reb. 16, 1943. F. W. GANS 2,311,044

METHOD OF PRODUCING LINOLEUM PRODUCTS

Original Filed March 8, 1941

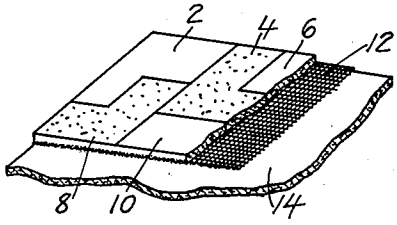


Fig. 1.

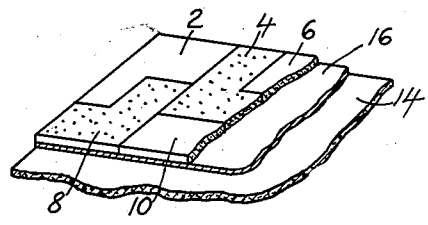


Fig. 2.

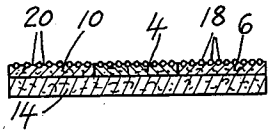


Fig. 3.

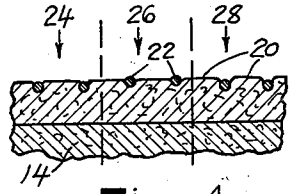


Fig. 4.

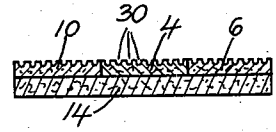


Fig. 5.

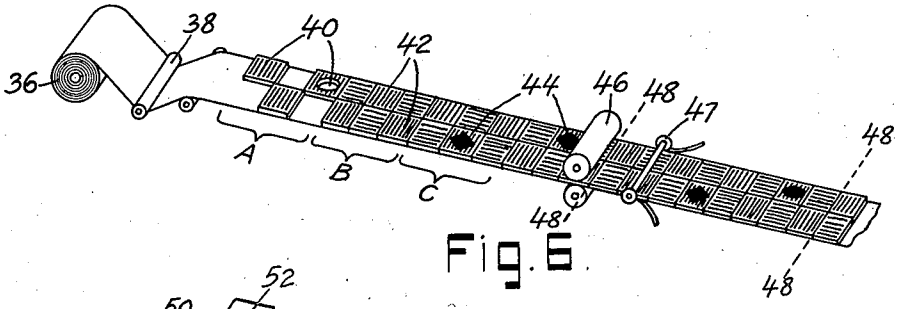


Fig. 6.

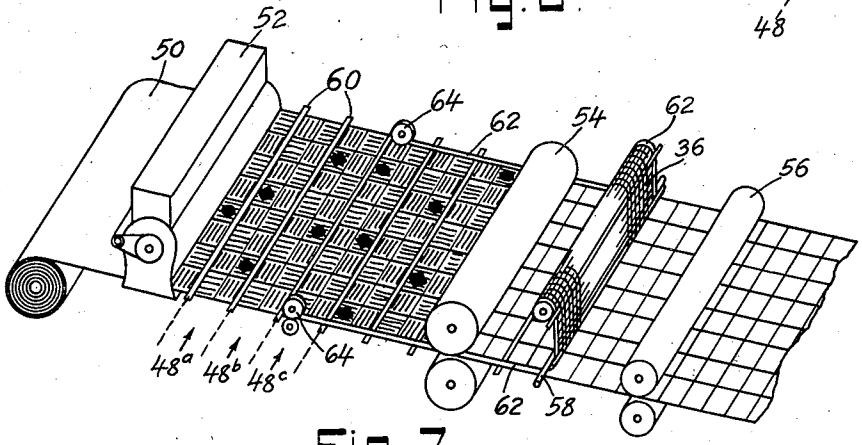


Fig. 7.

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METHOD OF PRODUCING LINOLEUM PRODUCTS

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Original application March 8, 1941, Serial No. 382,444. Divided and this application September 4, 1941, Serial No. 409,454

16 Claims. (Cl. 154—26)

My invention relates to methods of producing linoleum products such as floor coverings, wall coverings and the like and is a division of my copending application Serial No. 382,444, filed March 8, 1941.

Heretofore in the production of linoleum products it has been usual to apply the linoleum to a backing in the form of a number of individual pieces, tesserae or design elements which may vary considerably in size and shape. Generally also the design is repeated at regular intervals, say every eighteen inches, throughout the length of the material although these design sections may be displaced relative to each other to avoid the appearance of a recurring design. The pieces or tesserae of linoleum which are used to make up the design are uncured when applied to the backing and are easily torn or mutilated when handled. This is particularly true when they are made relatively thin for use in the production of inexpensive floor coverings. Moreover, when linoleum is applied to certain types of backing, such as felt base material there is a tendency for the design elements to spring away from the backing or to separate from each other along the edges if the product is rolled or bent at a sharp angle.

In the manufacture of floor coverings and the like heretofore the pieces of linoleum used to make up the design have been assembled either by hand or by machine but the hand operation is slow and intermittent whereas machines for use in assembling the individual design elements are very expensive and they cannot readily be changed from one design to another.

I have discovered that these objections to present types of linoleum floor coverings and methods of producing the same can be overcome and superior products can be produced by providing the uncured linoleum design elements, before they are applied to a backing, with a reinforcing layer of material which strengthens the elements so that they will withstand handling to better advantage. Preferably also the reinforcing material used is in the form of a sheet or web to which a number of design elements are secured so that they are held firmly in place during the subsequent operations of applying the elements to a backing. By the use of such reinforcing means it is possible to form units with a number of design elements preassembled thereon into design sections which are eighteen inches in width or of other widths corresponding to the width of the design repetitions in the finished product. The design sections thus formed may be produced as a continuous web and then be cut into units equal in length to the width of the finished product. The units in turn can be assembled quickly and easily on a suitable backing of coated burlap, saturated felt or other material to form a finished floor or wall covering. Furthermore, the composite intermediate product consisting of the reinforcing material with design sections thereon can be inspected for imperfections and any defective portions can be removed before the linoleum is applied to the backing. A perfect finished product is therefore obtained and waste due to loss of the backing and the production of short rolls or pieces is eliminated.

By means of the present invention the design elements may be assembled by hand on a continuously moving web of reinforcing means or relatively inexpensive mechanism may be used in assembling the elements to form the sections of the design. The speed of assembly of the design elements is thus increased over the usual intermittent operation while the cost of producing products, even with the most intricate designs thereon, is materially reduced. Moreover, the design may be changed from time to time without material delay and at little or no expense.

The reinforcing material used may vary in character and may be in the form of open mesh fabric or may be a continuous sheet of paper, linoleum, felt or other material. In some instances the design elements are permanently secured to the reinforcing material and the reinforcing material embodied in the finished product so as to become a part thereof. However, in accordance with certain modified forms of the invention the reinforcing material is stripped from the design elements after they have been secured to the backing.

A particular advantage inherent in those forms of the present invention in which the reinforcing material is embodied in the finished product resides in the fact that the product is rendered more resistant to tearing and the design elements are held together effectively so that the tendency for the elements to separate from each other at the edges or to spring away from the backing when the material is bent, is greatly reduced or is eliminated altogether. Some forms of the present invention are also of advantage in that the finished product although apparently smooth and attractive in appearance possesses almost imperceptible irregularities which impart definite non-skid characteristics to the finished product.

The principal objects of my invention are to reduce the cost and increase the speed of pro-

duction of linoleum floor coverings and the like and to produce a superior finished product.

Another object of my invention is to provide preassembled units embodying a plurality of design elements adapted to be secured to a layer of backing material.

A further object of my invention is to provide a linoleum product in which the tendency for the elements of the design to separate from each other or from the backing on bending of the product is materially reduced or eliminated.

Another object of my invention is to provide an intermediate product for use in the production of floor coverings and comprising uncured linoleum secured to a layer of reinforcing material.

Another object of my invention is to reduce losses due to defects in finished linoleum products and to avoid the production of short rolls or pieces of linoleum products.

A further object of my invention is to provide a novel type of linoleum product having nonskid properties.

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

In the drawing:

Fig. 1 is a perspective of a portion of one type of product embodying my invention with parts thereof removed to illustrate the construction more clearly,

Fig. 2 is a perspective of an alternative type of material embodying my invention,

Fig. 3 is a vertical sectional view through a further alternative form of product embodying my invention,

Fig. 4 is an enlarged view of a portion of the product illustrated in Fig. 3,

Fig. 5 is a vertical sectional view through another type of product embodying my invention,

Fig. 6 is a diagrammatic illustration of one type of means adapted for use in producing an intermediate product embodying my invention, and

Fig. 7 is a diagrammatic illustration of a typical means for producing a finished product embodying my invention.

The product illustrated in Fig. 1 comprises a number of design elements indicated at **2**, **4**, **6**, **8** and **10** applied to a web of reinforcing material **12** which may be of any desired size, but preferably is approximately 18 inches in width or of other width corresponding to the design sections in the finished product to be produced. The reinforcing material may consist of a layer of linoleum, paper, fabric, or any other suitable flexible material. One typical and preferred type of reinforcing material illustrated in Fig. 1 consists of foraminous material such as netting, cheese cloth, light wire screen, or other open mesh fabric **12** which presents a greater area of open spaces than of fabric. Netting having from about 4 to 36 threads to the inch may be used, but in general, I prefer to employ netting having from about 8 to 16 threads to the inch. Usually when employing a light open fabric as a reinforcing material it also is found desirable to apply sizing, such as starch, to the fabric to give it sufficient stiffness to permit ready handling of the fabric and to avoid stretching or distortion of the reinforcing layer. However the fabric may be subjected to a uniformly small tension to hold it even and smooth while avoiding such stretching as would cause the material to buckle when the tension is relieved or produce distortion of the design elements applied thereto.

The pieces or tesserae of uncured linoleum which serve as the design elements are arranged on the layer of reinforcing material and secured thereto in any desired manner as by pressing the assembled elements against the surface of the reinforcing material so as to bond the elements thereto and when fibrous or foraminous reinforcing material is used the fibers or threads become at least partially embedded in the design elements. The resulting composite product embodying a plurality of design elements and preferably having a complete section of the design thereon is secured to a layer of backing material **14** by subjecting the product to heat and pressure or by any other suitable means.

As shown in Fig. 2 the reinforcing material may be in the form of a continuous sheet of material **16**. I have used paper, uncured linoleum and a thin sheet of saturated felt as the reinforcing layer in such products but various other sheeted products may be used to advantage and secured to the backing **14** by means of heat and pressure or by the application of an adhesive to the backing or to the lower surface of the reinforcing material or to both.

In the constructions illustrated in Figs. 1 and 2 the design elements **2**, **4**, **6**, **8** and **10** are applied to the upper surface of the reinforcing material and are held together thereby so that they may be handled easily without danger of tearing the elements or causing them to become displaced with respect to each other. Moreover in applying the design elements to the backing material **14** the layer of reinforcing material **12** or **16** is placed against the backing material and thus incorporated in the finished product so that it strengthens the finished product and increases its tear resisting properties. However, one of the most important advantages in the use of the reinforcing material resides in its action in holding the design elements together at the edges and in holding them firmly in contact with the backing material when the product is bent.

In that form of my invention illustrated in Fig. 3 the reinforcing material indicated at **18** is located on the upper surface of the design elements so that in forming the finished product the elements **10**, **4** and **6** are brought directly into contact with the backing **14** throughout the surface thereof insuring a firm bond between the elements and backing itself. At the same time the reinforcing material serves to hold the elements in place so that they may be handled easily and without mutilation or relative displacement in applying the elements to the backing.

This reinforcing material may be formed of waxed paper, cellulose sheet, fabric or other suitable material and when in the form of a continuous sheet it is subsequently stripped from the upper surface of the product.

When the reinforcing material used is in the form of open mesh fabric it may, if desired, remain embedded in the upper surface of the design elements in the finished product as shown in Figs. 3 and 4. The linoleum material **20** between the threads or filaments **22** of the reinforcing material presents the greater area of the wearing surface of the material and the reinforcing material is pressed into the linoleum. As shown in the enlarged section of Fig. 4 the filaments **22** may be so embedded in the linoleum as to be substantially flush with the linoleum material and present a substantially smooth un-

broken surface as shown in the section 24. However, the filaments may be so embedded as to project a very slight distance above the intervening linoleum as shown in the section 26 or they may be depressed below the linoleum material as shown in the section 28 of Fig. 4. The extent to which the reinforcing material is embedded in the linoleum will depend upon the characteristics of the filaments and linoleum and the manner and degree of pressing to which the intermediate and final products are subjected during the operations of securing the reinforcing material and design elements together and in securing the composite intermediate product to the backing.

In any event, when the reinforcing material remains embodied in the upper portion of the finished product the surface of the product possesses minute and almost imperceptible irregularities or acquires such irregularities during use so that while it presents a smooth attractive surface which may be waxed or varnished to produce a high gloss thereon it nevertheless has marked anti-skid characteristics which prevent dangerous slipping of persons or objects thereon. Moreover the reinforcing material if colored or formed of metal such as light wire screen is exposed irregularly and to a slight extent and gives the finished product an attractive mottled appearance which modifies but does not obscure the design itself.

As shown in Fig. 5 the reinforcing material may be stripped from the upper surface of the design elements after they have been secured to the backing material so that the finished product embodies no reinforcing material whatever. However, the accuracy with which the design elements are arranged and the speed and economy of manufacture are greatly increased and the operations simplified. Moreover, as shown in Fig. 5 the product may be given desirable non-skid properties by the use of open fabric as a reinforcing material, since when stripped from the upper surface of the design elements the almost imperceptible depressions 30, formed by the threads of the reinforcing material, remain in the surface of the linoleum material. While these depressions are nearly obliterated and may be completely removed by pressing the material after the reinforcing web has been removed they are of advantage in producing a non-skid surface on the finished linoleum product.

The design elements may be assembled on the backing either manually or by machine and in Fig. 6 I have illustrated diagrammatically a typical arrangement of mechanism for use in the practice of my invention. In this construction a roll 36 of reinforcing material, such as sized cheese cloth eighteen inches in width, is passed beneath a tensioning roll 38 which places the material under a small but uniform tension. The web of material then passes to machines or the operators each of whom places one or more of the design elements 40, 42 and 44 on the reinforcing material until the web of reinforcing material is covered thereby. At the station A for example the first operator or a machine such as that shown diagrammatically at 52 in Fig. 7 and of the type described and claimed in my copending application Serial No. 384,241, filed March 20, 1941, places the elements 40 on the reinforcing material. The material carrying the elements 40 then passes on to the machine or operator at station B where the elements 42 are placed on the reinforcing material and at station C the elements 44 are placed on the reinforcing material thus completely covering the same. During this operation the reinforcing material is continuously held under uniform light tension to avoid any stretching or distortion thereof which might produce buckling or strains in the intermediate or finished product when the tension is released.

The material with the design elements thereon is passed beneath a rotary press 46 which serves to bond the design elements to the reinforcing material. After passing through the press 46, the resulting composite intermediate product is trimmed accurately to width by rotary knives 47 or other suitable cutting means and is inspected so that any defective portions may be removed. The web is then cut transversely into units of any desired length as indicated by the lines 48. By inspection of the composite intermediate product it is possible to eliminate those imperfect portions which would make it necessary to cut the finished product into short pieces or produce irregular rolls and there is no loss of backing material resulting from irregularities in the design elements.

The units of the intermediate product may be nine feet in length or of any other suitable length as desired. When the intermediate product is laid so as to extend longitudinally of the web of backing material it need not be cut into special lengths and can run directly from the press 46 and cutter 47 of Fig. 6 onto the web of backing material. However, it is ordinarily preferable to arrange the units so that they extend across the backing from side to side thereof. It is therefore usual to cut the intermediate product into lengths or units corresponding to the width of the finished product to be produced so that each unit embodies one section of the design. The units 48 are assembled in edge to edge contact on a layer of backing material either manually or otherwise as desired and the accurately cut edges of the units insure proper assembly of the units. As illustrated in Fig. 7 this may be accomplished by feeding a web of backing material 50, such as coated burlap or saturated felt past a suitable machine 52 which may be of the type illustrated and described in said copending application Serial No. 384,241.

It is preferable to displace the units 48 with respect to each other on the backing material to avoid the appearance of a recurring design. Thus, as shown in Fig. 7, the unit 48^a is similar to the unit 48^b but displaced with respect thereto. Moreover, as shown at 48^c certain of the units may be turned end for end to further vary the design while using similar design sections. So far as I am aware no one heretofore has ever produced design variations in linoleum products by turning sections of the design end for end and yet this is easily accomplished by means of the present invention.

The assembled units carried by the backing material are then passed through a press 54 which serves to secure the units to the backing material. When forming the product of Fig. 5 the reinforcing material 36 is stripped from the upper surface of the design elements after they have been secured to the backing and the product is passed beneath another press 56 which further bonds the elements to the backing and at least partially obliterates the depressions formed by the reinforcing material in the exposed face of the design elements. If the composite intermediate product extends in strips lon-

gitudinally of the web the operation of stripping the reinforcing material from the upper surface thereof requires only the receiving roll and the stripping bar 58. However, if the intermediate product is applied in units extending transversely of the web it is necessary to employ means which are applied over the reinforcing material to connect together the transversely extending pieces of reinforcing material on adjacent units and thereby strip the reinforcing material from the finished product in a continuous operation. As shown in Fig. 7 strips of tape 60 may be applied longitudinally of the joints between the units and transversely of the web so as to connect the pieces of reinforcing material together throughout the length thereof. In the alternative strips 62 may may be applied longitudinally of the web by taping rolls 64 to connect the pieces of reinforcing materials at the ends only or both the strips 60 and 62 may be employed so that the reinforcing material may be removed from the upper face of the material after pressing thereof to bond the units to the backing.

In this way the operation of assembling the design elements and securing them to the backing material to produce a finished product may be carried on as a continuous operation and the resulting finished product is of a superior quality due to the fact that the design elements are strengthened and cannot spring away from the backing material or separate at their edges when the product is flexed or bent at a sharp angle. Furthermore, because of the strength of the intermediate product the gauge or thickness of the linoleum material itself may be considerably less than that heretofore capable of use in practical operations.

In that form of my invention illustrated in Figs. 3, 4 and 5 the design elements are either assembled on a conveyor and the reinforcing material applied to the upper surface thereof or they are assembled on the reinforcing material and the resulting intermediate product is inverted to place the design elements in contact with the backing.

While I have illustrated and described preferred embodiments of my invention and preferred method of operation in accordance therewith it will be apparent that the composite intermediate product and the units may be produced in any desired manner and that the reinforcing material used may be of any suitable character adapted for convenient handling and for adequate bonding to the backing material. Moreover, the type of backing material employed may be of any desired or suitable character and the methods of assembling the units on the backing and of producing a non-skid effect on the exposed surface of the finished product as well as other features of my invention are capable of many modifications and changes without departing from the spirit and teachings of my invention.

In view thereof, it should be understood that the embodiments of my invention herein described and shown in the drawing are intended to be illustrative of my invention and are not intended to limit the scope thereof.

I claim:

1. A method of producing linoleum products which comprises the steps of securing uncured linoleum to a web of reinforcing material, severing said web into lengths and thereafter securing the resultant lengths of composite product in parallel relation to a layer of backing material.

2. A method of producing linoleum products which comprises the steps of securing a plurality of design elements formed of uncured linoleum in a predetermined arrangement to a web of reinforcing material, severing said web into lengths and thereafter securing the resultant lengths of composite product in parallel relation to a layer of backing material with the reinforcing material adjacent the backing.

3. A method of producing linoleum products which comprises the steps of arranging a plurality of design elements formed of uncured linoleum on a web of reinforcing material, subjecting the elements and reinforcing material to pressure to bond the same together, severing said web into lengths and thereafter securing the resultant lengths of composite product in parallel relation to a layer of backing material.

4. A method of producing linoleum products which comprises the steps of securing uncured linoleum to a reinforcing material formed of open mesh fabric presenting a greater area of spaces than of fabric, and thereafter securing the resultant composite product to a layer of backing material.

5. A method of producing linoleum products which comprises the steps of securing uncured linoleum to a reinforcing material formed of open mesh fabric presenting a greater area of spaces than of fabric and thereafter securing the resultant composite product to a web of coated burlap with the fabric adjacent the burlap.

6. A method of producing linoleum products which comprises the steps of securing uncured linoleum to a reinforcing material formed of open mesh fabric presenting a greater area of spaces than of fabric and thereafter securing the resultant composite product to a web of saturated felt with the fabric adjacent the saturated felt.

7. A method of producing linoleum products which comprises the steps of securing a plurality of elements formed of uncured linoleum to a web of reinforcing material in predetermined relation, cutting the resultant web of composite product into lengths and securing said lengths in parallel relation to a layer of backing material.

8. A method of producing linoleum products which comprises the steps of securing a plurality of design elements formed of uncured linoleum in a predetermined arrangement to a web of reinforcing material which is approximately eighteen inches in width, severing the resultant composite products into units which are approximately equal in length to the width of the finished product to be produced and securing said units to a layer of backing material transversely to the length of the backing and in edge to edge contact to produce a finished product.

9. A method of producing linoleum products having a design thereon which is repeated at predetermined intervals lengthwise of the product, comprising the steps of moving a web of reinforcing material which is approximately equal in width to the width of said design repetitions along a support past successive stations, depositing design elements formed of uncured linoleum on said web of reinforcing material at said stations to substantially cover the web, securing the assembled elements to said reinforcing material, severing the resulting composite product transversely of the web into units and securing said units to a layer of backing material.

10. A method of producing linoleum products

having a design thereon which is repeated at predetermined intervals lengthwise of the product, comprising the steps of moving a web of reinforcing material which is approximately equal in width to the width of said design repetitions along a support past successive stations, depositing design elements formed of uncured linoleum on said web of reinforcing material at said stations to substantially cover the web, securing the assembled elements to said reinforcing material, severing the resulting composite product transversely of the web into units approximately equal in length to the width of the finished product to be produced, and securing said units to a layer of backing material transversely to the length of said layer and in edge to edge contact.

11. A method of producing linoleum products having a design thereon which is repeated at predetermined intervals lengthwise of the product, comprising the steps of moving a web of reinforcing material which is approximately equal in width to the width of said design repetitions along a support past successive stations, depositing design elements formed of uncured linoleum on said web of reinforcing material at said stations to substantially cover the web, securing the assembled elements to said reinforcing material, severing the resulting composite product transversely of the web into units approximately equal in length to the width of the finished product to be produced, and securing said units to a layer of backing material transversely to the length of said layer and in edge to edge contact but with the design elements thereon relatively displaced to destroy the appearance of a recurring design.

12. A method of producing linoleum products which comprises the steps of at least partially embedding foraminous reinforcing material in uncured linoleum and securing the resulting composite intermediate product to a backing.

13. A method of producing linoleum products which comprises the steps of at least partially embedding foraminous reinforcing material in uncured linoleum and securing the resulting composite intermediate product to a backing with the reinforcing material located adjacent the backing.

14. A method of producing linoleum products which comprises the steps of at least partially embedding foraminous reinforcing material in uncured linoleum and thereafter securing the resulting composite intermediate product to a backing with the reinforcing material located adjacent the exposed face of the linoleum material.

15. A method of producing linoleum products which comprises the steps of securing a web of reinforcing material to the surface of uncured linoleum, thereafter securing the resulting composite intermediate product to a backing with the reinforcing material located on the exposed face of the linoleum material and stripping the reinforcing material from the linoleum material.

16. A method of producing linoleum products which comprises the steps of at least partially embedding foraminous reinforcing material in uncured linoleum, thereafter securing the resulting composite intermediate product to a backing with the reinforcing material located adjacent the exposed face of the linoleum material, stripping the reinforcing material from the linoleum material and thereafter pressing the finished product to at least partially obliterate the marks formed in the exposed surface of the linoleum material by the reinforcing material.

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