Dec. 9, 1969 G. W. REINKE 3,482,300

PRINTING SCREEN AND METHOD OF MAKING SAME

Filed Oct. 31, 1966

FIG. 1

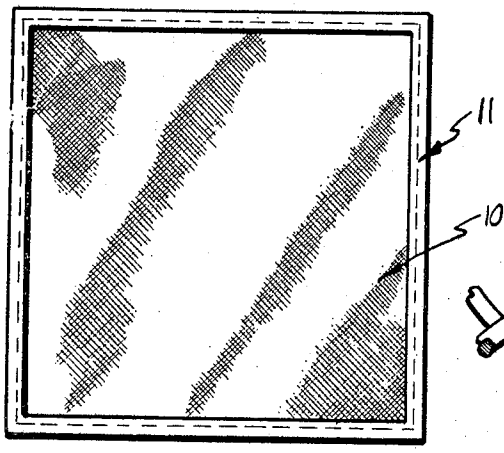


FIG. 2

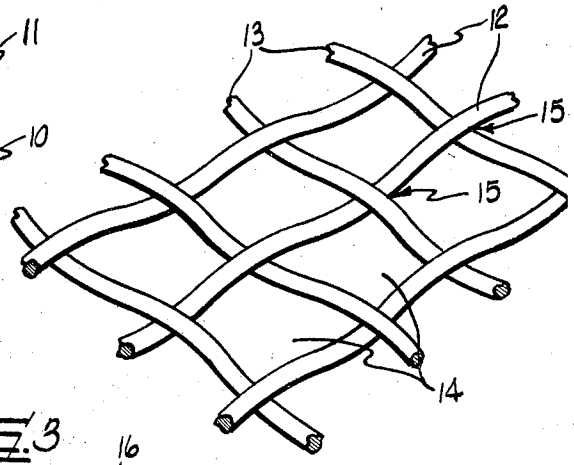


FIG. 3

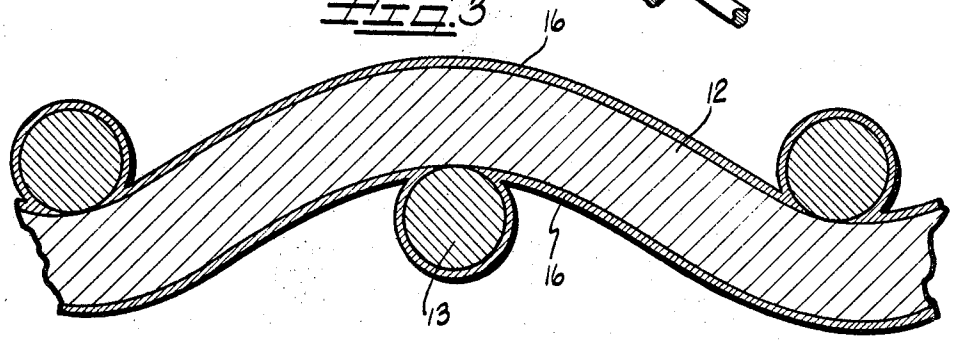


FIG. 4

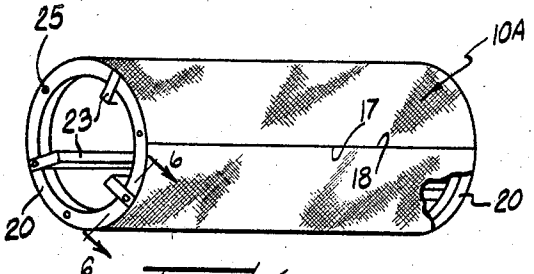


FIG. 5

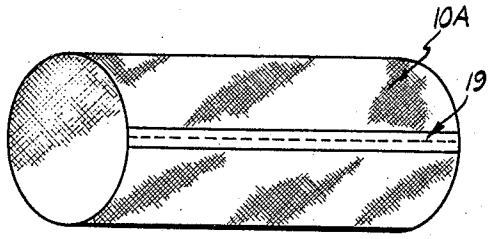
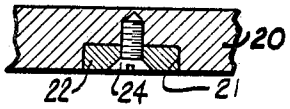


FIG. 6



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PRINTING SCREEN AND METHOD OF MAKING SAME

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U.S. Cl. 29—160 9 Claims

ABSTRACT OF THE DISCLOSURE

Self-supporting screen for a screen printing press including a screen frame having metal screen arranged thereon, wherein the screen is electrolytically coated with metal to rigidify same and render it self-supporting.

This invention relates in general to screen printing, and more particularly to a printing screen and a method of making a printing screen, and still more particularly to a printing screen of the type useful for a rotary printing press wherein the screen takes a cylindrical form and is generally driven in continuous motion in one direction, although other uses and purposes may be apparent to one skilled in the art.

Heretofore, rotary screen printing presses having the screen arranged in cylindrical form required screen supporting means about which the screen is driven, such as illustrated in the George W. Reinke Patent 3,155,034, granted on November 3, 1964. Employment of screen supporting means of the type disclosed in the aforesaid patent requires a sophisticated press structure in order to minimize friction and overcome other technical problems.

The present invention concerns a printing screen and method of making same, wherein the printing screen is self-supporting so that where used on a rotary press intermediate screen supports can be eliminated. The invention is accomplished by processing a standard metal screen so that it can be self-supporting and forming same for use on a rotary press. Processing includes depositing of a coating on a flexible non-self-supporting screen to transform same into a self-supporting screen. While the coating may be accomplished by any suitable manner, it has been found that such can be satisfactorily accomplished through electrolytically depositing processes.

It is therefore an object of the present invention to provide a new and improved printing screen and method of making same, wherein the printing screen is self-supporting.

Another object of the present invention is in the provision of transforming a standard printing screen into a self-supporting printing screen.

Still another object of the invention resides in the provision of a self-supporting printing screen and method of making same in the form of a cylinder for use in a rotary press.

A further object of this invention is to provide a method of making a printing screen which includes coating of a standard metal printing screen in such a manner as to rigidify same.

A still further object of this invention is to provide a method of making a cylindrical printing screen for use

on a rotary press which includes rigidifying of the screen by electrolytically depositing a coating thereon, cylindrically forming the screen wherein ends are brought together in abutting relationship, and securing the abutting ends together.

Other objects, features and advantages of the invention will be apparent from the following detailed disclosure, taken in conjunction with the accompanying sheet of drawing, wherein like reference numerals refer to like parts and in which:

FIG. 1 is a plan view of a section of printing screen stretched and secured to a frame for processing according to the present invention;

FIG. 2 is a greatly enlarged fragmentary positive view of the screen to be processed according to the present invention;

FIG. 3 is an enlarged transverse sectional view taken through a section of screen and illustrating the manner of rigidifying same in accordance with the process of the present invention;

FIG. 4 is a perspective view of a section of screen removed from the frame and in cylindrical form with opposite end edges abutting each other;

FIG. 5 is a view similar to FIG. 4 and illustrating the manner of fastening together the abutting end edges; and

FIG. 6 is an enlarged fragmentary and sectional view taken substantially along line **6—6** in FIG. 4.

The self-supporting printing screen of the present invention eliminates the need for supporting the screen intermediate its ends inasmuch as the screen is rigid and self-supporting. The present invention may be practiced with respect to any metal printing screen presently available, such as a Phosphor bronze or stainless steel screen of the "taffeta" weave type. The term "taffeta" weave relates to a screen where wires extend normal to each other and cross over and under each other so that wires extending one direction intersectingly engage wires extending normal thereto and thereby define openings of a particular size through the screen. The screen may be of any size such as a fine 325 mesh to a coarse 40 mesh. The chosen screen size will depend upon the particular printing job to be accomplished.

While rigidifying of the screen will be described as being accomplished by electrolytically coating of the screen, it should be appreciated that any suitable method of coating the screen may be employed. The first step of the present invention involves the preparation of a section of screen sized to accomplish the end printing result, and therefore where the screen is to be formed in a cylinder, the size would be such that it will define the size of cylinder needed for a particular rotary press to carry out the desired printing operation. Further, the mesh screen chosen will be in accord with the desired printing results.

Following the preparation of a section of screen, the screen, generally designated by the numeral **10** on the drawings is suitably fastened to a frame **11** in a tightly stretched manner. The frame is preferably rectangular but may take any shape, may or may not be adjusted, and is preferably of plastic in order to repel the coating applied to the screen. Thus the frame is stretched in the flat as shown particularly in FIG. 1. Any suitable

means may be employed for attaching the screen to the rectangular frame.

The screen **10**, as above explained, is preferably of the "taffeta" weave type, and as seen in FIG. 2, includes a series of equally spaced, parallel extending wires **12** running in one direction and interwoven with a series of equally spaced, parallel extending cross wires **13** that extend substantially normal to the wires **12**. As seen in FIG. 2, each wire **13** goes over a wire **12** and then under the next wire **12** and successively over and under adjacent wires, and similarly, the wires **12** extend over and under cross wire **13**, whereby substantially rectangularly-shaped openings **14** are defined through which ink may be forced during the printing operation. Further, a wire engaging intersection **15** is defined wherever a wire **12** crosses a cross wire **13**.

The screen **10** on the frame **11** is then coated with a suitable material in order to rigidify the screen. For example, an electrolytic deposit of material will be applied to one face of the screen, in which case the screen and frame would be immersed in an electrolyte and then suitably electrically charged to cause the formation of an electrolytic deposit upon the screen. While the screen is usually Phosphor bronze or stainless steel, it is preferably coated with an electrolytic deposit of nickel of any desired thickness to rigidify same. It has been found that a deposit of ¼ to one mil of nickel uniformly on one or both faces of the screen is sufficient to rigidify the screen. The deposit, shown in exaggerated form in FIG. 3 and identified by the numeral **16**, effectively welds the wires and cross wires together at the intersections **15** thereby rigidifying the screen. While the deposit **16** is shown in FIG. 3 on both faces of the screen, it should be appreciated that it need only be applied on one face if so desired, but that additional strength is obtained when depositing on both faces. Normally, coating will be effected on one side, and then the electrode facing the screen will cause a relatively heavier coat on that side of the screen. To equally coat the other side, the positions of the electrode and screen will be reversed. Further, since the sides facing the electrode will be coated, a heavy coating may be applied without filling the mesh. This welding effect prevents relative sliding movement between the wires **12** and cross wires **13**.

Thereafter, where it is desired to form the screen onto a cylinder or drum for use on a rotary press, the screen **10** is removed from the frame **11** and formed into a cylinder as shown in FIG. 4 and identified by the numeral **10A** where the opposite end edges **17** and **18** are brought together in butting relation. Any suitable device may be employed to hold the screen in cylindrical form, and thereafter the butting ends **17** and **18** are suitably secured together to effectively define a seamless cylindrical printing screen. The butting ends may be soldered together or effectively welded together by electrolytic deposition of a metal such as nickel about ⅛ of an inch wide across the joint defined by the butting ends **17** and **18**. Such a deposition is indicated by the numeral **19** in FIG. 5, and it is preferred that a relatively heavy deposit of nickel be provided here such as about 2 mils in thickness. Soldering of the butting ends would generally give the appearance of a seam as shown in FIG. 4.

The now completed printing cylinder, which is self-supporting due to the strength imparted by the nickel plating, includes a smooth, strong joint to hold it in cylindrical shape.

In order to assure proper registration when using the cylinder **10A**, it is necessary to longitudinally tension the screen during the application of a printing pattern and during use in the printing machine. This may be accomplished by mounting tensioning or retaining rings **20** at each end of the cylindrical screen as shown in FIG. 4 and securing same in place by soldering or gluing with an epoxy glue. The rings would be of metal and further provided with a plurality of grooves or slots **21** formed in their outer faces to receive mating lugs **22** of longitudinally extending tensioning bars **23**. Fasteners **24**, in the form of bolts or the like would be provided for securing the lugs **22** in place on the tensioning rings in order to maintain the cylinder under constant pressure at all times. Further, the tensioning bars **23** would prevent "rack" or distortion from occurring so that each end of the cylinder remains parallel with the other.

When mounting the screen on the press, the end tensioning rings are first fastened to the press driving members by bolts or the like which may engage in bolt holes **25**, and thereafter, the tensioning bars **23** would be removed. Similarly, when the cylinder is to be removed from the press, the tensioning bars are again fastened in place before releasing the cylinder from the press drive members. The printing cylinder may then be further processed as desired.

Following the mounting of a printing cylinder on the press, a squeegee may be inserted within the screen, and then the press and screen are ready for printing operation. Because of the smoothness of the screen, the screen can thereafter be printed in either direction or can be reversed at will. Upon completion of the printing operation, the screen may be removed from the press and again provided with a temporary tensioning means between the end retaining rings for further processing to apply a new design and effect further printing operations.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention, and that this invention is to be limited only by the scope of the appended claims.

The invention is hereby claimed as follows:

1. A method of making a self-supporting printing screen adapted to have applied thereto a printing pattern and thereafter be employed in a screen printing press, said method comprising the steps of mounting an electrically conductive taffeta weave screen in stretched condition onto a frame wherein the screen includes wires crossing each other defining openings, subjecting the entire screen to an electrolytic action to electrolytically deposit a coating of metal onto at least one entire face of said screen of a thickness sufficient to cause the wires crossing each other to be welded at their intersections thereby rigidifying said screen while still defining openings throughout the screen through which ink may be forced during a printing operation, removing the screen from the frame, shaping the screen into a cylinder so that the end edges abut and define a joint, joining the abutting end edges together, and mounting end supporting rings at each end of the screen.

2. A method as defined in claim **1**, wherein said joining consists of electrolytically depositing metal over said abutting end edges along said joint.

3. A method as defined in claim **1**, wherein said joining consists of soldering the abutting end edges along the joint.

4. A method as defined in claim **2**, wherein said deposited metal over said screen is about ¼ to ½ mil in thickness, and said deposited metal along said joint for joining the end edges is about 2 mils in thickness.

5. A method as defined in claim **2**, wherein the screen is fine 325 to coarse 40 mesh each way.

6. A method as defined in claim **1**, and photographically producing a printing pattern on said screen.

7. A method of making a cylindrical self-supporting printing screen comprising the steps of stretching a rectangular piece of electrically conductive taffeta weave screen onto a frame including wires crossing each other and defining openings, electrolytically depositing onto at at least one entire face of said screen metal of a thickness sufficient to cause a welding of the cross wires at their intersections while still maintaining the openings clear thereby rigidifying said screen, removing the screen from the frame, shaping the screen into a cylinder so

that the end edges abut and define a joint, and joining the abuting end edges together, securing tensioning rings at each end of said screen, and removably mounting a plurality of longitudinally extending tensioning bars to said rings for holding the screen longitudinally taut while processing same out of the press.

8. A method as defined in claim 1, wherein said screen is of stainless steel and said depositing metal is nickel.

9. A method as defined in claim 1, wherein said screen is of Phosphor bronze and said depositing metal is nickel.

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U.S. Cl. X.R.

29—471.1; 101—128.4; 140—71.5; 204—16