Sept. 21, 1965 W. L. BAKER 3,207,617

METHOD FOR PAINTING AN EMBOSSED PATTERN ON A SHEET OF MATERIAL

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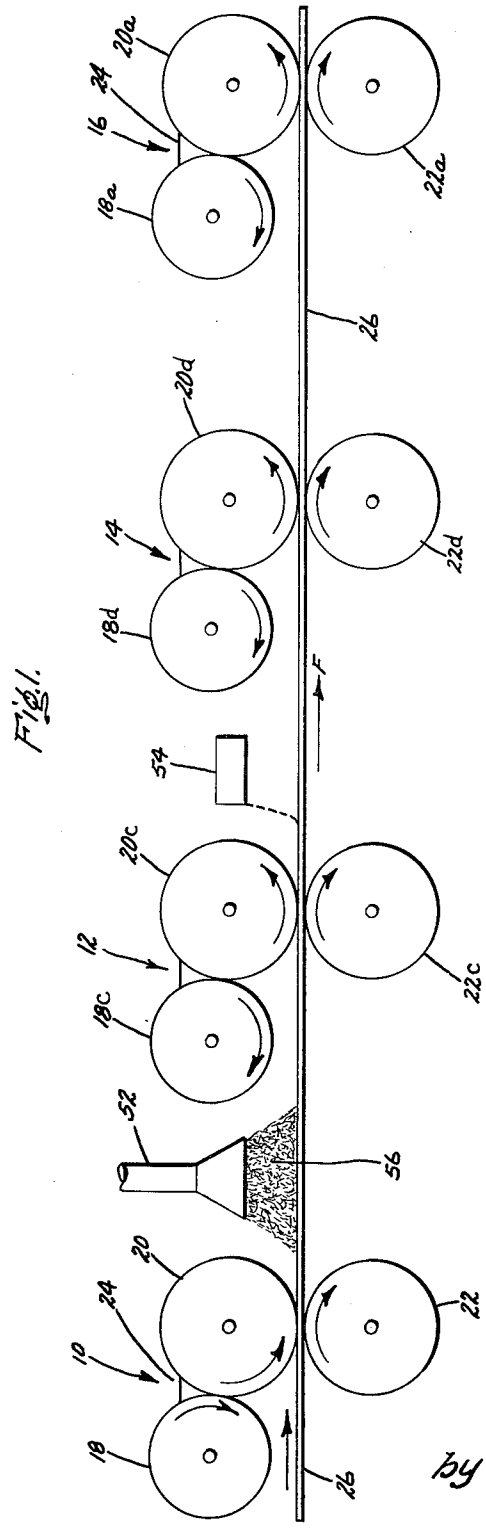


Fig. 1.

Inventor:
Willis L. Baker,
by Hood, Gunt & Dusk
Attorneys.

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Fig. 3.

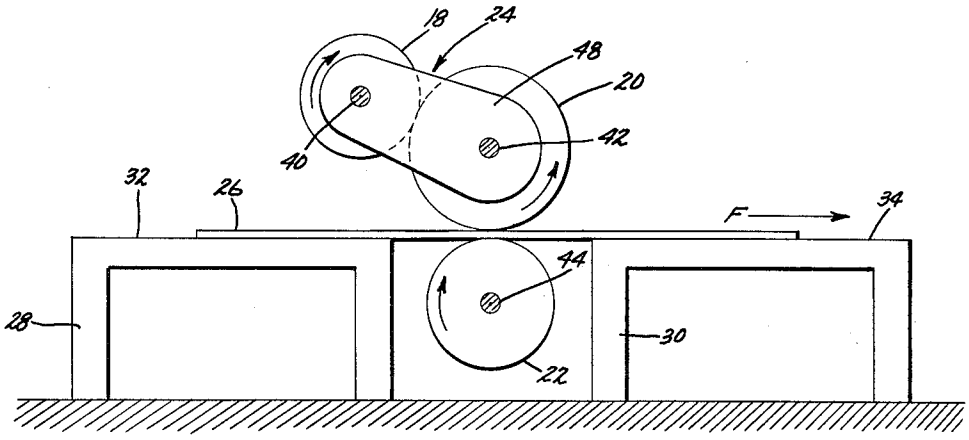
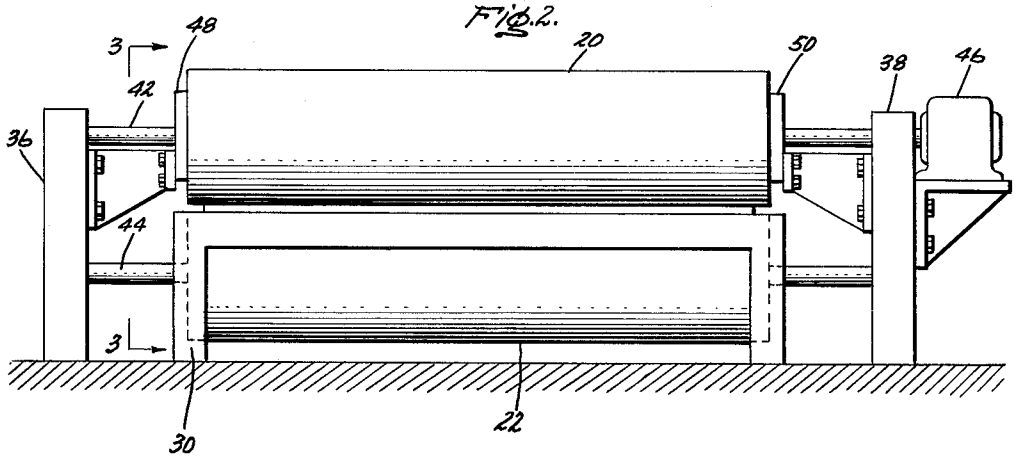


Fig. 2.



Inventor:
Willis L. Baker,
by Hood, Gust & Irish
Attorneys.

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Fig. 4.

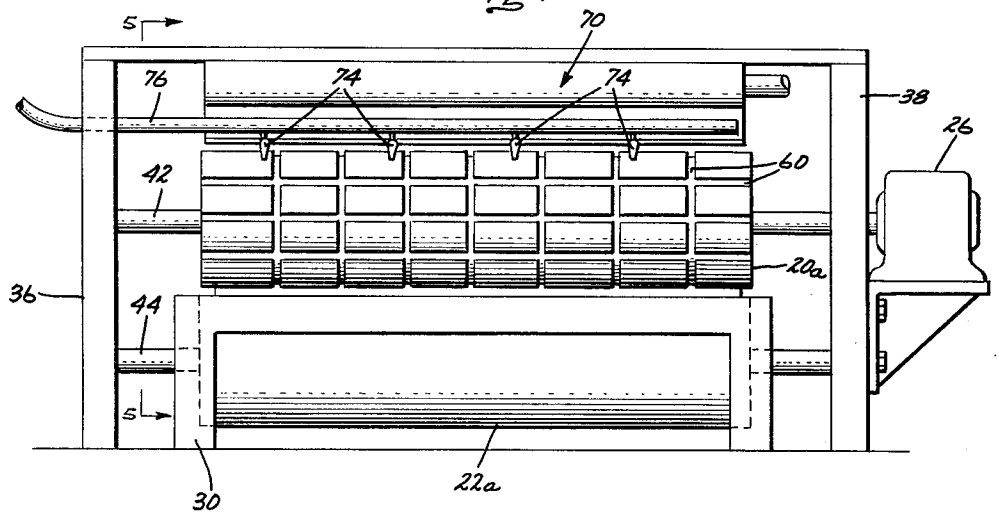
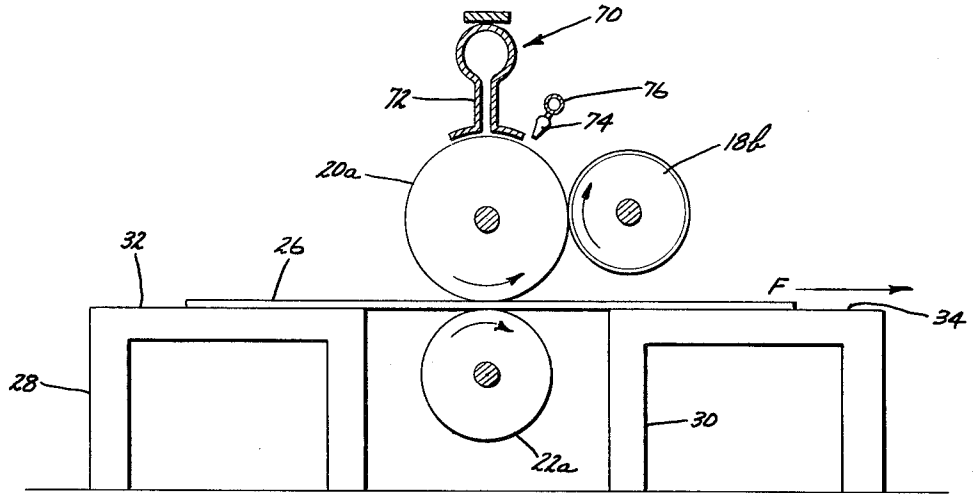


Fig. 5.



Inventor:
Willis L. Baker;
by Hood, Gust & Irish
Attorneys.

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Fig. 6.

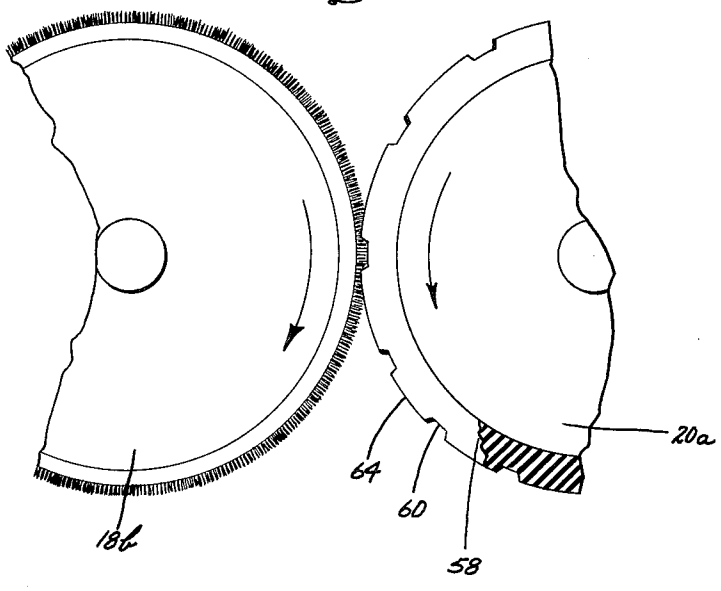
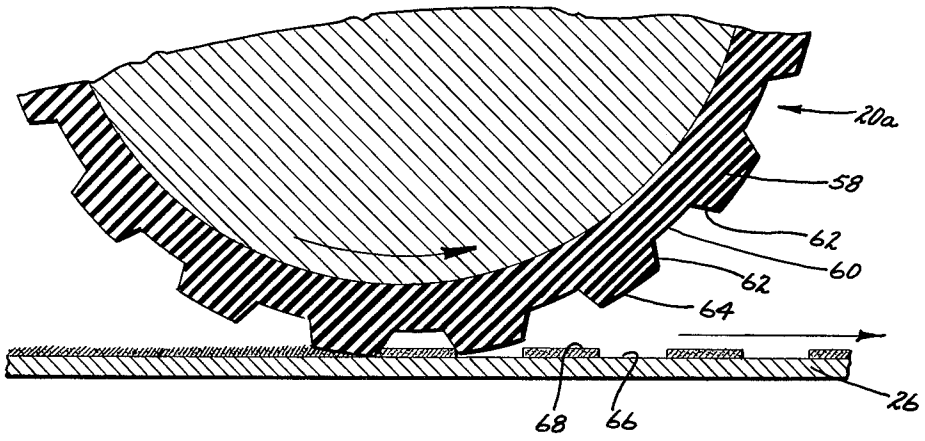


Fig. 7.



Inventor:
Willis L. Baker,
by Hood, Gust & Irish
Attorneys.

United States Patent Office 3,207,617 Patented Sept. 21, 1965

3,207,617

METHOD FOR PAINTING AN EMBOSSED PATTERN ON A SHEET OF MATERIAL

Willis L. Baker, Fort Wayne, Ind., assignor to Plastiwall, Inc., Fort Wayne, Ind.

Filed Feb. 6, 1962, Ser. No. 171,476
7 Claims. (Cl. 117—9)

This invention relates to an apparatus and method for painting an embossed pattern on a sheet of material, such as plywood, and more particularly to an apparatus and method whereby a complex line pattern may be embossed on a sheet of plywood or the like in a continuous, single operation.

In the furniture and homebuilding industries, sheets of construction material, such as plywood, hardboard and the like, are extensively employed and such sheets are commonly prefinished with a decorative coating of paint. Such coating of paint is conventionally applied by means of a paint-applying roller and a cooperating doctor or metering roller, the paint being fed to a well or trough between the rollers and thus applied to the paint-applying roller and in turn to the sheet which is moved past the roller in engagement therewith. Such roll-coating apparatus is extensively and conventionally employed in the application of single coats of paint to the surface of a sheet of material; however, such roll coaters have not been utilized heretofore in the painting of embossed, complex line patterns onto a sheet of material in a single, continuous operation.

It is therefore an object of this invention to provide apparatus for painting an embossed complex line pattern onto a sheet of plywood or the like in a single, continuous operation.

It is another object to provide apparatus which utilizes a roller for providing an embossed finish on a sheet of plywood or the like material.

It is yet another object of this invention to provide a method for embossing a paint pattern onto a sheet of plywood or the like in a single, continuous operation.

Other objects will become apparent as the description proceeds.

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a diagrammatic illustration of one apparatus of this invention;

FIG. 2 is a front elevation of one of the roll-coating stations of FIG. 1;

FIG. 3 is a part sectional illustration taken substantially along section line 3—3 of FIG. 2;

FIG. 4 is a front elevation of another roll-coating station which may be used in the apparatus of FIG. 1;

FIG. 5 is a partial sectional illustration taken substantially along section line 5—5 of FIG. 4;

FIG. 6 is a fragmentary sectional illustration of two of the rollers of one of the roll-coating stations of the apparatus of FIG. 1; and

FIG. 7 is another partial sectional illustration of the grooved roller of one of the roll-coating stations of the apparatus of FIG. 1 in the process of embossing a pattern on a sheet of material.

Referring to the drawings, and more particularly to FIG. 1, the apparatus therein disclosed is shown in diagram as including four roll-coating stations indicated generally by the reference numerals **10**, **12**, **14** and **16**, respectively. The first three of these roll-coating stations **10**, **12** and **14** are preferably identically constructed, each station including three cylindrically shaped rollers which are operatively engaged with each other. Station **10** has rollers **18**, **20** and **22**, station **12** has rollers **18***c*, **20***c* and **22***c*, and station **14** has rollers **18***d*, **20***d* and **22***d*. A description of station **10** will suffice for all three of these stations. The two rollers **18** and **20** of each station are mounted on shafts for rotation about horizontal axes, these axes being horizontally separated as shown and the rollers being engaged to provide a paint trough **24** there between. The roller **22** is also mounted for rotation about a horizontal axis and is vertically spaced from roller **20** to receive therebetween in rolling engagement a sheet **26** of material such as plywood, hardboard or the like. Generally speaking, paint is retained in the trough **24** formed between the two rollers **18** and **20** whereby the surface of the roller **20** is wetted as it revolves in counter-clockwise direction of the arrow. The sheet **26** is also moved in the direction of the arrow or toward the right as viewed in the drawing whereby the paint on the surface on the roll **20** is transferred to the upper surface of the sheet **26**. This process is one continuous operation until the sheet passes through all of the stations **10**, **12**, **14** and **16**. The particular structure of each station **10**, **12** and **14** is shown in FIGS. 2 and 3, which will now be described.

Referring to FIGS. 2 and 3, two tables **28** and **30** have coplanar horizontally disposed work-supporting surfaces **32** and **34**, respectively, for supporting sheet **26** which is to be painted. These two tables **28** and **30** are spaced apart so as to receive the supporting roller **22** therebetween, the uppermost surface of this roller **22** lying in the same plane as the work-supporting surfaces **32** and **34**.

For supporting the three rollers **18**, **20** and **22** there are provided two rigid upright frame members **36** and **38** which are spaced apart and which are provided with bearings for receiving the opposite ends respectively of the shafts **40**, **42** and **44** of the three rollers **18**, **20** and **22** respectively. A motor **46** mounted on the upright support **38** is attached to the shaft **42** for imparting rotation to the roller **20**. By reason of the operative contact of the other two rollers **18** and **22** with the roller **20**, it is thus seen that all three rollers may be rotated; however, in a preferred embodiment of the invention, the roller **22** may also be powered.

Two dam plates **48** and **50**, respectively, engage the opposite ends of the rollers **18** and **20**, thereby closing the ends of the trough **24**, which, as already explained, carries a quantity of liquid paint therein. It may now be mentioned that the apparatus of FIGS. 2 and 3 thus far described is conventional in the trade for painting a sheet of construction material, and for this reason it does not need any further elaboration. In departing from the conventional constructions, the two rollers **18** and **20** are preferably fabricated of stainless steel which is chrome-plated. In contrast therewith, each roller **20** carries a carpet covering on the outer periphery thereof, this covering having a nap which extends radially outwardly as shown more clearly in FIG. 6. In this FIG. 6, the roller on the left-hand side is shown as being provided with a carpeted surface. This carpeted surface preferably comprises a section of Wilton-weave, nylon carpeting in tubular form which is telescoped over the outer surface of the roller **20**, the pile on the carpeting projecting radially outwardly. This carpeted liner preferably is fabricated in accordance with the disclosure of my invention covered by my application Serial No. 160,366, entitled "Paint-Applying Device," as filed on December 18, 1961, now abandoned.

In operation, the motor **46** rotates the roller **20**. Because of the frictional contact of the roller **18** with the roller **20**, the roller **18** is rotated clockwise. The sheet of material **26** passes between and is engaged by both of

the rollers **20** and **22** whereby the rotation of the latter moves the sheet **26** in the direction of the arrow "F." Thus, once the sheet **26** is entered between the two rollers **20** and **22**, it is moved forwardly in a right-hand direction until it is passed completely between the two rollers **20** and **22**.

As previously mentioned, the three roll-coating stations **10**, **12** and **14** may be identically constructed as already described in connection with the machine of FIGS. 2 and 3. However, these stations are spaced apart so as to receive the nozzle **52** between the two stations **10** and **12** and a sand-scattering apparatus **54** between the stations **12** and **14**. The purpose of the first station **10** is to apply a coat of paint to the upper surface of the sheet **26**. As this sheet moves beneath the nozzle **52**, it is covered with a layer of randomly dispersed short lengths of glass fiber or roving, these lengths of roving preferably being one to two inches long; however, this length may vary to suit a particular purpose. While the nozzle **52** is shown, delivery of the rovings to the upper surface of the sheet **26** may be accomplished by any suitable means, such as by means of an air blast issuing from the nozzle **52** itself or by merely manually scattering the fibers over the surface according to the desired distribution. If the fibers are blown onto the sticky surface, the nozzle is moved along so as to leave the fibers adhering flatwise in sufficient number to yield a fibrous or textrous affect while permitting some area of the wood surface as coated with the paint material to appear between the fibers. Another method of applying the fibers or cut roving to the sheet is by the use of a cutter as described in Anderson Patent No. 2,787,314, this cutter serving to cut long lengths of glass roving into the desired shorter lengths and blow them in an irregular dispersion over the surface of the sheet **26**.

After receiving the roving indicated by the numeral **54**, the sheet progresses to station **12** where it receives another coating of paint over the cut roving. The rovings are thereby not only flattened onto the sheet surface but also are covered with another coating of paint.

Following this, as the sheet or panel **26** progresses in moving toward the right, silica sand from the conventional, vibrating depositor **54** is shaken or otherwise dropped onto the panel surface, following which it is immediately covered by a coat of paint from the station **14**. While a vibrating mechanism **54** is shown as depositing sand onto the panel surface, the sand may be manually scattered thereonto. This sand is scattered in a substantially even and continuous layer whereby the consistency of the paint on the panel surface is thereby thickened.

The paint used in the stations **10**, **12** and **14** and in one embodiment of this invention in the station **16** is preferably a modified vinyl hydrocarobn resin reduced with acetate, the resin portion being 24% to 32% by weight of the total, and the acetate portion being 68% to 74% by weight of the total. For the resin, 28% by weight is considered optimum. For a further description of this particular resin, reference is made to my application for a "Roofing Panel," Serial No. 131,870, filed August 16, 1961, now abandoned.

The panel **26** now leaves the station **14** and proceeds to the station **16** where the paint and its sand aggregate is embossed by means of the roll-coating apparatus illustrated in FIGS. 4, 5, 6 and 7. This apparatus will now be described with like numerals indicating like parts. This station **16** may take two different forms, one of these forms being very similar to the preceding stations **10**, **12** and **14** and the other being like that shown in FIGS. 4 and 5. The first of the aforementioned forms utilizes three rollers **18***a*, **20***a* and **22***a* all arranged the same as their counterparts **18**, **20** and **22**, respectively, of the preceding stations. However, the roller **18***a* instead of being stainless steel chrome-plated carries a carpet covering thereon the same as the preceding roller **20**. The

roller **22***a* is like its counterpart roller **22**, being stainless steel, chrome-plated. The roller **20***a*, however, is substantially different and as shown in cross-section in FIG. 7 is provided on its periphery with a rubber or neoprene liner **58** which, in a roll-coating machine of conventional size, is approximately ⅝ inch thick. For neoprene, 60-durometer grade is found to be most satisfactory. A series of both axially extending and peripheral grooves **60** are cut or formed in the outer periphery of the liner **58** as shown, the precise pattern and arrangement of these grooves **60** depending upon the pattern or design which is desired in the finished product. As illustrated, these grooves **60** in FIG. 4 are at right angles to each other; however, these grooves may be helical, spirally shaped, or otherwise randomly arranged to provide intricate patterns as may be desired. The grooves are preferably formed about ⅛ inch deep with the sides **62** thereof extending inwardly toward each other at an angle of about 45°, the base or bottom of the grooves being substantially flat or slightly curved as shown. The width of the grooves **60** at the outer periphery of the liner **58** is, in a working embodiment of this invention, about ¼ inch wide. The spaces **64** on the outer periphery of the liner **58** between adjacent grooves **60** may be considered as lands, the lands **64** between all grooves lying in a common cylindrical surface as shown.

In the embodiment of the station **16** as shown in FIG. 1, the carpeted roller **18***a* engages the grooved roller **20***a* with just enough force so as to prevent the paint in the trough **24** from dropping through the grooves. In this engagement between the two rollers **18***a* and **20***a*, the fibers constituting the outer surface of the roll **18***a* enter the grooves **60** and make contact with the sides and bottom thereof. It should also be noted in this embodiment that only the roller **20***a* is connected to a motor such as motor **46** of FIG. 2, the rotation of the roller **18***a* being derived from the roller **20***a*.

The panel sheet **26** as it emerges from the station **14** is now fed to the station **16** which is provided with a quantity of paint in the trough **24**. The roller **18***a* is adjusted to engage the roller **20***a* with just enough force such that as the grooves **60** leave contact with the roller **18***a*, a quantity of paint will remain therein.

As the peripheral surface of the roller **20***a* engages the upper surface of the panel **26**, the paint and sand aggregate is thereby embossed in a manner as shown more clearly in FIG. 7, the lands **64** on the roller squeezing the paint and sand aggregate rearwardly into the spaces of the groove **60** thereby resulting in only a thin film of paint and glass fiber remaining in the spaces **66** (FIG. 7) and piled paint and sand aggregate occupying the spaces indicated by the numeral **68**. The paint in the grooves **60** is added to the panel **26** and more specifically to the piles or embossments **68**.

Therefore, as the panel **26** leaves the station **16**, it will have an embossed finish thereon wherein the valleys tend to expose the fibrous texture of the glass roving and the hills or pile consist of paint and sand aggregate.

Not only is it possible to produce an embossed finish with the apparatus of FIG. 1 as just explained, it is possible to provide this finish in various colors. For example, if a total of three colors are desired, the first station **10** may be provided with buff-colored paint, the stations **12** and **14** with white paint and the station **16** with blue paint. In the finished panel as it is shown in FIG. 7, the valleys **66** in the embossed finish will appear as a buff color, while the hills will have both white and blue streaks thereon. As a matter of fact, by adjusting the force with which the roller **18***a* engages the roller **20***a*, only the rear (left-hand) edges of the piles **68** of the embossed finish (FIG. 7) will carry a blue line therealong, the carpeting on the roller **18***a* serving to place the blue paint in the aft portions of the grooves **60**.

While multicolored, embossed finishes may be obtained as just explained, the character of the coloring may be

altered by adjusting the force with which the rollers **18***a* and **20***a* are engaged with each other. A light engagement will result in the grooves **60** being substantially filled with paint before engagement of the roller **20***a* with the panel **26**. This will color the piles **68** (FIG. 7) with a substantially blue color the same as used in the final station **16**. However, if this force of engagement between the two rollers **18***a* and **20***a* is increased, then a lesser amount of paint will be deposited in the grooves **60** which thereby results in lining the aft edges of the pile **68** with the blue color as already explained.

Now a different and second embodiment of the invention will be explained in connection with station **16**.

This embodiment is more precisely shown in FIGS. 4 and 5 wherein the same grooved roller **20***a* is used but instead of a roller on the aft side of the roller **20***a*, a roller **18***b* substantially identical to the roller **18***a* is mounted on the front or right-hand side. The two rollers **18***b* and **20***a* are engaged the same as the previously described rollers.

On the frame members **36** and **38** is mounted a vacuum-cleaning device indicated generally by the reference numeral **70**. This device **70** comprises an elongated housing, having a length substantially equal to the roller **20***a*, which has a slotted nozzle **72** as shown more clearly in FIG. 5. The opening or slot in this nozzle **72** is substantially the same length as the roller **20***a* and extends parallel with the roller axis. The vacuum-cleaning device **70** preferably is disposed immediately adjacent the top side of the roller **20***a*.

Then interposed between the vacuum-cleaning device **70** and the carpeted roller **18***b* is a series of nozzles **74** which are mounted on a supply pipe **76** supported on the frame end **36** substantially parallel to the surface of the roller **20***a*. The nozzles **74** are spaced apart and are directed to spray a solvent onto the surface of the roller **20***a*.

In this arrangement, no paint is used. In distinct contrast therewith, the roller **20***a* is deliberately kept clean of paint, the cleaning being accomplished by the vacuum cleaner **70**, the spray nozzles **74** and the carpeted roller **18***b*. In operation, a vacuum of at least 10-inches is produced by the vacuum cleaner **70**, thereby sucking any foreign material on the roller **20***a* upwardly through the nozzle **72** and out of the device **70**. A suitable paint solvent is sprayed from nozzles **74** onto the surface of the roller **20***a* at intermittent times, this solvent serving to dissolve and loosen any material on the roller surface. The carpeting on the roller **18***b* also tends to loosen and wipe clean the surface of the roller **20***a*.

The panel **26** after having been previously coated with the paint and aggregate by the preceding stations **10**, **12** and **14** is next passed under the roller **20***a*. This roller **20***a* engages the upper surface of the panel **26** with just enough force to produce the embossed pattern as shown in FIG. 7. The lands **64** provide the valleys **66** while the grooves **60** provide the piles or ridges **68**.

If any sand, paint or chopped roving should be picked up by the roller **20***a*, it will be carried upwardly and first loosened by the carpeting on the roller **18***b* which, after a period of time, becomes soaked with the solvent from the spray **74**. Following this, the surface of the roller continues upwardly to receive a spray from the nozzle **74** which further loosens the sand and paint following which the sand and paint is sucked upwardly into the nozzle **72** by the vacuum cleaner **73**. Thus, the surface of the roll **20***a* may be kept clean for producing a well defined and distinct embossed pattern on the panel **26**. While the vacuum cleaner **70** may operate continuously, the spray **74** need be operated only intermittently with enough frequency to keep the material on the surface of the roller **20***a* loosened.

The carpeting of the roller **18***b* is shown in FIG. 6 as having fibers which extend radially outwardly therefrom such that they not only engage the lands **64** of the roller **20***a* but they also extend into and have wiping contact with the sides and bottom of the grooves **60**. The particular force with which the two rollers **18***b* and **20***a* engage each other should be adjusted to obtain the precise amount of cleaning and wiping contact desired.

In obtaining the desired finish, it is found that the paint viscosity should be 85-Kreb units. The durometer of the neoprene used for the roller **20***a* should be sixty (60). The solvent which is sprayed from the nozzles **74** may vary to suit the particular types of paint being used, but in one arrangement it consists of 50% toluol, 30% isopropyl alcohol (91% anhydrous), and 20% methyl isobutyl ketone.

After the panel leaves station **16**, the paint may be either air dried or dried by means of ovens conventionally used in the art.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention.

What is claimed is:

1. The method of producing an embossed painted surface comprising the steps of applying a coat of liquid paint to a surface, mixing sand with said coat of paint to thereby provide a layer of sand and paint on said surface, and rolling a grooved roller over said surface and said wet paint-sand mixture whereby the lands and recesses of said roller provide an embossed pattern on said surface.

2. The method of producing an embossed painted surface comprising the steps of applying a coat of liquid paint to a surface, mixing sand with said coat of paint to thereby provide a layer of sand and paint on said surface, rolling a grooved roller over said surface and said wet paint-sand mixture whereby the lands and recesses of said roller provide an embossed pattern on said surface, and maintaining said grooved roller clean of any sand and paint that adheres thereto during a rolling operation.

3. The method of applying a multi-colored embossed surface to a sheet of material comprising the steps of applying a base coat of a first color liquid paint to said sheet of material, immediately thereafter depositing a layer of sand on said base coat, applying a coat of liquid paint over said sand, and rolling a grooved roller over the surface of said sheet while the paint thereon is wet, said roller being provided with differently colored liquid paint in the grooves thereof, whereby the lands of said roller displaces the paint on said sheet to the regions engaged by said grooves with the paint in said roller grooves being deposited on top of the displaced paint to thereby provide a multicolored embossed finish.

4. The method of producing a decorative embossed surface comprising the steps of applying a first coating of liquid paint to a flat surface, depositing a layer of sand onto said coating, applying a second coating of liquid paint over said layer of sand, displacing the sand and paint mixture while said paint is wet in directions substantially parallel to said surface into a pattern of ridges and valleys, and drying said paint for solidifying said pattern.

5. The method of claim **4** wherein said paint has a viscosity of about eighty-five (85) Kreb units.

6. The method of producing a decorative embossed surface comprising the steps of applying a first coating of liquid paint of a first color to a surface, depositing a layer of sand onto said coating, applying a second coating of liquid paint of said first color over said layer of sand, displacing the sand and paint mixture while said paint is wet in directions substantially parallel to said surface into a pattern of ridges and valleys, simultaneously with said displacing step applying paint of a second color to ones of said ridges thereby providing a multi-colored pattern, and drying said paint for solidifying said pattern.

7. The method of producing a decorative embossed surface comprising the steps of applying a first coating of liquid paint to a surface, depositing a first layer of randomly dispersed short lengths of glass fiber onto said coat-

ing, flattening said short lengths of glass fiber onto said surface, applying a second coating of liquid paint over said layer, depositing a second layer of sand onto said second coating of paint, applying a third coating of liquid paint over said layer of sand, displacing the sand and paint while said paint is wet in directions substantially parallel to said surface into a pattern of ridges and valleys with the valleys having at least partially exposed the aforesaid fibers, and drying said paint to solidify said pattern.

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WILLIAM D. MARTIN, *Primary Examiner.*

RICHARD D. NEVIUS, *Examiner.*