July 3, 1962 K. E. HANKINS 3,042,564

CARPET WITH REINFORCEMENT

Original Filed Sept. 8, 1958 2 Sheets-Sheet 1

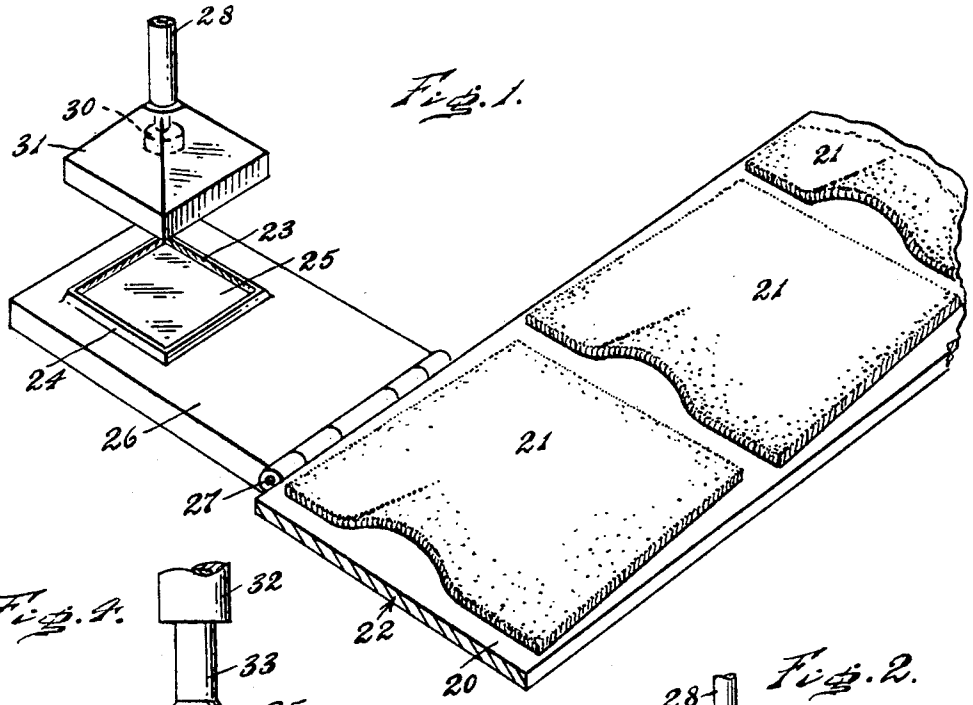


Fig. 1.

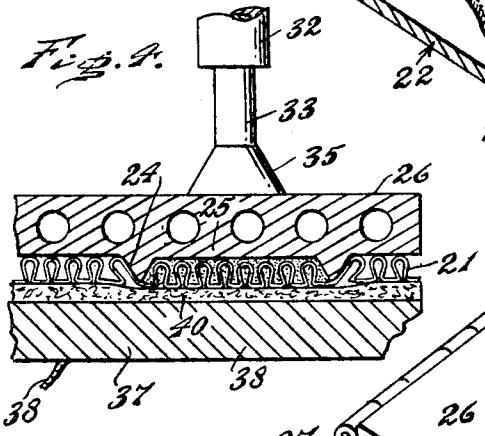


Fig. 4.

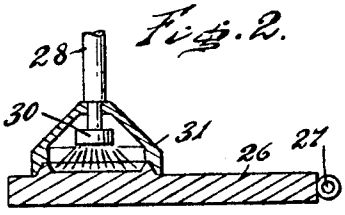


Fig. 2.

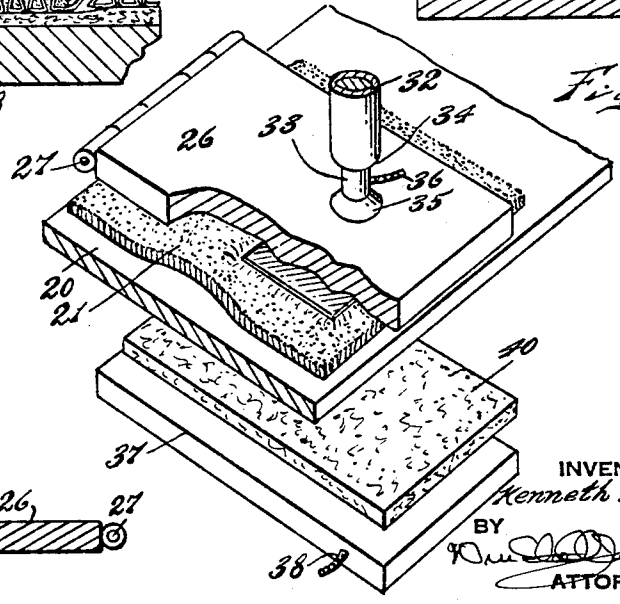


Fig. 3.

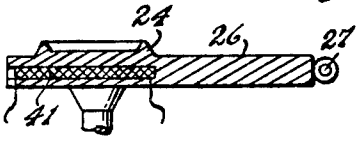


Fig. 5.

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Fig. 7.

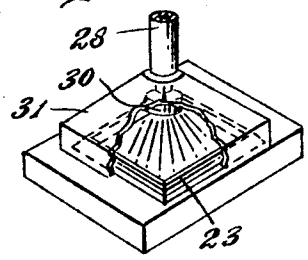


Fig. 6.



Fig. 11.

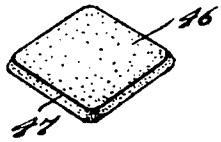


Fig. 8.

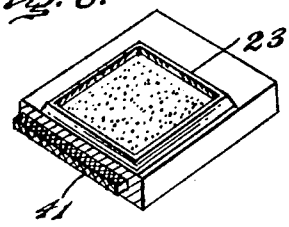


Fig. 12.

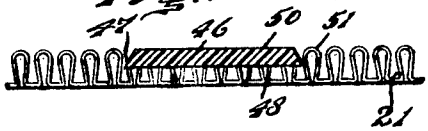


Fig. 9.

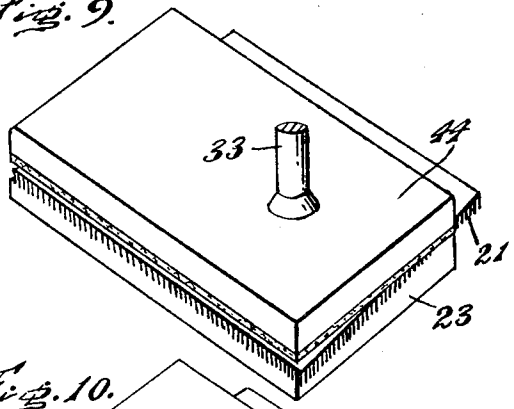


Fig. 12a.

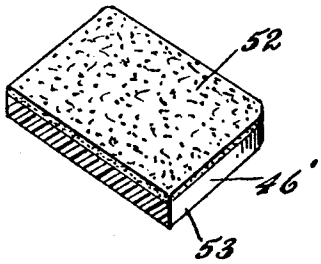
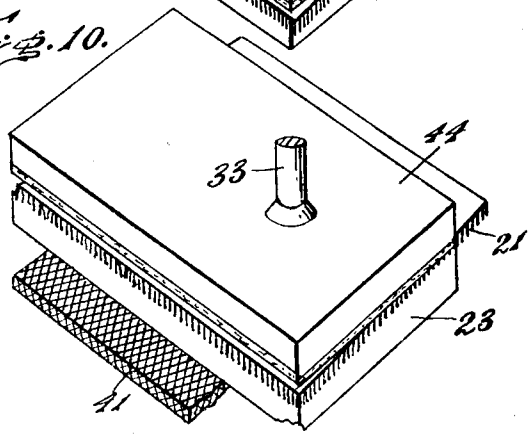


Fig. 10.



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United States Patent Office

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3,042,564
CARPET WITH REINFORCEMENT

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Original application Sept. 8, 1958, Ser. No. 759,667. Divided and this application Sept. 10, 1959, Ser. No. 839,131

1 Claim. (Cl. 154—49)

The present invention relates to carpet or a rug provided with a plastic or elastomer reinforcement.

The present application is a division of my copending application Serial No. 759,667, filed September 8, 1958, for Process of Molding Plastic Reinforcement on Carpet and Reinforcing Carpet, now abandoned.

Subject matter relating to the method of forming heel pads from plastisol is incorporated in my copending application Serial No. 169,565, filed January 29, 1962, for Affixing Heel Pads to Carpet.

A purpose of the invention is to form plastic or elastomer reinforcements on carpets or the like without penetrating the back and without bringing the pile through to the face of the reinforcement.

A further purpose is to provide an elastomer reinforcement on a carpet while assuring a resilient or cushion back for the reinforcement which will distribute the load and protect against puncturing or deforming the reinforcement.

A further purpose is to cause a fluid elastomer compound to gel at the side remote from the portion which is to engage the carpet before bringing the elastomer compound into contact with the pile of the fabric.

A further purpose is to cause the elastomer compound to gel on one side of the layer and to remain as a thixotropic liquid at the other side and then to bring the thixotropic liquid into adhesive engagement with the pile of the carpet, but guard against excessive penetration of the pile through the elastomer or of the elastomer into the pile by the gel layer engaging the pile.

A further purpose is to maintain the mold at a temperature not above 170 degrees F. and preferably not above 160 degrees F., to introduce the elastomer compound, preferably polyvinyl chloride, into the mold, to heat the mold to a temperature of 180 to 190 degrees F. in order to gel the elastomer compound at the surface of the mold while maintaining the elastomer compound at the open side of the mold as a thixotropic liquid, then to combine the thixotropic liquid side of the elastomer compound with the pile of the carpet while using the thickness of the gel to prevent the pile from penetrating too deeply in the thixotropic liquid and retaining pile free from elastomer as a cushion beneath the reinforcing, then to raise the temperature of the elastomer compound to curing temperature, suitably of the order of 350 degrees F. and then cool the mold to release the reinforcement.

A further purpose is to taper the edge of the reinforcement, making it wider at the base, so as to permit the mold to clear readily.

A further purpose is to employ a mold which is supported on a mold plate, the mold engaging the carpet at the reinforcement, and the mold plate engaging the carpet around the reinforcement, and to provide a shallower recess in the mold than on the mold plate so that the compression of the pile in the mold will act as a limitation against relative movement of the reinforcing toward the pile, and prevent packing of the pile in areas where no reinforcement is to be located.

Further purposes appear in the specification and in the claim.

In the drawings I have chosen to illustrate a few only

of the numerous embodiments in which the invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

FIGURE 1 is a diagrammatic perspective of a conveyer and associated mold, the mold being in open position, and spray mechanism being shown in exploded or detached relation from the mold.

FIGURE 2 is a section showing the spray in position over the mold.

FIGURE 3 is a sectional perspective of the closed mold and the press and heating elements.

FIGURE 4 is an assembled transverse sectional view of FIGURE 3.

FIGURE 5 is a section showing a modified form of mold heater in which an electric resistance element is used.

FIGURE 6 is a sectional perspective showing an injector for charging the mold.

FIGURES 7, 8, 9 and 10 are axial perspectives of a modified form of the invention, illustrating successive steps in the process.

FIGURE 7 illustrates the filling of the mold.

FIGURE 8 shows the heating of the mold to gel the side of the elastomer compound in contact with the mold.

FIGURE 9 shows the placement of carpet pile downwardly directed above the mold and pressing the carpet into engagement with the elastomer compound. The reinforcement pad is then cured in the position of FIGURE 9.

FIGURE 10 shows the removal of the heat and the cooling of the mold to permit separation.

FIGURE 11 is a perspective of a heel pad according to the invention.

FIGURE 12 is a section of a heel pad applied to a carpet.

FIGURE 12*a* is a sectional perspective of a heel pad having an abrasive layer.

In the prior art, the practice has been to sew a sheet of rubber, fabric, or other wear resistant material on the face of a carpet or automobile rug to protect against excessive wear in certain locations. This has caused difficulty when the stitches break or wear, and in any case necessarily superimposes the reinforcing above the level of the carpet where it is likely to catch on the foot of the user, and is not integrated or otherwise associated with the pile. The reinforcing is then poorly protected against penetration or damage.

In accordance with the present invention, the pile is intimately associated with and imbedded in the reinforcing, but in the preferred embodiment there is a resilient cushion of pile behind the reinforcing and the surface portion of the reinforcing is free from any penetration of the pile, which might cause an unattractive surface and also intefere with the continuity of the wear surface.

In accordance with the present invention, the elastomer compound, suitably polyvinyl chloride, is sprayed, injected or otherwise introduced into the mold, and then gelled at the surface of the mold to a thickness of say 0.020 to 0.060 and preferably about 0.040 inch before bringing it into contact with the pile of the carpet. The gelled layer therefore prevents the pile from extending clear through the elastomer layer.

The invention will be best understood by consideration of the drawings in detail.

In FIGURE 1 I show a conventional conveyer or other suitable feed platform or table **20**, which has a series of carpets, rugs or mats **21** placed on its surface. At one suitable stage **22** a mold **23** is located at one side of the carpet in its initial position, the mold having a suitable narrow rim **24** and a recess with a preferably uniform or embossed bottom **25**, and the mold being supported on a

mold plate 26 which is deeper or more remote from the outer surface of the mold than the recess of the mold. The mold is suitably hinged or otherwise mounted at 27.

The mold is initially filled or charged with a suitable formulation of elastomer compound, which may in one embodiment be introduced through a flexible pipe 28 from a suitable mixer and then sprayed in large masses or particles from a nozzle 30, suitably surrounded by a hood 31 to produce a uniform deposit in the mold.

The elastomer compound is desirably in the form of a thioxotropic liquid which does not flow immediately so that the mold can be safely inverted and flow will occur only under agitation or pressure.

Once the mold is filled, in the form of FIGURE 1, the mold is preferably inverted over a mat or carpet 21, with the mold cavity correctly placed. In this form the mold plate 26 is desirably pressed against the conveyer as by the ram 32 of an air cylinder which suitably carries at its end adjoining the mold plate one electrode 33 of a high frequency dielectric heater, the electrode being suitably insulated at 34 and 35 and provided with a suitable lead 36. On the opposite side of the mold and suitably below the conveyer, an opposing dielectric heater electrode 37 (replacing the stage 22) is placed connected by an electric lead 38 and insulated by a dielectric plate 40 on the conveyer.

Thus the carpet, with its pile directed upwardly, is pressed into engagement with the thioxtropic liquid layer of the elastomer compound.

In the preferred embodiment, the mold is initially held at a temperature below the gel temperature, say below 170 degrees F. in the case of the polyvinyl chloride elastomer compound, and preferably about 160 degrees F.

In the position of FIGURE 1, a suitable electric heater 41 of FIGURE 5, desirabiy provided or imbedded on the back of the mold plate, heats the mold, immediately after it receives the charge, to a temperature at which the elastomer compound immediately adjoining the mold will gel, say 180 to 190 degrees F., but the remaining portion remote from the mold will remain a thioxotropic liquid. Then the mold is inverted over the carpet, and the pile penetrates as far as the gel. The pile which is not opposite mold cavities, however, is not pressed down because the mold plate is shallower in the direction toward the carpet than the mold recess. Then in the position of FIGURE 3 the dielectric heater raises the temperature to say 350 degrees F. to cure the elastomer compound.

Finally, the dielectric heater is turned off and the mold is allowed to cool 10 degrees or preferably 20 degrees F., and then starting at the side remote from the hinge the mold can be separated by raising the ram 32 and allowing air to intrude between the mold and the reinforcing as the mold rises. Introduction of compressed air through holes in the mold may be used if desired to aid parting.

In some cases it is preferable to do all the heating by the electric heater 41, in which case the dielectric heater can be eliminated.

In some cases, as shown in FIGURE 6, instead of introducing the elastomer compound as a spray, it is introduced from an injector head 42 by an impeller 42' through a nozzle 43. Any other type of injector may be used.

FIGURES 7 to 10 show a form in which the carpet is inverted. The mold 23 is illustrated in FIGURE 7 and the mold is filled as from the spray 30.

Next, as shown in FIGURE 8, the mold is heated as by an electric heater 41 below the mold plate in order to gel the surface of the elastomer compound adjoining the mold.

In the next step, as shown in FIGURE 9, the carpet 21 is placed pile down extending over the mold and a press head 44 presses down to force the carpet pile into the mold but not penetrate the gel. In this position the

temperature of the heater 41 is raised to accomplish curing.

In the position of FIGURE 10 the heater is suitably removed in order to cool and permit parting and separation from the mold.

The cycle will preferably be of the order of 30 seconds to five minutes, preferably 45 seconds to 2 minutes.

The resulting heel plate or reinforcing 46 desirably has a beveled edge 47 and is wider at the bottom. This allows the pile to extend over the edge of the heel pad and prevents dirt from accumulating. The reinforcement layer does not extend to the bottom of the pile but leaves pile 48 between the reinforcement 46 and the back 50 of the carpet to provide a cushion and allow the heel pad or plate to change its position under load without penetration by the pressure of a heel or some projection on a shoe or the like. There is little chance that the heel pad could tear loose.

The top 50 of the heel plate or reinforcement is substantially flush with the top of the pile 51 adjoining, and this is accomplished particularly by the protection against packing down the pile during the molding due to the fact that there is an established relation between the depth of the recess in the mold and the depth of the mold plate.

In FIGURE 12*a* I show a heel pad 46' comprising a top elastomer layer 52 first deposited in the mold and having abrasive, say 10 percent by weight of stainless steel filings through 30 mesh on 40 mesh per linear inch, incorporated in the elastomer, and then a second elastomer layer 53 on the top (in the mold).

A typical formulation of polyvinyl chloride plastisol for use in molding a heel plate according to the invention is as follows:

	Pounds
Polyvinyl chloride resin (preferably B. F. Goodrich Geon 121 or Geon 121 mixed with Geon 202 in any proportion)	100
Dioctyl phthalate	50
Plasticizer, propylene glycol sebacate, molecular weight about 8000 (Rohm & Haas Paraplex G 25)	50
Dibasic lead phosphite (heat and light stabilizer)	2
Calcium carbonate powder	20
Cadmium red pigment	0.02

The composition is milled in the usual manner.

The principles of the invention can also be applied in rubber base compositions of the following character:

	Pounds
Neoprene (preferably type FB)	100
Phenyl alphanaphthylamine (Neozene A)	2
Carbon black powder	100
Zinc oxide powder	10
Hard clay powder	30
Dioctyl sebacate	50

The dry ingredients are incorporated into the plastic material by milling.

Neoprene type FB has a low molecular weight, a specific gravity 1.23, a viscosity of 800,000 to 1,200,000 cps. at 122° F. (Brookfield), soluble in aromatic and chlorinated hydrocarbons.

The curing of these products using dielectric heating can be accomplished in from 15 to 20 seconds.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art to obtain all or part of the benefits of my invention without copying the product shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claim.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

A carpet having a pile and a back, and a plate of

elastomeric material which covers and protects a certain area of the pile adjacent to an uncovered area of the pile, comprising a top portion of said plate of elastomeric material which extends substantially flush with the top of the uncovered pile and upward of the pile covered by said plate, and a lower portion of said plate of elastomeric material which has the upper ends of the covered pile embedded in it, said elastomeric material of the plate being molded and bonded to the embedded ends of the covered pile, and said plate being spaced from said back, supported by lengths of the covered pile between said lower portion of the plate and said back and cushioned by said lengths.

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