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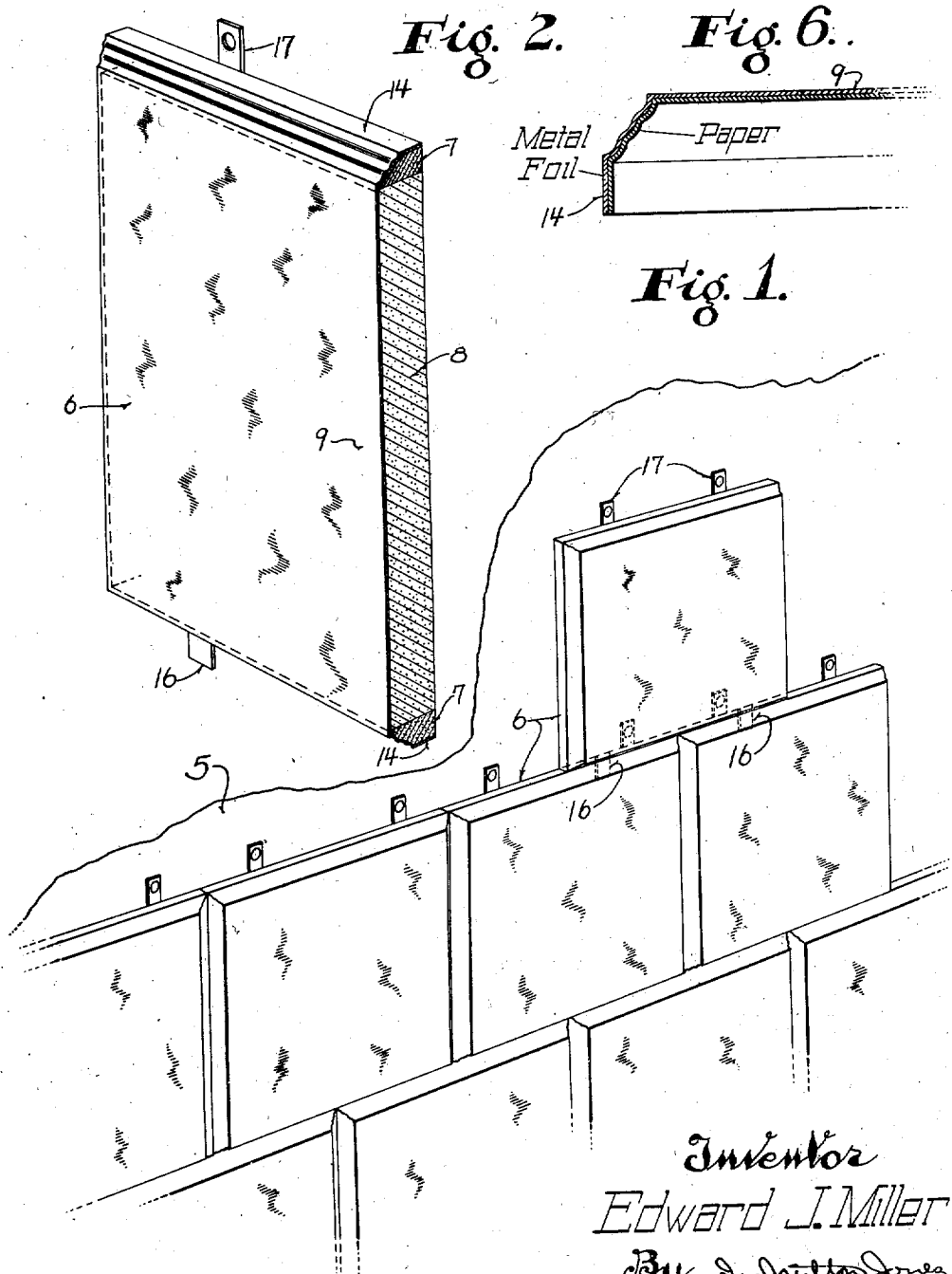
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ACOUSTICAL WALL SURFACING

Filed April 7, 1933

2 Sheets-Sheet 1



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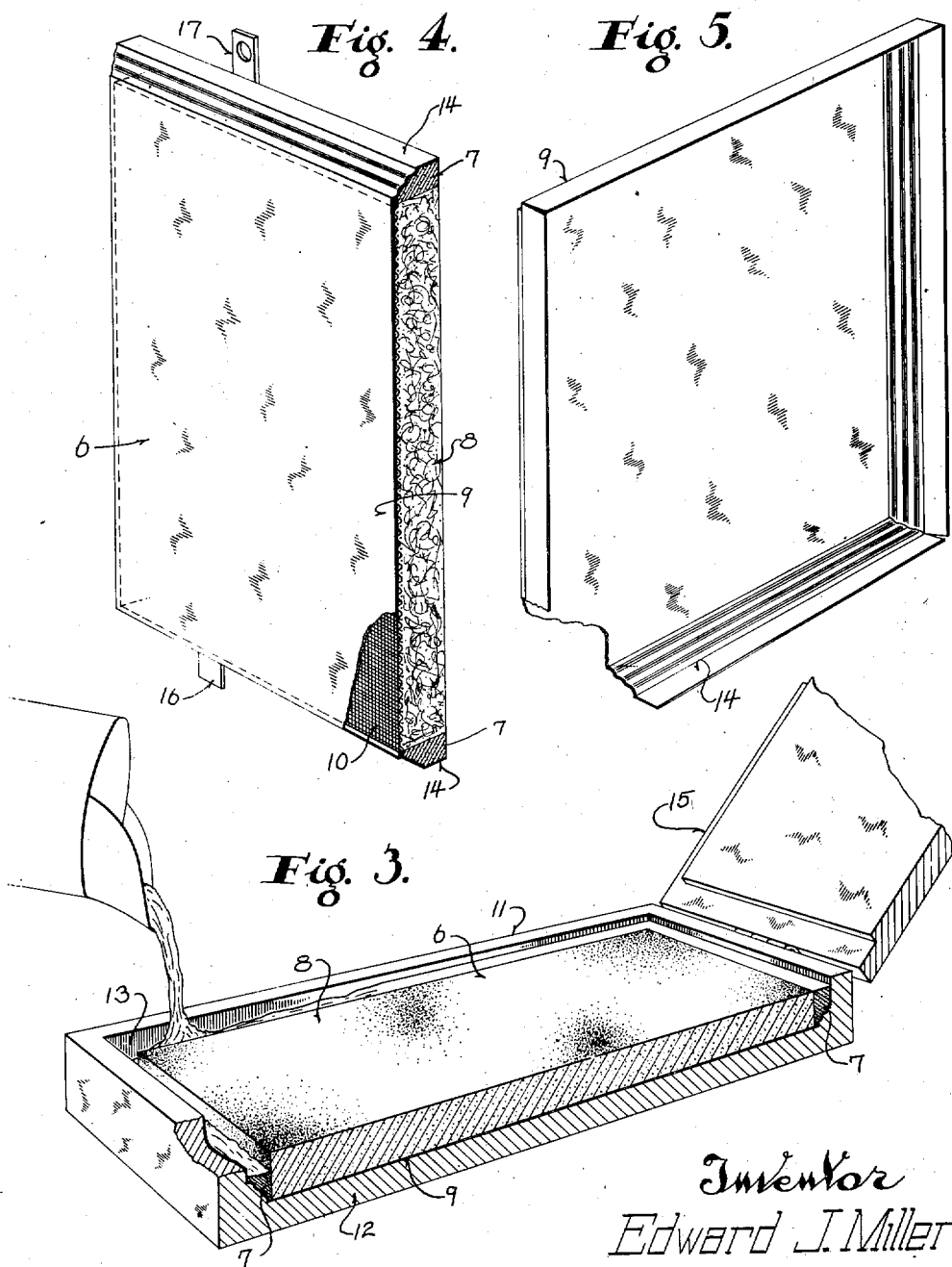
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UNITED STATES PATENT OFFICE

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ACOUSTICAL WALL SURFACING

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6 Claims. (Cl. 154-44)

This invention relates to certain new and useful improvements in acoustical wall surfacing.

Heretofore, all means available for covering walls, ceilings and the like to reduce sound reflection have been objectionable in that they did not lend themselves readily to decorative wall treatment. Invariably, the exposed surface was unsightly, and difficult, if not impossible, to keep clean.

It is, therefore, an object of this invention to provide a new wall surfacing having both a high acoustical factor and also a very decorative and pleasing appearance.

More specifically, it is an object of this invention to provide an acoustical wall covering comprising a layer of material having a high degree of sound absorption covered by an impervious and imperforate flexible membrane capable of being decorated in any desired manner.

It is known that acoustical wall surfacing has been proposed in the past in which a layer of sound absorbing material was covered by a fabric stretched across the exposed face thereof, but such surfacing is objectionable, as fabric is difficult to keep clean and does not readily lend itself to decorative treatment. The present invention has numerous advantages over such past schemes in that the membrane used is a metal foil which is not only impervious and impenetrable, but may be embossed or decorated in any desired manner and when in place, provides an absolutely sanitary and easily cleaned facing.

The present invention also distinguishes from the past method of covering an acoustical substance with a fabric in that the sound vibrations are transmitted to the sound absorbing material not by direct passage through the fabric as heretofore, but through a resonant vibration of the metal membrane, i. e., vibrations striking the exposed face of the surface are transmitted to the acoustical material covered by the metal membrane by the vibration of the membrane in resonance with the striking sound waves.

In this connection, it is a further object of this invention to so position the membrane with respect to the acoustical material that a dampening effect is obtained by reason of sound waves reflecting slightly from the acoustical material and counteracting those striking the outer face of the membrane.

A further object of this invention is to provide an acoustical wall surfacing of the character described which is formed in conveniently handled units, readily applied to the wall or ceiling to be covered, and which may be manufactured

either directly on the job or in the shop and sent out ready for application.

A further object of this invention resides in the novel method of making an acoustical wall surfacing unit of the character described.

A still further object of this invention resides in the provision of a highly flexible, thin membrane suitable as a covering for acoustical wall surfacing and composed of a layer of metal foil backed by paper or some similar material.

It is also an object of this invention to provide means to reinforce the metal foil or membrane especially where the acoustical material is of a soft wool or similar material.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated two complete examples of the physical embodiment of my invention constructed according to the best modes I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view illustrating a wall partially covered with the acoustical surfacing units of this invention;

Figure 2 is a perspective section view through a single unit illustrating its internal construction;

Figure 3 is a perspective view illustrating the method of making the units;

Figure 4 is a view similar to Figure 2, illustrating a unit of slightly modified construction;

Figure 5 is a perspective view of the metal foil membrane illustrating its formation prior to the completion of the unit; and

Figure 6 is an enlarged fragmentary section view to illustrate the specific construction of the membrane when backed by paper or the like.

Referring now more particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numeral 5 represents a wall, ceiling, or any other surface to be covered, and to which the novel acoustical units of this invention indicated generally by the numeral 6 are attached. The units 6 are preferably of such dimensions and shape as to be conveniently handled, both during manufacture and application, and in the present

instance, are illustrated as square blocks. Obviously, the units may be formed with any desired configuration, and may be applied to the supporting base or wall in any desired manner.

Each individual unit comprises a frame 7, a pad or layer 8 of acoustical material having a high factor of sound absorption, and an outer facing 9 in the form of a thin flexible membrane, covering the acoustical pad and attached at its peripheral edges to the frame 7.

The membrane 9 is formed of an impervious and imperforate material, other than fabric and preferably a thin metal foil as for instance, aluminum foil. Such foils may be embossed or decorated in any desired manner and thus afford a highly decorative facing for the unit, which is absolutely sanitary and easily cleaned.

The pad 8 of sound absorbing material may be a substantially solid block of porous plastic material as illustrated in Figure 2, or it may be a pad or body of fibrous material such as wool, as illustrated in Figure 4.

Where the material used is relatively solid, or firm, the membrane 9 is given the necessary support to preclude its being punctured, but where loose wool or other fibrous material is used, a supporting backing is preferably provided for the membrane. This backing may be a foraminous screen 10 positioned directly beneath the membrane 9 as illustrated in Figure 4.

The sound absorbing material 8 and the metal foil membrane, and also the wire screen 10 in the embodiment of the invention illustrated in Figure 4, are all held assembled by the frame 7. This frame 7 may be formed of any desirable material. It may be composed of wood, metal, either stamped or cast, or any other suitable substance, but is preferably cast of plaster. By casting the frame 7 of plaster, it is possible to simultaneously bond the entire assembly together. Also, the plaster in drying eliminates any looseness in the membrane facing to insure a smooth and even surface.

Various methods may be employed to form the unit, but it has been found desirable to use a closed die or form as illustrated in Figure 3. The die or form indicated generally by the numeral 11 comprises a lower mold 12 having a cavity 13 shaped to conform to the desired size and shape of the finished unit. Into this cavity 13, is placed the facing membrane 9 which has previously been cut to size and formed to its finished shape as illustrated in Figure 5.

With the metal membrane in position in the cavity 13, the pad or layer of sound absorbing material 8, either the relatively solid plastic material shown in Figure 2, or the loose wool or fibrous substance of Figure 4, is placed in position, leaving a space between its peripheral edges and the adjacent walls of the cavity 13, which, however, are covered by the edges 14 of the formed metal membrane facing 9.

With the sound absorbing material 8 in position, fluid plaster is poured into the space surrounding its edges, as illustrated in Figure 3; and when the marginal space is completely filled, a cover 15 is closed down onto the mold to retain the parts in position and determine the thickness of the frame. Obviously, after the plaster has dried, the unit may be removed from the mold and is ready for application.

It is observed that the edges 14 of the membrane facing preclude direct contact of the plaster with the walls of the mold or die so that removal of the completed unit is facilitated.

In the formation of the unit illustrated in Figure 4, in which the screen 10 is disposed, beneath the membrane facing, the screen is placed in the mold directly after the membrane is positioned therein and before the pad or layer of acoustical material is put in place.

If desired, attaching tongues 16 and 17 may be imbedded in the plaster frame at the time of its formation. These attaching tongues extend beyond the opposite marginal edges of the unit, and are used in the manner illustrated in Figure 1 to secure the units to the supporting or backing surface. The tongues 17 projecting from one edge of the unit are apertured whereas the tongues 16 need not be apertured. The unapertured tongues 16 are engaged in back of the upper edges of the units forming the tier directly therebeneath, whereas the apertured tongues 17 are secured by nails or other suitable fastening means to the supporting wall. Any other desired means of mounting the units on the supporting wall may be employed and if desired, the units may be merely glued to the supporting surface.

While the use of a thin metal foil for the membrane facing is completely satisfactory from the standpoint of the acoustical properties of the unit, a slightly better unit is obtained by using a membrane composed of a metal foil backed with paper or some similar material as illustrated in detail in Figure 6. By backing the metal foil with paper in this manner, a more tenacious bond is obtained between the membrane facing and the plaster frame. The metal foil is also reinforced without in any way detracting or altering its manner of functioning when in use. The paper backing may be secured to the metal foil by means of any suitable cement or asphaltum.

The operation of the unit in the absorption of sound is as follows: Sound waves striking the exposed surface or face, induce a vibration on the part of the membrane in resonance with that of the sound wave striking it, and the membrane, while just contacting the adjacent surface of the acoustical material nevertheless is free to vibrate, transmits the sound vibrations to the sound absorbing material.

The major portion of the sound waves transmitted in this manner to the acoustical material are dissipated therein, but that portion which is reflected therefrom has a dampening effect upon the incoming sound waves to further increase the efficiency of the unit. It has been proven by actual test, that the sound absorbing factor of known acoustical materials is increased by the provision of a thin flexible impervious and imperforate membrane across its exposed surface. This increase in the sound absorbing factor is undoubtedly due to the dampening effect which takes place in the slight space between the membrane and the adjacent surface of the acoustical material.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art of acoustics, that this invention affords a novel and commercially practical acoustical surfacing which lends itself readily to any desired decorative treatment; and is absolutely sanitary and may be easily cleaned.

It is also apparent that the unit of this invention provides a novel article of manufacture.

What I claim as my invention is:

1. As an article of manufacture, an acoustical wall surfacing unit comprising a frame of plastic

- material, sound absorbing material within said frame and having its edges bonded to the frame by the natural adhesion of the plastic material of which the frame is composed, and a thin flexible metal foil membrane stuck at its marginal edge portions to the frame by the inherent adhesion of the plastic material of which the frame is composed to cover the sound absorbing material and form a decorative facing therefor.
2. As an article of manufacture, an acoustical wall surfacing unit comprising a hollow frame of plastic material, sound absorbing material within the frame, and a thin flexible membrane covering said sound absorbing material, said membrane comprising a layer of metal foil backed by a layer of paper, the marginal edge portions of the membrane being stuck to the frame by the natural adhesion of the plastic material with its paper backing engaging the frame to insure maximum adhesion.
3. As an article of manufacture, an acoustical wall surfacing unit, comprising a hollow frame, sound absorbing material within said frame, a foraminous supporting sheet covering one surface of the sound absorbing material and a thin flexible highly impervious and imperforate membrane fixed at its marginal edge portions to said frame and covering the foraminous supporting sheet.
4. An acoustical wall surfacing comprising a layer of sound absorbing material, a foraminous metal screen covering the sound absorbing material, and a thin flexible highly impervious membrane covering the foraminous screen.
5. As an article of manufacture, an acoustical wall surfacing unit comprising a frame, sound absorbing material within said frame, a foraminous metal screen covering the sound absorbing material and attached at its marginal edge portions to said frame, and a flexible imperforate metal foil membrane covering the foraminous screen and also attached to said frame.
6. As an article of manufacture, an acoustical wall surfacing unit comprising a frame of conveniently handled proportions and composed of a plastic material, a slab of self-supporting sound absorbing material permanently bonded to said frame by the natural adhesion of the plastic material of which it is composed so that the frame with the sound absorbing material therein forms a composite structure adapted to be applied to a wall as a unit, and a flexible metal foil membrane permanently attached at its marginal edge portions to the frame to cover the sound absorbing material and afford a decorative facing therefor, said membrane being loose with respect to the sound absorbing material so as to vibrate freely and transmit sound energy to the sound absorbing material.

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