April 11, 1944. J. J. ORMOND 2,346,231

METHOD OF ENGRAVING TEXTILE PRINTING ROLLS

Filed Dec. 28, 1942

Fig. 1.

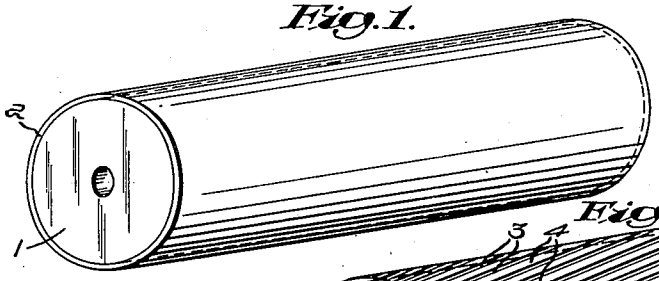


Fig. 2.

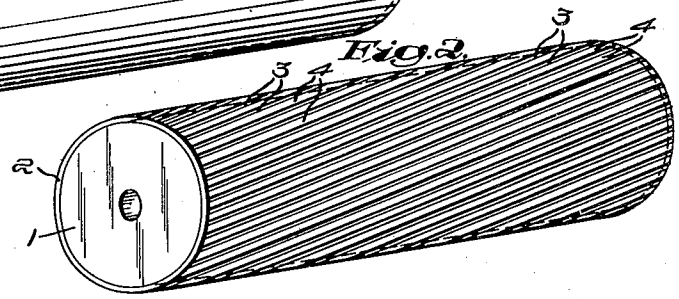


Fig. 3.

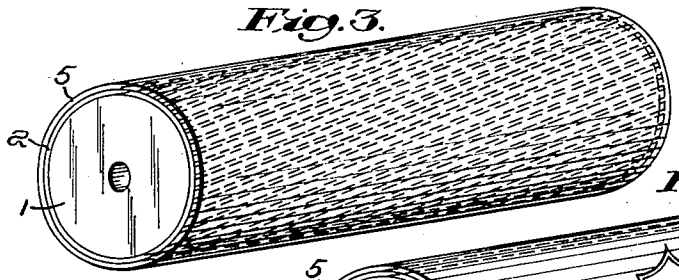


Fig. 4.

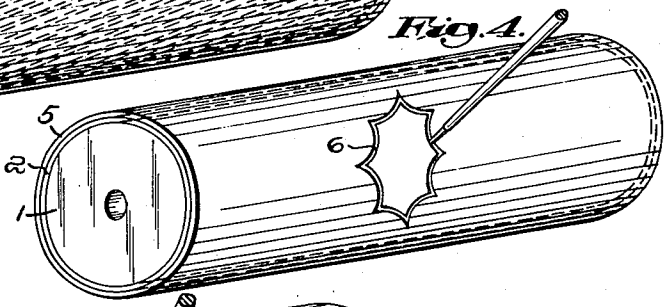


Fig. 5.

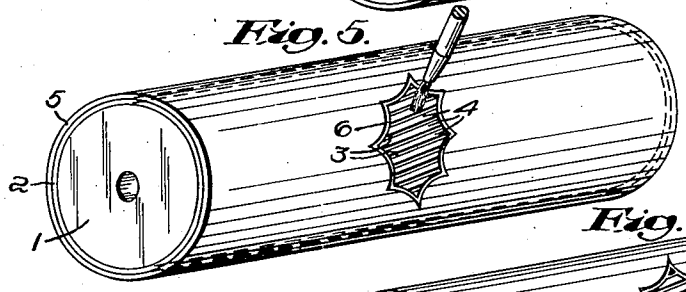
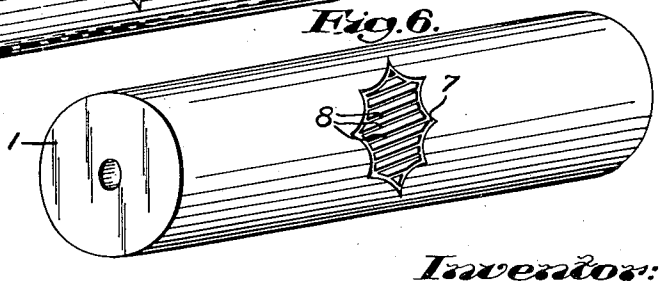


Fig. 6.



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METHOD OF ENGRAVING TEXTILE PRINTING ROLLS

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7 Claims. (Cl. 41—43)

This invention relates to printing and more especially to a method of engraving printing rolls of the type employed in textile color printing.

An object of the invention is to improve methods of etching textile printing rolls, and more especially to devise a simplified procedure for applying acid resist materials to rolls with a view to shortening the time ordinarily required for such operations, and to decreasing the number of etching operations commonly resorted to. Another object of the invention is to provide a simple, cheap and efficient method of engraving.

The nature of the invention and its objects will be more fully understood from the following description of the drawing and discussion relating thereto.

In the accompanying drawing:

Figure 1 is a perspective view illustrating a coating step in the method of the invention;

Fig. 2 is a perspective view illustrating a knurling operation;

Fig. 3 is a perspective view illustrating a second coating operation;

Fig. 4 is a perspective view illustrating the step of tracing a design outline;

Fig. 5 is a perspective view illustrating a washing out operation; and

Fig. 6 is a perspective view illustrating an engraved printing roll obtained by the method described.

In making textile printing rolls for printing dye colors, it is now customary to obtain intaglio or etched printing surfaces by two etching operations. The first operation consists in etching an outline of any given design which may be desired. Such an outline is obtained by coating the roll with asphaltum and cutting through the asphaltum an outline of the design by means of a pantograph machine. Acid reagent, as iron perchloride, is allowed to etch into the copper roll through the outline thus formed and thereafter the etched outline thus obtained is filled with enamel.

The second necessary etching operation, in the conventional method of making a textile printing roll, consists in again coating the roll over its entire surface with a light asphaltum. When dry, diagonally disposed ground lines are cut into the asphaltum coating by means of a knurling tool, or some other suitable apparatus. Since these knurled ground lines extend throughout the surface of the roll and both inside and outside of the portions of the roll surface included within the design outline, it becomes necessary to paint in with heavy asphaltum those areas of the roll surface occurring outside of the design outline where no engraving is to take place. The roll is then etched a second time to provide angularly disposed ground lines inside of the design outline, and these ground lines receive and print dye colors, thereby to furnish suitable shading or strength of the colors.

The invention generally includes the steps of applying two different types of acid-resist materials, one over the other, upon a textile printing roll. One of the coatings, namely, the underlying coating of acid-resist material, is scored to form a series of parallel ground lines, while the outer coating of acid-resist material is scored to form a design outline which also pierces the underlying coating. Portions of the outer acid-resisting material occurring within the design outline are removed to uncover a part of the underlying coating as defined by the design outline. At this point the roll is etched with acid reagent attacking the roll in the outline areas, and also in the spaces between the ground lines, as defined by the outline. After etching, the acid-resisting materials are removed and the roll is ready for printing.

In detail, the method of the invention consists in providing a copper roll 1, over which is coated an acid-resisting material 2, such as asphaltum. This operation may be carried out in some suitable manner as by brushing or otherwise.

The coated roll is then subjected to a knurling operation consisting of rolling against the surface of the roll 1 a knurling tool formed with a series of angularly disposed edges or teeth, which are adapted to cut into the asphaltum 2 and form a series of ground lines, leaving intervening portions 4 of the asphaltum.

The lines 3 constitute a series of narrow grooves which are scored in the asphaltum 2, thereby leaving uncovered portions of the copper roll surface which may be etched upon contact with acid.

The disposition of lines or grooves 3 in an angular manner, as diagrammatically illustrated in Fig. 2, is done to permit etching of ground lines of the usual type employed in textile printing rolls. Ground lines have been found to carry dye color more efficiently when formed in an angular manner. It should be understood that the ground lines obtained by etching constitute a kind of grain and that other grains may be utilized.

A further step in the method of the invention consists in applying to the surface of the roll 1, over the knurled coating 2, a second coating 5

which is composed of a material adapted to be rendered acid-resistant with respect to an etching reagent such as iron perchloride. An example of a material of this character is a solution or mixture of glycerin and mercurous nitrate. The application of mercurous nitrate and glycerin solution may be carried out by means of a brush or the roll may be immersed in a bath of this material.

Thereafter the mercurous nitrate coating 5 is treated with hydrogen chloride gas for a short period of time, as for example one-half minute or longer. As a result, the mercurous nitrate is converted to mercurous chloride, which appears in the form of a white crystalline mass and which is highly acid-resisting.

It is pointed out that the asphaltum of coating 2, first applied over the surface of the roll, while being acid-resistant with respect to an acid reagent such as iron perchloride, is readily soluble in a solvent such as turpentine or other organic liquids, as benzine and the like. The converted mercurous chloride, on the other hand, while being acid-resistant with respect to an acid reagent such as iron perchloride, is unaffected by a solvent such as turpentine or benzine, but may be dissolved by other solvents which will not affect the asphaltum.

Accordingly, a further step in the method of the invention is to trace with a pantograph machine a desired design outline 6 which pierces through the coating of mercurous chloride 5 and the lines 3, as has been diagrammatically illustrated in Fig. 4. There is thus left bare metal of the roll surface corresponding to the design outline, with acid-resisting material occurring both within the outline and outside of it.

Portions of the mercurous chloride occurring inside of the outline 6 are then removed by means of a suitable solvent for the mercurous nitrate applied in some desired manner, as for example by a brush or otherwise, as has been diagrammatically illustrated in Fig. 5. One example of a solvent of this character is ammonium hydroxide. The ammonia does not affect the portions of asphaltum 4 occurring between the lines 3 so that these portions are available to resist acid reagent.

The roll, bearing the design outline formed in the manner described, is then immersed in a bath of etching reagent such as iron perchloride, and etched for the usual period, after which all of the remaining portions of the mercurous chloride are dissolved with more ammonium hydroxide, and the asphaltum portions 4 are dissolved by the use of a solvent such as turpentine or the like.

The etching step forms a roll such as has been illustrated in Fig. 6 in the surface of which is engraved an outline 7 which includes ground lines 8 defined by the outline 7. The roll thus finished is then ready for printing and is adapted to print a design in accordance with the outline.

It will be observed that the use of two different types of acid-resisting material, applied one over another, is an important part of the invention. Also of importance is the fact that these two acid-resistant materials are soluble in totally different solvents. By making use of two different acid-resistant materials having such properties, it is possible to form ground lines as 3 in the underlying coating, then to form an outline in the overlying coating 4, and then to remove portions of the overlying coating 5 occurring within the outline. An outline and ground lines within the outline may then be etched simultaneously into the surface of the roll.

The immediate result is to eliminate one of the etching operations commonly resorted to in the above described conventional method of making textile printing rolls. In addition to this, the difficult and time-consuming operations of painting in portions of the roll occurring outside of a design outline, as is necessary in the conventional method of making rolls, is entirely done away with. In comparison with this difficult step of painting in, applicant's process employs the simple operation of lightly and quickly brushing around inside of the outline with a solvent for the second acid-resisting material, thereby to uncover the ground lines of the first acid-resisting material. This brushing operation does not have to be carried out with the same care as is required with the painting out operation. Substantial saving in time and labor is thus achieved, and in several respects a more uniform outline is obtained.

The method of the invention may be modified in several respects. For example, other types, of acid-resist materials, capable of being dissolved in different solvents, as wax, dragons-blood and others, may be resorted to. The use of these materials in the manner set forth may also be carried out in making other types of printing rolls than textile printing rolls, and in engraving other types of printing members or materials.

While I have shown a preferred embodiment of my invention, it should be understood that various changes and modifications may be resorted to, in keeping with the invention as defined by the appended claims.

I claim:

1. That improved process of engraving which comprises applying on a printing member a coating of acid-resist material, scoring the coating at selected points therein, applying a second acid-resist material over the printing member, cutting an outline through the second acid-resist material and the said first coating, removing portions of said second acid-resist material at points within the outline, and then etching.

2. That improvement in methods of engraving a printing member which comprises applying a coating of acid-resist material on the printing member, cutting a series of lines in the coating, said lines presenting uncovered surfaces of the printing member, applying a second coating of a chemical compound over the first coating, treating the chemical compound to convert it to an acid-resist material, cutting an outline through the two coatings, removing portions of the second coating occurring within the outline, and etching.

3. That improved process of engraving textile printing rolls which comprises applying on a roll an acid-resist coating, cutting a series of lines in the coating to lay bare portions of the roll surface, applying a second coating of mercurous nitrate over the said first coating, treating the said second coating with hydrogen chloride gas to convert the mercurous nitrate to mercurous chloride, cutting a design through the two coatings to leave bare portions of the roll surface in accordance with the outline, dissolving with an ammonium compound portions of the mercurous chloride occurring within the said outline, etching the roll to provide an outline and ground lines extending within the outline, and washing away acid-resist materials.

4. That improved method of engraving textile

printing rolls which comprises applying on a copper roll an acid-resist coating of asphaltum, cutting a series of lines in the coating to lay bare portions of the copper roll surface, applying a second coating of mercurous nitrate over the said first coating, treating the said second coating with hydrogen chloride gas to convert the mercurous nitrate to mercurous chloride, scoring a design through the two coatings to uncover portions of the copper roll surface corresponding to the outline, dissolving the mercurous chloride occurring within the said outline while preserving portions of asphaltum therein, and etching the roll to provide an outline and ground lines extending within the outline.

5. That improved method of engraving textile printing rolls which comprises applying on a copper roll an acid-resist coating, cutting a series of lines in the coating to lay bare portions of the copper roll surface, applying a second coating over the said first coating, treating the said second coating with a chemical reagent adapted to convert the said second coating into an acid resist, scoring a design through the two coatings, applying to the portion of the second coating occurring within the outline a reagent which is a solvent for the said second coating only, thereby to dissolve away said portions of the second coating occurring within the outline, and etching the roll in iron perchloride to provide an outline and ground lines extending within the outline.

6. That improved process of engraving textile printing rolls which comprises applying on a roll selective amounts of an acid resist material, applying a coating of mercurous nitrate over the said first applied resist material, treating the mercurous nitrate with hydrogen chloride gas to convert the mercurous nitrate to mercurous chloride, cutting a design in the two resist materials, dissolving with an ammonium compound portions of the mercurous chloride occurring within the said design, etching the roll and removing acid resist material.

7. That improved process of engraving textile printing rolls which includes applying a coating of mercurous nitrate upon a roll to be etched, treating the mercurous nitrate with hydrogen chloride gas to convert the mercurous nitrate to mercurous chloride, cutting an outline through the mercurous chloride, and etching.

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