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MACHINE FOR SCREEN PRINTING STEPWISE MOVABLE WEBS OF CLOTH

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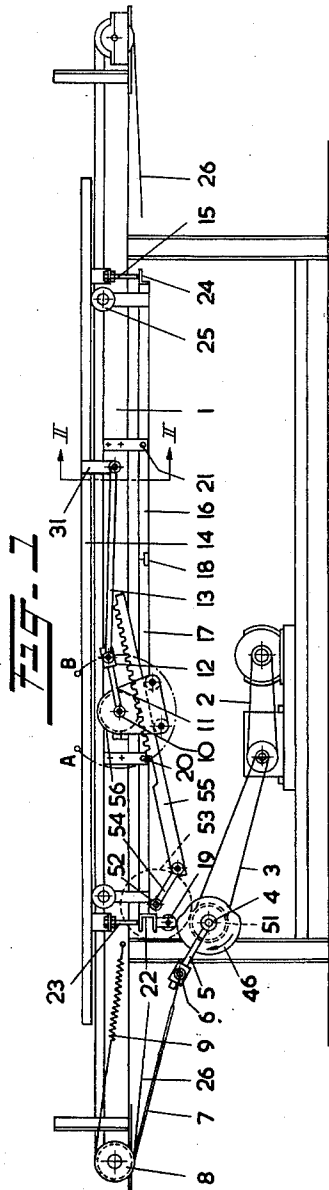


FIG. 4

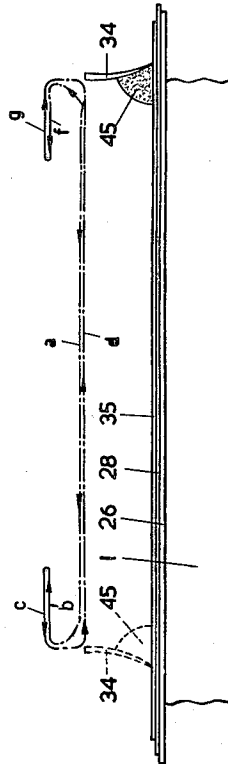
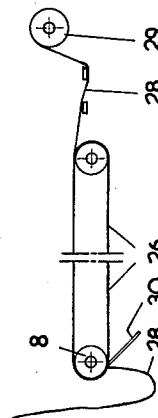


FIG. 1a



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2 Sheets-Sheet 2



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**MACHINE FOR SCREEN PRINTING STEPWISE
MOVABLE WEBS OF CLOTH**

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Claims priority, application Netherlands
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1 Claim. (Cl. 101—123)

This invention relates to a machine for screen printing stepwise movable webs of cloth comprising at least one squeegee driven with a non-uniform speed and arranged for reciprocatory movement over a liftable screen support, said squeegee being adapted to be lifted during the lifting of the screen support off the web of cloth, the movement of said web through the length of repeat and the lowering of said screen support onto said web, and being adapted to be driven continuously and to perform an even number of inoperative strokes in its lifted position to subsequently make a smaller number of operative strokes, the vertical movement of said squeegee being adapted to be controlled by a rotatable element provided on the shaft from which the horizontal movement of the squeegee is derived.

Actual practice has shown that this machine has a very great reliability owing to the very simple driving mechanism through which the various movements are continuously mechanically coupled. The superposition of the vertical squeegee movement on the horizontal squeegee movement opens up the possibility in any point of the operative squeegee stroke to adapt the spacing of the squeegee from the screen to the horizontal speed of the screen in said point and thus to correct the effect of the non-uniform squeegee movement on the printing result.

The object of this invention is to even improve said known machine.

In order to achieve this object according to the invention a transmission mechanism is provided between the shaft from which the horizontal movement of the squeegee is derived and the mechanism for horizontally driving the squeegee for alternating an even number of short inoperative squeegee strokes with a smaller number of longer operative squeegee strokes.

While the advantage that during the inoperative strokes the squeegee may get rid of the printing paste adhering thereto before the next operative squeegee stroke in the opposite direction commences is retained, the improvement opens up the possibility to so choose the length of the inoperative squeegee strokes that these do not take place above the stencilled portion (printing pattern) of the screen, so that printing paste that may possibly drip off the squeegee cannot fall on said stencilled portion of the screen.

It is true that it is possible to so compose the printing paste that the printing paste dripping off the squeegee onto the stencilled portion of the lifted screen will not cause any visible results in the printing, but it is advisable even to exclude the chance of results of this dripping off of the printing paste becoming visible, while retaining the initial advantages of the machine.

In order to elucidate the invention an embodiment thereof will be described with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side view of the screen printing machine;

2

Figure 1a shows the ends of the conveyor belt carrying the web of cloth to be printed;

Figure 2 is a large scale sectional view on line II—II in Figure 1;

Figure 3 is a diagrammatic view of the rotatable control element in the form of a cam;

Figure 4 is a diagrammatic showing of the squeegee movement;

Figure 5 is a plan view of the screen support.

According to the drawing the screen printing machine comprises a frame 1 having driving means 2 mounted thereon which via a chain 3 are adapted to drive the shaft 4 having an arm 5 secured thereto. Said arm 5 carries an adjustable sliding piece 6, to which one end of a chain 7 is secured, which chain is passed over a disc of a free wheel clutch 8 and which chain has its other end secured to a draw spring 9. The freewheel clutch 8 periodically drives the conveyor belt 26 to which the web of cloth 23 to be printed is temporarily attached.

To the shaft 4 a gear 51 is secured which via a transmission mechanism to be described hereinafter, drives a shaft 10 rotatably supported by the frame 1, which shaft 10 carries an arm 11 having an adjustable sliding piece 12 mounted thereon which via a connecting rod 13 and an arm 31 secured to the squeegee carrier 14 drives said squeegee carrier.

Beneath the squeegee carrier 14 there is a screen support 38 carrying a plurality of screens 47, 48, 49 (Figure 5) and to which by means of adjusting clamps 39 and connecting means 40 and 41 pairs of impact members 15 and 23 are secured. Said impact members are vertically adjustable by securing the clamps 39 to a different height on the angle irons 43.

Below the upper face of the frame 1 levers 16 and 17 are provided which at 18 are hinged to each other and which are rotatable about the journals 20 and 21 respectively. At their outward ends the levers 16 and 17 are coupled to each other by means of a transverse beam 24 and a transverse beam 22 respectively. The transverse beam 22 carries a roller 19 bearing on the periphery of a cam 46 secured on the shaft 4.

If upon rotation of the cam 46 the roller 19 is moved upwardly also the outward ends of the levers 16, 17 and the rollers 25 secured thereto, on which rollers the squeegee carrier 14 reciprocates, will also move upwardly. During this upward movement during which the squeegee carrier 14 moves away from the screen support 38 the transverse beams 22 and 24 at the ends of the levers 17 and 16 will after some time come into contact with the impact members 23 and 15, so that also the screen support 38 which until then rested on the conveyor belt 26, will be moved upwardly together with the squeegee carrier 14. In this manner first the lifting of the squeegee carrier 14 and thereafter, together with the squeegee carrier 14, the lifting of the screen support 38 is effected.

Conversely during the downward movement of the roller 19 from the uppermost position first the squeegee carrier 14 and the screen support 38 are together moved downwardly until the screen support 38 comes to rest on the conveyor belt 26 whereupon the squeegee carrier 14 alone continues its downward movement and approaches the screen support 38 more closely.

During the period when the screen support 38 is lifted off the conveyor belt 26, the conveyor belt 26 driven by the chain 7 and the freewheel clutch 8 together with the web of cloth 23 to be printed, which web is attached to said conveyor belt and is supplied from a supply roller 29, are moved over one length of repeat while the printed portion of the web is severed from the conveyor belt by a knife 30.

By means of clamps 32 a number of transverse bars

33 are secured to the squeegee carrier 14 (Figure 2), each bar carrying a squeegee 34.

The screen support 38 carries a number of screens each consisting of a frame 37 against the lower side of which a patterned piece of gauze 35 is secured.

Figure 5 shows three screens 47, 48 and 49 each meant for a certain colour print of a three colour pattern.

The squeegeeing of the printing paste 45 across a screen is effected in the manner as diagrammatically shown in Figure 4. Starting from the position of the squeegee 34 to the right in Figure 4 the printing paste 45 is pushed across the screen gauze 35 during the operative squeegee stroke *a*. Towards the end of the operative stroke *a* of the squeegee the squeegee while leaving the printing paste on the screen gauze is lifted relative to said gauze for carrying out the short inoperative strokes *b* and *c*. At the end of the stroke *c* the squeegee is moved downwardly relatively to the screen gauze to come to rest behind the printing paste left behind and to push back said paste towards its initial position during the subsequent operative stroke *d*.

Towards the end of the operative stroke *d* the squeegee while again leaving the printing paste on the screen gauze will again be lifted relative to said gauze to perform the short inoperative strokes *g* and *f* and to be lowered again relative to the screen gauze and to come to rest behind the printing paste. If during each pair of short inoperative strokes during which the conveyor belt 26 together with the web of cloth 28 to be printed is moved over a length of repeat *e* (Figure 5) printing paste drips off the squeegee 34 said printing paste owing to the short length of the inoperative strokes of the squeegee will never drop onto the patterned, or onto the open portion of the screen gauze, so that the printing effect is not jeopardized by this dripping off of paste.

In combination with the vertical reciprocatory movements of the squeegee carrier 14 and the screen support 38 which are derived from the suitably chosen periphery of the cam 46 on which the roller 19 is supported and synchronized relatively thereto the horizontal reciprocatory movement of the squeegee carrier 14 is effected by the transmission mechanism between the gear 51 mounted on the shaft 4 and the shaft 10. In the embodiment shown this transmission mechanism comprises a shaft 52 rotatably supported by the machine frame 1, on

which shaft a gear 53 in mesh with the gear 51 and an arm 54 are secured. The gear 53 has twice as many teeth as the gear 51.

The end of the arm 54 is hinged to the one end of a rack 55 which is in engagement with a pinion 56 secured to the shaft 10. The diameter and the number of teeth of the pinion 56 are so chosen that upon continuous rotation of the gear 53 the pinion 56 and therefore the shaft 10 and the arm 11 perform a rocking movement covering the arc of a circle A—B of more than 180°. Owing to the rocking movement of the arm 11 the squeegee carrier 14 driven by said arm 11 via the connecting rod 13 will each time perform a long (operative) stroke alternating with two short (inoperative) strokes. By interchanging the pinion 56 for a pinion having a different diameter and/or a different number of teeth the length of the short (inoperative) strokes of the squeegee carrier and, therefore, of the squeegees may be determined at will.

It will meanwhile be clear that there is a great degree of freedom in the structural embodiment of the transmission mechanism between the gear 51 and the shaft 10 for obtaining the alternation of a long and two short strokes of the squeegee carrier.

I claim:

A machine for screen printing a web of cloth movable step by step, comprising at least one squeegee, a mechanism for continuously reciprocally driving said squeegee at a non-uniform speed through an even number of inoperative strokes and a subsequent number of operative strokes less than said number of inoperative strokes, a shaft for driving said squeegee driving mechanism, a liftable screen support along which said squeegee is driven, means for lifting said screen off the web of cloth and for lifting said squeegee from said screen support during the movement of the web of cloth, and for subsequently lowering said screen support onto the web and said squeegee onto said screen support, said lifting means comprising a rotatable element on said shaft, and a transmission mechanism connected between said shaft and said mechanism for alternating an even number of short inoperative squeegee strokes with a number of longer operative squeegee strokes less than said even number.

No references cited.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,866,404

December 30, 1958

Robert Ronald Laupman

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 2 and 12, and in the heading to the printed specification, line 5, name of assignee, for "Gebr. Stork & Co's Apparateutfabriek N. V.", in each occurrence, read -- Gebr. Stork & Co's Apparatenfabriek N. V. --.

Signed and sealed this 16th day of June 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents