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METHOD AND DEVICE FOR SEPARATING
A SCREEN ON A FLAT SCREEN TEXTILE PRINTING MACHINE

Field of the Invention

5 The present invention relates to a method and a device for separating a screen from the fabric on a flat screen textile printing machine.

 In printing the fabric by a flat screen textile printing machine, a color paste is forced through a
10 screen with a squeegee onto the surface of the fabric to be printed on. For this purpose, the squeegee must be pressed against the screen so as to slightly bend the forward end of squeegee.

 After squeegeeing, the screen remains in a
15 sticky state on the surface of the fabric because of the viscousness of the color paste. Consequently it becomes necessary to peel off the screen from the fabric before subsequent squeegeeing.

Description of Prior Art

20 Generally the screen has been separated from the fabric by the following method.

 After squeegeeing, the screen is separated from the fabric by its rise in an inclined position, more specifically by: a) alternately raising the forward end
25 and the rear end of the screen, piecemeal with a time

interval, b) raising only one end of the screen, or c) raising one end of the screen at the side of completion of squeegeeing after lift of the squeegee at said side and, after a time interval, the other end.

5 The reason for raising the screen to bring it in an inclined position is to prevent the screen from flipping against the viscosity of color paste by the separation of the screen. If the screen flips, the residual color paste on the screen meshes would be
10 scattered around over the surface of the fabric. The printed textile soiled with the scattered color paste is treated as a defective product.

 The screen should be slowly raised into an inclined position to achieve a satisfactory result
15 according to conventional methods. In this case, the operating rate in a printing cycle is unavoidably much lowered. Currently the separation of screen, however, is conducted at a specific speed for the priority to efficiency despite the production of defective products.

20 Conventionally the screen has been moved upward and downward by a printing unit comprising an assembly of a screen stretched over a screen frame, a support for the screen frame, a squeegee(s), a squeegee carrier, a motor for the travel of squeegee, a transmission mechanism for
25 the transmission of the motion from the motor, guide

rails for the travel of the squeegee, etc., the printing unit being adapted to ascend and descend. The printing unit of the prior art is relatively heavy and has a complicated structure. Moreover, a large-scale device of sophisticated structure is required for the ascent and descent of the printing unit.

Summary of the Invention

An object of the present invention is to provide a method and a device for separating a screen from the fabric in the operation of a flat screen textile printing machine without lowering the operating rate in a printing cycle to achieve a satisfactory result.

Another object of the invention is to enable raising and lowering a screen by small-scale, simplified means for ascending and descending the screen.

To achieve these and other objects, there is provided, according to the invention, a method of separating a screen from the fabric on a flat screen textile printing machine comprising: at least one flat screen; an upwardly and downwardly movable screen frame having the screen stretched thereover; an endless belt extending under the screen for transporting the fabric to be printed on; a roller having a starting end or head portion of the endless belt reeved therearound; and a roller having a rear end or tail portion of the endless

belt reeved therearound, at least one of the rollers being driven, the method being characterized in that while squeegeeing a color paste with a squeegee, the screen frame is raised at the side of start of
5 squeegeeing, simultaneously with, or slightly later than, the start of squeegeeing, whereby the screen is separated from the fabric.

To achieve these and other objects, there is provided, according to the invention, a device for
10 separating a screen from the fabric on a flat screen textile printing machine comprising: at least one flat screen; an upwardly and downwardly movable screen frame having the screen stretched thereover; an endless belt extending under the screen for transporting the fabric to
15 be printed on; a roller having a starting end or head portion of the endless belt reeved therearound; and a roller having a rear end or tail portion of the endless belt reeved therearound, at least one of the rollers being driven, the device being characterized in that the
20 screen frame is ascended and descended by means at the forward and backward ends in a direction of squeegee travel and that at least one of forward and backward ends of the screen frame is connected to said means so that the end of the screen frame is turnable around an axis
25 orthogonal to the direction of squeegee travel.

Brief Description of the Drawings

FIG. 1 is a plan view schematically showing the flat screen textile printing machine of the present invention as a whole.

5 FIG. 2 is a front view schematically showing the textile printing machine of FIG. 1.

FIG. 3 is an enlarged view of a printing unit in the printing machine of FIG. 1.

FIG. 4 is a plan view schematically showing, by way of example, a structure of the machine according to the invention wherein an assembly having a screen stretched over a screen frame is mounted on a textile printing machine frame.

15 FIG. 5 is a cross section view taken along the line V-V of FIG. 4.

FIG. 6 (A) is an elevation showing the squeegeeing in its initial stage, and FIG. 6 (B) is an elevation showing the squeegeeing and the separation of screen in their intermediate stage.

20 FIG. 7 (A) is an elevation showing the completion of squeegeeing, and FIG. 7 (B) is an elevation showing the separation of the assembly of a screen and screen frame from the fabric.

Preferred Embodiment of the Invention

25 The present invention will be described below

in greater detail with reference to the accompanying drawings showing an embodiment of the invention.

The illustrated embodiment of the invention is an automatic flat screen textile printing machine.

5 A flat screen textile printing machine 1 has the same structure as conventional flat screen textile printing machines except for means for raising and lowering a screen to be described later. The screen textile printing machine 1 is schematically shown as a
10 whole in FIGS. 1 and 2.

In FIGS. 1 and 2, indicated at 2 is a roller for driving an endless belt 4 for transporting the fabric to be printed on 7; at 3, a driven roller; at 5, a motor for intermittently moving the endless belt 4; and at 6, a
15 printing table.

The screen textile printing machine 1 has printing units 11 arranged side by side with a predetermined spacing on a screen textile printing machine frame 10. The details of the printing unit 11
20 are illustrated in FIG. 3 (plan view).

Means 9 for raising and lowering the screen in the printing unit 11 has a structure as stated below.

The details of the means 9 are shown in FIGS. 4 and 5.

25 An assembly 118 having a screen 118b stretched

over a screen frame 118a is connected via the screen frame 118a to a pair of support bars 117, 117 extending widthwise of the belt 4, the bars 117, 117 being arranged side by side in parallel lengthwise of the belt 4.

5 Four brackets 115 are attached to both ends of squeegee guide rails 109, 109 extending in parallel with the support bars 117, 117. The support bars 117, 117 are supported at their ends by the brackets 115 via the means 9 serving as a joint.

10 The means 9 includes an upwardly and downwardly movable shaft 901, an actuator 903, such as an air cylinder, joined to the shaft 901 by a connector 902, and a vertically movable member 905 linked to a plunger 904 of the actuator 903.

15 The shaft 901 of the means 9 is joined by thread connection to a manually turnable adjusting screw 116 on the bracket 15. The shaft 901 is ascended and descended by the turn of the adjusting screw 116, whereby the assembly 118 is raised and lowered by the support
20 bars 117, 117. A gap s between a carrier portion of the belt 4 and the screen 118b opposed to the carrier portion can be adjusted by the ascent or descent of the assembly 118.

 The shaft 901 is fitted in the vertically
25 movable member 905 therethrough. More specifically, the

shaft 901 is fitted in a bore formed in the member 905 by way of so-called clearance fit. The member 905 is ascended and descended by the plunger 904 of the actuator 903, whereby the assembly 118, namely the screen 118b, is
5 ascended and descended, relative to the fabric 7 over the belt 4. Crevice-like arms 117a, 117a extending toward the brackets 115, 115 from the ends of the support bars 117, 117 are fixed to the member 905 by a pin 906 extending in a direction orthogonal to the squeegeeing
10 direction of a squeegee 114. The pin 906 is inserted by clearance fit in bores formed in the arms 117a, 117a.

Since the vertically movable member 905 is connected to the arms 117a, 117a extending from the ends of the support bars 117, 117 by the pin 906, the screen
15 frame 118a is turnable around an axis orthogonal to the direction of squeegee travel at one side and at the other side in the squeegeeing direction or direction of squeegee travel (direction indicated by an arrow in FIG. 3).

20 The pairs of squeegees 114, 114 arranged in the squeegeeing direction are moved together in the direction indicated by an arrow in FIG. 3. When the preceding squeegee is in a position raised or elevated from the screen 118b, namely in a state of non-squeegeeing, the
25 following squeegee is brought into contact with the

screen 118b to accomplish squeegeeing by pressure. The squeegees 114, 114 are operated for squeegeeing or is made inoperative for non-squeegeeing in a conventional manner. Therefore, their operation or non-operation is
5 not described more specifically.

In the practice of the invention, while the squeegee is moved forward in contact with the screen, the screen 118b is raised at the side of start of squeegeeing simultaneously with, or slightly later than, the start of
10 squeegeeing in order to achieve the intended purpose.

The screen can be moved upward for separation from the fabric in the manner described above.

The following results can be achieved by the method of separating the screen according to the
15 invention.

According to the method of the invention, the screen is raised with respect to the fabric for the separation of screen in the following manner. The separation of screen is initiated with a squeegee
20 positioned in close vicinity with one end of the screen frame 118a at the side of start of squeegee travel. Because the squeegee is positioned in close vicinity with one end of the screen frame 118a at the side of start of squeegee travel, the initial separation of screen occurs
25 at a shorter distance from the starting point than by

conventional methods with the screen more inclined and accordingly less or not tensioned.

Consequently the flip of screen is avoided at the moment of separation from the fabric according to the method of the invention unlike conventional methods. After initiation of separation without flipping, the screen is smoothly separated from the fabric by its upward movement in the manner described above while squeegeeing is carried out. Accordingly a satisfactory printing result can be achieved without lowering the operating rate in a printing cycle according to the present invention.

When the squeegee has advanced to the terminal position, the screen is completely separated. Subsequently after elevation of squeegee, the screen frame 118a is raised at its end from the other side than the side of start of squeegeeing until the screen 118b is suspended in the air as a whole together with the screen frame 118a above the fabric.

FIGS. 6 (A), (B) show the initial stage of squeegeeing and the intermediate stage of squeegeeing and separation of screen, respectively. FIGS. 7 (A), (B) illustrate the final stage of squeegeeing and the complete separation of screen from the fabric, respectively. The color paste is designated 30 in FIGS.

6 and 7.

The squeegee depicted in FIGS. 6 and 7 is advanced from the right side to the left side. The squeegee progressing from the left side to the right side is imaginable by substantially reversing the views.

According to the invention, the assembly of the screen frame and the support member is ascended and descended structurally independently of the other components of the printing unit. Due to this structure, the screen can be easily raised and lowered using a miniaturized actuator in the means for ascending and descending the screen, or in other words, in a simplified and facilitated manner.

In this way, a satisfactory printing result can be achieved in accordance with the invention without lowering the operating rate in a printing cycle, and the screen can be raised by miniaturized and simplified means for ascending and descending the screen.

What we claim is:

1. A method of separating a screen (118b) from the fabric (7) on a flat screen textile printing machine comprising: at least one flat screen (118b); an upwardly and downwardly movable screen frame (118a) having the screen (118b) stretched thereover; an endless belt (4) extending under the screen (118b) for transporting the fabric (7) to be printed on; a roller (3) having a starting end or head portion of the endless belt reeved therearound; and a roller (2) having a rear end or tail portion of the endless belt reeved therearound, at least one of the rollers (3), (2) being driven, the method being characterized in that while squeegeeing a color paste with squeegees, the screen frame is raised at the side of start of squeegeeing simultaneously with, or slightly later than, the start of squeegeeing, whereby the screen is separated from the fabric.

2. A device for separating a screen (118b) from the fabric (7) on a flat screen textile printing machine comprising: at least one flat screen (118b); an upwardly and downwardly movable screen frame (118a) having the screen (118b) stretched thereover; an endless belt (4) extending under the screen (118b) for transporting the fabric (7) to be printed on; a roller (3) having a starting end or head portion of the endless belt (4)



reeved therearound; and a roller (2) having a rear end or tail portion of the endless belt (4) reeved therearound, at least one of the rollers (3), (2) being driven, the device being characterized in that the screen frame

5 (118a) is ascended and descended by means (9) at the forward and backward ends of the screen frame (118a) in a direction of travel of squeegees (114) and that at least one of the forward and backward ends of the screen frame (118a) is connected to said means (9) so that the end of

10 the screen frame (118a) is turnable around an axis orthogonal to the direction of squeegee travel.

