Sept. 2, 1958 R. A. BENJAMIN 2,850,109

LIGHT-PERMEABLE SOUND-ABSORBING PANEL

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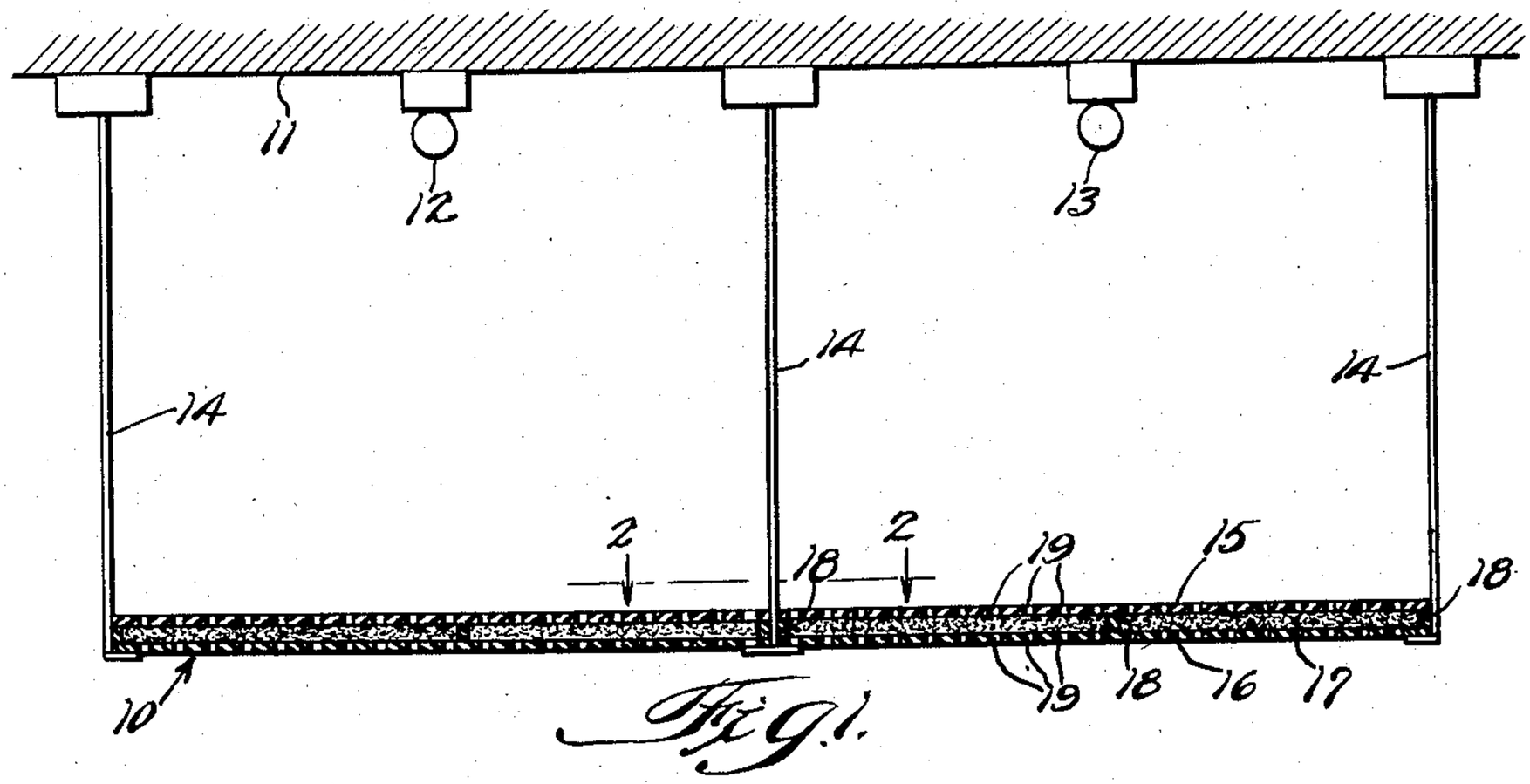

Fig. 1.

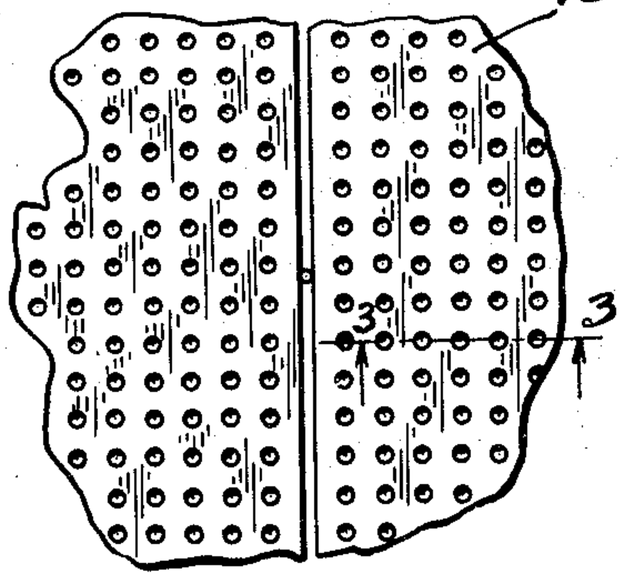

Fig. 2.

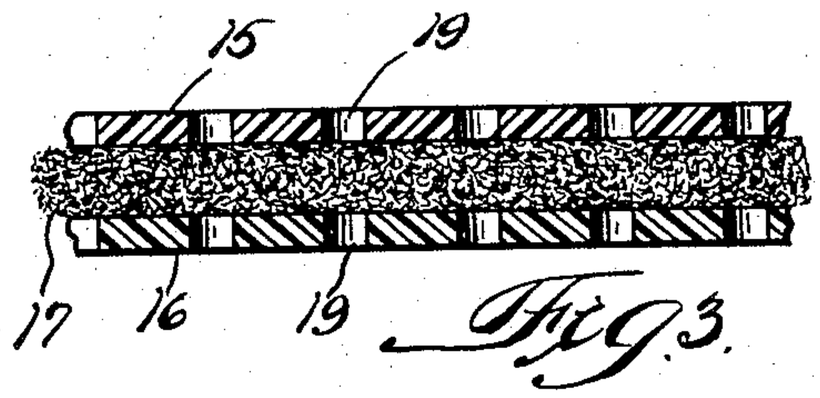

Fig. 3.

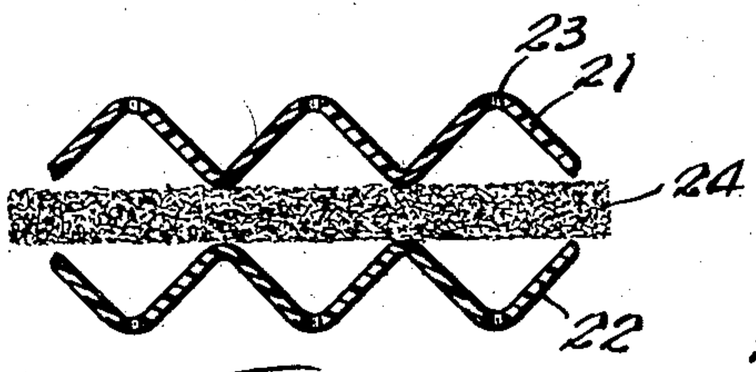

Fig. 5.

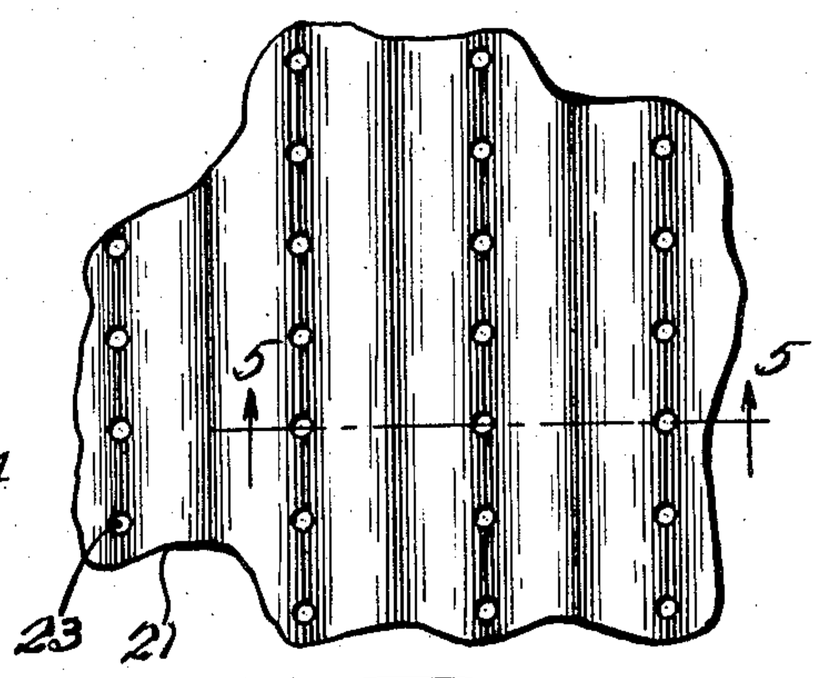

Fig. 4.

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LIGHT-PERMEABLE SOUND-ABSORBING PANEL

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7 Claims. (Cl. 181—33)

This invention relates to the acoustical and optical treatment of rooms, more particularly to the provision of light-permeable and sound-absorbing panels for utilization as individual members or in connection with lighting fixtures, and it is an object of the invention to provide improved apparatus of this character.

It is a further object of the invention to provide a panel of the character described which is simple in construction, efficient in operation, and pleasing in appearance.

In many rooms, whether offices, studios or factories, it is desirable to have sound-deadening means and, conveniently, these may be provided in connection with lighting fixtures, particularly those of the fluorescent lamp type, in order not only to absorb sound from the light fixture itself, but from the surroundings.

Sound-deadening panels or baffles of the prior art have been either opaque to light or the exterior surface of the panel has been solid so that sound waves impinging thereon were reflected to a substantial extent. Accordingly, it is a further object of the invention to provide an improved light-permeable, sound-absorbing panel wherein the exterior surface is sound-transparent over the sound frequency range, but the interior of the panel is highly effectively sound-absorbing over the same range so that sound after having entered the panel is absorbed or deadened and never emerges. In carrying out the invention in one form a light-permeable, sound-absorbing panel is provided comprising a pair of spaced apart perforated layers of light-permeable material and a layer of light-permeable, sound-absorbing material disposed in the space between the perforated layers.

For a more complete understanding of the invention reference should be had to the accompanying drawings, in which

Figure 1 is a view partially in section showing a panel according to the invention suspended from the ceiling of a room in connection with a fluorescent lighting fixture;

Fig. 2 is a fragmentary view taken in the direction of arrows **2—2** of Fig. 1;

Fig. 3 is a sectional view on a larger scale taken substantially along the line **3—3** of Fig. 2;

Fig. 4 is a fragmentary view similar to Fig. 2 of a modified form of the invention; and

Fig. 5 is a sectional view taken substantially along the line **5—5** of Fig. 4.

Referring to the drawings, the invention comprises a light-permeable, sound-absorbing panel **10** shown suspended from a ceiling **11** beneath a pair of fluorescent lamps **12** and **13**, the suspension being by means of rods **14** or other suitable means.

The panel **10** comprises a pair of perforated members **15** and **16** which are spaced apart and between which there is a layer of sound absorbing material **17**. As shown in Figs. 1 and 2, the layers **15** and **16** may be in contact with the surfaces of the layer of sound-absorbing material **17**, but it will be understood that the layers **15** and **16** may be spaced a short distance away from the sound-absorbing material. The layers **15** and **16** may be held apart in any suitable manner so as not to crush the sound-absorbing material, such for example as by spacers **18**.

The layers **15** and **16** may be made, for example, of a clear or translucent plastic material provided with perforations **19**, which perforations may, for example, be of the order of ⅛ inch to 5/16 inch in diameter and spaced on centers ¾ inch to 1¼ inch apart. The size, number, and spacing of the perforations, as well as the thickness of the layers **15** and **16**, may be chosen to satisfy particular conditions so long as the dimensions are such that the layers **15** and **16** are substantially transparent to sound over the sound frequency range.

The material **17** may be any translucent or transparent wool, for example made of spun glass or rock fibers which are highly sound absorbing over the sound frequency range. Thus, when sound impinges upon the layers **15** and **16** it passes therethrough by virtue of the perforations and then is absorbed within the wool layer **17**, the thickness thereof being chosen to satisfy the particular conditions. One to two inches in thickness has been found satisfactory.

The panel as a whole should be light-permeable in order that use may be made of it in connection with lighting fixtures and it may be as nearly transparent as the materials desired to be used will permit. It may also, of course, be translucent whereby to produce a desirable diffused effect. Various decorative effects may be produced by using colored materials, for example, for the layers **15** and **16**.

To obtain a slight spacing of a substantial portion of the exterior layers from the sound-absorbing material, these layers may be corrugated as shown by layers **21** and **22** in Figs. 4 and 5. The materials of layers **21** and **22** may be the same as those described in the preceding figures and the perforations **23** may be dimensioned and disposed as already described, but as shown are disposed only in the tops or outermost parts of the corrugations. Perforations may also be provided in the bottoms of the corrugations, if desired. A layer of highly efficient sound-absorbing, light-permeable material **24** is disposed between the corrugated layers **21** and **22** so that contact is had for support purposes only with the bottoms or innermost parts of the corrugations. In a panel constructed in this fashion, the sound enters the perforations **23** and spreads out within the triangular space between the perforations and the surface of the wool-absorbing material **24** so that the sound impinges initially upon the sound material over a larger area thereof. A greater portion of the wool-absorbing material comes into operation and a greater sound-absorbing or deadening effect is obtained.

While particular embodiments of the invention have been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made, and it is, therefore, contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

The invention having thus been described, what is claimed and desired to be secured by Letters Patent is:

1. A light-permeable, sound-absorbing panel comprisign a pair of spaced-apart, perforated layers of light-permeable, material, and a layer of light-permeable, sound-absorbing material disposed in the space between said perforated layers.

2. A light-permeable, sound-absorbing panel comprising a pair of spaced-apart, perforated layers of light-

permeable material, and a layer of fibrous, light-permeable material disposed in the space between said perforated layers.

3. A light-permeable, sound-absorbing panel comprising a pair of spaced-apart, perforated layers of light-permeable material, spacers for holding said perforated layers in said spaced-apart relationship, and a layer of fibrous, light-permeable material disposed in the space between said perforated layers.

4. A light-permeable, sound-absorbing panel comprising a pair of spaced-apart, perforated layers of light-permeable material, spacers for holding said perforated layers in said spaced-apart relationship, and a layer of fibrous, light-permeable material disposed in the space between said perforated layers but spaced therefrom.

5. A light-permeable, sound-absorbing panel comprising a pair of corrugated, spaced-apart, perforated layers of light-permeable material, and a layer of fibrous, light-permeble material disposed in the space between said perforated layers.

6. A light-permeable, sound-absorbing panel comprising a pair of corrugated, spaced-apart, perforated layers of light-permeable material, and a layer of fibrous, light-

permeable material disposed in the space between said perforated layers but being in contact only with the innermost parts of the corrugations thereof.

7. A light-permeable, sound-absorbing panel comprising a pair of corrugated, spaced-apart layers of light-permeable material, each of said layers being perforated along the outermost parts of the corrugations thereof, and a layer of fibrous, light-permeable material disposed in the space between said perforated layers but being in contact only with the innermost parts of the corrugations threeof.

References Cited in the file of this patent

UNITED STATES PATENTS

2,011,252	Modigliani	Aug. 13, 1935
2,160,638	Bedell et al.	May 30, 1939
2,161,708	Heerwagen	June 6, 1939
2,218,992	Monroe	Oct. 22, 1940
2,590,204	Phillips	Mar. 25, 1952
2,710,335	Wong	June 7, 1955
2,715,449	Lemmerman et al.	Aug. 16, 1955
2,759,093	Ferar et al.	Aug. 14, 1956