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STENCILING MACHINE

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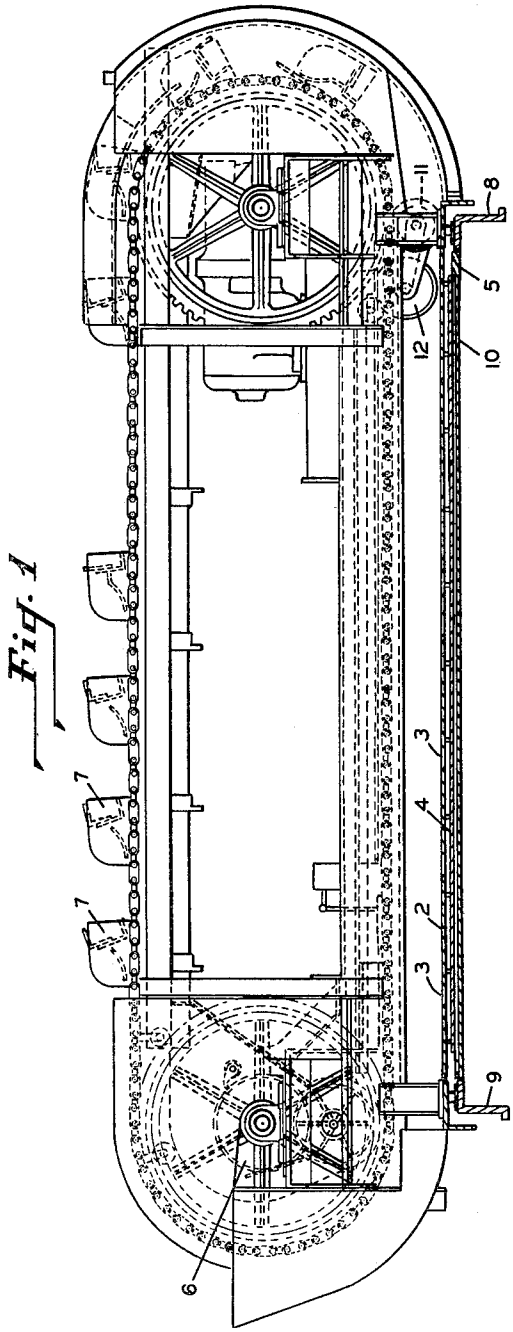


Fig. 1

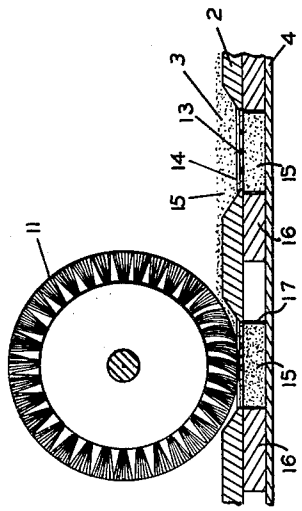


Fig. 2

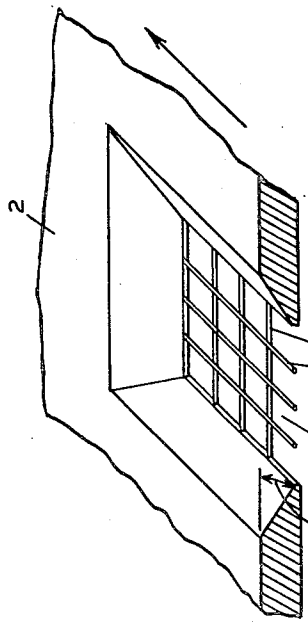


Fig. 3

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STENCILING MACHINE

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This invention relates to an improvement in a stenciling machine for the manufacture of inlaid linoleum, inlaid thermoplastic resin surface coverings, and the like. It is concerned more particularly with a specially constructed stencil plate for use in conjunction with a brush for removing inlaying composition.

In stenciling machines for the manufacture of inlaid surface coverings, a metal stencil is provided having openings therein through which granulated inlaying compositions are strickled. A metal plate is used to form the stencil and the openings made in the metal plate correspond to the design of the inlaying composition being laid up by the particular stencil. The stencil openings are generally provided with bridging wires which extend across the stencil openings and which are attached to the stencil plate to provide a supporting structure for the solid portions of the stencil disposed between the openings. Berger Patent 2,241,051 discloses a stenciling machine of the type referred to.

In forming complex designs with stenciling machines of the type referred to, a series of stenciling machines are used, some patterns requiring as many as seven or more stencils in series to complete the inlaid pattern on an appropriate backing material. The stencil units include a conventional strickler mechanism such as disclosed in the Berger patent referred to above, and include means for feeding granulated linoleum compositions or the like onto the supporting backing which is received on a slat-type conveyor positioned below the stencil.

In forming inlaid plastic surface coverings of the type with which this invention is concerned, a given pattern is laid up by the first stencil by positioning the supporting backing beneath the stencil, lowering the stenciling unit on appropriate side supports, depositing the inlaying composition through the stencil openings by strickling means onto the backing after which the stenciling unit is raised and the backing is moved by the conveyor to bring a fresh area of the backing into position and to bring the backing having the molding inlay composition deposited thereon to the next station. The color feeding machines with the stencils in place, or the stencil units, are set at a specified height above the table. When a series of stencil units are used to form a design, it becomes important for each successive stencil unit to feed a given thickness through the stencil openings onto the backing.

As shown in FIGURE 4 of the Berger reference, the stenciling machines of the prior art have been designed to lay up the inlaying composition to a depth which comes to the top of the stencil openings. When this is done, succeeding layups result in a greater amount of material being required to fill the openings of the stencil. This is so because each succeeding layup becomes engaged at a level which is above the original thickness setting and which is equivalent to the thickness of the stencil plate. Thus the lowering of the next stencil to the originally determined thickness is prevented by the height of color, compressed slightly, previously laid up. When brushes are used to sweep the inlay composition from the openings, the reinforcement wires of the stencil openings, shown in FIGURE 4 of the Berge patent, have prevented the brushes from sweeping the composition completely out of the opening and the removal of the inlay composition has been further complicated by the inability of the brushes to completely sweep the area immediately adjacent to the solid portion of the stencil parallel to the brush shaft. This phenomenon is particularly pronounced when a stencil plate having narrow openings is used. The above-enumerated difficulties are generally referred to by the expression pyramiding. When the designs laid up upon the backing are pressed, the ridges, caused by the pyramiding, collapse or spew and the highest layup accepts full pressure of the press. This layup flows, or liquefies and flows, bringing the second highest layup into play.

The primary object of this invention is to provide a stenciling unit for the manufacture of molded linoleum and similar products with means for laying up design elements of a desired uniform thickness through the stencil openings. An ancillary object of this invention is to provide a stenciling unit which will eliminate the above-described so-called "pyramiding" problems.

These and other objects of the invention will be clear from the following description of an embodiment of the invention which will be given in conjunction with the attached drawing, in which:

FIGURE 1 is a side elevation of a typical strickling unit,

FIGURE 2 is a diagrammatic view illustrating the construction of the stencil plate in accordance with the invention and the manner in which the rotating brush functions as it distributes the color through the stencils; and

FIGURE 3 is an enlarged perspective view illustrating the construction of a stencil opening in greater detail.

The unit of this invention includes a conventional strickler mechanism such as disclosed in the Berger patent referred to above. The metal stencil is indicated at 2; and, as shown in FIGURE 1, the stencil has openings 3 therein through which the granulated inlaying composition or the like is fed onto a supporting backing 4 which is received on a conveyor 5 which is moved intermittently below the stencil 2 to bring fresh areas of the bacing 4 into position to receive inlays of linoleum composition or the like to be deposited through the openings in the stencil.

By way of example, the granulated linoleum composition is received within a hopper 6, and a veined feeder deposits a measured amount of composition into the path of a plurality of strickling and compressing blades mounted on strickler carriages 7 which are secured to an endless chain carrier. The blades serve, when moved over the stencil 2, to distribute linoleum composiiton deposited in their path by the veined feeder over the stencil and through the stencil openings 3 onto the backing 4 and to compress the granulated material to a slight degree.

The stenciling unit is mounted on side rails 8 and 9 which are arranged to be raised upon completion of each stenciling cycle and to be lowered again after the backing 4 has been moved by conveyor 5 to bring a fresh area into position for the reception of inlaying composition. A table 10 supports the backing 4 and the slat conveyor 5.

Behind the series of strickling and compressing blades mounted on strickler carriages, a rotating brush 11 and a motor 12, for driving the rotating brush, are secured and set to remove the amount of inlay composition in excess of that required to fill the open stencil areas below the bottom surface of the stencil plate. A more complete description of the stenciling unit, including the means for activating and driving the rotating brush and the means for moving the stricklers and brush over the stencil plate, may be had by reference to Berger, U.S. Patent 2,241,051.

With reference to FIGURES 2 and 3, where views of the stencil plate showing the openings therein are illustrated in greater detail, the openings **3** in the stencil plate **2** are tapered back ⅛" from the edge of the openings and are cut to .008" of the bottom of the stencil at the opening edge creating an angle of 23.5° from the surface of the stencil plate. The wires **13** and **14**, across which the brush **11** travels, are used to hold the stencil together and to limit the depth to which the brush can sweep. They are placed at the very bottom of the stencil plate so that the brush **11** can remove all the inlaying composition **15** all the way down to the bottom of the stencil opening. When the wires across the stencil opening are placed in two directions to add strength to the over-all structure of the stencil they are placed substantially at right angles to one another. Where it is necessary to have wires in both directions, the wires **13** running perpendicular to the direction of brush travel are placed at the very bottom of the stencil and the wires **14** running with the direction of the brush travel immediately above them. Previously laid up inlaying composition is shown at **16**. The direction of brush travel is illustrated by the arrow in FIGURE 3.

In operation, the discharged inlaying composition is spread onto the stencil and through the openings therein by means of the scraper blades attached to the strickler carriages **7**. The series of scraper blades are generally arranged at decreasing angles with respect to the stencil plate and are provided to force the composition to completely fill the stencil openings. The blades by reason of their position with respect to the surface of the stencil plate **2** further serve to compress to a limited extent the composition in the stencil openings **3**. Next the brush **11** behind the scraper blades, as shown in FIGURE 2, removes all of the excess composition **15** remaining on the surface of the stencil and additionally the bristles of the brush enter into the stencil openings in the plate to remove all of the comopsition to the bottom of the openings, the depth to which the brush can sweep being limited by the wires **13** at the bottom of the stencil plate and across which the brush travels. Models **17** secured to the bottom of the stencil **2** serve to confine the inlaying composition to the desired design on the backing **4**.

In order to insure that the inlaying composition is not removed below the bottom of the stencil openings, the wires **13** placed perpendicular to the direction of brush travel at the very bottom of the stencil are at intervals of between a minimum of ⅛" and a maximum of ⅝". The wires placed substantially parallel to the direction of brush travel, of course, do not limit the depth to which the bristles enter the stencil openings and their spacing is thus not critical to the functioning of the stenciling machine.

We have found that the machines function in the desired manner when the angle at which the sides of the opening are tapered is an angle of from 13.5° to 43.5° from the upper surface of the plate.

The improvements in the stenciling machines of this invention have resulted in a number of benefits accruing from the elimination of pyramiding during the manufacture of inlaid surface coverings. Thus, in manufacturing, fewer pickups occur; that is, the lowering of the stencil plate no longer results in intimate contact of the stencil plate with the pyramided portions of previously inlaid design and thus reduces the tendency of the stencil plates to pick up previously laid inlay composition. This results in considerably improved yields of merchandisable product. The products laid up with the stenciling machines of this invention have a more uniform gauge so that the pressing cycle imparts a more uniform application of heat and pressure with better over-all properties in the final product as well as longer press pad life in the equipment. Because of the more uniform gauge, the removal of release paper is greatly improved and higher temperatures may be used during the consolidation cycle

resulting in improved properties in the surface coverings and shorter consolidation cycles. With the substantial elimination of spew caused by pyramiding, improvements in registering embossing are achieved as well as the elimination of repeat marks in the surface coverings and less distortion in the product. By achieving a more uniform gauge, improved surface coverings of lower gauges have been made possible.

This invention has also resulted in surface coverings of greatly improved saleability. This is particularly true of inlaid surface coverings formed from the thermoplastic vinyl resin inlaying compositions as the more uniform gauge of layup has resulted in less waviness in the finally consolidated product with resultant improved visual characteristics. With vinyls, the problem of pyramiding in inlaid designs becomes more pronounced insofar as the vinyl inlaying compositions have less compressibility than the standard inlaying compositions formed of linoleum resins. Of course, the more uniform gauge results in the same type of improvements in inlaid linoleum products. Because of the greater uniformity of products produced using the improved stenciling machines of this invention, greatly improved installations of the surface coverings are achieved through the improved pattern matching with attendant better seams. The more uniform gauge results in a surface covering having better maintenance characteristics such as improved and easier waxing characteristics.

The table set forth below shows the improvement in gauge of molded inlaid surface coverings realized in the practice of this invention. Two surface coverings were made using a granular thermoplastic vinyl resin inlaying composition for forming identical inlay designs using a seven stencil layup. Surface covering A was laid up with stenciling machines embodying this invention and surface covering B was laid up using stenciling machines of the type disclosed in Berger U.S. Patent 2,241,051. Both surface coverings were laid up starting with the same settings between the stencil plate and the felt backing and identical consolidating and finishing steps were used in forming the finished surface coverings.

Table

Surface Covering	A	B
Gauge Limits	.080" to .082".	.058" to .092".
Average Gauge	.068".	.081".
Maximum Deviation from Average	.014".	.023".
Maximum Deviation between Adjacent Design Elements.	.010".	.030".

We claim:

1. A stenciling machine including a stencil plate having openings therein through which granulated inlaying composition may be strickled onto a suitable backing, said openings having the sides thereof tapered at an angle of from about 13.5° to 43.5° from the upper surface of the stencil plate to substantially the bottom thereof, means movable over the stencil plate for strickling an excess amount of granulated inlaying composition over the upper surface of the stencil plate and into the openings to fill said openings with granulated inlaying composition, a brush movable over said stencil plate behind said strickling means for removing excess inlaying composition from the surface of the stencil plate and from the openings therein, and means for limiting the depth to which the brush can sweep to substantially the bottom surface of said plate.

2. A stenciling machine as defined in claim 1 in which the means for limiting the depth to which the brush can sweep comprises a plurality of wires running substantially perpendicular to the direction of brush travel and secured across the openings in said stencil plate at substantially the bottom thereof.

3. A stenciling machine as defined in claim 2 in which a plurality of additional bridging wires are secured im-

mediately over the brush limiting wires across the stencil openings in a direction substantially parallel to the direction of brush travel.

4. A stenciling machine including a stencil plate having openings through which granulated inlaying composition may be strickled onto a suitable backing, said opening having the sides thereof tapered at an angle of from about 13.5 to 43.5° from the upper surface of the stencil plate to substantially the bottom thereof, means movable over the stencil plate for strickling an excess amount of granulated inlaying composition over the upper surface of the stencil plate and into the openings to fill said openings with granulated inlaying composition, a rotating brush, including means for driving the brush, movable over said stencil plate behind said strickling means for removing excess inlaying composition from the surface of the stencil plate, and a plurality of wires running substantially perpendicular to the direction of brush travel secured across the openings in said stencil plate at substantially the bottom thereof.

References Cited in the file of this patent

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2,241,051	Berger	May 6, 1941
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