Jan. 23, 1934. G. VON WEBERN 1,944,200

PROCESS OF MAKING GRAINING ROLLS

Filed April 19, 1930

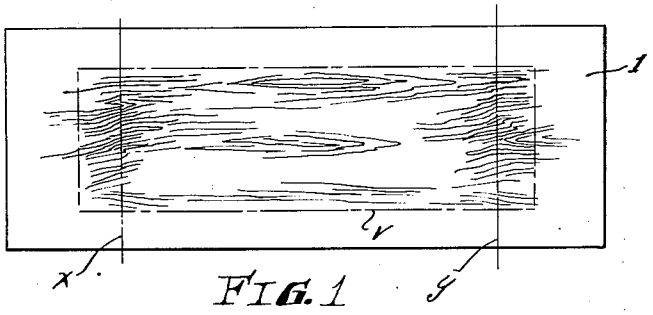


FIG. 1

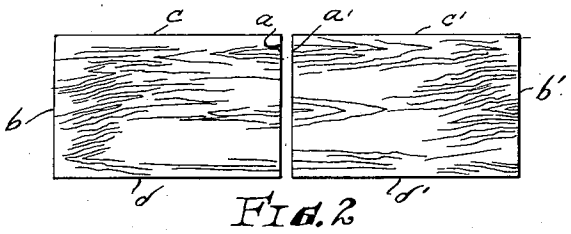


FIG. 2

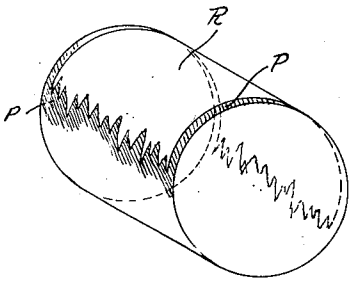


FIG. 6

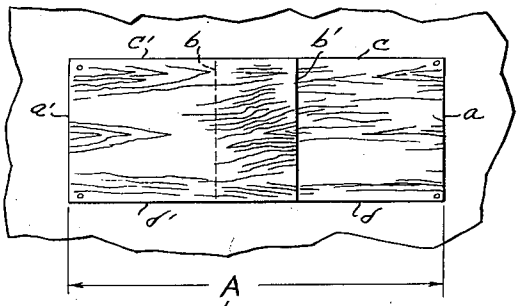


FIG. 3

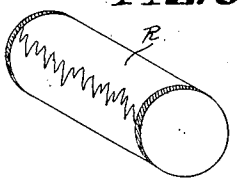


FIG. 7

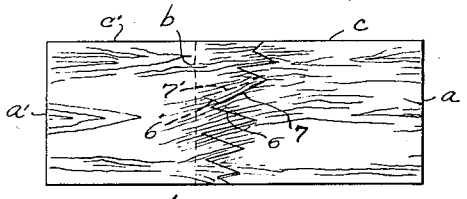


FIG. 4

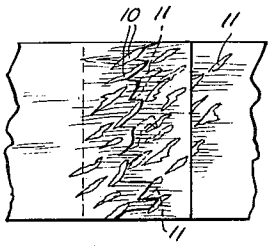


FIG. 4A

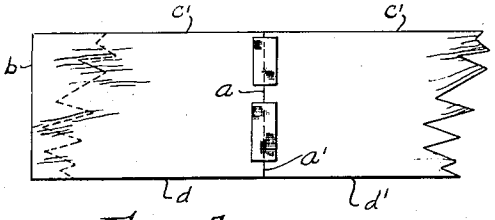


FIG. 5

Inventor

Guido von Webern

By Bates, Golrick & Teare

Attorneys

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PROCESS OF MAKING GRAINING ROLLS

Guido von Webern, Dayton, Ohio, assignor to Oxford Varnish Corporation, Detroit, Mich., a corporation of Michigan

Application April 19, 1930. Serial No. 445,576

10 Claims. (Cl. 95—5)

This invention relates to a process of forming continuous pattern rolls for printing designs, such as wood grain, marble and the like. The essential object is to provide a process by which a graining plate may be made in cylindrical form and, in effect, continuous pattern, and in which the joint or joints will be substantially imperceptible.

A further object is to provide a process in which the number of steps to make a continuous pattern roll are reduced substantially to a minimum, and the factor of inaccuracies due to lack of skill on part of the artist is materially reduced.

A further object is to provide an improved printing roll with a substantially continuous, that is jointless grained pattern thereon.

Further objects and features of the invention will become apparent from the following description relating to the accompanying drawing, wherein I have shown my preferred manner of practicing the invention. The essential characteristics will be summarized in the claims.

This invention will be discussed with relation to an intaglio roll, but it will be understood that insofar as the novel steps are concerned, the process is practicable with half tone rolls and other types of printing members which may be used to print grained patterns.

The requirements of the present process differ from those occurring in textile, wallpaper and like work, in that the patterns for textiles, paper, etc., are of conventional design and the design units repeat, whereas there is no repetition of design in natural wood or marble. In preparing rolls for wood graining work, the methods previously known called for considerable hand cutting and finishing at the joints after etching the roll, and one of the features of the present invention is that the necessity for this hand finishing is nearly eliminated. The present process has several variations, the more important of which will be described in detail.

Preferably, I start with a print of the design to be copied, somewhat larger than enough to cover the desired area on the cylinder to be etched, and on which the two ends of the pattern nearly correspond. This area may be half the circumference of the cylinder, the entire circumference, or as a matter of fact, any part of it. This print is now preferably cut in two, say near its center, and the ends are overlapped with the patterns on both sections lying face up. The two sections may be fastened to a suitable cutting board with the two severed ends first mentioned spaced from each other exactly the distance which it is desired to cover on the roll. I may then cut back the section which lies on top of the other section, preferably using zigzag or non-horizontal lines in such manner that the grain design of both pattern reproductions will approximately match. In doing this, I cut along the more distinct grain lines wherever possible, and in the case of wood having very distinct grain patterns, such as the "flake" of quartered oak, I follow along the flake lines. Where this is no longer possible because the flake stops, I cut the print along diagonal or circumferential lines, following the dense grain lines as much as possible and cutting parallel thereto.

Having thus obtained an approximate match between what were previously the opposite ends of the print, the two sections of the print may now be rejoined in their original position as by suitable adhesive tape, whereupon if the two ends of the print have been match cut, the ends of the rejoined print will be found to fit into each other with the print curled up into a circle.

A sheet of the usual carbon resist previously exposed from the same plate or film that was used to produce the print, outlined and/or cut as above described, and which is also marked in any suitable way as on the back side thereof to determine the position of the grain thereon, may now be secured in the usual way to the roll surface to be etched. The outlined and/or cut pattern print also marked similarly to the resist may now be used to indicate on the resist where the etching should stop. For example, any suitable line may be drawn on the resist or the blank portions of the roll, using the match cut or outline on the print as a pattern and the resist at one side of the match line (toward the nearest margin) painted out carefully, as with asphaltum, in substantial conformity to the outline of the print. The opposite end of the resist and the side margins are, of course, also painted out or otherwise treated to protect the roll surface not to be etched. The surface of the roll within the protected area is now etched with a suitable agent.

After the etching is completed, the residue left by the etching process and the protective paint may be removed by a suitable solvent or cleaner. Another, for example an identical resist, or part of the first, depending on the character of the pattern and/or size of the roll, the new resist being properly marked as before, to locate it on the roll, may now be laid onto the unetched portion of the cylinder and if this second resist strip has a pattern identical with the first, the grain pattern at both ends of the new resist strip may be made to absolutely match the grain pattern

at the opposite ends of the etched area. Before etching with the second resist, the etched surfaces at the ends of the etched area and the side margins are protected as by a suitable coating of paint, which may be applied to the second resist (after the paper base thereof has been removed).

It is obvious from the above that instead of making the resist to go only part way around the cylinder, the first resist described may be made to completely cover the entire cylinder, although as a matter of fact, it is usually more convenient and better results are obtained if a plurality of resists are used, to etch the different portions of the cylinder. This and other variations of the method will be more fully explained in connection with the drawing.

To better illustrate the invention, I have shown an exemplary series of steps in the accompanying drawing. In the drawing, Fig. 1 is a plan view of a suitable sample, such as a wood board; Fig. 2 is a divided photographic print made from a selected area on the board; Fig. 3 is a view showing the two parts of the print in partly overlying relation to each other for matching and cutting; Fig. 4 shows the two sections of the print after the match cutting is completed; Fig. 4*a* is a view similar to Fig. 4 showing a special grain pattern; Fig. 5 is a view of the print rejoined along the original severing lines, and Figs. 6 and 7 are diagrammatic illustrations of rolls of different dimensions showing exemplary steps of the process.

Referring again to the drawing, and first to Fig. 1, 1 indicates a suitable wood sample, such as a finished board, having in general the desired grain characteristics. Let us suppose first that the roll it is desired to make has a circumferential dimension of thirty or sixty inches. Now it is possible on a great many wood samples to find about the same general grain characteristics at one part of the board as may be found in another. For example, suppose one finds such generally similar grain characteristics 30'' apart, then by my method, a single resist strip may be made to cover the entire 30'' roll or one-half a 60'' roll.

It will be seen from Fig. 1 that there is a general similarity of grain effects in proximity to the two broken vertical lines *x* and *y*. Having found these two similar areas, I make a photograph of the board embracing both areas, say a photograph in the proportions indicated by the broken line *v*. A print of such photograph will, of course, cover considerably more than the entire circumference of a 30'' roll, assuming the lines *x* and *y* are 30'' apart, or more than one-half the circumference of a 60'' roll. Fig. 2 represents a print made from such a photograph of the area within the line *v*, which print has been severed at *a*—*a'*. The purpose of severing the print is so that the two ends which are substantially similar may be matched up by experimental cutting or otherwise outlining one or both ends of the print, as above indicated. For clearness of illustration, the various edges of the two parts of the print are given reference characters; the edges at *a* and *a'* being those formed by dividing the print; *b* and *b'* the opposite edges, and *c*, *c'* and *d*, *d'* the respective top and bottom edges.

It will be seen that if the two sections of the print of Fig. 2 are fastened as by thumb tacks, on a matching board 4, face up, as shown in Fig. 3, with the severed edges *a* and *a'* a measured distance from each other, (dimension line A equals 30'' for example), any part of the zone lying between the lines *b* and *b'*, Fig. 3, may be used to effect matching or registration of the grain lines on the top section with those of the underlying section. This may be done by simply cutting back the top section to any distance within this zone of overlap of the two prints, until the desired match is effected.

Matching and outlining may be carried out as follows. One first turns back the uppermost free edge, *b* for example, and finds grain lines which substantially coincide on both prints, and he now cuts along diagonal lines, such as indicated at 6, where the grain lines are actually crossed, and at 7 where the grain lines are actually followed. When following the grain lines, the direction of cut is determined by these lines alone and may be actually parallel to the edges *a* and *a'*, but when crossing the grain lines, the cut is made diagonally for the most part because it is much less easy to detect a joint on a diagonal or circumferential line than a joint on a line parallel to the axis of the roll, assuming the grain lines run generally circumferentially.

This outline cutting, as mentioned, is largely a matter of experiment, and several cuts may have to be made before a satisfactory match has been found. For example, having found that the cutting lines 6 and 7 on Fig. 4, do not result in a true alignment of grain lines or a satisfactory grain line blending, another cut may be made as along the dotted lines 6', 7', reducing the length of the top section of the print, as will be obvious. The limit of cutting back the top section is, of course, the edge *b'* of the bottom section.

The process may be varied in the step illustrated in Fig. 4, in that the print may be on substantially transparent material, so that the grain lines appearing below the overlapping portion of the top print may be viewed through the top print, thus assisting in finding the grain lines which more nearly correspond, rather than having to turn the top sheet back and study the two together. In the case of an ordinary paper print, the top section only of the print may be made sufficiently transparent by any known treatment, such as with a suitable oil.

In the illustration shown in Fig. 4*a*, it will be seen that wood patterns having very definite cross grain characteristics, such as quartered oak, may be matched somewhat easier than plain walnut or mahogany grain, which latter have no such peculiar grain marks. In Fig. 4*a* the so-called flakes of quartered oak are indicated at 10 on the top print and 11 on the underlying print. The cutting lines may in this case follow along the flakes, and as to the top print, the cutting lines will follow along that edge of the flake which is toward the free or inner edge of the top print, whereas the flake on the print underneath is followed on the side of the flake toward the free end of this under print. Thus when the resists are properly applied to the roll, and the roll etched the grain effect will be a natural one and the joint practically invisible. The same general principle as shown in Fig. 4*a* applies to cutting the print in butt or burl walnut and like woods having rather peculiar grain marks; for example, the burl lines in burl walnut are followed the same as the flake lines in quartered oak. In marble the cleavage veins or lines are generally followed.

Having thus matched the pattern ends by an irregular outline, the edges *a* and *a'* may now be rejoined, as shown in Fig. 5. It will be seen that

a resist properly marked for location according to the rejoined print and having the same grain pattern will exactly cover a 30'' roll. Furthermore, two resists that are, for example, cut or painted out or otherwise made identical with the rejoined print, and are identical in pattern will completely cover a 60'' cylinder, that is, one having a circumferential length equal to twice the dimension A of Fig. 3. In either case the grain at the ends of such resists will substantially match. In case two resist strips corresponding to the rejoined print are used, there will be a recurrence of pattern, that is to say, there will be an identical pattern on two diametrically opposite sides of the roll. The resists may be outlined using the rejoined print as a pattern or templet, as shown in Fig. 5, outlining each resist carefully along the zigzag lines at one or both ends of the print.

Assuming the resist R has been properly located on the cylinder and properly outlined, the roll surface underlying the resist is now etched to the proper depth and fineness of tone. In case only part of the roll is covered, the copper at the ends of the resist is protected by a coating of paint, such as P in Fig. 6. Before applying a second resist to the opposite surface of the roll (Fig. 6), the roll is first cleaned of all the protecting paint and the residue of the etching operation. The second resist does not necessarily have to be outlined since the etched portions of the roll serve as a very definite guide. The previously etched surfaces, at least at the two ends of the etched area, are, of course, covered with protective paint before starting to etch the second resist. From this point, the etching process, as previously outlined, may be repeated and afterward the entire roll is cleaned of etch residue and paint. Some hand tooling may have to be done where there are blank or unetched spaces at the joints, but if the above steps are carefully followed, this hand tooling is practically a negligible item.

In the above detailed exemplary description, it is assumed that the resist will cover either the entire or half the circumference of the roll. This, however, is not essential since the first resist may cover any portion of the roll, say all but a few inches of the circumference, and the intervening space filled in by etching through a resist section corresponding to any part of the original board or sample, or an entirely different board or sample.

For illustration of the above, I may select a subject having generally similar grain areas spaced longitudinally of the board, but which spacing does not bear any integral relation to the circumferential length of the roll, as does the pattern shown in the drawing. Suppose, for example, the generally similar areas are spaced a few inches less than the roll measures circumferentially. In such case, I start with a photograph and divide it substantially as shown in Fig. 2, but instead of overlapping the ends *b* and *b'* as in Fig. 3, I then fasten the opposite edges, *a* and *a'*, to the matching board, spaced exactly the circumferential length of the roll, leaving the edges *b* and *b'* separated. Then a second print section is inserted between the spaced edges *b* and *b'*; underlying both these edges. The second print is made from any sample having grain characteristics generally similar to those at the ends of the divided strip. After this the match outlining may be accomplished substantially as before, for example by cutting back both edges *b* and *b'* until the grain lines of the two top print sections register with the exposed grain lines on the print, underneath. Incidently, the second print may lie on top of the edges *b* and *b'*, in which case this second print receives the match cutting. Afterward the print forming the fill-in is properly marked to determine its position on the roll. The two original print sections are then rejoined to form a pattern for outlining one resist, and the second print, which has also been marked for position is used to locate the resist properly on the unetched portion of the roll.

The two resists thus formed completely cover the roll, and, assuming the distance A has been measured accurately and the match cutting accurately performed, a continuous pattern effect is obtained on the roll by etching, as above described. This variation of the method is particularly valuable where the pattern effects desired are formed on two separate board, marble etc. samples and/or where a non-repeating pattern is desired.

It will be obvious that in lieu of dividing the print, as shown in Fig. 3, a cylinder of suitable material substantially the size of the roll to be etched, may be used as a matching board. In such case, the print will be simply wrapped around the cylinder, face out, with the ends overlapping, as in Fig. 3 for example, the match outlining, such as cutting, being done in accordance with Figs. 4, 4*a*, or generally in accordance with the previous description.

In the above description I have treated the photographic print or prints as elements separate from the photographic positive. However, it will be obvious that the photographic positive (usually on transparent material) may be used instead, thus eliminating the step of outlining the resist in the manner heretofore described. For example, it is possible to suitably treat the positive and get the essential result of match cutting without destroying the positive, as by simply marking on it for the match outline. In such case, the match outline will be brought out on the developed resist made from the positive.

In special cases, I may also use the resist itself for the photographic copy with which the match outlining is effected.

No detailed description of the actual steps in forming an etch resist or in the method of etching a roll therethrough has been given, but reference may be made to the patent to J. P. Henry No. 1,548,465, owned by the assignee hereof, for a suitable method for use in intaglio printing. Any of the other known methods, for example half tone, may also be used.

I claim:

1. A method of forming a continuous pattern printing roll for printing natural grain subjects having irregular non-repeating patterns, comprising making photographic copy of portions of the same or similar natural grain subjects, and end matching the copy by laying different originally non-adjacent portions thereof over each other, and outlining the uppermost overlying portion to cause the grain lines of both said portions to substantially coincide at said outline, and thereafter using the copy to produce an etched surface on a roll.

2. The method according to claim 1, which includes selecting a substantially transparent photographic copy whereby the coinciding grain lines are easily found.

3. The method according to claim 1, wherein the outline substantially follows the grain lines

in part and is diagonal thereto except where the grain lines are substantially followed.

4. A method of forming a continuous pattern printing roll for printing natural grain subjects having irregular non-repeating patterns, comprising making photographic copy of portions of the same or similar natural grain subjects and end matching the copy by laying portions thereof, representing non-adjacent portions of the original over each other and outlining by cutting the uppermost overlying portion back to cause the exposed grain lines of both said portions to substantially coincide at the cut outline, and thereafter using the copy to produce an etched surface on a roll through the intermediacy of a suitable resist bearing the design of the photographic copy used as aforesaid.

5. The method of forming a continuous pattern roll for printing natural grain subjects having irregular non-repeating patterns, comprising making a photographic copy of the natural grain subject, matching two ends of the copy by laying a portion of one end over a portion of the other end, and cutting the uppermost overlying portion back to cause the exposed grain lines of both said portions to substantially coincide, then outlining the cut end of the copy on the applied resist on the roll with an acid resisting coating, and etching one portion of the roll, then removing the coating and applying another resist using the etched outline as a guide, and further etching the roll.

6. In the method of forming a continuous printing roll for natural grain subjects having irregular non-repeating patterns, the steps of first making photographic copy of the natural grain subject to be reproduced on the roll, then matching the grain lines in two portions of such photographic copy, which portions were not adjacent in the original by laying one portion of the photographic copy over another portion of the photographic copy and cutting back the free edge of the uppermost portion along a continuous line, parts of which follow the grain lines, the intermediate parts extending diagonally of the grain lines.

7. The method of forming a pattern roll for grain printing in simulation of natural subjects having irregular non-repeating patterns, comprising selecting a natural grain subject having similar pattern effects on different portions thereof, then making a photograph of the subject, then overlapping opposite ends of the photograph to cause the similar areas thereof to be superposed, then cutting back the overlapping portion of the uppermost end to cause the exposed grain lines on both ends to register, following the grain lines in part and cutting diagonally where not following the grain lines, and then using the photograph as a pattern to outline a resist for etching the roll.

8. The method of forming a continuous grain design pattern roll from natural grain subjects having irregular non-repeating patterns, comprising, making a photographic copy of the original pattern, then dividing the copy into two parts, then reversing the position of the parts, with the ends of both parts overlapping, then cutting back the part which lies uppermost on a portion of the other to cause the grain lines at the edge of the uppermost part to register with the exposed grain lines of the other part, and thereafter reassembling the copy and using the same to produce an etched roll.

9. The method of forming a pattern printing roll for natural grain subjects having irregular, non-repeating patterns which includes the following steps: first photographing the subject, then making a print from the photograph, then dividing the print, then laying one section of the print on the other in reversed position and in a predetermined lengthwise relationship according to the area on the roll it is desired to cover, and cutting the superposed portions of the print sections to cause the grain lines at the exposed edges of both sections to substantially register, notwithstanding general non-registration of such grain lines.

10. The method of forming a pattern roll for grain printing in simulation of natural subjects having irregular, non-repeating patterns, comprising, selecting a natural grain pattern in which spaced areas thereof a given distance apart have substantially similar design characteristics, taking a photograph of the pattern covering both areas, then superposing the substantially similar areas by overlapping the opposite ends of the photograph, then cutting back one of the ends along a zig-zag line parallel to the grain lines and otherwise diagonally thereof, to cause substantial registration of grain lines on both ends, and thereafter using the photograph as a pattern to outline an etch resist for etching the roll.

GUIDO VON WEBERN.