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METHOD OF IMPROVING THE CURL RESISTANCE OF CORK TILE

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Fig. 1

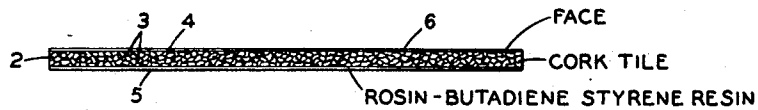


Fig. 2

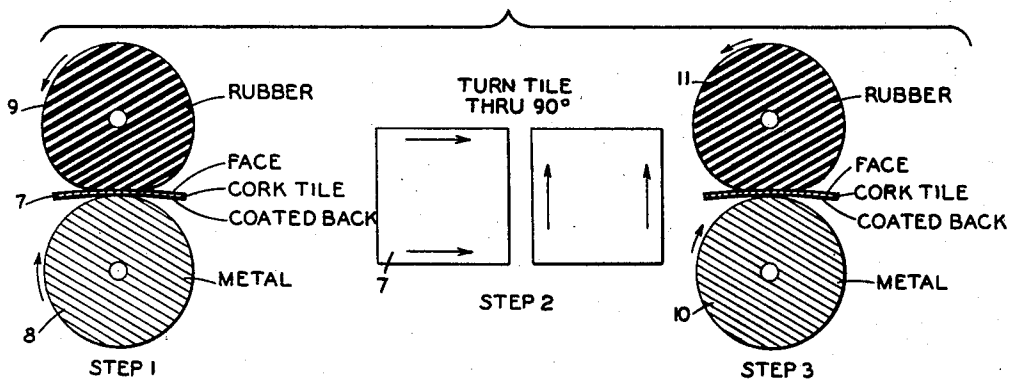
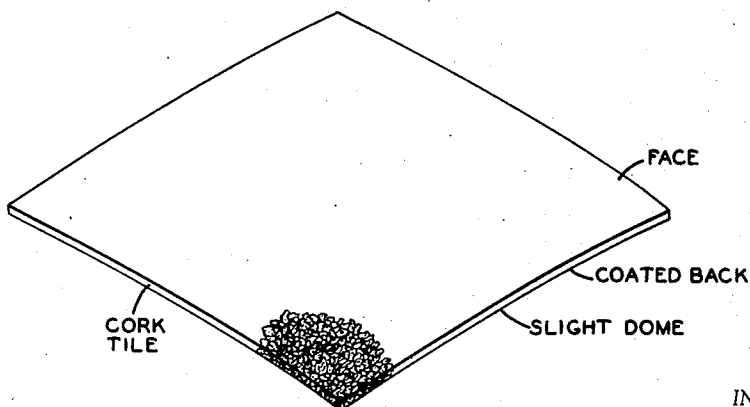


Fig. 3



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METHOD OF IMPROVING THE CURL RESISTANCE OF CORK TILE

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4 Claims. (Cl. 117-65)

This invention relates to a method of improving the curl resistance of cork tile. Cork tile generally is formed of cork granules which are coated with a binder material, compressed in a mold, and heated to activate the binder. The formed mass is then severed into sheets which are subsequently cut into tile pieces of the desired size and configuration. Cork tile is used primarily as a surface covering on floors and walls but is also used on furniture tops, counter tops, and elsewhere where surface coverings are applied.

When cork tile is installed as a surface covering, conventional practice is to apply a layer of adhesive to the surface to be covered and, while the adhesive is wet, to press the individual pieces of cork tile into the adhesive. The solvents which customarily are used in these adhesives, generally either water or alcohol, penetrate the back of the cork tile, to a limited extent at least, and this results in swelling of the cork particles into which the solvent penetrates. Since the faces of the tiles are not exposed to the adhesive solvent and also may be restrained from expanding by a finish, such as a wax, polyethylene, or other coating, an upward curl of the tiles at the edges results. The force of this curl is of considerable magnitude and may be sufficient to overcome the initial tack of the adhesive. When this occurs, so-called peaked seams result where adjacent pieces of the cork tile abut. This necessitates rerolling of the cork tile pieces applied to the surface after the adhesive has developed greater tack. Unless this rerolling is effective for pressing the upwardly curled edges of the tiles into firm contact with the adhesive after it has developed sufficient tack to withstand the force of curling, or if such rerolling is not accomplished, the final floor or other surface covered with the cork tiles will be unsightly and difficult to maintain.

An object of the invention is to provide a cork tile which may be bonded satisfactorily to a surface to be covered with any of the conventional adhesives without danger of peaked seams occurring where the edges of the tiles abut.

Another object of the invention is to provide a cork tile which may be pressed into engagement with a solvent type adhesive, containing water or alcohol solvents, for instance, without objectionable curling at the edges resulting from imbibition of the solvent into the under surface of the tile.

A further object of the invention is to provide a cork tile which is factory preflexed to a slightly domed shape with the peripheral edges of the tile curled slightly toward the back of the tile as supplied for installation.

According to the present invention, the under surface of the cork tile has intimately bonded thereto a coating which is semipervious to water, alcohol, and other solvents used in the adhesives for securing cork tiles to supporting surfaces. This coating, due to its semipervious character, permits the attainment of a good bond between the adhesive used in installation and the cork tile and at the same time insures that the total

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quantity of solvent which penetrates into the tile is so small as to reduce the swelling of the under surface to the point where both the degree and force of the upward curl are minimized. By attaining a proper balance between the penetration of the solvent necessary to achieve the desired bond and the exclusion of excess quantities which adversely affect the degree and force of curl, the initial tack of the adhesive is sufficient to hold the tile flat; and in installation all that it is necessary to do is to lay the tiles in the adhesives with the edges in abutting relationship, roll the surface, if necessary, to obtain good intimate contact between the back of the tiles and the adhesive, and permit the adhesive to set. Rerolling is not necessary.

Many coatings, such as waxes, polyethylene, hydrocarbon resins, or blends of these materials, are unsatisfactory for use as the coating for the under surface of cork tile. While they adequately seal the back of the tile against solvent penetration, they provide a surface to which the conventionally used adhesives will not bond satisfactorily.

I have found that a relatively low-cost, water-based coating composition which provides an adequate seal for cork tile without adversely affecting the bond with conventional adhesives may be compounded from a mixture of a dispersion in water of rosin and a butadiene-styrene synthetic rubber latex, provided certain limitations with respect to proportioning are observed.

The preferred rosin dispersion is an alkaline dispersion in water. Especially good results are achieved with an ammoniacal dispersion of a dark wood rosin stabilized with an animal protein and sold by Hercules Powder Company under the trade name Dresinol 238. This dispersion contains 40% solids.

The rubbery copolymers of butadiene and styrene are well-known in the art. Any of the butadiene-styrene synthetic rubber latexes may be used, such as those containing 25% to 75% butadiene and 75% to 25% styrene. Particularly good results are achieved with a copolymer including 50% butadiene and 50% styrene sold by Naugatuck Chemical Company and known as GRS 2000. This material contains from 38% to 41% solids.

The proportioning of these two principal components of the coating composition may be varied. The proportions on a solids basis should fall within the range of 100 to 300 parts of rosin for each 100 parts of butadiene-styrene synthetic rubber. Particularly good results are achieved when the ratio is in the order of 175 to 200 parts of rosin for each 100 parts of butadiene-styrene synthetic rubber.

If desired, polystyrene latex may be added to the composition to reduce the tackiness of the dried coating. Good results are achieved when from 10% to 50% of polystyrene solids, based on the total coating solids, are incorporated into the composition.

The following is an example of a suitable coating composition for use in the practice of the present invention:

Parts by weight	
Rosin dispersion, 40% solids (Dresinol 238)	175
Butadiene-styrene synthetic rubber latex, 38%-41% solids (GRS-2000)	96
Polystyrene latex, 35%-37% solids (SKU 4227)	122

If desired, methyl cellulose or other thickeners may be used or water added to provide a coating of the desired consistency. An antioxidant such as Agerite Alba, hydroquinone monobenzyl ether, or other similar material may be added to the coating composition, if desired.

The preferred method of applying this coating to the back of the cork tile pieces is to use a roller coater. The quantity of coating applied will vary, depending upon the thickness of the tile, the composition of the tile,

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method of manufacturing the tile, the degree of seal required, and other variable factors. Generally from 2 to 7 grams of dry coating per square foot will be found adequate. From 3-5 grams of dry coating per square foot has been found to be most satisfactory on 9"x9"x $\frac{3}{16}$ " cork tiles. The coating is applied, and thereafter the water is removed, the coating then presenting an essentially dry surface, free of objectionable tackiness.

If desired, the upper or wearing surface of the tile may be provided with a surface finishing treatment, such as the application of a polyethylene-wax coating composition.

For economical factory production, it is preferred to apply the back coating to sheets of the cork composition prior to severance into tiles since larger units may be operated upon. It is also preferred to finish the face of the sheets prior to tile severance. This may be accomplished in a more or less continuous operation by feeding the sheets to the roll coater where the back coating is applied, conveying the coated sheets through a drier to remove water from the back coating, passing the dried sheets through a sander which smooths the upper face of the sheets, applying the face treatment to the sanded sheets, and then cutting the sheets into pieces slightly larger than the desired final size, providing for trimming to final size in a subsequent operation.

I have found that the resistance of the product to curling upon application against solvent type adhesives may be improved further if the rough cut tiles are subjected to a controlled flexing which it is believed relaxes the strains in the cork tile pieces. This, combined with the application of the semipervious coating to the under surface of the tiles, yields a tile which will not peak when lead in solvent type adhesives. Any tendency for the tiles to curl upwardly as a result of application of the back coating or as a result of strains in the cork composition is eliminated by this flexing operation and flat tiles may be provided. Actually, by controlling the flexing operations in the manner described below, it is possible, if desired, to impart a slight dome to the tiles with the edges curled downwardly to a slight degree. This insures that when the tiles are laid in abutting relationship, the joints will not be peaked. Also, any expansion of the under surface of the tiles resulting with a minor imbibition of solvent from the adhesive through the semi-pervious back coating will be taken up in the body of the tile without upward curling of the edges.

The controlled flexing operation is most advantageously done after the back coating has been applied and may be accomplished by passage of the tile blanks between calender rolls, one of which is hard and nonyielding and the other of which is relatively soft and resilient. Preferably the blanks are fed through a calender, as mentioned above, in one direction and then turned through an angle of 90° and fed through the same calender or another calender to again flex the sheet but in a direction at 90° to the direction of flexing of the first calendering operation.

The invention is illustrated in the attached drawing, in which:

Figure 1 is an end view of a piece of cork tile embodying the invention;

Figure 2 is a diagrammatic view illustrating the flexing operation on pieces of cork tile; and

Figure 3 is a diagrammatic view showing a post-flexed tile, with the "dome" imparted to the tile shown to an exaggerated degree.

Referring to Figure 1, the cork tile piece is indicated at 2 and is made up of cork granules 3 bonded at their contacting surfaces with a binder 4. The binder is so thin in most instances as to be imperceptible. The back coating is indicated at 5. A face treatment 6 may be provided, if desired.

Referring to Figure 2, there is shown a cork tile blank 7 which is being passed between calender rolls 8 and 9.

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The roll 8 may be made of steel and may have a diameter of 10 inches. The roll 9 may have a rubber facing with a Shore A hardness of about 60-65. It may have an outer diameter of 10 inches. A pressure of about 250 pounds per lineal inch is applied to a cork tile piece 9" x 9" x $\frac{3}{16}$ " thick in this operation. Preferably the rolls 8 and 9 are rotated at a surface speed ratio of from 1.1:1 to 1:2 rubber to steel, but ratios from 1.5:1 to 1:10 can be used.

After the tile 7 has passed from between rolls 8 and 9 in step 1, it is rotated through a 90° angle, as indicated in step 2, and is then passed between calender rolls 10 and 11 in step 3. If desired, the piece may be refed through a single calender; but for rapid commercial production, it is preferred to have two calenders mounted in tandem and to feed the pieces directly from one into the other after turning the pieces through an angle of about 90°. The calender used in step 3 may be of similar construction to the calender used in step 1 or, as noted previously, may be the same calender. The modification of the cork tile and the coatings on the face and back and tile as a result of this calendering is not understood. The final result, however, is readily observable. Tiles which have been subjected to the calendering operation are flat or slightly domed and lie flat when pressed into engagement with solvent type adhesives.

The size of the rolls, the hardness of the rubber roll, the relative surface speeds of the rolls, the pressure applied by the rolls, and other factors will vary with the size and grade of cork granules used in the tiles, the size and thickness of the tiles, the type of binder used, i. e. natural resins from the cork or an added binder, and other variable factors. Rolls as small as 3" and as large as 24" in diameter may be used; and, of course, a small steel roll and a larger rubber covered roll may be used together. The pressure and speed of through-put may also be varied. Generally pressures of 100-400 pounds per lineal inch will be satisfactory. Through-put speeds of 10-100 lineal feet per minute have been used with success. Rubber rolls having Shore A hardness in the range of 30-95 will give good results. Optimum results appear to be obtained with most cork tiles with a rubber roll having a Shore A hardness of 60-65. With some cork tile products, it may be desirable to calender at a greater pressure in the first calender than in the second. This depends upon the strains in the cork tile being operated upon and the desired end product—a slightly domed tile or a flat tile.

The invention is not limited to any particular flexing conditions, for as mentioned above, improved results are achieved by use of the semi-pervious back coating without resort to the controlled flexing.

While the invention has been described with respect to pieces of cork tile of square configuration, it is obvious, of course, that pieces of other shapes, such as pieces used in the simulation of plank flooring, may be similarly treated. The invention is not limited to tiles of any size or shape. Also, some cork tiles are made without the use of an added binder to hold the granules together, the natural resins in the cork being relied upon to bond the granules. The invention is applicable to all types of cork composition surface coverings, with or without added binders of any sort.

I claim:

1. A method of improving the curl resistance of cork tile which curls objectionably when installed with a solvent type adhesive, the solvent of which penetrates the under surface of the tile, comprising coating the under surface of the tile with a coating composition comprising a mixture of a dispersion in water of rosin and a butadiene-styrene synthetic rubber latex in the proportions on a solids basis of from 100 to 300 parts of rosin for each 100 parts of butadiene-styrene synthetic rubber and drying the same to provide a coating which is semi-pervious to the passage of water and other solvents used in adhesives for securing tiles to supporting surfaces, and thereafter subjecting the under-coated tile to flexing in which the

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tile is flexed downwardly toward said under surface first in the direction of one pair of the edges of the tile and then in the direction of the other pair of edges of the tile.

2. A method of improving the curl resistance of cork tile which curls objectionably when installed with a solvent type adhesive, the solvent of which penetrates the under surface of the tile, comprising providing the under surface of the tile with a coating which is semipervious to the passage of water and other solvents used in adhesives for securing tiles to supporting surfaces, and thereafter subjecting the under-coated tile to flexing in which the tile is flexed downwardly toward said under surface first in the direction of one pair of the edges of the tile and then in the direction of the other pair of edges of the tile.

3. A method of improving the curl resistance of cork tile which curls objectionably when installed with a solvent type adhesive, the solvent of which penetrates the under surface of the tile, comprising providing the under surface of the tile with a coating which is semipervious to the passage of water and other solvents used in adhesives for securing tiles to supporting surfaces, and thereafter subjecting the under-coated tile to a controlled flexing over a curved nonyielding surface by the application of yielding pressure to the tile to flex the same into engagement with the curved surface and repeating this flexing at an angle of about 90° to the direction of initial flexing.

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4. A method of improving the curl resistance of cork tile which curls objectionably when installed with a solvent type adhesive, the solvent of which penetrates the under surface of the tile, comprising providing the under surface of the tile with a coating which is semipervious to the passage of water and other solvents used in adhesives for securing tiles to supporting surfaces, and thereafter subjecting the under-coated tile to a cross calendering operation in two directions at substantially 90° one with respect to the other with the under-coated surface being pressed into engagement with a substantially nonyielding calendering surface by a yielding calendering surface to flex the tile toward the under-coated surface.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,852,412

September 16, 1958

Lloyd V. Hassel

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 34, for "lead" read -- laid --; line 44, for "with" read -- from --.

Signed and sealed this 25th day of November 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents