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(54) **Method for washing and exchanging screen frames in an automatic screen printing machine and apparatus therefor.**

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Description

This invention relates to a method and an apparatus for washing and exchanging of screen frames in an automatic screen printing machine, wherein the washing, drying, holding, and taking-out of a screen frame are effected efficiently according to an operation and work cycle of the printing machine.

Detaching, washing and moving operations for screen frames have been pointed out as the works which are most delayed in the automation and considered to be irrational in the printing step of an automatic screen printing machine. In recent years, with a prevalence of screen frame washing machines, the washing step alone has been almost automated. The detachment from the printing machine and the mounting on the printing machine, the movement to the washing machine or the movement to a screen frame receiving track, and the water-wiping after washing and the drying are oil carried out by hand. Furthermore, the amount of lots in textile printing decreased in the recent years and the number of colors to be printed tends to be increased. Thus, the loss of time in exchanging and washing screen frames for the change of colors or patterns tends to increase, and the work efficiency decreases in the printing machine and as a result, the decrease in the print productivity becomes a problem.

Such works as exchanging, washing, drying, holding and taking-out of screen frames in an automatic screen printing machine have previously been carried out mostly by hand because a system for rationalizing these preparative operations in the automatic screen printing machine have not been developed, and are wholly entrusted to the judgment and manual work of the printing machine operators.

The present inventors have found that such works as exchanging, washing, drying, holding and taking-out of screen frames have a certain regularity, and by utilizing this regularity, various operations such as the exchange of a screen frame can be carried out efficiently and rationally without any load to an operator.

It is an object of this invention to greatly increase the operational efficiency of a printing machine by increasing the efficiency and saving labors in works inevitably involved in a printing operation of an automatic screen printing machine, such as exchanging, washing, drying, holding and taking-out of screen frames, especially planning automation of these operations.

It is another object of this invention to provide an exchange apparatus for a screen frame in which the above preparatory operations involved with an automatic screen printing operation can be carried out without a loss of time, the printing operation being able to be continued during the time of these preparative operations, and the working environment is not contaminated by color pastes, etc.

Still another object of this invention is to provide an exchange apparatus in which the taking-out and holding of a screen frame can be carried out according to the sequence by which a screen is attached to an automatic screen printing machine.

According to this invention, there is provided a method of washing and exchanging screen frames in an automatic screen printing machine, which comprises

arranging a first screen frame conveying passage and a second screen frame conveying passage along the automatic screen printing machine,

arranging regions of washing and drying the screen frame between the discharging end of the second screen frame conveying passage and the feed end of the first screen frame conveying passage, a temporary pooling portion through which the screen frame is movable between the discharge end portion and the washing and drying regions, a switch-over feed mechanism for the screen frame between the washing and drying regions and the feed end portion, and a holding portion through which the screen frame is movable and is led to the first screen frame conveying passage,

transferring the screen frame used in the automatic printing machine to the second screen frame conveying passage and conveying said screen frame to the temporary pooling portion;

feeding the screen frame pooled temporarily in the temporary pooling portion to the washing and drying regions to wash and dry the screen frame and discharging the washed screen frame to a switch-over feed mechanism,

at the time of color changing, feeding the washed screen frame from the switch-over feed mechanism to a predetermined position of the automatic screen printing machine or its vicinity through the first screen frame conveying passage; and

at the time of pattern changing, feeding the screen frame in the holding portion to a predetermined position of the automatic screen printing machine or its vicinity through the first switch-over feed mechanism and the first screen frame conveying passage, and transferring the washed screen frame to the holding portion by the switch-over feed mechanism, and holding the washed screen frame in the holding portion. A preferred embodiment of the above method is described in present claim 2.

According to this invention, there is also provided an apparatus for washing and exchanging screen frames, having a first screen frame convey-

ing passage and a second screen frame conveying passage, arranged in the repeat feeding direction of an automatic screen printing machine, and a washing apparatus and a drying apparatus for a screen frame, arranged between the discharge end portion of the second screen frame conveying passage and the feed end portion of the first screen frame conveying passage, wherein

a temporary pooling apparatus for the screen frame is arranged for movably supporting the screen frame between the discharge end portion and the washing and drying apparatuses, and a rotating feed apparatus is arranged for half-rotating the screen frame from the temporary pooling apparatus to the washing and drying apparatuses,

a screen frame turning round apparatus for turning round the washed screen frame is arranged between the washing and drying apparatuses and the feed end portion, and a switch-over feed mechanism is arranged for switching over the movement of the screen frame, and

a holding apparatus for movably holding the screen frame is connected to the switch-over feed mechanism.

A first characteristic feature of the screen frame washing and exchanging method and apparatus of this invention resides in that a first screen frame conveying passage and a second screen frame conveying passage are arranged along a repeat feed direction of the automatic screen printing machine, and regions for washing and drying the screen frame are disposed between the discharge end portion of the second screen frame conveying passage and the feed end portion of the first screen frame conveying passage.

All of such operations as mounting and dismounting of a screen frame for pattern changing on the automatic screen printing machine, exchanging of a screen frame and pattern changing on the same screen are started on the mounting and dismounting operations of the screen frame to the automatic screen printing machine. In the present invention, by providing a first screen frame conveying passage and a second screen frame conveying passage in a repeat feed direction of the automatic screen printing machine, the mounting and dismounting operations become possible by a screen frame handling apparatus at any desired position of the automatic screen printing machine. The delivery of the screen to and from this mounting or dismounting position can be conducted easily without a loss of time.

The screen frame to be dismounted from the automatic screen printing machine inevitably has a color paste adhering thereto. Hence, when color changing is performed on the same screen or when a screen is held, the adhering paste should be removed. In the present invention in the vicinity of the discharge end of the second screen frame conveying passage, the washing and drying apparatuses for the screen frame are provided. Therefore, the screen frame is washed and dried at the same time as the delivery of the screen, and for washing and drying, particular labors or time is not necessary. When color changing is to be carried out by using the same screen frame, the washed and dried screen frame is again fed to an arbitrary position of the automatic screen printing machine through the first screen frame conveying passage.

The second characteristic feature of the method and apparatus of this invention is that a temporary pooling portion through which the screen frame is movable is provided between the discharge end portion of the second screen frame conveying passage and the washing and drying regions of the screen frame. The provision of this pooling portion makes it possible to separate the screen frame washing and drying steps and the screen frame discharging and feeding steps, and while the discharging of the screen frame used is carried out on one hand, the washing and drying of a screen frame to which a color paste adheres can be carried out sufficiently with an ample time.

A third characteristic feature of the method and apparatus of this invention is that the screen frame switch-over feed mechanism is provided between the washing and drying regions and the feed end portion of the first screen frame conveying passage, and the holding portion having a movable screen frame, which joins to the screen frame feed mechanism, is also provided. The screen frames after washing and drying must be re-distributed to the automatic screen printing machine at the time of color changing (A), and at the time of pattern changing, the used screen frames must be held (B). Furthermore, at the time of pattern changing, it is necessary to take out a new screen frame. Since in this invention the screen frame switch-over feed mechanism is provided between the washing and drying regions for the screen frames and the feed end portion of the first screen frame conveying passage, the above-mentioned three operations become possible. Furthermore, since the holding portion where the screen frame is movable or the temporary pooling portion is provided, the screen frames can be held and taken out very smoothly without any time loss.

According to this invention, the foregoing features relate to one another, and in color changing, the washed screen frame is fed to a predetermined position of the automatic screen printing machine or its vicinity from the switch-over feed mechanism through the first screen frame conveying passage. In pattern changing, the screen frame in the holding portion is fed to a predetermined position of the

automatic screen printing machine or its vicinity through the switch-over feed mechanism or the first screen frame conveying passage, and at the same time, the washed screen frame can be received in the holding portion through the switch-over feed mechanism.

According to this invention, the foregoing operations are synthetically combined, and the efficiency and labor of operations necessarily involved in the automatic screen printing, such as the exchanging, washing, drying, holding and taking-out of screen frames, particularly the automation thereof, become possible, and increase of the operational efficiency and rationalization of the printing machine can be attained. This leads to the advantage that the above preparative operations can be achieved without a loss of time and without contaminating the working environment with a color paste. Since the printing operation can be continued during the washing and drying of the screen frames, this enables preparatory operations and the textile printing operation to be performed alternatively. Hence, the operational efficiency of the printing machine can be greatly increased.

In the following the present invention is specifically described on the basis of the accompanying drawing.

Figure 1 is a side elevation of a screen frame washing and exchanging apparatus of an automatic screen printing machine according to the present invention.

In Figure 1 showing the entire arrangement of the apparatus, the automatic screen printing device 1 consists of an endless belt 4 for supporting and intermittently or continuously feeding a textile cloth 5 in a repeat feeding direction, a textile cloth introducing apparatus 2 for introducing the textile cloth 5 to the automatic screen printing machine, an adhering roller 3 for making the textile cloth adhere to the endless belt 4, and a screen frame 6 for applying a color paste to the textile cloth 5 on the endless belt 4.

In the repeat feeding direction of the automatic screen printing machine, a first screen frame conveying passage 9, 10 and a second screen frame conveying passage 7, 8 are provided. The first screen frame conveying passage 9, 10 is composed of an upper guide rail 9, and an upper belt conveyer 10 supporting and driving the screen frame along this guide rail. Likewise, the second screen frame conveying passage 7, 8 consists of a lower guide rail 7 and a lower belt conveyer 8 which supports and drives the screen frame along this guide rail.

A washing apparatus 31 and a drying apparatus 41 for the screen frame are provided between the discharge end portion of the second screen frame conveying passage 7, 8 and the feed end portion of the first screen frame conveying passage 9, 10. The washing apparatus 31 consists of a belt conveyer 32 for holding and conveying the screen frame and washing units 33 provided on the upper and lower sides of the screen frame. In each washing unit 33 a circulating shower pipe 34 is provided on the upstream side and a pure water shower pipe 37 is provided on the downstream side, and intermediate between them, an upper brush roller 35 and a lower brush roller 36 are provided so as to wash out the color paste adhering to the screen surface. Following the washing apparatus, there is disposed the drying apparatus 41. The drying apparatus 41 consists of a belt conveyer 42 for holding and conveying the screen frame and air nozzles 43 provided on the upper and lower sides of the screen frame. The air nozzle is for drying up the water droplets adhering to the screen. The air may be air at room temperature or hot air.

In the present invention, between the discharge end portions of the second screen frame conveying passage 7, 8 and the washing apparatus 31 and the drying apparatus, a temporary pooling device 11 for the screen frame is provided which device movably supports the screen frames. In the specific example shown in Figure 1, the temporarily pooling apparatus 11 for the screen frame, a so-called lifting stocker, is arranged above the discharge end portion of the second screen frame conveying passage 7, 8. This apparatus is provided with a lifting conveyer 12 elevating stepwise a screen frame in its interior and a conveyer driving system 13 for driving the conveyer. On the upper portion of the lifting stocker 11 there is provided a thrust apparatus 14 for thrusting out the screen frame which reaches the highest portion. Thus, the screen frame 6 conveyed through the second screen frame feeding passage 7, 8 gradually ascends by predetermined steps by the lifting conveyer 12 and then reaches the highest portion, and is thrust out from the thrust apparatus 14.

In the present invention, a rotating feed apparatus (rotary unit) 21 is disposed for half-rotating the screen frame 6 from the temporary pooling apparatus 11 to feed it to the washing and drying apparatuses 31 and 41. Since a color paste adhere in a large amount to the upper surface of the screen, by turning this side and washing it, the removal and washing of the color paste can be performed effectively. In this specific embodiment, the rotating feed apparatus 21 is a rotary unit composed of a pair of belt conveyers 23 holding a screen unit and a rotary frame 22 which rotatably supports the belt conveyer. The pair of belt conveyer 23 receive the screen frame 6 from the temporary pooling apparatus 11, and is half-rotated and is driven to feed the screen frame to the washing and drying apparatuses 31 and 41.

A screen frame reversing apparatus rotary frame 52 for reversing a washed screen frame to the original state and a switch-over feed mechanism 51 for switching-over the movement of a screen frame are arranged between the washing and drying apparatuses 31 and 41 and the feed end portion of the first screen frame conveying passage 9, 10. In this embodiment, the screen frame reversing apparatus 52 is built in the switch-over feed mechanism (lifting rotary unit) 51. This reversing apparatus 52 is provided with a pair of belt conveyers 53 movable to and fro, which is disposed rotatably to the machine frame of the switch-over feed mechanism 51 and elevatably by a roller chain 55. To drive the roller chain 55, a driving device 54 is provided. The switch-over feed mechanism 51 is switched over in the driving so that the following three actions are done. (I) When the screen frame 6 is received from the drying apparatus 41 and the pair of belt conveyers is half-rotated, it is elevated by the roller chain 55 and the screen frame is fed to the feed end portions of the first screen frame conveying passage 9, 10. (II) The pair of belt conveyers 53 receives the screen frame 6 from the drying apparatus 41, and is then half-rotated. It is then driven horizontally and feeds the screen frame to a screen frame holding apparatus (stocker unit) 61. (III) The pair of belt conveyers 53 receives the screen frame 6 from the screen frame holding apparatus 61, and without half-rotation, it is elevatingly driven by the roller chain 55 and feeds the screen frame to the feed end portion of the first screen frame conveying passage 9, 10.

In the present invention, the screen frame holding apparatus 61 which supports a screen movably is connected to the switch-over feed mechanism 51 which switches over the movement of the screen frame. In this embodiment, the holding apparatus is composed of a stocker unit. A lifting frame 62 supporting the screen frame is provided elevatingly by a ball screw 63 to be driven by a driving apparatus 64. In this stocker unit 61, screen frames for pattern changing are received according to the sequence of arrangement to the automatic screen printing machine, and when they are elevated to the uppermost position by the lifting frame, they are transferred to the belt conveyer 53 by the thrust apparatus 65. The used screen frames are received according to the arrangement to the screen printing machine. In the embodiment shown in the drawing, the stocker unit 61 is fixed, and the laminated screen frames can be mounted or dismounted. The stocker unit 61 may be movably mounted.

The structure and operation of the printing machine, such as the automatic screen printing apparatus 1 and the cloth introducing apparatus 2, are known, and these known ones may be used.

The lower belt conveyor 8, the upper belt conveyor 10 and belt conveyers 23, 32, 42 and 53 are made of a resin belt having a narrow width, and those on which both sides of the screen frame are carried and conveyed are preferred. By this, the receipt and delivery of screen frames among the apparatuses, and their washing and drying can be carried out without any hindrance.

A complete cover, not shown, to eliminate dropped color pastes and dirty waters is provided below each of the lower guide rail 7, the lifting stocker 11, the rotary unit 21, the washing apparatus 31, and the drying apparatus 41.

Elevating and lowering machines, such as the lifting conveyer 12 of the lifting stocker (pooling device) 11, the roller chain 55 of the lifting rotary unit 51, and the ball screw 63 of the stocker unit 61 are not limited to these specific examples, and may be other suitable devices.

The specific embodiment shown in the drawing is one in which the apparatus of this invention is disposed in the front portion of the printing machine (on the side of the introduction apparatus), but it may also be disposed in the rear portion of the printing machine (on the side of the dryer). The driving mechanisms and control apparatuses are disposed for driving and controlling every apparatus to cope with the operational and working cycle. These driving mechanisms and control devices may be known ones, and their illustration and explanation is omitted.

The screen frame exchanging apparatus of the invention is provided with the above-mentioned mechanisms, and these mechanisms may be operated by manual operation, mechanically, or by a hydraulic circuit or an electrical circuit. Of course, the driving of these mechanisms may be automatically controlled by the assistance of a computer or a sequencer, and it is possible to exchange, wash, dry, hold, and take out screen frames automatically according to the operational and working cycle of the automatic screen printing machine. Holding and taking-out of screen frames can be performed at the positions of the first screen frame conveying passage 9, 10, the positions of the second screen frame conveying passage 7, 8, or intermediate portions thereof.

In the embodiment shown in the drawing, the second screen frame conveying mechanisms are arranged in the lower portion and the first screen frame conveying passage are arranged in the upper portion. By sequencing this arrangement conversely, it is possible to arrange the first screen frame conveying passage in the upper portion and the second screen frame conveying passage in the lower portion.

The use of the present invention is as follows:

(1) During textile printing of A pattern in a color a by the automatic screen printing machine, screen frames for B pattern are thrust one by one from the stocker unit 61 by the thrust apparatus 65, and by the lifting rotary unit 51, the frames are automatically fed and arranged according to the screen printing sequence on the upper belt conveyor 10, and are allowed to stand by.

(2) When printing of A pattern in color a is over, the operator carries the used screen frame on the lower belt conveyer 8 according to the printing sequence.

(3) When all of the screens have been loaded, the lower belt conveyer 8 proceeds in the direction of the arrows, and the screen frames are sent to the lifting stocker 11 according to the sequence. In the lifting stocker 11 the lifting conveyer 12 with an attachment rises step by step to temporarily hold all the screen frames for A pattern.

(4) When the above action is over, the B pattern screen frame standing by on the upper belt conveyer 10 is transferred to the lower belt conveyer 8 by a screen frame lowering apparatus (not shown), and according to the printing sequence, the screen frame is conveyed to a predetermined position.

(5) The operator sets the conveyed screen frame of the B pattern to a predetermined position on the printing machine, and begins to print B pattern in color a. The screen frame for pattern A in color a previously dyed is automatically washed and treated by the method described in the next section. Thus, the operator can devote himself to the printing of the B pattern in color a.

(6) During the printing of B pattern in color a, the A pattern screen frame temporarily held in the lifting stocker 11 is transferred to the rotary unit 21 one by one by the thrust apparatus 14. In the rotary unit 21, the lower belt conveyor 23 is operated in a direction in which the upper and lower belt conveyers take up the screen frame.

(7) The screen frame of A pattern taken up by the rotary unit 21 is reversed upside and downside so that washing and water draining are easily performed in the next step. The reversal is carried out by turning the rotary frame 22, on which the belt conveyer 23 and its driving apparatus (drawing omitted) are loaded, in the arrow direction.

The rotary frame 22 has a stopper provided on one side in taking out a screen frame. The stopper swerves always in a downward direction so that the screen frame may not fall down during swerving.

(8) When the reversal of the screen frame is over, the belt conveyer 23 of the rotary unit 21 is rotated backward in a direction in which the screen frame is thrust in the direction of the washing apparatus 31. The belt conveyer 32 receives the screen frame, and sends it to the washing unit 33.

(9) The washing unit 33 has two brush rollers 35 and 36 and shower pipes 34 and 37. From the shower pipe 34, a circulating (not shown) supplies water for utilizing waste water again, and onto the other shower pipe 37, pure water is supplied for rinsing and washing of the screen frame is automatically performed. The washing unit 33 may pass the screen frame therethrough at a position fixed, or the screen frame may be temporarily fixed and the washing unit 33 may be moved to the left and right of the drawing.

(10) The washed screen frame is sent to the drying apparatus 41 by the belt conveyor 32. High-velocity air is sprayed to the upper and lower surfaces of the screen frame in the drying apparatus 41 to scatter water. The air nozzle 43 is connected to a turbo-blower (not shown) and has such a structure that it blows high-velocity air of at least 100 meters/second uniformly from a slit. The supplied air may effectively be somewhat heated.

(11) The washed and dried screen frame of A pattern is then sent to the next lifting rotary unit 51, and is again reversed up and down again so as to perform screen printing. In this case, like the rotary unit 21, the belt conveyor 53, etc. are together reversed by swerving the reversing apparatus 52.

Both sides of the reversing apparatus 52 are provided with openable-closable stoppers which can be opened or closed by an air cylinder, and according to the advancing direction of the screen frame, any one of them automatically acts as a stopper.

In the above case, the screen frame advances from the left of the drawing, and the right stopper is closed and the left stopper is open. The reversing apparatus 52 swerves in the direction of the arrow. As will be mentioned below, when a screen of a new pattern is taken out from the stoker unit 61, the left stopper is open and the right stopper is closed.

(12) A Pattern screen frames washed, dried and turned over as above are lifted one by one by this lifting rotary unit 51, and delivered to the upper belt conveyer 10. They are arranged on the upper belt conveyer 10 according to the sequence of screen printing by A pattern screen frames, and are allowed to stand by until the screen printing of B pattern in color a is completed.

(13) When the screen printing of B pattern in color a is over on the printing machine 1, the routine returns to step (2). The used screen frames are loaded on the lower belt conveyer 8, and the above step (3) and the subsequent steps are repeated according to the same sequence, whereby printing of A pattern of color b, printing of B pattern of color b, and printing of A pattern of color C are alternatively carried out. During this printing operation, preparative operations such as washing of used screen frames, drying and feeding are automatically performed.

(14) When the printing of A pattern in various colors is over and the printing of B pattern begins, there is no screen frame on the upper belt conveyer 10. Next, screen frames of new C pattern are thrust one by one by the thrusting apparatus 65 into the rotary frame 52 of the lifting rotary unit 51. In this case, without reversing, they are lifted to the height of the upper belt conveyer 10, and according to the printing sequence all screen frames of C pattern are arranged and allowed to stand still on the belt conveyor 10.

(15) As soon as the C pattern screen frame is transferred from the stocker unit 61 and the stocker unit 61 becomes empty, the screen frames of A pattern of a final color standing by in the lifting stocker 11 are washed and dried in the same manner as described above, and then they are reversed upside and downside and received by the lifting rotary unit 51 to stocker unit 61 one by one. In this case, the lifting frame 62 is gradually lowered for every one screen frame by the rotation of the ball screw 63.

(16) When all of the screen frames having A pattern have been received, the lifting frame 62 of the stocker unit 61 is lowered to the lower portion by the ball screw 63. Screen frames having A pattern are taken out, and in exchange, screen frames of D pattern are set. They are again elevated and allowed to stand by at a predetermined position.

(17) When all patterns B of a predetermined color are printed out, C patterns of color a and D patterns of color a are alternatively printed by the same sequences and steps as described above.

During this time, it is sufficient for the operator only to set and dismount screens onto and from the screen printing zone. Previously three operators were required during 15 to 30 minutes for completing a color changing operation including screen frame washing. By this invention, one operator is required during about 12 minutes for this operation (for 8-color screen printing).

(18) The above automatic operation cycle can be performed automatically according to the screen printing work cycle in response to the instructions of a computer if data such as a pattern number, a coloring number, and a color number (the number of screen frames) are inputted to a terminal device attached to an operating board of the screen printing machine. The upper portion of the stocker unit 61 is not shown in the drawing, but a bar code reader is provided at this portion. After the pattern number and the pattern sequence have been confirmed by a bar code mark attached to each screen frame, they may be discharged from the stocker unit 61.

According to this invention there are provided, along the automatic screen printing machine, an arrangement of a first screen frame conveying passage and a second screen frame conveying passage, the screen frame washing and drying regions between the feed end portions of the second screen conveying passages and the feed end portions of the first screen frame conveying passages, a temporary pooling portion through which the screen frame is movable between the discharge end portions and the washing and drying regions, a switch-over feed mechanism between the washing and drying regions and the feed end portions, and the holding portion, through which the screen frame is movable, leading to the feed mechanism of the screen frame, whereby it is provided that the screen frames may be moved at a certain sequence. The exchanging, washing, drying, holding and discharging of screen frames can be carried out efficiently without a loss of time according to the operation and work cycle of the automatic screen printing machine.

Thus, various operations in the screen printing, for example, when colors are changed by using the same pattern, operations of taking out, washing and drying used screen frames and returning them to the same position, or when screen printing of one pattern with all colors is over, operations of taking out the used screen frames, washing and drying them and holding them in the holding rack apparatus, and when screen printing with a new screen is to be begun, operations of taking out the screen frames from the holding rack apparatus, and delivering them to a predetermined position of the screen printing machine, can be carried out with a high efficiency according to the program of the screen printing operation.

Claims

1. A method for washing and exchanging screen frames (6) in an automatic screen printing machine (1), characterized by

arranging a first screen frame conveying passage (9,10) and a second screen frame conveying passage (7,8) along the automatic screen printing machine (1);
arranging regions of washing and drying the screen frame (6) between the discharging end of the second screen frame conveying passage (7,8) and the feed end of the first screen frame conveying passage (9,10), a temporary pooling portion through which the screen frame (6) is movable between the discharge end portion and the washing and drying regions, a switch-over feed mechanism (51) for the screen frame (6) between the washing and drying regions and the feed end portion, and a holding portion through which the screen frame (6) is movable and is led to the first screen frame conveying passage (9,10);
transferring the screen frame (6) used in the automatic screen printing machine (1) to the second screen frame conveying passage (7,8) and conveying said screen frame (6) to the temporary pooling portion;
feeding the screen frame (6) pooled temporarily in the temporary pooling portion to the washing and drying regions to wash and dry the screen frame (6) and discharging the washed screen frame (6) to a switch-over feed mechanism (51);
at the time of color changing, feeding the washed screen frame (6) from the switch-over feed mechanism (51) to a predetermined position of the automatic screen printing machine (1) or its vicinity through the first screen frame conveying passage (9, 10); and
at the time of pattern changing, feeding the screen frame (6) in the holding portion to a predetermined position of the automatic screen printing machine (1) or its vicinity through the switch-over feed mechanism (51) and the first screen frame conveying passage (9,10), and transferring the washed screen frame (6) to the holding portion by the switch-over feed mechanism (51) and holding the washed screen frame (6) in the holding portion.

2. A method according to claim 1, wherein the screen frame (6) temporarily pooled in the pooling portion is half-rotated to feed it to the washing and drying regions, and the washed screen frame (6) is turned over to thrust it to the first screen frame conveying passage (9,10).

3. An apparatus for washing and exchanging screen frames (6), having a first screen frame conveying passage (9,10) and a second screen frame conveying passage (7,8), arranged in the repeat feeding direction of an automatic screen printing machine (1), and a washing apparatus (31) and a drying apparatus (41) for a screen frame (6), arranged between the discharge end portion of the second screen frame conveying passage (7,8) and the feed end portion of the first screen frame conveying passage (9,10), wherein
a temporary pooling apparatus (11) for the screen frame (6) is arranged for movably supporting the screen frame (6) between the discharge end portion and the washing and drying apparatuses (31,41), and a rotating feed apparatus (21) is arranged for half-rotating the screen frame (6) from the temporary pooling apparatus (11) to the washing and drying apparatuses (31,41);
a screen frame turning round apparatus (52) for turning round the washed screen frame (6) is arranged between the washing and drying apparatuses (31, 41) and the feed end portion,
a switch-over feed mechanism (51) is arranged for switching-over the movement of the screen frame (6); and
a holding apparatus (61) for movably holding the screen frame (6) is connected to the switch-over feed mechanism (51).

Patentansprüche

1. Verfahren zum Waschen und Wechseln von Siebdruckrahmen (6) in einer automatischen Siebdruckmaschine (1), gekennzeichnet durch
Anordnen eines ersten Siebdruckrahmen-Transportdurchgangs (9, 10) und eines zweiten Siebdruckrahmen-Transportdurchgangs (7, 8) entlang der automatischen Siebdruckmaschine (1);
Anordnen von Bereichen zum Waschen und Trocknen des Siebdruckrahmens (6) zwischen dem Entnahmeende des zweiten Siebdruckrahmen-Transportdurchgangs (7, 8) und dem Zufuhrende des ersten Siebdruckrahmen-Transportdurchgangs (9, 10), eines temporären Sammelbereichs, durch den der Siebdruckrahmen (6) zwischen dem Entnahmeendbereich und den Wasch- und Trocknungsbereichen bewegbar ist, eines Umschaltzufuhrmechanismus (51) für den Siebdruckrahmen (6) zwischen den Wasch- und Trocknungsbereichen und dem Zufuhrendbereich und eines Haltebereichs, durch den der Siebdruckrahmen (6) bewegbar ist und zum ersten Siebdruckrahmen-Transportdurchgang (9, 10) geführt wird;
Überführen des in der automatischen Siebdruckmaschine (1) benutzten Siebdruckrahmens (6) auf den zweiten Siebdruckrahmen-Transportdurchgang (7, 8) und Transportieren

des Siebdruckrahmens (6) zum temporären Sammelbereich;
Zuführen des temporär im temporären Sammelbereich gesammelten Siebdruckrahmens (6) zu den Wasch- und Trocknungsbereichen, um den Siebdruckrahmen (6) zu waschen und zu trocknen und Entladen des gewaschenen Siebdruckrahmens (6) in einen Umschaltzufuhrmechanismus (51);
zum Zeitpunkt des Farbwechsels Zuführen des gewaschenen Siebdruckrahmens (6) aus dem Umschaltzufuhrmechanismus (51) in eine vorbestimmte Position der automatischen Siebdruckmaschine (1) oder in die Nähe davon durch den ersten Siebdruckrahmen-Transportdurchgang (9, 10); und
zum Zeitpunkt des Musterwechsels Zuführen des im Haltebereich befindlichen Siebdruckrahmens (6) zu einer vorbestimmten Position der automatischen Siebdruckmaschine (1) oder in die Nähe davon durch den Umschaltzufuhrmechanismus (51) und den ersten Siebdruckrahmen-Transportdurchgang (9, 10) und Überführen des gewaschenen Siebdruckrahmens (6) in den Haltebereich durch den Umschaltzufuhrmechanismus (51) und Halten des gewaschenen Siebdruckrahmens (6) im Haltebereich.

2. Verfahren nach Anspruch 1, wobei der temporär im Sammelbereich gesammelte Siebdruckrahmen (6) einer Halbdrehung unterzogen wird, um ihn den Wasch- und Trocknungsbereichen zuzuführen, und der gewaschene Siebdruckrahmen (6) gewendet wird, um ihn in den ersten Siebdruckrahmen-Transportddurchgang (9, 10) auszustoßen.

3. Vorrichtung zum Waschen und Wechseln von Siebdruckrahmen (6) mit einem ersten Siebdruckrahmen-Transportdurchgang (9, 10) und einem zweiten Siebdruckrahmen-Transportdurchgang (7, 8), die in der Wiederholungszufuhrrichtung einer automatischen Siebdruckmaschine (1) angeordnet sind, und einer Waschvorrichtung (31) und einer Trocknungsvorrichtung (41) für einen Siebdruckrahmen (6), die zwischen dem Entnahmeendbereich des zweiten Siebdruckrahmen-Transportdurchgangs (7, 8) und dem Zufuhrendbereich des ersten Siebdruckrahmen-Transportdurchgangs (9, 10) angeordnet sind, wobei
eine temporäre Sammelvorrichtung (11) zum beweglichen Halten des Siebdruckrahmens (6) zwischen dem Entnahmeendbereich und den Wasch- und Trocknungsvorrichtungen (31, 41) angeordnet ist, und eine Drehzufuhrvorrichtung (21) zur Durchführung einer Halbdrehung des Siebdruckrahmens (6) von der temporären Sammelvorrichtung (11) zu den Wasch- und Trocknungsvorrichtungen (31, 41) angeordnet ist;
eine Siebdruckrahmen-Wendevorrichtung (52) zum Wenden des gewaschenen Siebdruckrahmens (6) zwischen den Wasch- und Trocknungsvorrichtungen (31, 41) und dem Zufuhrendbereich angeordnet ist;
ein Umschaltzufuhrmechanismus (51) zum Umschalten der Bewegung des Siebdruckrahmens (6) angeordnet ist; und
eine Haltevorrichtung (61) zum beweglichen Halten des Siebdruckrahmens (6) mit dem Umschaltzufuhrmechanismus (51) verbunden ist.

Revendications

1. Procédé de lavage et de changement de cadres de sérigraphie (6) dans une machine (1) automatique de sérigraphie, caractérisé par :
l'agencement d'un premier passage (9, 10) d'acheminement du cadre de sérigraphie et d'un deuxième passage (7, 8) d'acheminement du cadre de sérigraphie le long de la machine (1) automatique de sérigraphie;
l'agencement de régions de lavage et de séchage du cadre de sérigraphie (6) entre l'extrémité de décharge du deuxième passage (7, 8) d'acheminement du cadre de sérigraphie et l'extrémité d'amenée du premier passage (9, 10) d'acheminement du cadre de sérigraphie, d'une partie de regroupement temporaire par l'intermédiaire de laquelle le cadre de sérigraphie (6) est mobile entre la partie d'extrémité de décharge et les régions de lavage et de séchage, d'un mécanisme (51) d'amenée de commutation pour le cadre de sérigraphie (6) entre les régions de lavage et de séchage et la partie d'extrémité d'amenée, et d'une partie de maintien par l'intermédiaire de laquelle le cadre de sérigraphie (6) est mobile et est acheminé jusqu'au premier passage (9, 10) d'acheminement du cadre de sérigraphie ;
le transfert du cadre de sérigraphie (6) utilisé dans la machine (1) automatique de sérigraphie au deuxième passage (7, 8) d'acheminement du cadre de sérigraphie et l'acheminement dudit cadre de sérigraphie (6) jusqu'à la partie de regroupement temporaire ;
l'amenée du cadre de sérigraphie (6) temporairement regroupé dans la partie de regroupement temporaire jusqu'aux régions de lavage et de séchage, afin de laver et de sécher le cadre de sérigraphie (6) et la décharge du cadre de sérigraphie (6) lavé à un mécanisme (51) d'amenée de commutation ;
au moment du changement de couleurs,

l'amenée du cadre de sérigraphie (6) depuis le mécanisme (51) d'amenée de commutation jusqu'à une position prédéterminée de la machine (1) automatique de sérigraphie, ou dans son voisinage, par l'intermédiaire du premier passage (9, 10) d'acheminement du cadre de sérigraphie ; et

au moment du changement de motifs, l'amenée du cadre de sérigraphie (6) dans la partie de maintien jusqu'à une position prédéterminée de la machine (1) automatique de sérigraphie, ou dans son voisinage, par l'intermédiaire du mécanisme (51) d'amenée de commutation et du premier passage (9, 10) d'acheminement du cadre de sérigraphie, et le transfert du cadre de sérigraphie (6) lavé à la partie de maintien grâce au mécanisme (51) d'amenée de commutation et le maintien du cadre de sérigraphie (6) lavé dans la partie de maintien.

2. Procédé selon la revendication 1, dans lequel le cadre de sérigraphie (6) temporairement regroupé dans la partie de regroupement subit une demi-rotation afin d'être acheminé jusqu'aux régions de lavage et de séchage, et le cadre de sérigraphie (6) lavé est retourné afin d'être poussé jusqu'au premier passage (9, 10) d'acheminement du cadre de sérigraphie.

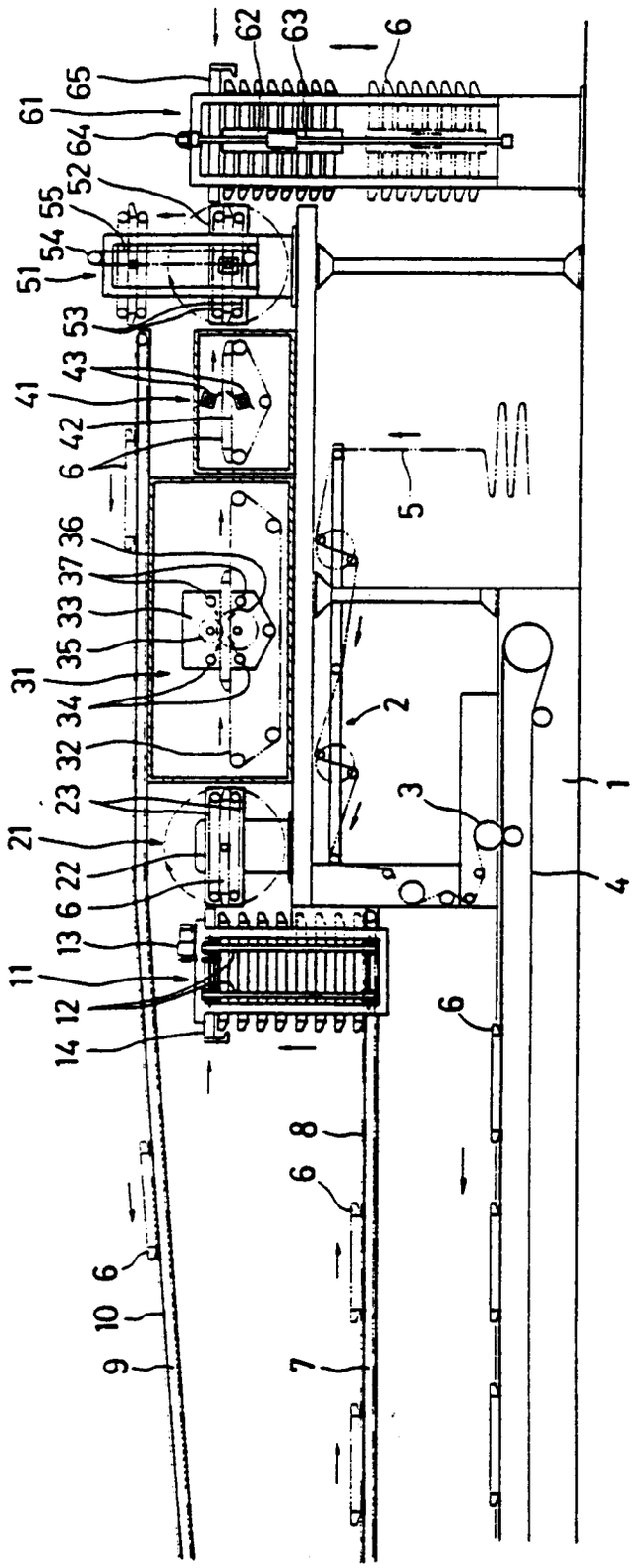
3. Appareil de lavage et de changement de cades de sérigraphie (6), comportant un premier passage (9, 10) d'acheminement du cadre de sérigraphie et un deuxième passage (7, 8) d'acheminement du cadre de sérigraphie, agencés dans la direction d'amenée de répétition d'une machine (1) automatique de sérigraphie, et un appareil de lavage (31) et un appareil de séchage (41) pour un cadre de sérigraphie (6), agencés entre la partie d'extrémité de décharge du deuxième passage (7, 8) d'acheminement du cadre de sérigraphie et la partie d'extrémité d'amenée du premier passage (9, 10) d'acheminement du cadre de sérigraphie, dans lequel un appareil de regroupement temporaire (11) pour le cadre de sérigraphie (6) est agencé afin de le (6) supporter de manière mobile entre la partie d'extrémité de décharge et les appareils (31, 41) de lavage et de séchage, et un appareil d'amenée rotatif (21) est agencé afin de faire subir une demi-rotation au cadre de sérigraphie (6) depuis l'appareil de regroupement temporaire (11) jusqu'aux appareils (31, 41) de lavage et de séchage ;

un appareil (52) de retournement du cadre de sérigraphie pour retourner le cadre de sérigraphie (6) lavé est agencé entre les appareils (31, 41) de lavage et de séchage et la partie d'extrémité d'amenée,

un mécanisme (51) d'amenée de commutation est agencé afin de commuter le déplacement du cadre de sérigraphie (6); et

un appareil de maintien (61) destiné à maintenir de manière mobile le cadre de sérigraphie (6) est relié au mécanisme (51) d'amenée de commutation.

FIG.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