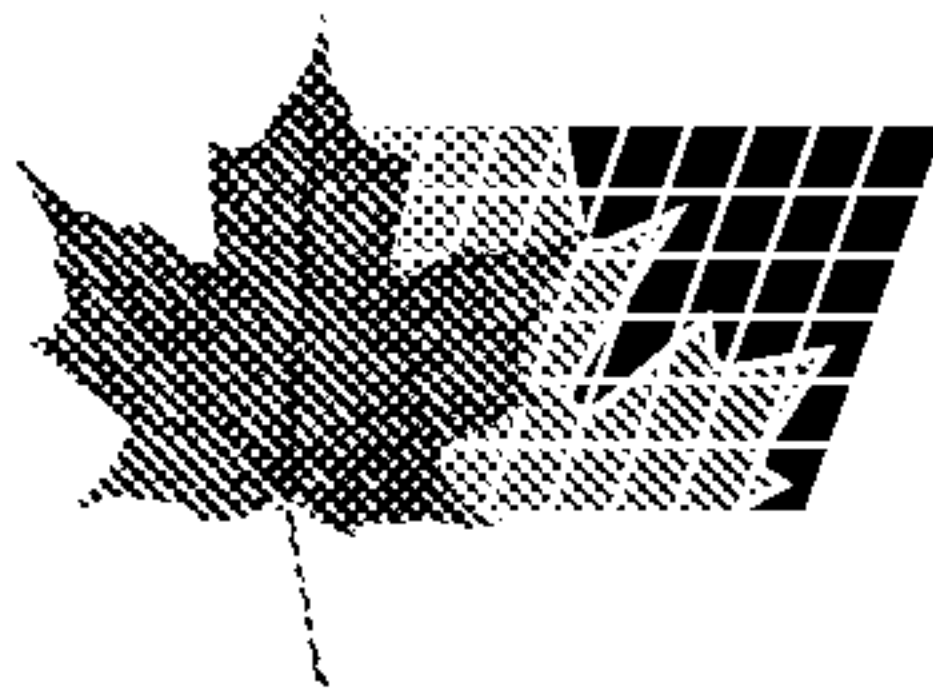




(22) 1995/02/27

(43) 1996/01/24

(45) 2001/04/10

(72) Graab, Gerhard, DE

(72) Heckel, Klaus, DE

(72) Rischer, Dieter, DE

(72) Nahe, Thorsten, DE

(72) Gruenhag, Helmut, DE

(73) CARL FREUDENBERG, DE

(51) Int.Cl.⁶ D06N 7/02

(30) 1994/07/23 (P 44 26 172.1) DE

(54) **REVETEMENT DE SOL DE PLUSIEURS COULEURS ET A
MOTIFS**

(54) **MULTI-COLOURED, PATTERNED FLOOR COVERING**

(57) A multicoloured, patterned floor covering of rubber includes a base web of caoutchouc elastomeric material having a first colour, and at least one contrastingly coloured granulate which is pressed flush into a surface of the base web and fixed. Individual particles of the granulate have at least two particle sections which are coloured differently from each other and from the first colour. In the granulate particles, strip or wedge shaped portions of at least a first particle section extend through at least a second particle section. The differently coloured particle sections have the same colours in at least 50% of the particles of each granulate visible in the surface of the floor covering and have respective surface areas n . When the granulate includes two colours 1, 2, the sum of the areas n follows the formula $\Sigma n_1 \neq \Sigma n_2$ and when the granulate includes more than two colours 1, 2,...x, the sum of the areas n follows the formula $\Sigma n_1 \neq \Sigma n_2 \neq \Sigma n_x$.

ABSTRACT

A multicoloured, patterned floor covering of rubber includes a base web of caoutchouc elastomeric material having a first colour, and at least one contrastingly coloured granulate which is pressed flush into a surface of the base web and fixed. Individual particles of the granulate have at least two particle sections which are coloured differently from each other and from the first colour. In the granulate particles, strip or wedge shaped portions of at least a first particle section extend through at least a second particle section. The differently coloured particle sections have the same colours in at least 50% of the particles of each granulate visible in the surface of the floor covering and have respective surface areas n . When the granulate includes two colours 1, 2, the sum of the areas n follows the formula

$$\sum n_1 \neq \sum n_2$$

and when the granulate includes more than two colours 1, 2,...x, the sum of the areas n follows the formula

$$\sum n_1 \neq \sum n_2 \neq \sum n_x$$

MULTI-COLOURED, PATTERNED FLOOR COVERING

The invention relates to multi-coloured, patterned floor coverings made of rubber. More particularly, the invention relates to floor coverings consisting of a cautchouc (elastomer) base web and a contrastingly coloured cautchouc (elastomer) granulate which is pressed flush at least into the surface of the base web and is subsequently permanently fixed therein by vulcanization of the material of the resulting product. The individual particles of the granulate have at least two particle sections which are different in colour from each other and from the base web.

A floor covering of this general type is described in German Patent Application SN 44 05 589.7 and includes a base web of a first colour and contrastingly coloured particles which are embedded into the base web. The base web and the particles are made of a cross-linkable, elastomeric material. The contrastingly coloured elastomerer granulate is pressed flush into the surface of the base web and is permanently fixed therein by subsequent vulcanization of the resulting base/granulate combination. The individual contrastingly coloured particles have particle sections which are different in colour from each other and from the base web.

In this prior floor covering, the amount and colour of the granulate particles and their particle sections is selected and coordinated with the amount and colour of the base web material in such a way that the blended colour achieved upon a homogeneous mixing of all components in the floor covering is the same as the first colour of the base web. A process for the manufacture of the granulate particles and their differently coloured particle sections disclosed in that prior application as well as a method for embedding them into the base web.

It is a disadvantage of this prior floor covering that the colours of the particles spread onto the base web must be selected such that the blended colour achieved upon a homogeneous mixing thereof is the same as the base web colour. This requirement severely limits the range of colours available for use in such a floor covering. The range of possible colour designs which can be created in such a floor covering is therefore substantially limited. Furthermore, it is impossible to render that floor covering conductive by incorporating soot into the base web, because of these limitations with respect to granulate colour.

The present disclosure is of a floor covering of the above general type, which gives the designer more freedom in selecting the colour design of the floor covering and thereby provides for an improved optical appearance. The disclosure also provides an electrically conductive variant with a wide range of possible colour patterns.

In particular, at least a first particle section of each granulate particle has strip or wedge shaped portions which extend through at least a second particle section. Furthermore, the differently coloured particle sections have the same colours in at least 50% of the particles of each granulate visible in the surface of the floor covering and have respective surface areas n . If two colours 1 and 2 are present in each granulate, then in the at least 50% of the particles with equally coloured particle sections the sums of the areas n of the respective colours follow the following equation:

$$\sum n_1 \neq \sum n_2$$

If colours 1,2,3...x, are present in each granulate, the sums of the areas n of the respective colours in the at least 50% of the particles with equally coloured particle sections follow the formula

$$\sum n_1 \neq \sum n_2 \neq \sum n_x$$

More particularly in accordance with the invention there is provided, multicoloured, patterned floor covering, comprising a base web of material having a first colour, and at least one contrastingly coloured granulate which is first pressed flush into a surface of the base web and subsequently fixed therein by vulcanization of the resulting product the web and the granulate being made of a crosslinkable, elastomeric material; individual particles of the granulate having at least two particle sections which are coloured different from each other and from the first colour; in the granulate particles, strip or wedge shaped portions of at least a first particle section extending through at least a second particle section and the differently coloured particle sections have the same colours in at least 50% of the particles of each granulate visible in the surface of the floor

covering and have respective surface areas n ; wherein when the granulate includes two colours 1, 2, the sums of the areas n for each colour follow the formula

$$\sum n_1 \neq \sum n_2$$

and when the granulate includes more than two colours 1, 2,...x, the sum of the areas n follows the formula

$$\sum n_1 \neq \sum n_2 \neq \sum n_x$$

and where the amount and colour of the particles and the particle sections have been selected in relation to the amount and colour of the material of the base web so that a blended colour can be achieved upon homogenous mixing of all components in the floor covering which does not correspond to the first colour.

The aesthetic appearance of such a floor covering can be varied to a much greater extent than is possible with the prior art floor coverings described above. The colours for a floor covering in accordance with the invention can be selected almost arbitrarily and one is only limited by aesthetic criteria. The range of possible designs is thereby significantly extended, since it is possible to achieve any colour effect in the overall appearance.

The use of elastomeric materials for all floor covering components provides the new floor covering with excellent mechanical properties. The properties of the floor covering are easily controlled since the body of the floor covering, which is provided by the base web, is of homogeneous consistency and completely encloses the particles embedded therein at least below the surface of the flooring.

The particles can be so tightly spaced in the new floor covering that they mutually contact. In such an embodiment, the overall appearance of the floor covering is mainly determined by the structure and colour of the particles. However, it is also possible to embed the particles into the base web in a spaced apart arrangement. The overall appearance of the floor covering is then determined essentially by the colour of the base web, whereby the particles break up the appearance of the web. The particles can be

distributed in any selected pattern, for example in the form of letters, words and/or pictograms.

The floor covering embodying the invention can be manufactured by substantially the same manufacturing process as the one disclosed in German Application 44 05 598. However, the colours of the particles in the floor covering and of their particle sections must be selected according to the requirements of the present disclosure. Thus, the contrastingly coloured cross linkable, elastomeric material granulate is spread onto a homogeneously coloured base web of the same material and of a first colour. The base web can be formed by feeding a homogeneously coloured cross linkable elastomeric material base granulate of a first colour from above into the gap between a pair of counter rotating, horizontally positioned parallel rollers. The granulate of contrasting colour is added and the resulting granulate mixture can be compressed in the gap without generation of pores and without mutual mixing of the colours of the granulate particles along their edges. The granulate of contrasting colour preferably is fed into the gap not at the center thereof but closer to one of the rollers. It is thereby avoided that this granulate is exposed to the substantial shear forces generated at the center of the gap. It is assumed that this permits the achievement of a precise patterned appearance of the floor covering. The granulate of contrasting colour includes particles which have at least two particle sections that are coloured differently from each other and from the base web. The particles are pressed into the base web flush with the surface of the web by a roller calendar, a continuous vulcanization machine, or a press and at a temperature of 160 to 190°C. Subsequently, the particles are fixed in place by vulcanization of the material of the granulate and the base web. The mechanical stress on the particles and their particle sections is especially low in such a process. This allows one to achieve colour patterns that are free of blended or blurred colours on the visible surface of the floor covering. The finished, vulcanized product is not heat softenable and is characterized by a high chemical, mechanical and thermal stability.

All known cross linkable vulcanizable elastomers suitable for use in floor coverings can be used in the floor covering here described. For example, rubbers and elastomers having the standard designations SBR, NBR and EPDM or natural caoutchouc as well as mixtures thereof can be used.

A granulate having a colour which contrasts with the one of the base web can be obtained by independently making individual rubber mixtures of contrasting colour, forming each of the mixtures into a strand by way of extruders, and subsequently granulating them.

In a preferred embodiment, independently produced rubber mixtures of contrasting colour are first shaped into a multi-coloured strand by using a single extruder, and then granulated and spread onto the base web. However, the limitations with respect to the shape, colour and area of the equally coloured particle sections in accordance with the present disclosure must always be fulfilled. Mixing along the edges of the individual rubber mixtures of contrasting colour used for the manufacture of the multi-coloured strand and granulate particles should be prevented during processing in the extruder. This can be achieved by operating the extruder under especially gentle mixture conditions. In particular this means that temperatures in excess of 100°C should be avoided as well as all other stress which can lead to a complete disintegration of the rubber mixtures employed.

In another preferred embodiment, the first particle section consists of a pair of essentially parallel subsections. Experience in the industrial field has shown that dirt particles settle in stripes on floors with vehicle or pedestrian traffic. Such dirt deposits are optically especially well concealed with the floor covering of this embodiment. This concealing effect is further increased when the first particle section is not straight at least at one point of its extent.

In a further preferred embodiment, the smallest linear extent of the particles at the surface of the floor covering is 12mm. This means that the visible particle sections are relatively large, which especially in large rooms creates a less disquieting surface effect than do numerous small particles. These large particles moreover can be arranged in the form of pictograms.

"Smallest linear extent" refers to the shortest straight line which connects the most closely spaced opposite edges of a particle in the surface of the floor covering.

In still another preferred embodiment, the floor covering embodying the invention is electrically conductive with a leakage resistance below 10^6 ohms according to DIN 51 953. In this embodiment, the base web accordingly includes embedded soot, which results in a dark black coloured base web. However, within the confines of the present invention,

it is possible to produce a floor covering wherein this black colour is not dominant in the visible surface thereof. Furthermore, there are no limits to the colour variations possible. In order to ensure that the surface of the floor covering is sufficiently conductive, the amount of base web surface covered by the granulate must be limited. The surface coverage can only be so dense that in any 20cm² area of the floor covering the base web is still visible and, thus, accessible to electrodes.

Granulates for use in a floor covering embodying the present invention can be made from natural or synthetic raw materials and are preferably produced with mixing arrangements conventionally used in the rubber industry, for example kneeders, rolling mills and/or extruders. In the final manufacturing step, the elastomer mixtures used to achieve granulate particles that have at least a pair of contrastingly coloured particle sections are transferred into a body of elongated shape from which short portions are subsequently sliced. The sliced-off portions together form the granulate. The particle sections of contrasting colours can be achieved by gently shaping two elastomer strands of contrasting colour into an elongated body by way of an extruder. It is however preferable to sufficiently reduce the friction forces in the extruder so that a mutual mixing of the individual colour components in the strand is avoided. Whether or not this has been achieved can be relatively easily monitored by way of the outer appearance of the elongated body. Whenever the outer surface of the body is free of pores and has a clearly structured colour pattern, free of blurred colours, a correspondingly exactly structured pattern is also present inside the elongated body. The body preferably has a circular cross-section, but can also have any other cross-sectional shape such as polygonal or a shape that includes both straight and curved portions.

Changes and modifications in the specifically described embodiments can be carried out without departing from the scope of the invention which is intended to be limited only by the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY AND PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Multicoloured, patterned floor covering, comprising a base web of material having a first colour, and at least one contrasingly coloured granulate which is first pressed flush into a surface of the base web and subsequently fixed therein by vulcanization of the resulting product the web and the granulate being made of a crosslinkable, elastomeric material; individual particles of the granulate having at least two particle sections which are coloured different from each other and from the first colour; in the granulate particles, strip or wedge shaped portions of at least a first particle section extending through at least a second particle section and the differently coloured particle sections have the same colours in at least 50% of the particles of each granulate visible in the surface of the floor covering and have respective surface areas n ; wherein when the granulate includes two colours 1, 2, the sums of the areas n for each colour follow the formula

$$\sum n_1 \neq \sum n_2$$

and when the granulate includes more than two colours 1, 2,...x, the sum of the areas n follows the formula

$$\sum n_1 \neq \sum n_2 \neq \sum n_x$$

and where the amount and colour of the particles and the particle sections have been selected in relation to the amount and colour of the material of the base web so that a blended colour can be achieved upon homogenous mixing of all components in the floor covering which does not correspond to the first colour.

2. Multicoloured floor covering as defined in claim 1, wherein the first particle section has at least two substantially parallel subsections.

3. Multicoloured floor covering as defined in claim 2, wherein the strip shaped first particle section is not straight at least at one point of its extent.

4. Multicoloured floor covering as defined in claim 1, 2 or 3, wherein the smallest linear extent of the particles at the surface of the floor covering is 12mm.
5. Multicoloured floor covering as defined in claim 1, 2, or 3, wherein the base web includes sufficient soot to render it electrically conductive.