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W. GERB

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METHOD OF PRODUCING INSULATING MATS

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FIG. 1

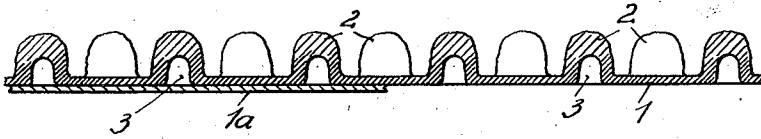


FIG. 2

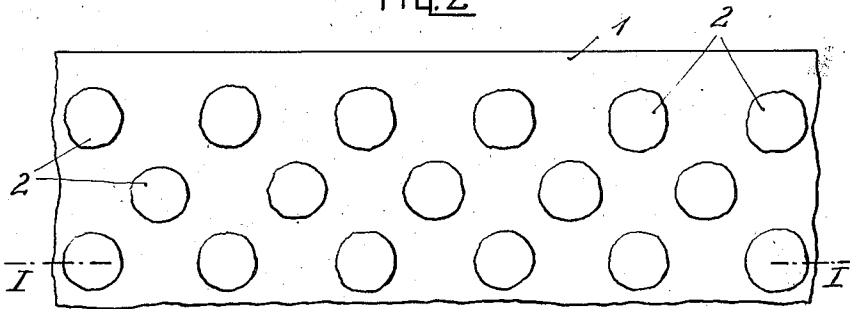


FIG. 3

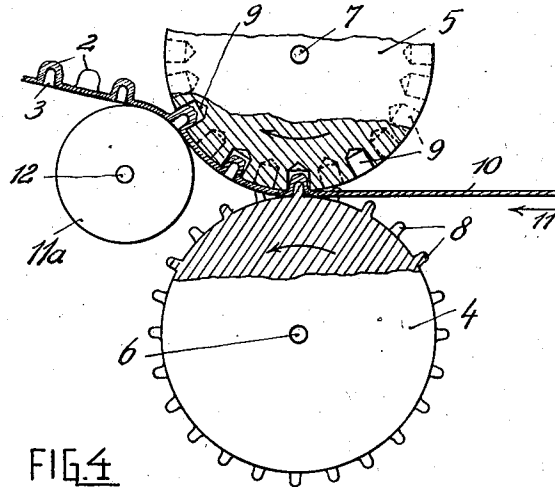
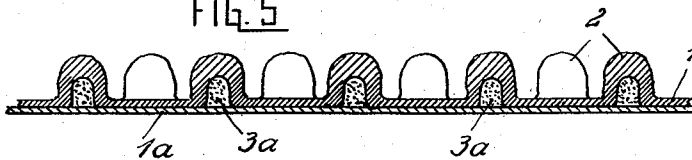


FIG. 4



FIG. 5



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METHOD OF PRODUCING
INSULATING MATS

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2 Claims. (Cl. 154--28)

The invention relates to a method of and apparatus for producing insulating mats, which are composed more particularly, although not essentially, of a fibrous material, such as paper, cardboard, or the like.

It is known per se to produce projections or elevations in a web of material of this nature for the purpose of imparting a certain resiliency to the insulating mats made from this web. These projections are obtained by a stamping or pressing operation.

Now according to the invention, these projections, at the same time as the same are raised from the surface of the material, are loosened in their structure. In this way the elasticity of the mats is considerably enhanced, as the projections or elevations constitute supporting points having a greater degree of elasticity than the remaining surface of the mats. Owing to the loosening of that portion of the material forming the actual elevations or projections there are produced in the latter small pockets or spaces, as a result of which the heat-insulating and sound-deadening properties of mats made in accordance with the invention are considerably improved. In carrying the invention into effect it is possible to make use of cheap materials, and it is exactly when using a cardboard material of this nature that a particularly effective and extensive loosening of the material of the projections or elevations is obtainable.

To enhance the effect the projections or elevations may be produced on both sides of the material. Mats produced according to the invention, whilst useful for a variety of purposes, are particularly suitable for deadening sound. If desired, they may be placed one upon the other to form a multiple-layer structure, in which case it will be found preferable to arrange the layers in such fashion that the projections or elevations on the one mat are situated next to the recessed surface of the following mat. Owing to the loosened structure of the material of the elevations or projections the elasticity of the entire mat is increased by the fact that the material intermediate of the elevations or projections represents a resilient support.

The invention will now be described more fully with reference to the accompanying drawing, in which—

Fig. 1 is a section through part of a mat produced according to the invention, taken along the line I—I in Fig. 2.

Fig. 2 is a plan view of the mat according to Fig. 1.

Fig. 3 shows diagrammatically, partly in section, the primary parts of the apparatus used for producing the mat.

Fig. 4 is a section through part of a mat, in which the projections have been subjected to an additional pressing operation.

Fig. 5 is a section through an additional form of embodiment of a mat, in which the hollow spaces of the recesses have been filled out with a suitable filling material.

Referring now to Figs. 1 and 2, 1 is the web of fibrous material from which the mats are produced. In this material there are formed by suitable means, of which a possible example will be described later, projections or elevations 2, and accordingly corresponding recesses 3. These projections or elevations are so acted upon during their production that the material of the projections is loosened in its structure, resulting in the advantages above referred to. The difference in the structure between the material of the projections and the remaining material is represented by the different cross-hatching in the drawing.

The loosening of the material of the projections or elevations is obtained by the fact that the clearance between the shaping studs or dies and the corresponding matrices is greater than the thickness of the web of material. In this manner the matrix remains practically ineffective as regards the forming of the elevations. The underneath side of the web of material or mat 1 may be furnished with a covering layer 1a connected in suitable fashion with the layer 1 in order to prevent dust or other foreign matter from penetrating into the recesses.

Fig. 3 shows a possible form of apparatus for carrying the invention into effect. This comprises two rollers 4 and 5, which rotate about their shaft 6 and 7 in the direction of the arrows. On the roller 4 there are provided studs 8, the roller 5 possessing corresponding recesses or cavities 9.

As shown by the drawing, the studs 8 are considerably smaller than the recesses 9, both as regards their height as well as their diameter. The dimensions are in any case such that the spacing between the studs 8 and the recesses 9 is greater than the thickness of the material passed between the two rollers.

The web of cardboard or other material employed is designated 10, and is passed between the rollers in the direction of the arrow 11 in such fashion that the projections or elevations are formed in the manner referred to. For the pur-

pose of extracting the material from the apparatus after the projections have been produced there is provided a special roller 11a rotating about the shaft 12 at a speed which is greater than that of the rollers 4 and 5.

Tests made have shown that with the assistance of the roller 11 the web of material may be withdrawn more readily and in more simple fashion from the rollers 4 and 5.

I do naturally not limit myself in any way to the specific form of apparatus described in the above. Thus, for example, it would also be possible to employ two plates furnished with studs and recesses respectively and moved in relation to each other for producing the projections or elevations. The essential feature of the particular apparatus employed consists in the fact that upon the pressing operation so much space remains between the stud and the bottom of the matrix that the material is not held by the latter, but is capable to a certain extent of free movement, so that the structure of the material of the projection formed will be loosened accordingly.

Under certain circumstances it may be necessary subsequently to reinforce a mat produced according to the method described in the above, so that the same will not be liable to a permanent variation in form by reason of externally acting forces. According to the invention, this reinforcement is effected by the fact that after the production of the mat in the normal fashion the mat is subjected to a gentle reverse pressing operation, as illustrated by way of example in Fig. 4.

In order in the case of particularly heavy strains to prevent the loosened projections or elevations from being pressed back, the hollow spaces of these projections may be wholly or partially filled out with a suitable filling material, preferably a material having elastic properties.

Fig. 6 illustrates by way of example a part of a mat of this description. In this case 1 is the web of material, 2 are the projections produced therein, and 3a is a filling substance introduced into the hollow spaces of the projections, this substance preferably being retained within the hollows by means of a covering layer 1a applied to the surface of the mat.

What I claim as new and desire to secure by Letters Patent is:

1. A method of producing insulating mats composed more particularly of a fibrous material, such as cardboard, paper and the like, which consists in subjecting the said material to a pressing operation to produce elevations therein, and simultaneously loosening the structure of that portion of the said material constituting the said elevations while at the same time avoiding compressing the loosened structure of the elevations.

2. An insulating mat composed more particularly of a fibrous material, such as cardboard, paper and the like, having elevations formed from the material, the material of the elevations being loosened in structure as compared with the remaining material.

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