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2,318,272

METHOD OF PRODUCING LINOLEUM PRODUCTS

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Fig. 1.



Fig. 2.



Fig. 3.

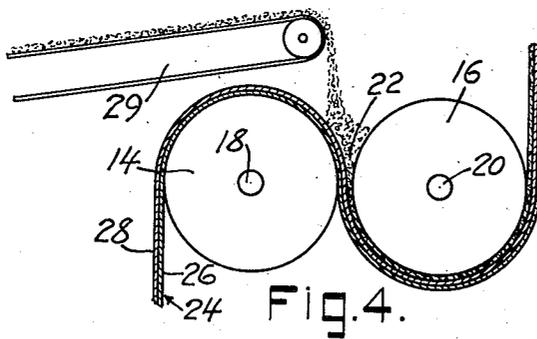


Fig. 4.

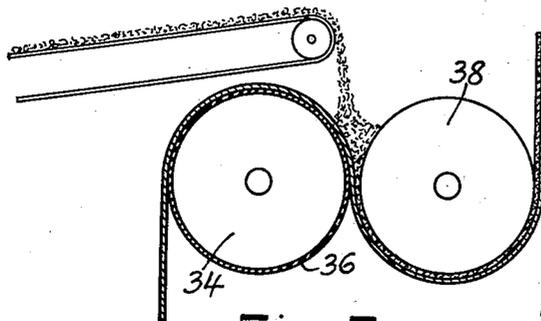


Fig. 5. BY

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# UNITED STATES PATENT OFFICE

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## METHOD OF PRODUCING LINOLEUM PRODUCTS

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Application August 22, 1941, Serial No. 407,928

14 Claims. (Cl. 154—25)

This invention relates to linoleum products adapted for use as floor coverings and the like and particularly to methods for producing such products wherein a linoleum composition is calendered directly onto a web of backing material formed of felt and containing a bituminous saturant or the like.

It has been usual practice heretofore to calender linoleum compositions onto burlap backing or other flexible and stretchable fabrics but so far as we are aware no one has successfully calendered linoleum compositions onto backing material formed of saturated felt. All previous attempts to calender linoleum compositions onto saturated felt have resulted in tearing or breaking of the web due to the unyielding and inelastic nature of the backing and its inherent inability to withstand the tension and strains to which the material is subjected during the calendering operations. The use of strong felts containing a high percentage of rag fiber and the use of heavily saturated sheets have been equally ineffective in resisting such strains and overcoming these objections. It is also found that when the backing is dense or non porous the gases entrapped or formed in the linoleum material or adjacent the face of the backing material during the calendering operation form "blisters" in the finished product, presumably because the gases cannot escape through the backing material.

In accordance with our invention these objections to methods of the prior art are overcome and linoleum compositions are calendered directly onto felt or similar backing material containing a bituminous saturant.

Our invention is particularly adapted for use in producing products of the type shown and described in the copending application of William C. Weigle, Serial No. 351,756, filed August 7, 1940, wherein floor coverings are provided with a cushioning layer which renders the product yieldable under foot and greatly simplifies the operations required in laying the material. Moreover, the cushioning material preferred is readily split so that after it has been secured to a floor it may be removed without injury to the wear resisting surface and may be relaid in another location if desired.

While the methods of the present invention are particularly adapted for use in the manufacture of products embodying a layer of cushioning material they may also be used in producing floor coverings in which no cushioning material is employed.

The advantages of the present invention may

be attained by the selection of particular types of felt or by the use of particular methods or equipment whereby the surface of the backing material to which the linoleum composition is applied is yieldably supported during the calendering operation. In this way the strains to which the material is subjected are relieved and tearing or breaking of the web is reduced or eliminated altogether. The present invention further contemplates the use of a web of backing material which is of a semi-porous nature whereby those gases which are entrapped or formed during the calendering operation are permitted to escape through the pores in the backing material and the formation of blisters in the finished product is reduced or eliminated.

In one embodiment of our invention the web of backing material consists of felt having a bituminous or other saturant applied to only one face thereof whereas the opposite face of the web is dry or substantially unsaturated. This web is passed between the calender rolls with the unsaturated layer or face thereof adjacent the first calender roll and serving as a cushioning means which relieves the strains and tension applied to the material during the calendering operation. In an alternative form of our invention the backing material is formed from webs of saturated and unsaturated felt which have been laminated together and passed between the calender rolls with the saturated layer in position to receive the linoleum composition and supported by the cushioning layer of unsaturated felt. When using either a laminated or a semi-saturated type of felt as a backing material the composite web preferably is of a semi-porous type which will permit gases entrapped or formed during the calendering operation to pass through the pores thereof and thus escape preventing the formation of blisters between the linoleum composition and the web of backing material.

In a further alternative embodiment of our invention the backing material is in the form of a web of felt having a saturant distributed uniformly throughout the web but insufficient in amount to prevent such penetration of gases through the web as to prevent the formation of blisters when the linoleum composition is calendered onto the face thereof. When using this type of felt the first calender roll is provided with a yieldable surface or cushioning blanket which serves to relieve the strains placed upon the material and prevents tearing of the web during the calendering operation.

One of the objects of our invention is to provide

novel methods for producing linoleum products such as floor coverings and the like wherein the backing is formed of felt or other similar material containing a saturant.

Another object of our invention is to provide novel methods whereby linoleum compositions may be calendered directly onto a web of felt containing a saturant such as a bituminous material.

Another object of our invention is to provide novel methods for producing linoleum products which are of a yieldable character and embodying a layer of cushioning material.

A further object of our invention is to produce a new type of linoleum floor covering in which a linoleum composition is carried by a layer of backing material of a semi-porous nature.

These and other objects and features of our invention will appear from the following description thereof in which reference is made to the accompanying drawing.

In the drawing:

Fig. 1 is a vertical sectional view through one typical form of product produced in accordance with our invention.

Fig. 2 is a vertical sectional view of an alternative product produced in accordance with our invention.

Fig. 3 is a vertical sectional view of a further alternative type of product produced in accordance with our invention.

Fig. 4 is a diagrammatic illustration of typical mechanism adapted for use in the practice of our invention; and

Fig. 5 is a diagrammatic illustration showing an alternative type of mechanism adapted for use in the practice of our invention.

The form of product illustrated in Fig. 1 is of a preferred type described and claimed in the copending application referred to above. This product embodies a backing material which includes a lower cushioning layer 2 and an upper saturated layer 4 whereas a layer of wear resisting linoleum composition 6 is applied to the upper exposed face of the saturated layer 4 of the backing material. The backing material is in the form of a semi-saturated unitary web or felt in which the saturant is applied only to the upper face of the felt while the lower face of the felt is dry or unsaturated.

The product illustrated in Fig. 2 is similar to that of Fig. 1 but is in the form of a laminated web including an upper sheet of saturated felt 8 bonded to lower sheet 10 of dry felt. The linoleum composition 12 is applied to the upper face of the saturated layer 8 of the laminated web of the backing material.

In forming either of the products illustrated in Figs. 1 and 2 in accordance with our invention it is possible to use conventional equipment such as that heretofore used in calendering linoleum compositions onto a backing formed of burlap or other woven fabric. Equipment of this type is illustrated diagrammatically in Fig. 4 wherein a pair of calender rolls 14 and 16 are mounted for rotation about parallel horizontal axes 18 and 20 and are spaced apart at the "pinch" 22 a distance sufficient to produce a finished product having the desired thickness or gauge. The backing material indicated generally at 24 is passed over the first calender roll 14 with the unsaturated face 26 thereof in engagement with the surface of the first calender roll so as to serve as a cushion support for the saturated face 28 of the web. The saturated face

of the web is exposed toward the second or complementary calender roll 16 whereby the linoleum composition is applied thereto as the web passes between the "pinch" of the calender and on beneath and about the second calender roll. The linoleum composition is supplied to the space between the calender rolls 14 and 16 by a conveyor or other suitable means indicated at 29 and is calendered directly onto the saturated face 28 of the web.

In carrying out the process the calender rolls and the linoleum composition are both heated to temperatures which in most instances are well above the melting point of the saturant carried by the web of backing material. Thus, for example, when using a saturant of a bituminous nature and having a melting point in the neighborhood of 150° F. to 155° F. as determined by the "ball and ring" method and a penetration of 16 to 18 at 77° F. we prefer to have the calender rolls and linoleum composition maintained at a temperature of about 230° F. to 240° F. However, for some purposes it is preferable to use saturants having a higher melting point and a rubbery or elastic consistency. Such saturants frequently have a melting point of 160° F. to 180° F. and a penetration of from 35 to 40 at 77° F. The temperature of the calendering rolls and of the linoleum composition is then usually somewhat higher and may be around 250° F., or more. In any event, by maintaining the calendering rolls and composition at temperatures considerably above the melting point of the saturant during the calendering operation the saturant is caused to flux and blend with the linoleum composition thus securing more perfect bonding of the linoleum composition to the backing material than has been possible heretofore.

In order to avoid the formation of blisters by the trapping of gases between the linoleum composition and the backing it is desirable to employ backing material of a semi-porous nature, that is to say, material which is not so dense or so non-porous as to preclude the escape of gases therethrough and prevent the formation of blisters during the calendering operations.

Tests upon various types and weights of felt were made to determine the degree of porosity which is required for satisfactory calendering practice in accordance with our invention. These tests were carried out in a manner similar to that used in making the standard porosity tests for dry felt using apparatus known as a "Densometer" and manufactured by Gurley Co. The material to be tested was subjected to a pressure difference of 1½ pounds per square inch on opposite sides of the felt and the time required for the passage of 400 cc. of air through one square inch of the felt was determined. In the case of a typical 60 point felt having saturant applied to one face only and the opposite face dry, the time required for passage of the air therethrough was 2 minutes and 40 seconds. A typical 40 point felt incompletely but uniformly saturated required 3 minutes and 9 seconds. Felts of this character are found to calender satisfactorily without the formation of blisters. However, when the felt is further saturated or is much thicker the time required for the passage of air through the felt is longer and ranges from 4 to 6 minutes. Such felts almost invariably exhibit objectionable blistering. The porosity of the felt is notably decreased when the usual back coating or sealing coat of paint is applied to saturated felts and in general it is found that if the porosity, when

tested as described above, is more than about four minutes the formation of blisters in the calendered product becomes so objectionable as to render the process commercially impractical.

The product illustrated in Fig. 3 differs from that of Figs. 1 and 2 in that it does not include any cushioning layer but simply embodies a layer of backing material 30 having a layer of linoleum composition 32 carried thereby. The backing material 30 is uniformly impregnated with a saturant but is of a semi-porous nature and like that of products of Figs. 1 and 2, has a permeability of from about 2½ to 3 minutes as measured by the above described test.

In forming products of this character or any other products embodying a layer of backing material which does not embody a layer of cushioning material we prefer to employ mechanism of the type illustrated diagrammatically in Fig. 5. In this construction the first calender roll 34 is provided with a layer or blanket 36 of cushioning material such as rubber, cork composition or other material which serves to yieldably support the backing material during the calendering operation.

The backing material is passed into engagement with the yieldable surface of the first calendering roll 34 so that it is cushioned as it passes between the calendering rolls and during the calendering operation. The web then passes about the second calender roll 38 which may be of the usual type employed in calendering composition onto backing material. The calendering rolls and linoleum composition are heated as when using the mechanism of Fig. 4.

The steps employed in controlling the operations and curing the product in any of the forms of our invention are substantially the same as those employed when calendering linoleum compositions onto burlap or other conventional materials in the prior art. Similarly the saturant carrying face of the backing may be provided with a sealing coat of paint such as that generally employed on felt heretofore, and any suitable type of linoleum composition may be used in carrying out the methods of our invention.

Our invention is also adapted for use in forming linoleum products having various thickness or gauge and has been found to be particularly useful in producing thin gauges of material, as low as 1.78 millimeters in thickness, although it is equally applicable for use in producing heavier products. It is also possible to use various weights of felt and to employ any suitable type of saturant adapted to form an adequate bond with the linoleum composition employed.

In view thereof it will be apparent that our invention is of broad application and is capable of many modifications and changes within the scope of the following claims.

We claim:

1. The method of producing linoleum floor coverings and the like embodying backing material which is substantially inelastic which comprises the step of cushioning said backing material while calendering a linoleum composition onto one face thereof.

2. The method of producing linoleum floor coverings and the like embodying a substantially inelastic sheet of impregnated felt which comprises the step of cushioning said sheet of felt while calendering a linoleum composition onto one face thereof.

3. The method of producing linoleum floor coverings and the like embodying a substantially in-

elastic layer of material containing a bituminous saturant which comprises the steps of yieldably supporting said layer as it is passed between the rolls of a calender, and feeding a linoleum composition to said rolls and into contact with said layer whereby said composition is calendered onto the face of said layer while strains due to the calendering operation and which tend to break or tear the layer are relieved.

4. The method of producing linoleum floor coverings and the like which comprises the steps of passing a layer of backing material and a layer of cushioning material together between calendering rolls and calendering a linoleum composition onto the face of said layer of backing material.

5. The method of producing linoleum floor coverings and the like which comprises the steps of passing a layer of saturated felt and a layer of cushioning material together between calendering rolls and calendering a linoleum composition onto one face of said layer of saturated felt.

6. The method of producing linoleum floor coverings and the like which comprises the steps of passing a layer of saturated felt and a layer of unsaturated felt together between calendering rolls and calendering a linoleum composition onto one face of said layer of saturated felt.

7. The method of producing linoleum floor coverings and the like which comprises the steps of forming a web of felt, impregnating one face only of the felt with a bituminous composition, while leaving the opposite face of the web unsaturated, passing the web between calendering rolls with the unsaturated face thereof in contact with the first calender roll and calendering a linoleum composition onto the impregnated face of the web as the web passes between the rolls.

8. The method of producing linoleum floor coverings and the like which comprises the steps of laminating a layer of unsaturated felt onto one face of a layer of felt which is saturated with a bituminous composition, passing the laminated web between calender rolls with the unsaturated face in contact with the first calender roll and calendering linoleum onto the saturated face of the laminated web.

9. The method of producing linoleum floor coverings and the like which comprises the steps of applying a bituminous saturant to one face of a web of felt, passing the web between calender rolls heated to a temperature above the melting point of the bituminous saturant with said web positioned so that the unsaturated face of the web is adjacent the first calender roll and calendering a linoleum composition onto the impregnated face of the web as it passes between said rolls.

10. The method of producing linoleum floor coverings and the like which comprises the steps of incompletely saturating a web of felt with a bituminous saturant, passing the web between calender rolls and calendering a linoleum composition onto one face of the web as it passes between said rolls.

11. The method of producing linoleum floor coverings and the like which comprises the steps of incompletely saturating a web of felt with a bituminous saturant, passing the web between calender rolls heated to a temperature above the melting point of bituminous saturant and calendering a linoleum composition heated to a temperature above the melting point of the bituminous saturant onto the one face of the web as it passes between said rolls.

12. The method of producing a yieldable floor covering embodying a layer of cushioning material and a layer of wear resisting material, which comprises the steps of forming a web of material embodying a cushioning face and a backing face, passing said web between calender rolls with the cushioning face in contact with the first calender roll and feeding a linoleum composition into the space between said rolls so that it will be calendered onto the backing face of said web.

13. The method of producing a yieldable floor covering embodying a layer of cushioning material and a layer of wear resisting material which comprises the steps of forming a web of material

embodying a cushioning face and a semi-porous asphalt impregnated face, passing said web between calender rolls with the cushioning face in contact with the first calender roll and feeding a linoleum composition into the space between said rolls so that it will be calendered onto the impregnated face of said web.

14. The method of producing linoleum floor coverings and the like comprising the steps of forming an incompletely saturated and semi-porous web of felt and calendering a linoleum composition onto one face of said web.

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