May 12, 1970 R. UDDENBORG 3,511,335

INSULATING WALLPAPER

Filed April 21, 1966

Fig. 1.

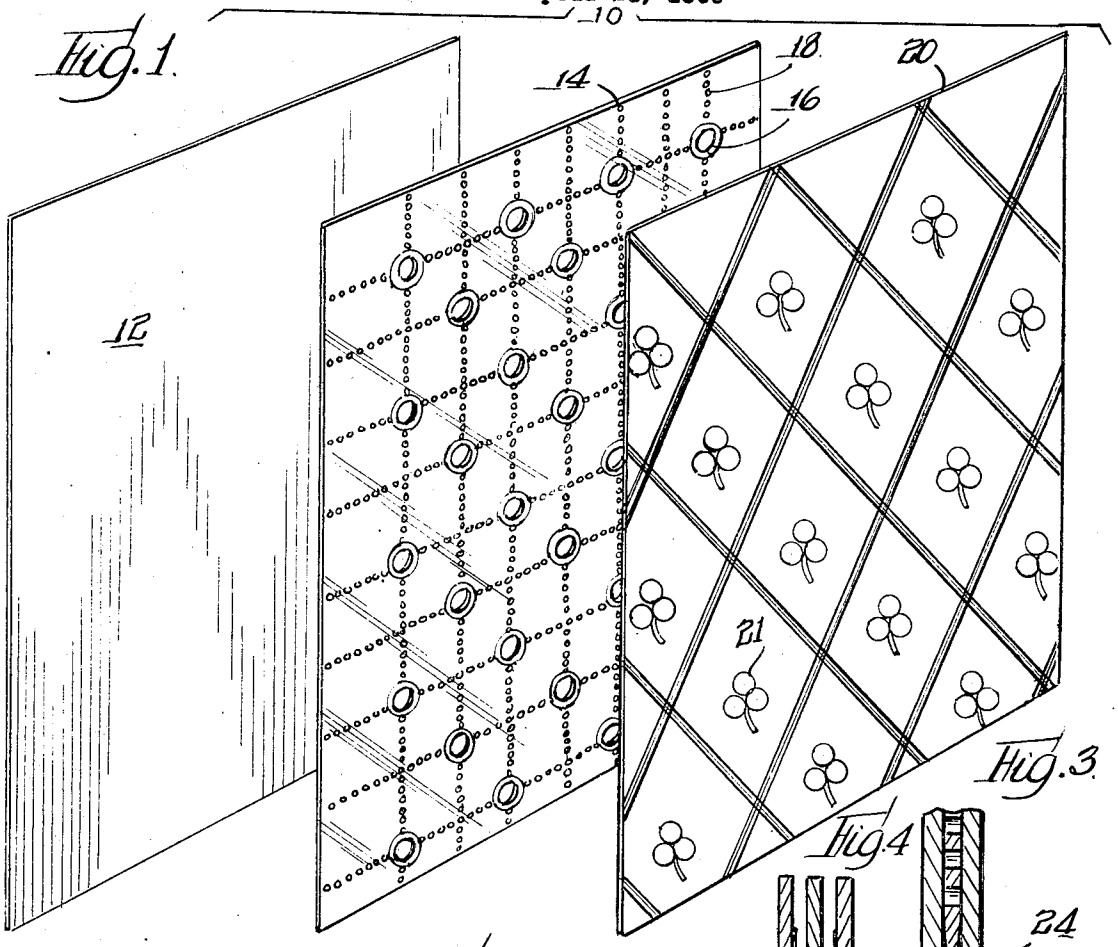


Fig. 3.

Fig. 4

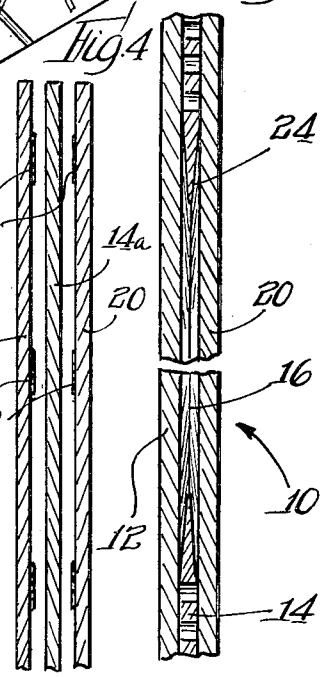


Fig. 5.

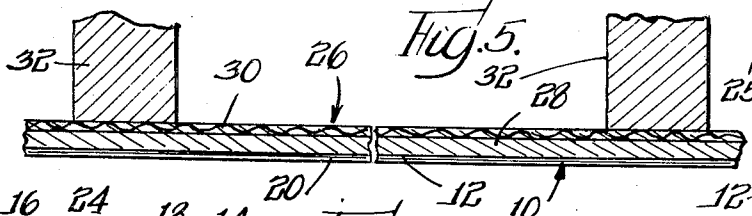
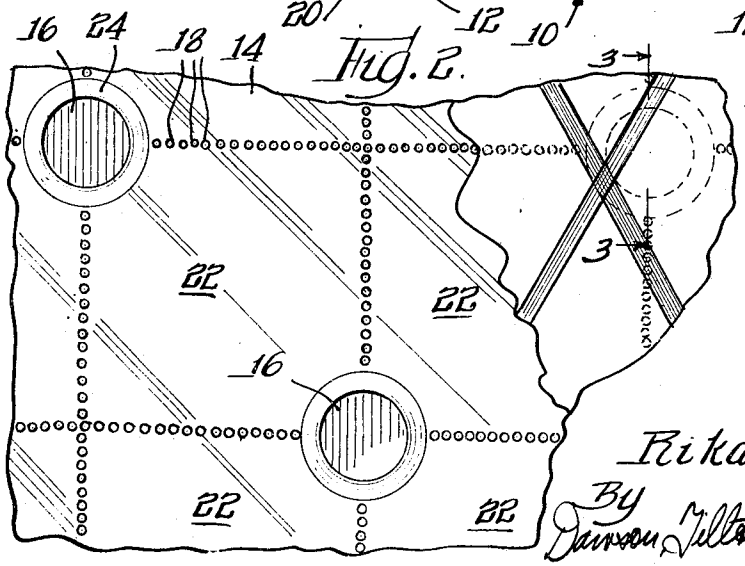


Fig. 2.



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INSULATING WALLPAPER

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ABSTRACT OF THE DISCLOSURE

A wall covering having three layers of flexible material, the intermediate layer comprising a thin film, preferably of plastic, having a plurality of intersecting rows of small closely-spaced apertures which border a multiplicity of imperforate panels. The inner and outer layers, which may be formed of paper, are adhesively secured to each other through such apertures, leaving the thin imperforate panels of the intermediate layer free to vibrate independently of the inner and outer layers in response to sound waves impinging on the wall covering.

This invention relates generally to wallpaper and more particularly to wallpaper having improved noise and heat insulating qualities.

Modern apartments, offices and homes are commonly constructed with relatively thin walls which are inexpensive and provide a maximum amount of usable space for a minimum cost. However, such a construction has a serious drawback in that the thin interior walls provide relatively little insulation against noise. The noise generated by the playing of a television set or operating a typewriter is readily transmitted through the thin walls to the adjacent rooms in the building. Thus, the inhibitants of many buildings are often subjected to a relatively high noise level which interferes with their normal activities.

In addition to the drawback of noise transmission through the interior walls, many buildings are unsatisfactory due to a relatively high level of heat transmission through the exterior walls of the building. On a cold day, heat is readily conducted through relatively thin exterior walls. This heat loss greatly increases the amount of fuel required for heating a building.

The prior art solution to the above problems consists mainly of constructing relatively thick insulated walls for a building. The amount of noise and heat which is conducted through these thick insulated walls is comparatively low. However, the cost of materials and labor for constructing a thick insulated wall is relatively high.

Therefore, one of the objects of this invention is to provide an inexpensive wall structure having a relatively high resistance to the transmission of sound and heat.

Another object of this invention is to provide a means for quickly and easily applying a sound and heat insulating media to a wall.

Still another object of this invention is to provide a decorative wallpaper which has improved heat and sound insulating characteristics.

These and other objects of the invention will become more apparent from a reading of the following detailed description taken in connection with the accompanying drawings, wherein:

FIG. 1 is an exploded view showing the construction of a wall covering which forms a preferred embodiment of my invention;

FIG. 2 is an enlarged view illustrating the details of the structure of the wall covering of FIG. 1;

FIG. 3 is a sectional view, along the line 3—3 of FIG. 2, of the wall covering structure;

FIG. 4 is a sectional view of a second embodiment of my invention; and

FIG. 5 is a sectional view of a wall on which the wall covering of FIG. 1 has been secured.

Referring now to the drawings in greater detail, there is shown in FIG. 1 a preferred embodiment of the wallpaper or covering **10**. The wall covering **10** has a laminated structure which includes a flexible backing layer **12**. The backing layer **12** forms a base for a wall covering structure and is preferably made of a relatively heavy flexible paper or other suitable material. A second intermediate layer **14** is juxtaposed against the first layer **12**. The second intermediate layer is made of a thin pliable sheet or film of polythylene or other suitable polymeric material. The layer **14** is formed with a matrix of large apertures **16** which are interconnected by a series of relatively small apertures **18**. A third decorative layer **20**, formed of a flexible paper, is positioned adjacent the outer surface of the second intermediate layer **14**. A decorative design **21** is imprinted on the outer surface of the layer **20**.

While it is not desired to be limited to any one theory, it is believed that the wall covering **10** derives its sound insulating properties from the thin sheet or film **14**. It is a well known fact that sound is transmitted by vibrations. Since the sheet or film **14** is extremely pliable, the vibratons of the film are very limited. Therefore, when sound vibrations impinge on the wall covering **10**, they are effectively absorbed or dampened by the pliable sheet or film **14**.

From an examination of FIG. 2, it will be seen that the inner layer or sheet **14** is divided into a series of relatively small panels **22** by the apertures **16** and **18**. It has been found by experimentation that the panels **22** further decrease the transmission of sound through the wall covering **10**. It is believed that the relatively small panels **22** reduce the transmission of sound because they have a different rate of vibration than the relatively large front and back panels **12** and **20**. Since the panels **22** vibrate at a different rate than the two outer panels, the sound vibrations which are transmitted by the outer panels are broken up by the small panels **22** of an intermediate layer or sheet **14**. This breaking up of the sound waves or vibrations reduces the sound transmission through the wall covering **10**, since vibrations which are readily conducted by the two outer layers **12** and **20** are dispersed by the inner layer **14**. By the same token, the sound waves which are conducted, even to a limited extent, by the inner layer **14** will be dispersed by the two outer layers **12** and **20**. Thus, the inner layer or sheet reduces sound transmission due to its pliability and the formation of a plurality of small panels which tend to disperse vibrations conducted by the large outer layers **12** and **20**.

Referring now to FIG. 3, the apertures **16** are formed with an inwardly tapering edge portion **24**. The inwardly tapering edge portion permits the outer layer **20** to be pressed against the backing layer **12** through the apertures **16** without forming a ridge in the outer decorative layer at the edges of the apertures **16**. By the use of a suitable paste or adhesive on the surfaces of the two layers **20** and **12**, at the apertures **16**, the three separate layers are formed into a unitary structure. This structure results from the bonding of the outer decorative layer **20** to the backing layer **12** through the apertures **16**. The intermediate layer **14** is firmly held in position by the adhesive connection between the two outer layers.

Although I use a plurality of apertures **16**, in a preferred embodiment of my invention, to interconnect the backing layers **12** with a decorative layer **20**, the apertures **16** and **18** can be eliminated. The elimination of the apertures **16** and **18** reduces the sound insulating qualities of the wall covering to some extent. However, due to the pliability of the inner layer **14**, the sound insulating properties of the wall covering **10** are not impeded to any

great degree by the elimination of the apertures **16** and **18**. When the apertures **16** and **18** are eliminated, as shown in FIG. 4, the inner polyethylene inner layer **14***a* forms a continuous panel to which the outer layers **12** and **20** are connected. This connection is advantageously formed by a plurality of small circular areas or dots **25** of pressure sensitive adhesive. The dots **25** of adhesive are placed opposite each other and they securely grip the center layer when pressed against it.

The backing layer **12** is secured by suitable adhesive, as is commonly done with wallpaper, to a wall **26**. As is seen in FIG. 5, the backing layer **12** is secured directly to the plaster **28** of the wall **26**. The plaster **28** is supported by a suitable lath or backing **30** which is mounted on the studs **32** in the conventional manner.

In a third embodiment of my invention, I fabricate the intermediate layer **14** of a thin, bright metal foil. The use of a metal foil for the intermediate layer **14** greatly increases the resistance of the wall covering to the transmission of heat. The bright metal foil reduces heat losses by radiation while simultaneously reducing sound transmission through the wall covering. Although a pliable polymeric film has better sound insulating qualities, an intermediate layer **14** of a thin bright metal foil impedes the transmission of sound, while also reducing heat transmission.

It will be apparent to those skilled in the art that the shape of the apertures **16** can be varied without reducing the heat and sound insulating qualities of my structure. Thus, oblong, square, or other shaped apertures, can be used. In the preferred embodiment of the invention, I utilize a round aperture, since the round aperture provides the greatest amount of bonding surface between the backing layer and the decorative outer layer, while reducing the effective insulating area of the intermediate layer by a minimum amount.

What is claimed is:

1. A sound absorbing wall covering comprising three layers of flexible material adhesively secured and arranged to provide an outer layer, an inner layer, and an intermediate layer; said intermediate layer comprising a film of thin flexible material having a plurality of intersecting rows of small closely-spaced apertures bordering a multiplicity of imperforate panels; a limited number of relatively large openings interposed along said rows of apertures; said inner and outer layers being alhesively secured together through said relatively large openings and said imperforate panels being free to vibrate independently of said inner and outer layers in response to sound waves impinging on said wall covering; said inner layer providing a surface adapted for adhesive attachment to a wall surface.

2. The wall covering of claim **1** in which said intermediate layer is formed from a thin flexible film of plastic material.

3. The wall covering of claim **1** in which said inner and outer layers are formed of paper, said outer layer having a decorative design applied thereto.

4. A flexible sound insulating wall covering, comprising in combination a paper backing sheet for adherence to a wall, a decorative sheet adapted to face away from such wall, and a flexible plastic sheet interposed between said backing sheet and said decorative sheet, a plurality of small closely-spaced apertures in said plastic sheet arranged in intersecting rows dividing said plastic sheet into a multiplicity of contiguous imperforate panels, a limited number of large openings in said plastic sheet in positions to interrupt said rows of small apertures therein, the rim portions of said large openings being tapered inwardly to form sharp edges around said openings, and adhesive material securing said decorative sheet to said backing sheet in said large openings in the plastic sheet, whereby the formation of significant ridges in the decorative sheet at the edges of said large openings is prevented.

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