

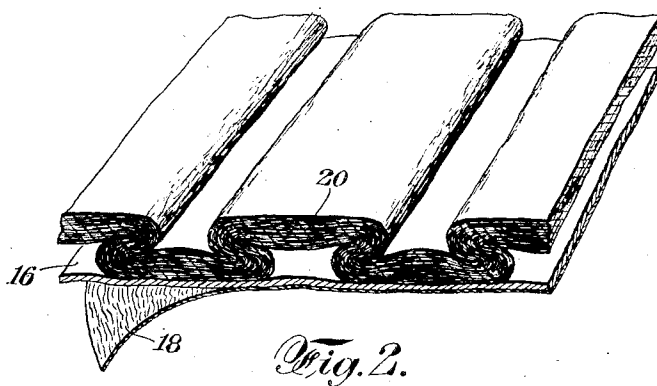
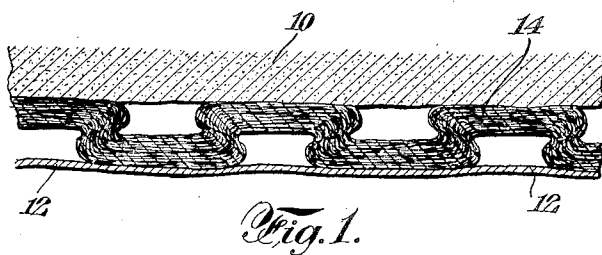
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ACOUSTICAL CONSTRUCTION

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ACOUSTICAL CONSTRUCTION

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6 Claims. (Cl. 154—44)

In the production of materials for various acoustical and insulating purposes, it is often desirable to provide an approximately flat facing sheet which can be held in spaced and cushioned relation to a backing element such as a wall or ceiling. For example, to obtain really good acoustical effects, such facing sheet preferably should be held softly cushioned from the wall a distance of about one-quarter or three-eighths of an inch or more. While this is the desired condition, it is one which has been exceedingly difficult to meet, for the normal soft bodies which might be used as spacing elements ordinarily do not have sufficient strength to hold the facing sheet from pulling away from the backing element, and where the strength is obtained this is done with the sacrifice of the necessary softness. Thus if superimposed layers of felt are used there is generally a lack of strength unless the felt is compressed or impregnated to such an extent that the cushioning action is largely destroyed.

I have found that this problem can be solved very efficiently and inexpensively by using a felted material preferably of a homogeneous nature and attaching it in spaced bands to the facing sheet with flattened loops between the bands for attachment to the backing element. It will be found that the felts, even when quite soft, have a surprising tensile strength and this factor is utilized when the loop arrangement is employed. For this purpose I may use hair felt but I find that particularly efficient and inexpensive results can be had with rag felt—the cheap material made from old rags which is now principally employed for roofing, after being impregnated with asphaltic material.

In utilizing the felt, it should be attached to the facing material along spaced bands broad enough to give a substantial zone of attachment. Loops are left between these attachment bands and these loops should be large enough relative to the spacing between the bands so that when the loops are flattened as during attachment to the backing element, the edges of the loops adjacent the backing element will overlie the flattened portions of the felt contacting (or approximately contacting) with the facing sheet. By arranging the loops in this manner it is evident that the cushioning and spacing effect does not depend upon the stiffness of the felt, for this construction will result in substantial rows where the zones of overlap occur, such that if pressure is applied this pressure will be taken up with an actual compression of the felt, as well as utilizing its springiness resulting from the

fact that it is creased back upon itself. Such overlap may be of relatively small area or the loops may be so large relative to the spacing as to approach the point where there will be substantially three thicknesses of the felt at all points between the backing and facing elements when the mass is compressed. Even when the loops are of this size, under normal circumstances there will be enough spring in the felt so that voids of substantial volume will be formed to give a soft cushioning relationship.

By the arrangement of loops above described, the spacing between the facing sheet and the backing element normally will be at least twice and under some circumstances more than three times the thickness of the felt employed. As stated above, it is desirable to have the facing sheet held at least one-quarter inch and preferably more than three-eighths inch from the backing element and accordingly I prefer to use a relatively thick felt. However, this invention can be applied to thin felts, and valuable results can be obtained using this invention even though the spacing between the facing sheet and the backing element is considerably less than one-quarter inch, the important feature for the purpose of this invention being that the felt shall run back and forth to give strength, and have such thickness and texture that the overlapping layers will give a cushioning action even when pressed down so that they are in contact with each other.

It is, of course, permissible that the loops when first formed by attachment of the felt to the facing sheet should be in the form of rounded arches, but in such case if the material is rolled up, these loops will usually be flattened so that when the time comes for attaching the material to the rigid backing element, the loops will have relatively broad zones for attachment. Usually it will be found most practical to apply the adhesive to the rigid backing element and then press on the insulating structure.

The best and cheapest material which I have found for use in my invention is ordinary rag felt laid down rather loosely and formed as an integral substantially homogeneous sheet. Such sheet in and of itself has sufficient strength for my purpose both when subjected to longitudinal strain and also as resisting a tendency to separate into layers and thus cause the facing sheet to leave the backing element. There is no reason why this felt should not be surfaced with material such as paper if desired, nor why two or more layers of the felt should not be attached together, but ordinarily there is no particular

benefit in such structure and therefore I may state that my invention involves the use of a spacing member consisting essentially of soft, approximately homogeneous, sheeted felt thereby

intending to imply that homogeneous felt is a required condition of the invention, but that the addition of other material such as paper or the laminating of two or more layers of such felt is not precluded.

The facing sheet may be of any desired type of flexible material such as felt, paper or fabric. However for acoustical work the facing sheet is preferably quite soft, and I have found that if a substantially flat sheet of material is used such as paper or felt, there is a tendency for this to be drawn out of the true plane by the contours of the spacing element, and also there is a tendency for it to be creased or bent when the structure is rolled for shipment. These distortions tend to show up when the structure is applied to a wall or ceiling, and in order to render them less obvious I have found it advisable to form the facing sheet with an uneven surface. This may be done by creping, embossing or otherwise shaping the facing sheet itself or I may form the facing sheet of two members, one of which is a flat sheet of such material as felt or paper and the other is a surfacing sheet which has previously been embossed, creped or creased in such a way that the distortions resulting from handling the structure will not be noticeable. For example, I have found that particularly attractive appearances can be had by using an embossed sheet of asbestos paper for the coating sheet, or by using metal foil for this purpose which has been embossed or preferably both creased and embossed as described in my co-pending application, Serial No. 62,740 filed Feb. 7, 1936.

By having the facing sheet formed of a flat member and an embossed member, additional softness is given to the facing sheet due to the fact that the two will not be united over their whole area and this softness gives additional acoustical qualities to my product. It is also permissible under the spirit of my invention to perforate the facing sheet which gives added acoustical qualities as is well understood in the art. In this particular case the perforations have particular value, for some of them lead to the soft felt and others will lead to the channels formed by the inside of the loops and thus there will be particularly efficient absorption of the sound waves.

The backing element preferably is a rigid portion of the building construction such as a plaster wall, or a wall or ceiling otherwise put up, and in the finished installation this will usually be the only backing element employed. However, under some circumstances, particularly if ability to roll up the insulating material for shipment is not of importance, or if the material is to be employed for insulation such as sound deadening, the spacing member may be attached to any desired type of sheeted element in advance of installation, and this in turn may later be attached or connected to the wall, ceiling or other structural element and thus become a part of the ultimate construction.

My invention is illustrated in the accompanying drawing, in which Fig. 1 shows a section through a wall to which a structure embodying my invention has been applied; Fig. 2 is a perspective view of a portion of a sheet of composite material forming the structure of my invention, in which the loops have been approximately flat-

tened as they would be by rolling, and where the loops are larger relative to the spacing between the attachment bands than is the case in Fig. 1.

In Fig. 1 the numeral 10 indicates a wall of ordinary construction which may for example be faced with plaster; (the term "wall" is intended to include a ceiling). 12 is the facing sheet which is held in spaced and cushioned relation to the wall 10 by the spacing element 14 which is formed of a felt such as rag felt, and is attached to the facing element 12 in spaced bands, and is provided with loops that are here shown attached to the wall 10. It will be noted that the edges of the loops contacting or approximately contacting with the wall 10 overlie the portions of element 14 which contact or substantially contact with the facing sheet, so that compression lines or rows are supplied which will resist pressure exerted against the facing sheet. Such pressure will first bend the felt somewhat to bring the overlying portions into contact, and further pressure will compress these overlying portions to give a resilient cushioning action.

In Fig. 2 the facing sheet is shown as made of a flat facing member or liner sheet 16 to which is attached an embossed or creped covering sheet 18 which may be made of ordinary paper or metal or of asbestos paper. In this case it will be noted that while in general the covering sheet 18 will bear against the facing member 16 for attachment, it will also have raised portions resulting from the embossing, creping or other folding or creasing operations which stand away from the facing member. Such raised portions may serve somewhat to increase the resilience of the surface and thereby improve the acoustical qualities as well as adding to the appearance of the product. The spacing member 20 of Fig. 2 is attached to the sheet 16 by bands which are relatively close together, and comparatively large loops are formed between these bands which are here shown as more or less flattened as they would be by rolling for shipment. With this arrangement the actual compression of the felt would become more of a factor in the cushioning value of the structure but in general its action would be similar to that of the structure shown in Fig. 1.

While my invention is primarily intended for attachment to walls and ceilings as a sound-absorbing medium to improve acoustical qualities, it also may be used for other purposes such as for sound deadening or other insulating uses.

It is to be understood that the examples shown are intended only by way of illustration.

What I claim is:

1. A structure adapted for use for acoustical purposes on the walls or ceilings of buildings, comprising a facing sheet and a spacing member attached thereto, such spacing member consisting essentially of soft compressible approximately homogeneous sheeted felt which is attached to the facing member along spaced bands with loops extending back between such bands adapted for attachment to a backing element said loops being large enough so that under pressure they will form a series of soft, compressible rows of overlapping material to hold the facing sheet spaced from such backing element.

2. A structure as specified in claim 1, in which the loops are large enough so that when flattened by pressure as during attachment to a backing element, the edges of each loop will

overlie two adjacent bands approximately contacting the facing member.

3. An insulating structure consisting essentially of a facing sheet and a spacing member
5 formed of a homogeneous sheet of compressible soft rag felt attached to the facing sheet along spaced bands with flattened loops extending
back between such bands whereby such facing
sheet may be attached to a rigid surface in
10 spaced relation thereto, said loops being large enough so that when flattened they will form a series of rows of overlapping material to hold such facing sheet cushioned relative to such
rigid surface by the compressibility of the rag
15 felt.

4. A structure for sound deadening or sound absorption consisting essentially of a facing member carrying a covering sheet having portions contacting with the facing member and
20 portions raised relative thereto, and a spacing member adapted to hold such facing member in spaced and cushioned relation to a wall member, said spacing member consisting essentially of a sheet of soft, compressible felt attached to

the facing member by spaced loops and having intermediate soft, flexible loops running back for attachment to a wall, whereby the longitudinal tensile strength of the felt will serve to hold the facing sheet from leaving the wall and the compressibility of the felt will hold the facing sheet
5 in cushioned relation to the wall.

5. A structure as specified in claim 4, in which the covering sheet is formed of sheet asbestos.

6. A wall structure having a usual rigid approximately flat surface, a facing sheet for such wall, and cushioning attachment means for such facing sheet consisting essentially of a sheet of soft compressible rag felt running back and forth between the facing sheet and the flat surface and attached to the wall and facing sheet
10 along spaced bands the portions of the sheet of felt along the facing sheet being large enough to overlie portions of such sheet along the wall with approximately perpendicular portions connecting the same to form a series of compression ribs.
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