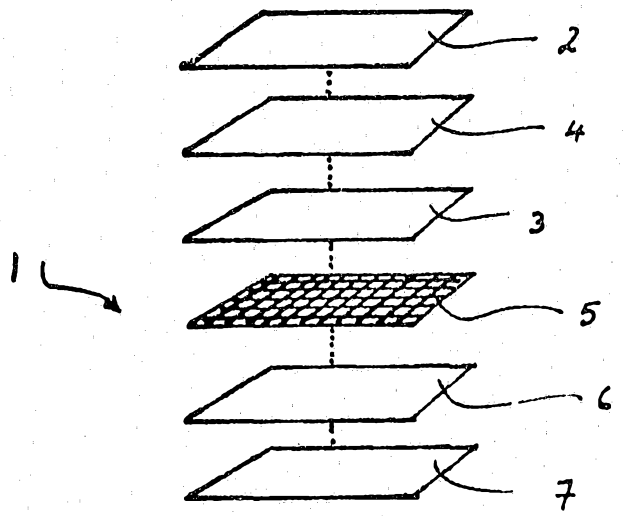


FIG. 1

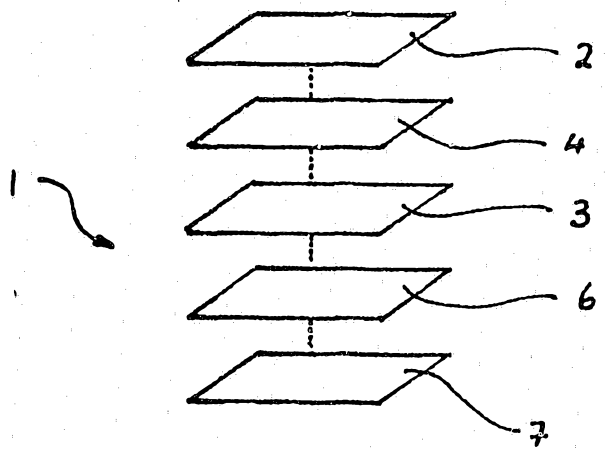


FIG. 2

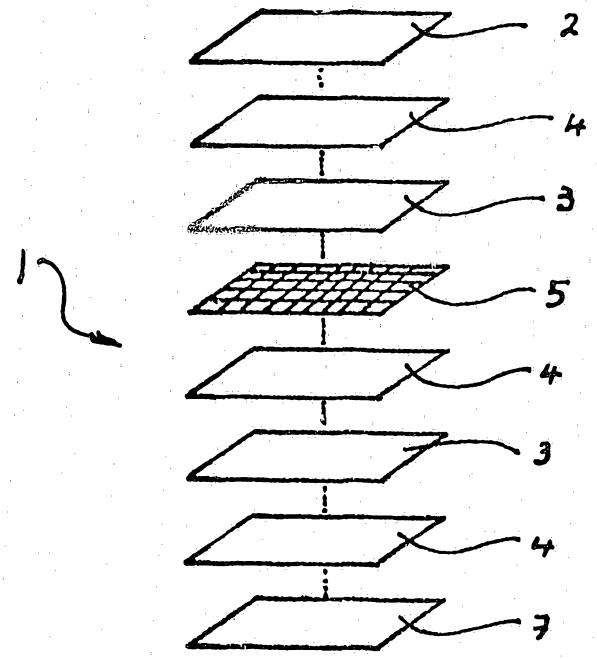


FIG. 3