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Broderick

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[54] METAL APPLICATOR ROLL

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2,638,050	5/1953	King.....	29/121 R X
3,167,850	2/1965	Broderick	29/121 R
3,177,558	4/1965	Gronholz et al.	29/121 R
R28,027	6/1974	Bills et al.	29/121 R

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[58] Field of Search..... 29/121 R, 132

[56] References Cited

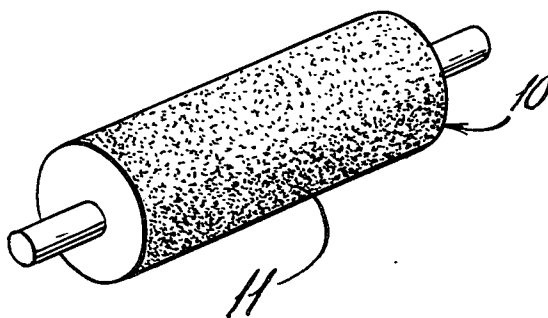
UNITED STATES PATENTS

1,932,168 10/1933 Adams 29/121 R

[57] ABSTRACT

A hardened metal applicator roll having a precisely random etched surface and method for producing the same.

3 Claims, 2 Drawing Figures



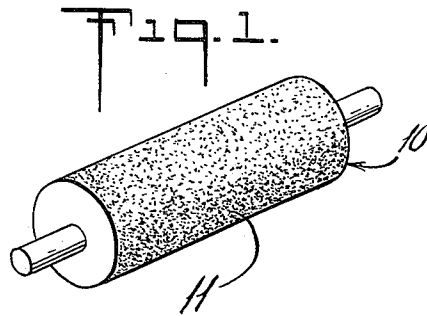
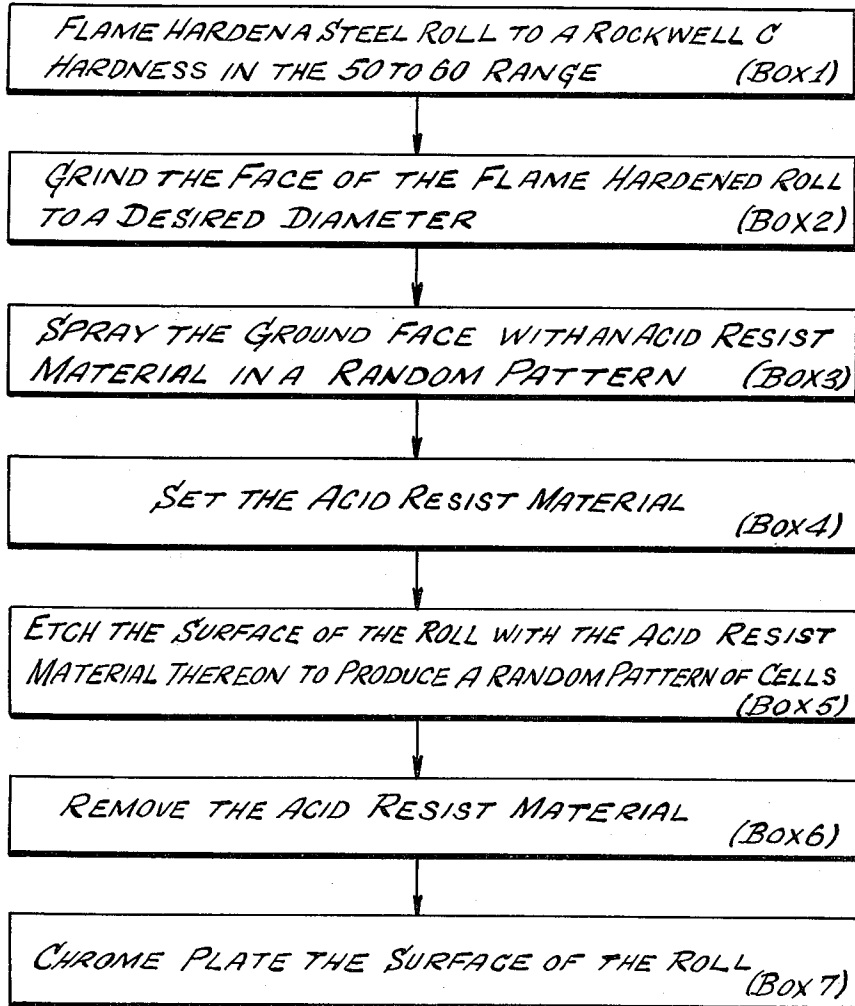


Fig. 2.



METAL APPLICATOR ROLL

BACKGROUND OF THE INVENTION

In offset and gravure printing an ink fountain applicator roll is generally used. This roll has a cellular type surface. The roll rotates in an ink fountain so the cells in the surface will pick up ink. The surface of the roll is doctored to remove excess ink. Depending upon the type of printing, the ink is transferred to a printing roll or blanket or the like. The cells in the surface of the applicator roll are provided to give an accurate and metered amount of ink or other material which is to be applied.

Various types of rolls have been used for the purpose of applying the ink. Machine engraved mild steel rolls have been used and also photoengraved mild steel rolls have been used. Generally when photoengraved rolls are used the mild steel roll is copper plated to accept the acid etching of the cells into the surface by the photoengraving process. These types of applicator rolls are usually chrome plated with a hard industrial chrome after engraving to improve their wearing properties and prevent rust. All of the above described rolls suffer from a common drawback in that they are very susceptible to damage because of their softness. The reengraving and chrome plating of these damaged rolls is costly. Very often, in use, excessive doctor blade pressure may be necessary and can cause the soft steel or copper base under the chrome plating to deflect sufficiently to cause the chrome plating to chip or crack. These chips of chrome may be picked up by the doctor blade and pressed against the surface of the applicator roll quickly generating damages and ruining the engraving. Also carelessness in the handling of these soft chrome plated rolls may crack the chrome and indent the soft metal making the roll virtually useless.

Recently ceramic coated rolls have been tried for ink fountain application. These rolls are hard but quite brittle and if they do become damaged are difficult to repair. Hence the economics of these rolls is unknown at the present time.

SUMMARY OF THE PRESENT INVENTION

I have discovered a new applicator roll which may be used in offset or gravure printing as the ink fountain applicator roll. My new roll resists damages caused by excessive doctor blade pressure and my new roll resists chipping even when chrome plated. My new roll resists damages that may occur during handling. Furthermore, my new roll has economic advantages in that it is easily re-etched should it be required.

In accordance with the present invention my new roll is a hardened metal applicator roll having a precisely spray etched surface for carrying material such as ink to be applied to another surface. The face surface of my roll may be chrome plated if desired and the surface of my new roll has a Rockwell hardness in the C range of 50 to 60.

My new applicator roll is made by machining a steel roll which will permit flame hardening. The roll is machined to its final tolerances except for the face of the roll. The face is lathe turned to a diameter which will allow grinding of the face surface after flame hardening. Typical allowances of .012 inch in diameter are generally acceptable. The face of the roll is flame hardened to a Rockwell C hardness in the 50 to 60 range.

The face of the hardened roll is ground to the final desired tolerance and the hardened, ground roll sprayed with an acid-resist. The viscosity of the acid-resist and the pressure used in the spraying, etc. may be controlled to obtain the desired concentration of spray and size of spray mist. The spraying allows small globules of the resist to adhere to the face of the roll to form a controlled and irregular surface on the face. The acid-resist is set either by drying or by the passage of time and the roll with the set acid-resist on its surface rotated in acid to etch the surface into a uniform but random pattern of cells. The acid resist is removed by standard techniques. The etched roll may be hard chrome plated if desired.

The steel being substantially as hard as the hardness of the chrome the deflection problems and chipping of the roll surface are greatly reduced if not eliminated. Furthermore, because the surface of the roll and the chrome plate have similar hardness the wearing of the surface is decreased and the life of the roll greatly improved. If it is desired to re-etch the roll this may be readily accomplished relatively inexpensively.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a hardened metal applicator roll in accordance with the present invention, and

FIG. 2 is a block flow sheet showing the steps in the method of manufacturing hardened metal applicator rolls in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings in FIG. 1 there is shown a new applicator roll 10 in accordance with the present invention. The roll is a hardened steel roll and has a random pattern of cells over its entire face surface 11. The roll depicted in FIG. 1 is produced in accordance with the process as outlined in the Box Flow Sheet Diagram of FIG. 2. A steel roll, with a chemical composition which will permit hardening such as AISI 1055 or AISI 4150 or the like, is machined to the desired final tolerances except for the face of the roll. The face is lathe turned to a diameter which will permit grinding the face of the roll. Typically an allowance of about 0.015 inch in diameter is generally acceptable as this much will be ground off in machining the face of the roll. The roll is flame hardened by standard flame hardening techniques to produce a surface which has a hardness determined by the Rockwell hardness tester of 50 to 60 on the C scale rating. (Box 1)

The flame hardened roll has its surface ground to remove the excess diameter as previously mentioned and is ground to the final desired diameter and tolerances. (Box 2)

The ground and hardened roll has an acid-resist material sprayed on its surface. The acid-resist material may be an asphalt or a latex and is sprayed in a carrier so that the viscosity of the material may be controlled. The pressure and the concentration of the spray are also controlled so as to form small globules of acid-resist and a very nonuniform coating of acid resist over the surface of the roll. (Box 3) The spraying of the acid resist material produces a random and irregular coating with some minute areas of the roll completely free of acid-resist, other minute areas of the roll having a relatively thick coating of acid-resist and other minute areas of the roll having a varying thickness of coating of acid-resist.

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The roll with the acid-resist material sprayed on its surface is allowed to dry and the acid-resist set either by the use of elevated temperatures or merely by the passage of time. (Box 4) Multiple sprays and etches may be required to give the final specified carrying capacity.

The roll with the set acid-resist material on its surface is rotated in an acid bath. Generally the acid used to etch the roll is a mixture of acetic and nitric acids. The roll is rotated for a desired period of time and to a desired depth to eat away portions of the roll which do not contain acid-resist material or have minimal acid-resist material to varying depths and produce a random cellular pattern in the surface of the roll. (Box 5)

The etched roll is wiped with a suitable solvent for the acid-resist material to remove excess acid-resist material and produce the irregular patterned surface. (Box 6) If desired the etched roll may be hard chrome plated to give it a neat polished smooth appearance. (Box 7)

The roll may be used in any of the offset or gravure printing operations or other coating operations where it is desired to apply ink or a coating material to a sheet or another material. My new roll is rotated in a bath

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containing the coating material or ink, excess material doctored off by a standard doctor blade and a controlled and metered amount of material applied either to another roll for printing purposes or directly to a material as desired.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated by the appended claims.

What is claimed is:

1. A hardened metal applicator roll having a precise randomly etched surface for carrying material to be applied to other material, said surface having a random pattern of cells of varying size and depth and irregular shape.

2. A hardened metal applicator roll according to claim 1 wherein the roll is a chrome plated, steel roll.

3. A hardened metal applicator roll according to claim 1 wherein the roll is a steel roll having a surface hardness of a Rockwell C hardness rating in the 50 to 60 range.

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