United States Patent [19]

Mentone

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[54] **RIGIDIZED PRINTING SCREEN**

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[52] **U.S. Cl.** ..... **101/127**, 204/38 B, 245/8

[51] **Int. Cl.** **B41n 1/24**

[58] **Field of Search** ..... 101/127, 127.1, 128.2, 101/128.4; 29/160; 245/8; 209/233, 412; 117/35.5; 204/33, 29, 38 B

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

An improved process for rigidized screen for printing and the like in which the frame is zincated prior to rigidizing the screen by encapsulating the screen in nickel.

1 Claim, No Drawings

RIGIDIZED PRINTING SCREEN

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to printing screens and methods of making printing screens and, more particularly, to rigidized self-supporting printing screens.

2. Description of the Prior Art

There are numerous printing screens and methods of rigidizing flexible printing screens as evidenced by the Rafton U.S. Pat. No. 1.934,643, and the Reinke U.S. Pat. No. 3,482,300. Basically, these patents teach the coating of a screen to rigidize it by electrolytically coating the screen with a suitable material. For example, the Reinke patent shows a screen which is rigidized by electrolytically depositing nickel on a stainless steel screen. Reinke indicates that a uniform deposit of one-fourth to 1 mil of nickel on both faces of the screen is sufficient to rigidize the screen. While prior art processes of this type work relatively well, with screens having stainless steel frames, they are not suitable for all applications. For example, problems occur when it is desired to use a lightweight frame such as aluminum to support a screen to be rigidized. While other frames such as stainless steel are suitable, it is oftentimes preferred to use an aluminum frame for various reasons. Generally, the aluminum frame has good strength, good dimensional stability, good corrosion resistance besides being light, easy to cast, and generally less expensive than other types of frames. The use of an aluminum frame to support a screen to be encapsulated in nickel creates a problem because the aluminum is not passive in the nickel plating solution. Consequently, to plate nickel onto a screen with an aluminum frame produces a secondary reaction in the nickel plating solution that affects the encapsulating properties of the nickel. Although other encapsulating materials have been tried, it is preferred to use a final nickel finish on the screen because of its strength and corrosion resistance. Furthermore, an alternate method of using two plating materials, i.e., a first plating solution to plate onto both the aluminum and stainless steel and a second nickel plating solution to encapsulate the screen, is undesirable because the two layers of plating would substantially reduce the openings in the screen.

The present invention eliminates the problem of plating on an active metal frame such as aluminum by using two plating solutions, a first zincating solution to plate onto the aluminum frame but not onto the stainless steel screen and a second nickel plating solution to encapsulate and rigidize the screen.

SUMMARY OF THE INVENTION

Briefly, the invention comprises a process and a method for producing an improved rigidized screen with an aluminum frame for use in the printing industry. In its further embodiment the invention includes an improved apparatus or screen for use in the printing industry.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment of my invention, one prepares an aluminum frame with a stainless steel screen for rigidizing by first cleaning the screen and frame. In the first step, one generally cleans the aluminum frame with a stainless steel screen in an aluminum

etch cleaner. Next, the frame and screen are subjected to a spray rinse to remove any impurities or particles on the screen and frame. The screen and frame are then immersed in a nitric acid bath for approximately 30 seconds to remove any remaining impurities on the screen and frame. After the nitric acid bath, the screen and frame are subjected to a rinse of normal tap water to remove any nitric acid and thus prepare the frame and screen for the zincation step.

In the zincation step, the screen and frame are zincated for one minute in a zincating solution by immersing the aluminum frame and screen in the zincating solution which typically comprises sodium hydroxide and zinc hydroxide. Although sodium hydroxide and zinc hydroxide are described, other zincating solutions could also be used. During the zincating process, the outer layer of aluminum oxide is dissolved and replaced with a fine layer of zinc while the stainless steel screen remains unaffected by the zincating solution, i.e., the zinc does not plate onto the stainless steel. Care must be taken in zincating the aluminum frame to ensure that enough zinc is plated onto the aluminum frame to cover all the exposed areas of the frame. However, too long exposure to the zincating solutin causes the zinc to form flakes and ridges that fall off when the aluminum frame is immersed in the nickel plating solution. Typically, I have found for a zincating solution at room temperature about one minute is sufficient time to produce a zinc coating of proper thickness.

After zincating, the screen and frame are removed and washed with a deionized water spray to remove any zincating solution on the frame and screen.

As the zincating process does not plate any zinc onto the stainless steel screen, it is apparent that at this stage the screen is uncovered while the aluminum frame is covered with a layer of zinc.

The final step to rigidize the screen requires plating nickel onto the flexible but taut screen to encapsulate the screen to thereby produce a rigid screen. In order to properly plate the nickel it is preferred to use a nickel sulfamate bath with a PH of approximately 5. The higher PH is desirable and preferred as it does not readily attach the zinc layer on the aluminum frame. Furthermore, with a higher PH the nickel forms a harder and stronger deposit around the stainless steel wires which produces a substantially stronger screen.

While my process is described with respect to aluminum frames, it is apparent that my process will work equally well with aluminum alloy frames and other active metal frames such as magnesium.

With my process it has also been found that the thickness of the nickel layer need only be on the order of 0.1 mil to 0.2 mil to produce a rigidized screen.

I claim:

1. A rigidized self-supporting printing screen comprising:

an aluminum frame for supporting a printing screen, a layer of zinc encapsulating said aluminum frame to provide a protective coating around said aluminum frame, a flexible stainless steel printing screen stretched tautly across the zinc covered aluminum frame, said flexible printing screen and said zinc covered aluminum frame having a layer of nickel thereon, said layer of nickel on said flexible printing screen encapsulating said screen to thereby rigidize said screen, said layer of encapsulating nickel having a thickness on the order of 0.1 mil to 0.2 mils to thereby produce a rigidized printing screen.

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