

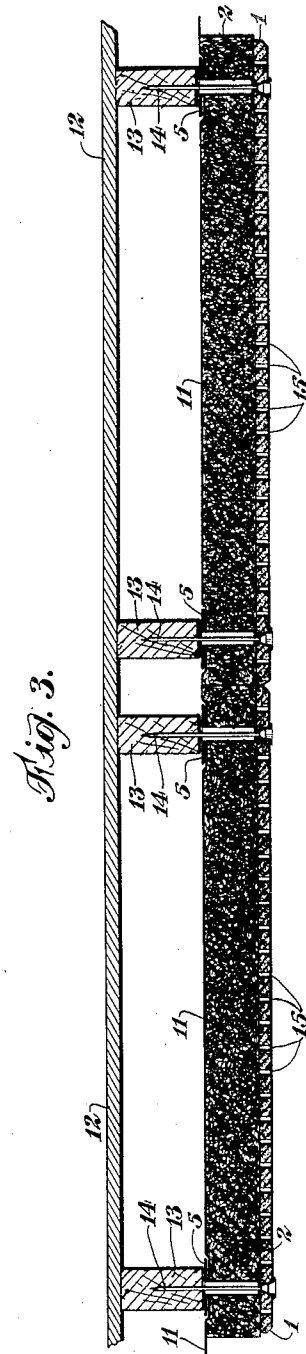
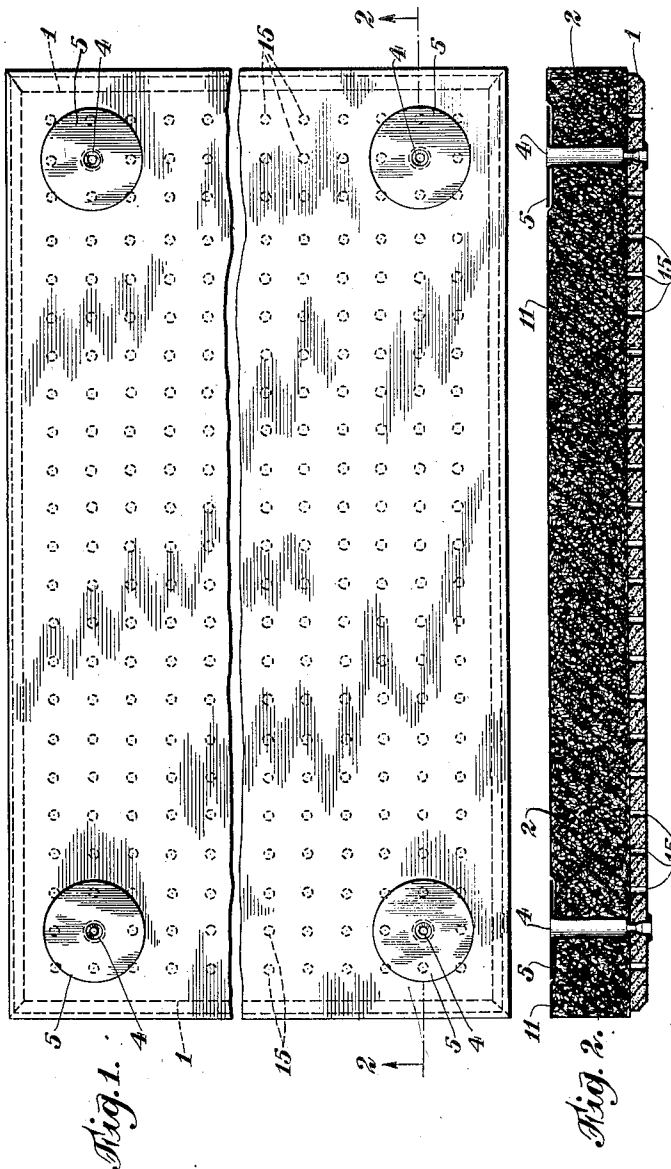
Sept. 12, 1933.

G. D. KELLOGG ET AL
ACOUSTICAL CONSTRUCTION

1,926,679

Filed Jan. 25, 1932

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4.

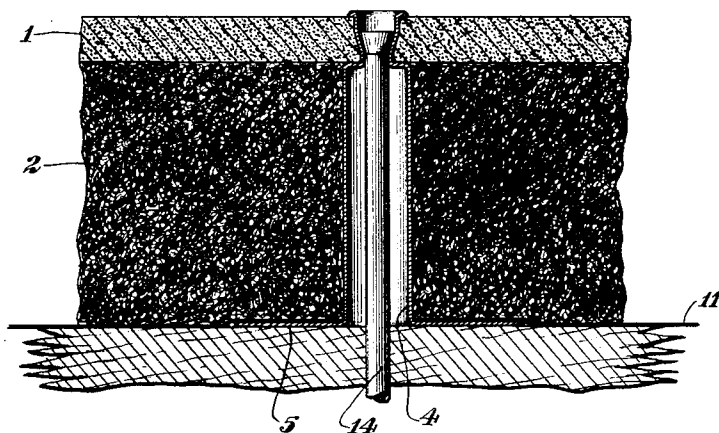


Fig. 6.

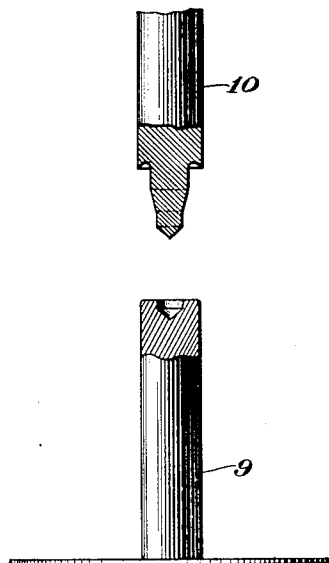
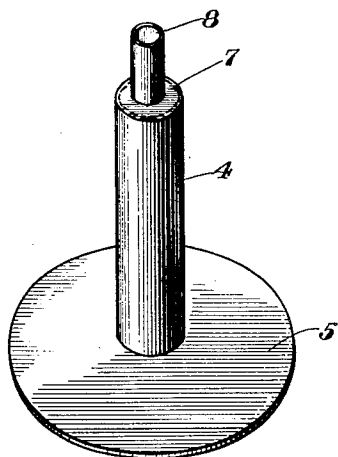


Fig. 5.



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1,926,679

ACOUSTICAL CONSTRUCTION

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Application January 25, 1932. Serial No. 588,574

8 Claims. (Cl. 20-4)

The present invention relates to improvements in acoustical construction, and particularly to such a construction comprising preassembled units.

5 One of the outstanding disadvantages in the conventional constructions employed for acoustical treadment resides in their lack of certain of the qualities necessary for exterior surfaces of a wall or ceiling. For most purposes it is highly desirable that such surfaces be permanent and fireproof in character, readily cleaned and painted, and decorative and pleasing in appearance. Conventional types of acoustical or sound-absorptive materials such as felts of fibrous material, or molded masses of mineral wool associated with a binding material, lack one or more of the properties desirable in an exterior finish, and consequently for the most part acoustical constructions have been only partially satisfactory. For instance, sound-absorptive sheets or blocks composed of molded masses of mineral wool associated with a binder such as the commercial product "Rockoustile", are very efficient from the standpoint of acoustical effectiveness, but due to their inherent frangibility such products are subject to a relatively large breakage, and furthermore are characterized by surfaces which do not lend themselves readily to decorative treatment or cleaning. One of the objects of this invention is the provision of a structure wherein frangible sound-absorptive material of the type mentioned is reinforced with a facing material which renders it capable of being readily applied in unit form and which facing also prevents breakage and obviates other disadvantages inherent in the sound-absorptive material employed.

Another object of the invention is the provision of an acoustical construction of high acoustical efficiency wherein the surface of the element directly exposed to the impinging sound is of a permanent and fireproof character, readily cleaned and painted, and having pleasing and decorative appearance.

45 A further object of the invention is the provision of an acoustical unit which may be readily and economically installed.

A further object of this invention is the provision of an improvement on the acoustical construction disclosed in the pending application filed by Hoff and Kellogg on even date herewith, consisting in improved means for assembling the facing and sound-absorbing element, and in addition the provision of improved means for securing the unit to wall or ceiling substructure.

Various other objects and advantages of the invention will be evident from the following description of an illustrative and preferred embodiment shown in the accompanying drawings, wherein

Fig. 1 is a plan rear view of the preassembled unit.

Fig. 2 is a sectional view along the line 2-2 of Fig. 1.

Fig. 3 is a side sectional view of a plurality of the units combined with a ceiling substructure.

Fig. 4 is a detail view of the means employed for securing the unit in position.

Fig. 5 shows the tubular spacing member before being combined with the other elements, and

Fig. 6 illustrates the dies employed for clinching the end of the tubular member after assembly.

The unit shown in detail in Figs. 1 and 2 comprises a perforated facing member 1 and a backing member 2 contiguous to the facing member comprising a block or pad of sound-absorptive material. The facing and backing members are maintained in an assembled relation by a tubular spacing member 4 made of spun brass or the like. The spacing member terminates in an outwardly extending flange 5 at its inner end and is provided with an intermediate shoulder 7 which abuts against the facing member.

In assembling the unit, the tubular members 4 in the form shown in Fig. 5 are inserted through suitable openings in the pad so that the flange 5 rests against the back of the pad. The assembly is then combined with the facing member so that the reduced ends 8 of the tubular members extend through perforations in the facing member. Die 9 is then inserted through the bottom of the tubular elements and the reduced end portion clinched as best shown in Fig. 4 by driving die 10 into the reduced end portion 8.

The tubular members have a threefold function in that they serve as spacers, means to secure the various elements of the unit, and means for permitting convenient entry of the fastening means which secure the unit in position.

An impervious sheet 11, suitably of paper, is secured to the back of the unit to prevent "breathing" of the sound-absorbing material.

The units may be combined with any type of wall or ceiling surface to be acoustically treated as shown in Fig. 3. In this figure a ceiling or wall substructure which may be plaster, lathing or any other suitable material is indicated generally by numeral 12. Nailing strips 13 are affixed to the substructure at spaced intervals corresponding to

the dimensions of the individual units. Each unit is disposed so that the tubular members are in alignment with the underlying strips 13, and the unit is secured in position by fastening means such as nails 14 driven through the tubular elements into strips 13. The tubular elements are disposed so that the bottom portion thereof is in contact with the bottom portion of strips, whereby they function to maintain the facing member at a fixed distance from the substructure and in alignment with adjacent units. As shown, adjacent units are preferably disposed so that the facing members and sound-absorbing backings are in aligned, abutting relationship. In installing the units the marginal portions of the sound-absorptive backing which projects slightly beyond the edges of the facing portion, as shown in Fig. 2, is compressed against corresponding marginal portions of adjacent units whereby a tight fit between adjoining units is insured. It will be noted that the construction provides for a tight fit between adjacent units and for an abutting contact of the edge portions of the sound-absorbing material of adjacent units. This construction is especially advantageous in that it obviates the circulation of air in large quantities through the joints due to "breathing" caused by temperature fluctuations and the resulting deposition of dirt on the surface of the facing member adjacent the joint.

For the sound-absorptive backing 2 there are preferably employed molded sheets or blocks of mineral wool associated with a suitable binder such as the commercial product "Rockoustile" or "Rock Cork". Such products are highly efficient sound absorbers, and the disadvantage arising from their inherent fragility and tendency to dust and disintegrate are obviated by the reinforcement imparted by the facing member. Various other kinds of sound-absorptive material, however, may be employed to advantage in the practice of the invention other than frangible blocks.

The facing member is preferably composed of dense, rigid or self-sustaining material in contradistinction, for instance, to porous, flexible materials such as fabrics. It is preferably of sufficient thickness to be strong and self-sustaining and also to provide sufficient depth to the perforations that they will not be ordinarily clogged up by paint applied to the surface. A thickness in excess of about one-eighth of an inch is the optimum minimum for these purposes. This sheet may suitably consist of an asbestos-cement composition commonly employed as wallboard and tiling material. Such sheets ordinarily include about 15—20% of asbestos-fibers, and about 80—85% of Portland cement. In manufacturing these sheets, a pulp of the fibrous-cement mixture is formed into a felted web on a suitable felting device and the web wound on a mandrel until it forms a laminated cylinder of the desired thickness. This cylinder is then cut longitudinally and developed into sheet form. After drying the sheet may be impregnated with a suitable waterproofing material. Sheets thus made are provided with suitable perforations 15 and then cut in facing units of the requisite size. In place of employing laminated asbestos-cement sheets as described above, sheets of the same constituents but varying in their proportions and fabricated by molding under pressure such as "Transite" may be used. Various other types of sheet material may be employed for the facing member in addition to the asbestos-cement products above mentioned, the most important requirement being that the

sheet is structurally strong and is of a self-sustaining or rigid character, in contradistinction to materials such as fabrics and the like.

The number and size of the perforations 15 are subject to considerable variations. In general the number of perforations is restricted to a minimum compatible with the attainment of the desired degree of acoustical efficiency. For a facing having a thickness of $\frac{1}{8}$ inch, a perforated area of 10% consisting of uniformly spaced perforations of a diameter of $\frac{11}{64}$ " has been found to be entirely satisfactory.

Sound-absorption tests on a ceiling acoustically treated in accordance with the invention gave the following results:

Cycles -----	128	256	512	1024	2048	4096
Coefficient.						

From the above test it will be apparent that the construction provided by this invention is highly efficient acoustically. Its unitary character renders it exceptionally easy and economical to install. It further provides an exterior surface which has all the advantages of the conventional types of surface finishes.

What we claim is:

1. A partition construction comprising a substructure, a facing member, of self-sustaining sheet material having openings for the reception of fastening elements, in spaced relation to the substructure, tubular spacing members interposed between the substructure and facing member so that the tubular openings therein are in alignment with the openings in the facing member, and fastening elements projecting through the aligned openings in the facing member and tubular spacing members into the substructure to secure thereto the assemblage of facing member and spacing member.

2. A partition construction comprising a substructure, a facing member, of self-sustaining sheet material having perforations for the passage of sound and openings for the reception of fastening elements, in spaced relation to the substructure, tubular spacing members interposed between the substructure and facing member so that the tubular openings therein are in alignment with the openings in the facing member, a sound-absorptive filling material disposed between the substructure and facing member, and fastening elements projecting through the aligned openings in the facing member and tubular spacing members into the substructure to secure thereto the assemblage of facing member and spacing members.

3. A partition construction comprising a substructure, a facing member of self-sustaining sheet material having openings therein, in spaced relation to the substructure, tubular spacing members extending through said openings and the space between the facing member and substructure into abutting relationship with the substructure, means interconnecting the tubular members and facing member to secure said members from relative movement, and fastening elements projecting through the center of the tubular members into the substructure to secure the assemblage of said members and facing members thereto.

4. A partition construction comprising a substructure, a facing member of self-sustaining sheet material having openings therein, in spaced relation to the substructure, tubular spacing members extending through said openings and the space between the facing member and sub-

structure into abutting relationship with the sub-structure, means interconnecting the tubular members and facing member to secure said member from relative movement, fastening elements projecting through the center of the tubular members into the substructure to secure the as-
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10 member.

5. An acoustical construction comprising a sub-structure, a facing member of self-sustaining sheet material having openings therein for the introduction of fastening elements and perfora-
15 tions for the passage of sound, in spaced relation to the substructure, tubular spacing members extending between the substructure and the fac- ing member and having the tubular passageways therein in alignment with the openings in the
20 facing member, means interconnecting the tubu- lar members and facing member to secure said members from relative movement, fastening ele- ments projecting through passageways in the
25 tubular members into the substructure to secure the assemblage of said members and facing mem- ber to the substructure, and sound-absorptive material interposed in the space between the sub- structure and facing member.

30 6. A partition construction comprising a sub- structure, a facing member of self-sustaining sheet material having openings therein, in spaced relation to the substructure, tubular spacing members extending through said openings and the space between the facing member and sub- structure into abutting relationship with the substructure, said tubular members having an intermediate shoulder portion abutting the facing member to prevent inward movement of the lat-
ter, means interconnecting the tubular member and facing member to secure the latter from movement outwardly of the substructure, and fastening elements projecting through the center of the tubular members into the substructure to secure the assemblage of said members and facing member thereto.

7. An acoustical construction comprising a sub-structure, a facing member of self-sustaining sheet material having openings therein for the introduction of fastening elements and perfora-
80 tions for the passage of sound, in spaced relation to the substructure, tubular spacing members extending through said openings and the space between the facing member into abutting rela-
85 tionship with the substructure, said tubular mem- bers having an intermediate shoulder portion abutting the facing member to prevent inward movement of the latter, means interconnecting the tubular member and facing member to secure the latter from movement outwardly of the sub-
90 structure, fastening elements projecting through the center of the tubular members into the sub- structure to secure the assemblage of said mem- bers and facing member thereto, and sound-ab- sorptive material interposed in the space between the substructure and facing member.

8. An acoustical construction comprising a substructure, a facing member of self-sustaining sheet material having openings therein for the introduction of fastening elements and perfora-
100 tions for the passage of sound, in spaced relation to the substructure, tubular spacing members extending between the substructure and the fac- ing member and having the passageways therein in alignment with the openings in the facing member, each of said tubular members terminat-
105 ing in an outer flange portion extending laterally over the outer surface of the facing member and having an intermediate shoulder portion abutting the inner surface of the facing member, fastening elements projecting through the center
110 of the tubular members into the substructure to secure the assemblage of said members and fac- ing member thereto, and sound-absorptive ma- terial interposed in the space between the sub- structure and facing member.

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