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COMPOSITE FLOOR AND DECK COVERING CONSTRUCTION

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Fig. 5

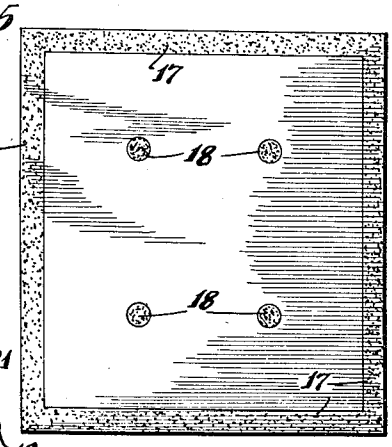


Fig. 1

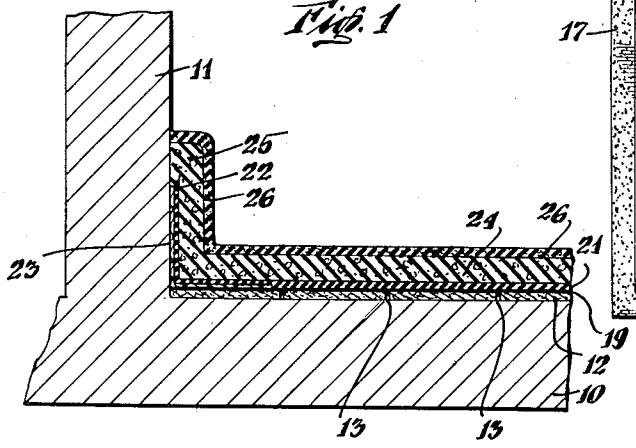


Fig. 2

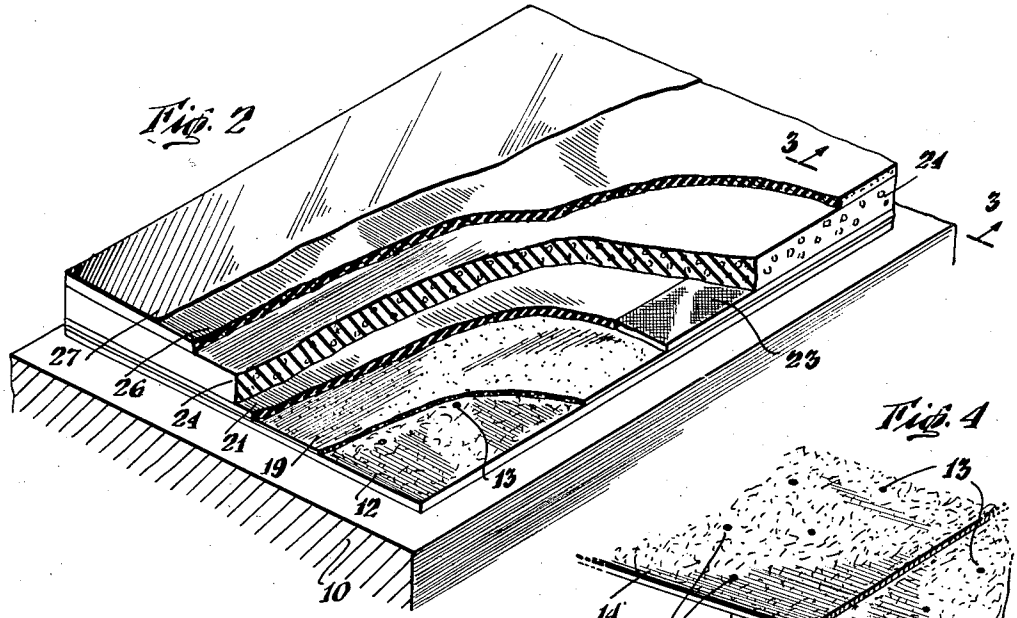
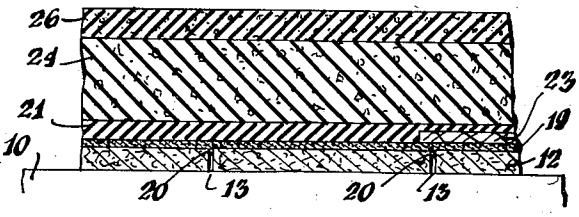


Fig. 4

Fig. 3



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COMPOSITE FLOOR AND DECK COVERING CONSTRUCTION

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9 Claims. (Cl. 94—3)

Our present invention relates to a composite floor and deck covering construction and more particularly to a permanent, substantially monolithic floor and deck covering, which is of general use for many purposes, but which is particularly useful as a covering over sub-floors or base supports, which for various reasons may undergo movement and which normally develops stresses in any coating bonded to them throughout the floor area. Such stresses may occur in connection with any insecure type of sub-floor such as one made of separate concrete slabs which develop shrinkage and expansion cracks that open and close with temperature changes, and also wood floors made, for example, by ship-lap, tongue-and-groove, plywood, sheathing, etc., which shrink either from loss of moisture contained at the time of installation or are subject to expansion and contraction caused by absorption of atmospheric moisture and subsequent drying out under conditions of lower humidity. The present invention is also applicable in covering the decks or some floor portions of ships or other structures where the normal use of the structure is such as may result in relative mechanical movement of portions of the sub-floor, so that any floor covering bonded thereto throughout or at closely spaced points will be subjected to stresses such as are outlined above and may be subject to permanent damage due to cracking, ingress of moisture and the possible freezing of the moisture penetrating through or into the cracks.

The present invention provides a substantially rigid, floating type floor covering construction, which may be formed in situ and which is secured to the sub-floor only at the periphery of a floor area; or, when the floor is of very large area, the covering may also be secured to the sub-floor additionally only on about 15-foot centers as measured from one another and from the periphery. The floor covering construction in accordance with the present invention is further somewhat resilient as an inherent property of its construction, substantially waterproof and in effect is a monolithic structure once it has been installed as set forth in detail hereinafter.

Briefly, the construction in accordance with the present invention includes an under-layer of a water- and air-pervious felt, upon which is a layer of a plastic composition including rubber and other materials which will harden in time to provide a substantially rigid, monolithic wear coat or surface. Other intermediate layers and surfacing layers may be provided as hereinafter particularly set forth. The under layer of felt is free to move with respect to the sub-floor or base support except at the periphery and, in the event of use covering large areas, additionally only at points spaced a substantial distance, as fifteen feet, apart as hereinabove described so as to permit relative movement of parts of sub-floor or base support without injury to the floor or deck covering construction of the present invention.

Other features and objects of the present invention will appear from the following description of a specific embodiment thereof, and will be pointed out in the appended claims, all when taken in connection with the accompanying drawings in which:

Figure 1 is a somewhat diagrammatic view on an enlarged scale illustrating a floor construction and a finished edge portion or base board formed therewith in accordance with the present invention, the view being substantially in vertical section;

Fig. 2 is a fragmentary view in perspective and with parts of the several layers progressively broken away to show the detailed construction in accordance with a preferred form of the present invention, the layers being severally illustrated on an enlarged scale in respect to actual installations;

Fig. 3 is a fragmentary view substantially in vertical section on the line 3—3 of Fig. 2 and on a further enlarged scale illustrating the construction in accordance with the present invention;

Fig. 4 is a detailed view in perspective illustrating the manner in which pieces of felt are lapped together when the felt layer is to be made of more than one piece; and

Fig. 5 is a view on a very small scale illustrating the manner in which the flooring construction of the present invention is secured to the base support at the periphery and at spaced points inside the periphery.

Referring now to the accompanying drawings, there is illustrated in Figs. 1, 2 and 3 at **10** a base support or sub-floor, which may be of wood, concrete slabs, metal or any other desired construction. As stated hereinabove, while the invention is peculiarly useful where this base support is of a relatively insecure material, the construction of the present invention is applicable and effective in use over a rigid and secure type of sub-floor, even through some of the features thereof may not be required on such a rigid support and even though other types of floor coverings may be adequate or relatively satisfactory on such rigid sub-floor constructions. There is also shown in Fig. 1 at **11** a vertical wall portion contiguous with the base support **10**, to illustrate the application of the construction of the present invention to a juncture of a floor and a side wall.

The bottom-most layer of a floor construction in accordance with the present invention, is generally indicated at **12**, this layer comprising a layer of felt, which is pervious to water and air and which in practice may consist of an asphalt impregnated asbestos felt perforated at desired intervals, for example on about ½-inch centers, with fine holes **13**. Felt of this kind, weighing about 15 pounds per 100 square feet, may be purchased on the open market and has been found satisfactory for the present purposes. This particular weight of felt is not critical, however. The purpose of the perforations which are initially formed in the felt layer is to permit the felt of this layer to be placed evenly and smoothly upon a sub-floor while bleeding out any air which may tend to be trapped under the layer of felt as laid down.

In the event that the area to be covered is wider than the felt, usually supplied in roll form, as in the usual case, one strip shown at **14**, Fig. 4, may be lapped a substantial distance as about two inches, over another strip **15** as shown, for example, at **16**, and the two strips cemented together by any suitable adhesive. For this purpose a commercially available adhesive, such as a solvent-containing or cut-back rubber adhesive which is irreversible in its setting characteristics has been found eminently satisfactory although the use of this type of adhesive as against some other type is not a necessary or critical part of the present invention.

The felt layer formed of one or more pieces cemented together as aforesaid and covering the entire floor area is cemented to the base support **10** at the periphery as indicated by the stippled margin **17**, Fig. 5. This marginal area which is cemented down may be of any desired

width, for example such as four inches. In the event that the entire floor area to be covered is not over about 250 square feet, or in the event that the felt layer is secured to the sub-support **10** at its peripheral portions as aforesaid at distances of not more than about fifteen feet apart, whichever may be the limiting factor, no further securing of the felt layer to the sub-support may be needed. However, in larger floor or deck areas, it may be necessary, in addition to the securing of the marginal portions as shown at **17**, Fig. 5, to secure points or small ears of the felt layer **12** on about fifteen foot centers down to the base support **10** as shown for example at **18**, Fig. 5. In cementing the felt layer to the base support, the same type of adhesive may be used as is used in cementing one strip of felt to another as described above in connection with Fig. 4.

The purpose of the above construction is to provide a free-floating surface area between the points of attachment of the felt layer **12** to the base support **10**, so that relative movement of parts of the base support beneath the free floating area will not damage the substantially rigid floor construction according to the present invention. This in practice effectively prevents the possibility of cracks or checks occurring in the floor construction of this invention due to relative movement of parts of the base support.

After the felt layer **12** has been placed and secured in position as aforesaid, a thin coating is applied thereover. This coating, which is shown at **19**, is preferably one having a composition, the essential active ingredients of which are rubber latex, vulcanizing constituents for said rubber latex and a hydraulic cement such as an aluminous cement or in some cases an ordinary Portland cement. This coating is applied as a paste containing more or less water, which is combined during the drying of this coating with the hydraulic cement. The coating **19** may be applied with a trowel or in any other suitable manner and is preferably scraped down to a thickness in the order of magnitude of about $\frac{1}{64}$ inch. This coating may be applied as one or more coats, but usually one coat will be found adequate.

In the present application and the claims thereof the term "rubber" is frequently used. This term as used herein is intended to include not only natural rubber, but also any artificial or synthetic rubber. For certain purposes some of the synthetic rubbers may be preferable to natural rubber by reason of their resistance to chemical attack, for example by oils and greases. Of these synthetic rubbers a polymerized chlorine derivative of 1,3-butadiene, which is sold under the trademark name "Neoprene" is presently preferred. The term "latex" as used herein in connection with rubber is intended to mean an aqueous dispersion of any "rubber" as herein defined. As such, therefore, these terms are used in their broadest conventional sense throughout the present specification and claims.

In stating the composition of certain of the layers herein the term "vulcanizing constituents" for the rubber or for rubber latex is used. By this term is meant any conventional or other vulcanizing agents and/or vulcanization accelerators. The present invention contemplates the use of such agents and/or accelerators, but is not limited to the particular character of such agents or accelerators so used. Any compositions or compounds known or usable for these purposes may be used in accordance with the present invention, it being remembered, however, that the vulcanization of the rubber or rubber latex in the present case must occur substantially at room temperature rather than requiring elevated temperatures for this chemical reaction, and the vulcanizing agents and/or accelerators should be chosen accordingly.

The material of the thin layer **19** may penetrate to some extent into the felt itself in a manner not particularly illustrated, and also penetrates somewhat into the perforations **13** as illustrated on an enlarged scale in Fig. 3 at **20**. This penetration of the material of the layer **19**, however, is such by reason of the consistency of the felt material of this layer as applied and by reason of the very small diameter of the holes **13**, that the material of the layer **19** will not pass through the felt layer **12** in sufficient amount so as to cement the felt layer **12** to the base support **10** even at or near any of the holes **13**. Thus the felt layer is retained free to move with respect to the support **10** except as it is secured thereto as hereinabove described in connection with Fig. 5.

The hydraulic cement in the composition **19** is present in an amount sufficient substantially to dehydrate the latex used and thereby to provide a relatively rigid composition as finally dried and/or cured. This layer, therefore, serves to a large extent to close up the perforations or holes **13** in the felt layer and serves to cement the felt layer to subsequent layers applied above the layer **19**. It is not, however, relied upon per se as a total water-proofing for the felt layer in installations where such water-proofing is desirable or necessary.

The next layer to be applied, in accordance with a preferred embodiment of the invention, is a neat rubber layer **21** which serves the purpose of providing absolute water-proofing characteristics where the floor construction may be subjected to more or less water. This layer is composed of a rubber composition usually made up by mixing a suitable rubber latex, the viscosity of which has been increased to substantially the consistency of mayonnaise, and suitable vulcanizing constituents for the rubber of this layer. This layer may be applied as two or more coats, for example with a trowel, with the application of the second or each subsequent coat delayed until the first or previously applied coat has dried sufficiently to permit foot traffic without being picked up by the foot.

As aforesaid, the purpose of this layer is basically to provide water-proof characteristics and as such to close any pinholes which may have been left through the layer **19** or areas left uncovered through negligence of the personnel applying the layer **19** in practice.

It is usually preferred that this layer **21** extend up any side walls contiguous to the floor area being covered as indicated at **22**, and further that the corner portions between the side walls and floor area be reinforced by suitable textile type material such as burlap as indicated at **23**. When such reinforcing is used, the burlap or other textile material in the form of strips or bands may be completely impregnated with the material of the layer **21** before or as a result of its being placed in the position shown in Fig. 1. In this way the corner portions are adequately reinforced mechanically by the fabric layer **23** and against water penetration by the rubber composition layer **22**. In practice this neat rubber layer or membrane may be applied in a total thickness of about $\frac{1}{32}$ inch and in a manner so that the portion **22** extending up the side walls is applied to a height of about four to six inches. Ordinarily this layer **21** is applied as two coats, although this number is not critical and may be one or more than two.

The next layer above the neat rubber layer **21** is a wear coat and is indicated at **24**. This layer may have the same composition as the layer or coat **19** with the addition, however, of a suitable mineral filler or aggregate, preferably a hard igneous rock, such as andesite, having a grain or particle size of about 16 to about 60 mesh. This wear coat is applied over the entire floor or deck area up to and in contact with any surrounding wall. It may have a thickness of about $\frac{1}{8}$ to about $\frac{1}{4}$ inch depending upon the service requirements, i. e. the purposes for which the floor is to be used. The layer **24** may be applied in one or more coats as may be desirable as aforesaid.

In the event that the neat rubber layer **21** is extended

up a side wall, as shown at 22, this layer 24 is also normally extended up over the neat rubber layer as indicated at 25 to form a finish portion, equivalent to a baseboard. As such, it protects the neat rubber layer from damage due to sunlight or otherwise when the floor area is likely to be exposed to such damage. It also serves to provide a substantially rigid, monolithic floor coating calculated to take any wear to which the construction may be subjected in its use, i. e. not only foot traffic, but also movement thereover of any rolling vehicles such as hand trucks in commercial installations, the support of furniture or other articles which may be placed upon the floor construction, and for any general purpose.

In the event that the construction in accordance with the present invention is to be used in installations where the utmost in water-proofing is not essential, for example indoors, it may in some instances be permissible to omit the neat rubber layer shown at 21 and in effect to combine the layers 19 and 24 as a single layer or wear coat, these layers having similar composition as aforesaid. In such instances the composite layer may or may not be extended up the side walls as shown in Fig. 1 in accordance with the desires of the users.

In the actual installation of the side wall construction, it is conventional to place masking tape along the wall 11 at a predetermined distance from the floor, so that when the layers 22 and 25 or merely the layer 25 is placed up the side walls an even or uniform base line may be established. This, however, is a detail of the actual installation which per se forms no part of the present invention.

In many installations the construction as described thus far may be considered complete and used as such. In some instances, however, where it is desired to have a somewhat smoother surface than is usually available from the construction as thus far described, a finish layer shown at 26 is applied above the layer 24. This layer 26 is preferably of the same composition as the wear coat or layer 24, with the exception that the solid filler or mineral aggregate used should be of a smaller particle size, for example about 75 to about 200 mesh. If desired, this finish layer may in addition have intermixed therewith some suitable organic dye or inorganic pigment to give a desired color to the floor construction. The use of such coloring is, however, no necessary part of the present invention, so that it is mentioned merely for completeness of description.

It will be noted from the description given that all the layers 19, 21, 24 and 26 are compounded of rubber or rubber latex. As such, each layer will weld to the contiguous layers upon the drying or maturing of the floor construction as a whole, so as to produce in effect a substantially rigid, monolithic construction, without cracks or seams.

Under many conditions the construction as described to this point is complete. In some installations, however, particularly where it is desirable that the surface be relatively dust-proof and cleaning facilitated to a maximum extent, a plastic sealing coat may be applied above the layer 26 as shown for example at 27. This sealing coat may be a vinyl resin dispersion or solution in any suitable liquid medium and applied either with a trowel, preferably set on edge, or with a brush, whichever is the more convenient. It will be understood that this vinyl sealer layer is unnecessary insofar as the serviceability of the flooring construction is concerned, and as such is a possible modification in this case.

While we have shown and described but one principal embodiment of the invention and have suggested and taught certain modifications thereof for certain somewhat limited uses and further have taught the essential and non-essential character of the several layers used in the construction in accordance with this invention, many equivalents of the construction herein specifically taught will

suggest themselves to those skilled in the art from the foregoing description. We do not wish to be limited, therefore, except by the scope of the appended claims, which are to be construed validly as broadly as the state of the prior art permits.

What is claimed is:

1. A permanent, substantially monolithic floor and deck covering for use on a base support which is subject to relative movement of different portions thereof, said covering being formed and applied in situ, comprising a base support which may be subject to relative movement as between different portions thereof; a supporting layer of air- and liquid-pervious felt, means adhesively cementing said supporting felt layer to said base support at the periphery of said felt layer and additionally only at spots arranged on about 15 foot centers as measured from one another and from said periphery; a relatively thin coating applied as a plastic mass over said felt layer and having a composition, the essential active ingredients of which are rubber latex, vulcanizing constituents for said rubber latex, and an hydraulic cement; a relatively thicker layer of a rubber composition applied as a plastic mass over said thin coating and being substantially integrally bonded thereto throughout the entire surface to be covered, said relatively thicker layer having a composition, the essential active ingredients of which consist of rubber in the form of a latex and vulcanizing constituents for the rubber of this layer, and this relatively thicker layer serving to render the covering impervious to water; and a wear coat above and substantially integrally bonded to said relatively thicker layer, said wear coat being applied as a plastic mass and having a composition, the essential active ingredients of which consist of a rubber latex, vulcanizing constituents therefor, an hydraulic cement, and a solid mineral aggregate filler; whereby to provide a substantially rigid, floating floor covering of seamless monolithic character, which will be substantially unaffected by such relative movement of portions of the base support as may occur in normal use.

2. A floor and deck covering in accordance with claim 1, wherein the covering has a total area of not over about 250 square feet, and in which said layer of felt is adhesively cemented to said base support solely around its periphery and is otherwise free thereof to permit relative movement of portions of said base support without injury to said covering.

3. A floor and deck covering in accordance with claim 1, wherein said layer of felt is a layer composed of an asphalt-impregnated asbestos felt having a plurality of holes therethrough to bleed any air trapped between said felt layer and said base support as said felt is laid, said holes being sufficiently small so that material subsequently applied as a plastic mass to form a layer above the felt layer will not penetrate through the felt layer in sufficient amount to cause said felt layer to be adhesively bonded to said base support by the material so passing through the holes in the felt layer.

4. A permanent, substantially monolithic floor and deck covering for use on a base support which is subject to relative movement of different portions thereof, said covering being formed and applied in situ, comprising a base support which may be subject to relative movement as between different portions thereof; a supporting layer of air- and liquid-pervious felt, means adhesively cementing said supporting felt layer to said base support at the periphery of said felt layer and additionally only at spots arranged on about 15 foot centers as measured from one another and from said periphery; and a wear coat above and bonded to said felt layer, said wear coat being applied as a plastic mass and having a composition, the essential active ingredients of which consist of a rubber latex, vulcanizing constituents therefor, an hydraulic cement, and a solid mineral aggregate filler; whereby to

provide a substantially rigid, floating floor covering of seamless monolithic character, which will be substantially unaffected by such relative movement of portions of the base support as may occur in normal use.

5. A floor and deck covering in accordance with claim 4, comprising in addition, a finish layer above and substantially integrally bonded to said wear coat, said finish layer having substantially the same composition as said wear coat, but with said solid mineral aggregate filler present in particles of smaller size than the particles thereof in said wear coat.

6. A permanent, substantially monolithic floor and deck covering for use on a base support which is subject to relative movement of different portions thereof, said covering being formed and applied in situ, comprising a base support which may be subject to relative movement as between different portions thereof; a supporting layer of air- and liquid-pervious felt, means adhesively cementing said supporting felt layer to said base support at the periphery of said felt layer and additionally only at spots arranged on about 15 foot centers as measured from one another and from said periphery; a wear coat above and bonded to said felt layer, said wear coat being applied as a plastic mass and having a composition, the essential active ingredients of which consist of a rubber latex, vulcanizing constituents therefor, an hydraulic cement, and a solid mineral aggregate filler; and at least one intermediate layer including rubber latex as an essential active ingredient and disposed between said felt layer and said wear coat and adhesively bonded by the latex content thereof to both and serving to effect substantial water-proofing of the entire floor covering, whereby to provide a substantially rigid, floating floor covering of seamless monolithic character, which will be substantially unaffected by such relative movement of portions of the base support as may occur in normal use.

7. A floor and deck covering in accordance with claim 1, for use in covering a floor area bounded by at least one vertical wall, comprising in addition, a portion of and integral with said relatively thicker layer of rubber composition extending a predetermined distance up said vertical wall, and an outer layer portion of and integral with said wear coat extending up said wall to cover and

completely to enclose the rubber layer so extending up said wall as aforesaid, so as to form a finished base portion extending integrally from said floor covering a predetermined distance up said wall.

8. A floor and deck covering in accordance with claim 1, comprising in addition, a finish layer above and substantially integrally bonded to said wear coat, said finish layer having substantially the same composition as said wear coat, but with said solid mineral aggregate filler present in particles of smaller size than the particles thereof in said wear coat, said mineral aggregate filler in said wear coat having a particle size from about 16 to about 60 mesh and in said finish coat having a particle size from about 75 to about 200 mesh.

9. A floor and deck covering in accordance with claim 4, comprising in addition, a finish layer above and substantially integrally bonded to said wear coat, said finish layer having substantially the same composition as said wear coat, but with said solid mineral aggregate filler present in particles of smaller size than the particles thereof in said wear coat, and a vinyl resin sealing coat above said finish layer.

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