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SOUND ABSORBING CONSTRUCTION

Benjamin S. Reynolds, Madison, Wis., assignor to
Burgess Battery Company, Chicago, Ill., a cor-
poration of Wisconsin

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6 Claims. (Cl. 181—33)

This invention relates to improved acoustical constructions and more particularly to pre-assembled structural elements such as are used for the construction of air ducts acoustically corrected to prevent transmission of sound. The constructions and methods described and claimed herein, may, however, be used in the acoustical treatment of walls, ceilings and other like surfaces.

10 The principal object of this invention is to provide a pre-fabricated acoustical unit which may be easily assembled and used to form or line an air or ventilating duct or to treat wall or ceiling surfaces.

15 A further object of this invention is to provide an acoustical lining for air ducts which will not be affected by high air velocities passing through the duct, and which will not offer appreciably greater resistance to air flow than the usual metallic surface.

20 It is usually found necessary to line air or ventilating ducts with material which absorbs sounds so that the occupants of the rooms connected with such ducts are not disturbed by noises emanating from the motor, fan, the exterior of the building, other rooms, etc. The use of such linings allows higher air velocities to be used since the noises resulting from such increased velocities are absorbed by the lining. Higher air velocities permit a reduction in the size of the ducts and thereby decrease construction costs.

25 Ventilating and other air ducts generally are made of sheet metal in modern constructions. It is desirable to keep the sound-absorbing lining as thin as possible to keep the cost of construction low and to keep the effective cross sectional area of the duct as large as possible. Furthermore, the duct should be easily constructed and erected on the job by any metal worker without additional equipment or tools. The structure embodying this invention has these advantages.

30 The acoustical construction of this invention consists primarily of a unit consisting of a sound-absorbing pad assembled with a backing sheet and a foraminous facing which preferably is the perforated membrane, preferably metal, such as is described in Norris patent 1,726,500. A perforated metal facing is desirable since it provides a smooth surface for the flow of air and offers a minimum resistance to air flow, prevents destruction and disintegration of the absorbing material by high velocity air currents, and it has desirable mechanical properties so that it may be installed easily by a metal worker.

35 Further objects and advantages will become ap-

parent from the following detailed description taken in conjunction with the accompanying drawing wherein:

Fig. 1 illustrates in perspective, partly in section, a portion of an air duct constructed according to my invention;

Fig. 2 is a vertical sectional view illustrating the acoustical construction.

In the embodiment of my invention illustrated in the accompanying drawing, the absorbing material 10 and perforated facing 12 are mounted on a backing sheet 14 to form an acoustical panel which may be used for the construction of air ducts. The absorbing material may be pads or blankets of hair felt, "balsam wool" (a blanket form of insulation made of wood fibers cemented into a loose fluffy mass), mineral or metallic wool, and the like. The backing sheet and facing are preferably thin sheet metal.

The perforated facing 12 is cut to the desired size and suitable allowances may be made to allow the marginal portions 22 to be turned at substantially right angles to the facing to form a pan. The use of pans stiffens the construction and effects a better butt joint with the adjacent unit. The absorber 10 is then cut to fit within the pan.

The desired positions for the perforated metal domes 16 or other anchoring means are then located on the backing sheet 14. This is accomplished by laying the facing sheet 12 on backing sheet 14 as it will be in the final assembly and forcing a pin punch through the perforations of the facing at the points selected for support by screws 18. The facing perforation may be enlarged by the punch if required. The perforated domes 16 or other raised perforated sheet means are then centered at these marks and attached to backing sheet 14 as by soldering. Strips of perforated metal may be used in place of domes 16, provided portions of such strips are bulged or raised so as to leave a space between the perforated metal and the backing sheet into which a screw may be driven.

The construction is assembled by placing the absorbing material 10 on the backing sheet 14 and domes 16. The foraminous facing 12 is then placed on the absorbing material. Screws 18, preferably self-tapping screws, are inserted through the holes in the facing previously selected in locating the anchoring means on the backing sheet. The screws are forced through the absorbing material until they contact the perforated domes. The screws readily enter one of the perforations in the dome and the screw is then driven to the desired depth, thereby main-

taining the facing, absorber and backing in assembled relation. It is generally desirable to drive the screw into contact with backing sheet 14 thereby tightening it into place to prevent loosening.

For convenience in handling the absorbing material, it is desirable in certain cases to provide a unit of the absorber 10 and facing 12. This may be done by attaching the absorber to the facing as by gluing or by mechanical means such as staples 20 and 21. The legs of the staples (either double leg as 20 or single leg as 21) are inserted through the openings in the foraminous facing and bent over at the back of the absorber, as shown in Fig. 2. This unit may be attached to the backing 12 as hereinbefore described.

The lining is proportioned and attached to the backing sheet so that it does not interfere with the assembly of the duct. The lining units are attached to the duct walls prior to assembling the walls. The duct is assembled in any desired manner. In the duct illustrated in Fig. 3, the side walls 34 and 35 are provided with overlapping edges for fastening to walls 36 and 37. The walls may be fastened by means of a lock seam, soldering, self-tapping screws or any other means.

It is understood that the construction illustrated may be modified in various ways. For example, the foraminous facing and the backing sheet may be made of any thin, stiff sheet material such as veneered wood sheets, bakelized sheets and the like. The perforated domes may be replaced by wood blocks or wood strips.

Although I have described my invention in conjunction with the construction of air ducts, it is obvious that the described construction may be used for the treatment of wall or ceiling surfaces of rooms or other enclosures.

I claim:

1. An acoustical construction comprising a metallic sheet backing member, a sound-absorbing pad contiguous to said backing member, a perforated facing member contiguous to said pad, raised perforated sheet means attached to the interior surface of said backing member, and threaded means passing through said perforated facing and said pad and into the perforations of said raised sheet means to maintain said elements in assembled relation.

2. An acoustical construction comprising a

metallic sheet backing member, sound-absorbing material contiguous to said backing member, a perforated sheet facing contiguous to said sound-absorbing material, perforated hollow metal domes attached to the interior surface of said backing member, and screws passing through said facing and said absorbing material and threaded into the perforations in said domes.

3. An acoustical construction comprising a sheet metal backing member and a pre-assembled unit contiguous thereto and mounted thereon, said unit comprising a sound-absorbing pad and a perforated sheet metal facing attached thereto by means extending through said facing and pad to maintain said elements in assembled relation, dome-shaped perforated sheet metal members mounted interiorly said backing member, and self-tapping screws passing through said facing and co-operating with said dome-shaped members whereby said construction is maintained in assembled relation.

4. In an acoustical construction comprising a backing member, a sound-absorbing pad contiguous thereto, and a facing member contiguous to said pad, said backing member having raised, perforated sheet metal domes on its interior surface for cooperating with threaded means passing through said facing and pad to maintain said elements in assembled relation.

5. The structure of claim 1 in which the metallic sheet backing member is in the form of a duct and said sound-absorbing pad and perforated facing member are mounted on the interior surfaces of said duct.

6. In a ventilating duct having side walls of sheet metal, a lining of sound-absorbing construction arranged on the interior surfaces of said side walls, said lining being composed of one or more units, each said unit comprising a flanged perforated sheet metal member, the edges of said flanges abutting said wall, said flanges serving to space the broad surface of said member from the contiguous wall of said duct, sound-absorbing material between said member and said contiguous wall, and means supporting said unit comprising one or more perforated sheet metal domes mounted on said contiguous wall interiorly thereof and a screw passing through said member and said sound-absorbing material and threaded into one of said domes.

BENJAMIN S. REYNOLDS.