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(54) A silk screen printer.

(57) The present invention relates to silk screen printer which comprises a cylindrically curved printing table adapted for the application of print onto print material; a stencil frame and stencil arranged for reciprocating movement in response to the reciprocating movement of the printing table (2); a squeegee arrangement for pressing the stencil against the printing table and therewith transfer print to print material located between the printing table and the stencil; and a gripper (8) which coacts with the printing table and which grips the leading end part (3a) of the print material(3), as seen in the direction of movement, at least during part of a printing sequence.

The gripper (8) is pivotally mounted on the printing table (2) and extends in the direction of longitudinal, curved extension of the table, the gripper (8), in a registered position, being pressed against a stop means (13) such as to register the gripper in relation to the chassi (10) of the printer, it being possible to effect this registration while disregarding the stop position of the stencil frame and the printing table (2).

The printer also includes a forked roller arrangement (30) which is effective in retarding movement of the gripper (8) towards a registered position and in accelerating the gripper (8) away from this position.

It is proposed that Figure 3 is published together with abstract.

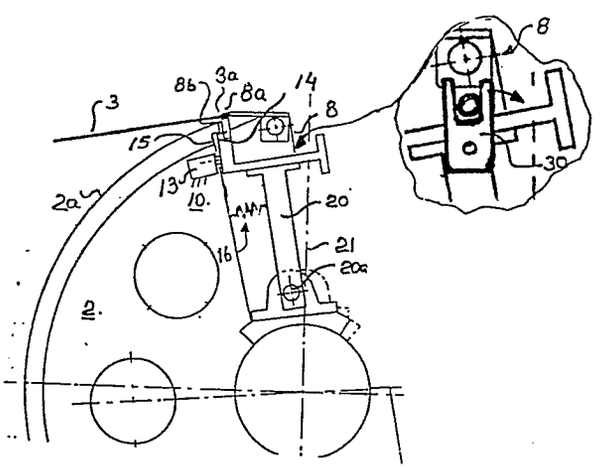

Fig. 3

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Description

A SILK SCREEN PRINTER

TECHNICAL FIELD

The present invention relates to a silk screen printer, and then preferably to a silk screen printer of the kind which comprises a reciprocatingly rotatable, curved printing table, preferably a cylindrical printing table.

Silk screen printers of the kind equipped with a flat frame or frame carriage, in which the stencil is held stretched, and a cylindrical printing table are normally adapted to apply print to a hard and inflexible material, or at least to a material which will only bend to a limited extent.

Two sub-categories can be added to this category of printer, namely:

a) Printers in which the material to receive print is held firmly by means of grippers disposed in a stencil frame.

b) Printers in which the material to receive print is held firmly by grippers disposed on the printing table.

Printers belonging to sub-category a) are intended primarily for printing on hard materials.

In the case of printers belonging to sub-category b), it is also possible to print on bendable or flexible material, and even on very thin materials.

The present invention relates primarily to silk screen printers that can be referred to sub-category b).

It is known in the case of such printers to mount a stencil in a frame or frame carriage which is intended to move to and fro in response to the reciprocating movement of the cylindrical printing table and to provide a squeegee arrangement or corresponding device adapted, inter alia, to press the stencil against the material and the printing table and, via relative movement between the squeegee arrangement and the stencil, to transfer print to the material located between the printing table and the stencil, said squeegee arrangement or said device being stationary in relation to the printer chassi.

In the case of a silk screen printer of the kind to which the present invention relates, it is known to provide the printing surface of the printing table with a recess which is intended to co-act with a gripper which grips the leading edge part of the print material, as seen in the feed direction, at least during a part of a printing sequence.

The term "gripper" in the present context normally refers to an array of two pairs of gripping fingers which are effective in clamping the print material firmly at its leading edge part.

The present invention also relates to silk screen printers of the kind which have a flat printing table.

BACKGROUND PRIOR ART

A silk screen printer of the kind in which the printing table has the form of a reciprocatingly moveable cylindrical drum and (although not shown) a horizontal reciprocatingly movable stencil frame or frame carriage, and in which the horizontal reciprocal movement of the stencil frame is guided by the pivoting movement of the drum is known from UK Patent No. 1,467,910.

A gripper for holding the sheet of material to receive print, hereinafter referred to as the print material, is mounted on the printing table and is caused to move in an arcuate path in response to movement of the drum or the printing table, said arcuate path coinciding with the upper printing surface of the drum.

In the case of a silk screen printer of the aforesaid kind and belonging to sub-category b), measures have been taken to ensure that thin print material can be brought into exact registration with the gripper on the drum, despite the fact that the gripper is not located in a registered position when stopped together with the drum.

Thus, the present invention is a further development of the silk screen printer described and illustrated in the aforesaid UK patent specification.

SUMMARY OF THE INVENTION

TECHNICAL PROBLEMS

In the case of silk screen printers in general, and in particular in the case of printers that are equipped with a cylindrical printing table in the form of a reciprocatingly pivotal full or half drum (Stop-cylinder machines), it is known that difficulties exist in retur ning and stopping the printing table with gripper and stencil frame to and in precisely one and the same position, a registered position, in which the table-mounted gripper is able to grip print material which has been brought to a precise registered position at a slightly earlier stage.

Naturally, the same difficulties are experienced when the gripper is to be registered first in a precise position and the print material then subsequently displaced to its precise registered position, whereafter the gripper is caused to grip the registered print material.

Since the pivoting cylindrical printing table will have a high kinetic energy as it is rotated swiftly backwards and forwards, and since the mass of the stencil frame must also to be taken into account as a positive contributory factor in the prevailing kinetic energy of the system, it will be seen that a highly qualified technical problem resides in the ability to stop the printing table, with gripper and frame, in an exact, predetermined position. The kinetic energy to be overcome and handled will naturally be greater with greater speeds and the difficulties encountered in stopping the printing table and the stencil frame in one and the same registered position will be considerable, even at selected constant printing speeds.

Consequently, the difficulty met with in attempting to achieve such registration in precisely one and the

same position when printing speeds vary represents a still more qualified technical problem.

Since, in order to achieve a high degree of printing accuracy when printing with the aid of a silk screen printer, it is necessary for the gripper and the print material gripped thereby, and the stencil frame, to adopt one and the same relative position during each printing sequence, it is both a technical challenge and a technical problem to provide such conditions that in spite of the large swinging masses concerned and the high kinetic energies in the printing table and frame which must be stopped abruptly, the gripper can be moveably mounted on the printing table (thus not always fixed in relation to the prevailing position of the table) and then to realize that in such cases, solely the gripper need be caused to adopt a predetermined, exact position in relation, inter alia, to the printer chassi, without needing to take into account the stop position of the printing table and the frame (the stencil) in relation to the printer chassi.

When an arbitrary, non-registered position is permitted between the gripper, the gripped print material and stencil, when the gripped material is intended for print, a problem resides in the provision of simple means with which the requisite registration between print material and stencil can be re-established during the subsequent printing sequence.

When studying the above mentioned technical problems, it will be seen that a further technical problem resides in the provision of conditions, with the aid of simple means, which will enable adjustments to be made to the registered position of the gripper in relation to the printer chassis and to enable this adjusted position to be maintained through a plurality of printing sequencies.

It will also be seen that a highly complicated technical problem is one of providing conditions, with the aid of simple means, which will enable the gripper to be registered in the correct position at high speeds, without needing to take into account the large swinging mass forces and high kinetic energies of the printing table, or at least only to a slight extent.

As a study of the prior standpoint of technics will show, and as will be seen from the technical problems encountered with a silk screen printer of the kind to which this invention relates, a qualified technical problem is one of realizing that the requisite exactitude with respect to registration of the gripper in relation to the printer chassi can actually be achieved by causing solely the gripper to stop in an exact registered position and there, in turn, grip print material which has, in turn, been registered precisely in relation to said chassi, whereas the stencil ,stencil frame and table can be allowed actually to stop in any non-registered position in relation to the chassi and therewith be afforded a longer retardation time and retardation path, but upon return movement of the stencil and printing table for printing purposes, the stencil shall first be brought to a registered position in relation to the stationary gripper before commencing the actual printing sequence, with common guided movement between stencil, printing table and print material.

One pronounced technical problem resides in the provision of conditions, with the aid of simple means, such that the registration of the gripper in relation to the printer chassi or some other reference point, such as the intended registered position of the print material, can be effected by stopping a gripper and gripper attachment which have only a small weight and thus only low kinetic energy.

Another technicalproblem is one of realizing the possibility of constructing the gripper so that it is "loosely" pivotable or flippable in relation to the printing table and, having realized this possibility, of providing means which enable this possibiltiy to be put into practice, such that solely the upper part of the gripper can be readily registered irrespective of the position of the stencil during the gripper registering sequence, and to provide means such that when the gripper is in gripping engagement with print material which has been brought to a registered position by some other means, the necessary registered coaction can be obtained between gripper, print material and stencil during the whole of the subsequent printing sequence.

In the case of silk screen printers of this kind, it will be seen that a highly qualified technical problem is one of realizing that one or more of the above mentioned technical problems can be solved readily, by arranging for solely the upper part of the gripper to be brought to an exact registered position relative to the printer chassi or some other reference point in a first stage and there caused to grip print material which has been registered in this position and, with the gripper and the print material in said registered position relative to the chassi, subsequently displace the stencil frame and the stencil pattern to a registered position in relation to the gripper in a second stage, and then further moveing the gripper and print material to effect printing of said material, while holding the stencil and the print material in a mutually registered position during the whole of the printing sequence.

It will be seen that another technical problem is one of providing simple means for catching the "loose" gripper upstream of the registered position and slowing down the gripper more quickly than the printing table, while still achieving accurate registration.

It will be seen that a further technical problem is one of providing simple means for imparting to the "loose" gripper a movement in a direction away from the registered stop position which conforms to movement of the printing table during the printing sequence, before movement of the gripper is overtaken by the table, so that coaction between the printing table and the gripper need not take place under conditions in which the table is in motion while the gripper remains stationary, but can take place when the gripper is already moving in the direction of the printing table, but at a speed somewhat slower than the speed of the table. This reduces the force of impact and therewith the transference of impact energy.

Finally, it will be seen that a technical problem is one of effecting the aforesaid retardation and acceleration with the aid of one and the same

auxiliary device.

SOLUTION

The present invention relates to a silk screen printer, and then particularly to a silk screen printer of the kind which has a curved printing table, preferably a fully cylindrical or part cylindrical printing table, adapted for applying print to print material, and in which a stencil held in a stencil frame is reciprocatingly moveable above the table in response to the rotational movement ofsaid table, and which comprises a squeegee arrangement or a corresponding device which is effective in pressing the stencil against the print material and the printing table and, via relative movement between the squeegee arrangement and the stencil, in applying print to the print material located between the table and the stencil, said squeegee arrangement or said device being stationary in relation to the printing table chassi.

The printing table coacts with a gripper which grips the leading edge part of the print material, as seen in the direction of movement of the material, at least during part of a printing sequence.

For the purpose of solving one or more of the aforesaid problems, it is proposed in accordance with the invention that the printer is provided with a gripper which is mounted for horizontal pivotal movement on the table and which in one direction extends in the direction of a longitudinal extension or the movement direction of the table, and that when in its registered stop position, the gripper will be stationary in relation to a first stop means provided on the printer chassi, irrespective of the stop position of the printing table subsequent to having passed said stop position with the gripper.

In accordance with one advantageous embodiment of the invention, the aforesaid stop position can be adjusted, so as to adjust the gripper registering position in a horizontal direction and therewith adjust registeration of the gripper to a desired location in relation to the chassi or some other reference point.

The first stop will preferably be stationary in relation to the printer chassi or stand.

In order to be able to manage through retardation the large kinetic energies represented by swinging and moving masses essentially independently of the need of good gripper registration, and in order to permit longer retardation times without subsequent need to lower the printing speed, it is proposed in accordance with the invention that the printing table and the stencil frame are constructed to be able to pass a position at which the gripper is intended to be in a registered position and therewith leave the gripper for registration in this position, and to pass towards a stop position which need not be a registered position.

In order to be able to take up the smaller kinetic energy of the moving gripper in a smooth and gentle fashion, it is proposed in accordance with a further developmentof the invention that the first stop means will have the form of a movement damping device, preferably a hydraulic device, located in a clearly defined end position or terminal position.

When the gripper is located in its registered position, the front material-gripping end of the gripper will be slightly raised, so as to be able to reach and coact with the registered print material more readily.

In accordance with a further embodiment of the invention, the gripper is mounted on the free end of an elongated element which is pivotally mounted at the other end thereof. During a printing operation and return to the registered position, i.e. with the gripper resting against the second stop means, the elongated element will extend in a direction related to a radius of the curved printing table, such that the free end of the element and the gripper are located on one side of the radius with the pivot attachment of said element located on the other side of the radius. This pivot attachment of the elongated element is preferably spaced from the centre of rotation of the curved printing table.

In accordance with one embodiment, the elongated element is arranged to slope from its pivot attachment in the movement direction of the table when said table, subsequent to a printing sequence, returns to a gripper registering position.

Thus, when the gripper is located in its registered position and the table in general is able to pass some distance beyond this position, the elongated element will turn so as to extend in the direction of said radius, thereby raising the gripper proud of the surface of the printing table, and therewith affording the gripper easier access to and improved coaction with the registered print material.

In addition to the aforesaid retardation means for retarding motion in a direction towards the stop position, the printer will also preferably include means for accelerating the gripper during its initial movement from the stop position, so as to reduce the extent of the transfer of impact energy from the printing table to the gripper.

Preferably, said means will have the form of a forked roller fork arrangement, which is able to function both as a retarding means and as an accelerating means.

It is necessary in this latter respect that the dual purpose forked roller arrangement, or means, is able to coact with the gripper before said gripper reaches its final, registered stop position, so as to be able to slow the gripper down to zero over a short movement path and also be able to accelerate movement of the gripper from said stop position before movement of the gripper is overtaken by movement of the table and therewith ensure that only small impact forces will occur.

ADVANTAGES

Those advantages primarily associated with the inventive silk screen printer reside in the provisions of conditions which will enable the gripper and the print material to be brought to a registered position in relation to the printer chassi or some other refence point while overcoming limited kinetic energy of the gripper,
without needing to register the stencil, stencil frame

and printing table in said position. The stencil and print material are in register with one another during a printing sequence, however, in that the stencil is first brought to a registered position in relation to the gripper and the print material, whereafter measures are taken to apply print to the print material.

This is realised by mounting the gripper on an attachment which is pivotally moveable hoizontally along the printing table and by the provision of improved conditions which enable solely the gripper to be brought to a predetermined registered position in relation to the printer chassi, so as to be able in this position to grip precisely positioned print material, irrespective of the position of the stencil and without needing to pay too much attention to the inexactitude of the stop position of the stencil and printing table, this inexactitude resulting from the retardation of large mass forces.

Another advantage is that the gripper is accelerated initially, by separate means, from its registered position before the gripper is overtaken by the printing table, so as to reduce the transferrence of impact energy.

The primary characteristic features of a silk screen printer constructed in accordance with the invention are set forth in the characterising clause of the following claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention at present preferred and having features significant of the invention will now be described in more detail with reference to the accompanying drawings, in which;

Figure 1 is a simplified and perspective view of an earlier, known silk screen printer with gripper means mounted on a cylindrical, reciprocatingly movable printing table;

Figure 2 is a somewhat simplified side view of an inventive gripper table-attachment, and shows the gripper in a non-registered position and also a forked roller arrangement; and

Figure 3 is a somewhat simplified side view of the inventive gripper table-attachment with the gripper in a registered position and the forked roller arrangement in a coacting position.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 illustrates part of a silk screen printer 1 having a curved printing table 2 which presents a cylindrical printing surface 2a. The printer is intended to apply print to print material 3. The printer also includes a stencil 4, which is only partially shown, mounted in a stencil frame 5 in a conventional manner.

In the Figure 1 illustration, the front edge 3a of the print material 3 is shown to be located adjacent registering devices mounted on respective sides of the printing surface 2a of the cylinder or drum. Mounted in the immediate vicinity of the registering devices are holding down devices 6 which are effective in holding the front edge 3a of the thin print material against the printing surface 2a.

A better understanding of the construction of the individual components and the modus operandi of the printer in general will be obtained from the before mentioned UK patent specification 1,467,910, to which the reader is referred.

It should be mentioned, however, that the reciprocating movement of the stencil frame 5 and the stencil 4 is guided directly in response to rotary movement of the printing cylinder, by means of a rack arrangement (not shown) disposed along the side 5a of the stencil frame 5 and a pinion (not shown) disposed along the end surface of the printing cylinder 2.

During a printing sequence, the illustrated printing table will move to the right, as indicated by an arrow in Figure 1, and the frame 5 with stencil 4 will also move to the right as seen in the Figure.

A squeegee arrangement 7 is fixedly mounted in relation to the printer chassi and is shown in a position in which it coacts with the stencil 4 and presses printing paste (not shown) located on the stencil down through the stencil perforations and onto the underlying print material 3.

Coacting with the leading or front edge 3a of the print material are two grippers. Each of the grippers is provided with gripping fingers (not shown in Figure 1) which are mounted in the printing surface 2a of the cylindrical printing table.

As before mentioned, the schematically illustrated sqeegee arrangement 7 is intended to press the stencil 4 against the print material 3 and also against the printing surface 2a in a known manner, and therewith transfer print to the print material 3 located between the printing table and the stencil. The printing table 2a coacts with two grippers which are intended to hold the leading edge 3a of the print material, as seen in its direction of movement, preferably during the whole of a printing sequence, or in any event during at least a part of said sequence.

Since the manner in which the squeegee arrangement 7 is activated, and the manner in which the frame 5 and the operating functions of the printer are known to the art, no detailed description of these operational functions will be given here, for the sake of simplicity.

It should perhaps be mentioned, however, that the squeegee arrangement is arranged to be lowered during a printing sequence, so as to press the stencil against the print material at the uppermost point of the printing surface 2a and to be held in this position as the print material is moved to the right by the gripper.

Referring now to Figures 2 and 3, which illustrate a silk screen printer constructed in accordance with the inventio, one of the two grippers 8 of the illustrated embodiment is capable of moving horizontally to some extent in an arcuate path along the printing surface 2a of the printing table 2.

As will be understood, different auxiliary devices may be used to effect horizontal movement of the gripper 8 along part of the printing surface 2a of the printing table.

Thus, the gripper 8 is arranged to be displaced through a short distance along the printing surface 2a in direction commensurate with a longitudinal extension of the stencil frame or the direction of movement of said frame during a printing sequence.

Figure 2 illustrates the print material 3, and particularly the leading edge 3a of said material, located in an exact position of registry in relation to the printer chassi 10.

As illustrated by the arrow in Figure 2, it is assumed that the printing table 2 with gripper 8 is moving towards a gripper registering position, namely a position in which a surface 11 on the gripper abuts with a surface 12 on a first stop means 13, which means 13 is stationary in relation to the printer chassi 10.

During the terminal movement of the gripper 8 and the printing table 2 (retarded movement), a surface 14 on the gripper 8 will come into abutment with a surface 15 on the printing surface 2a, therewith registering the gripper in relation to the printing table 2, and also the stencil frame 5 with stencil 4.

In the illustration of Figure 3, it is shown that when the printing table is moved further to the left in the Figure,, the gripper is brought into abutment with the first stop means 13, therewith bringing the gripper to a stop. The gripping fingers 8a of the gripper 8 will then be in gripping engagement with the leading edge 3a of the print material 3.

In this position, the gripper is registered in relation to the chassi 10, but not in relation to the printing surface 2a and the stencil 4, since these components are located further to the left, as seen in the drawing.

This is illustrated in that the surface 15 of the printing table is shown to be spaced from the surface 14 on the gripper 8. In practice, this distance can be greater than that shown.

Although the gripper 8 is shown in Figure 3 in coaction with the first stop means located on the chassi 10, it will be understood that some other suitable reference point may be chosen instead.The differences between the illustrations of Figure 2 and Figure 3 are intended to show that the stencil frame and printing surface 2a can be moved further to the left, beyond the gripper registered position, without the position of the gripper 8 being changed in relation to the stop means 13.

It is now possible to allow the frame 5 and the printing table 2 to stop, without taking the desired exact registration of the gripper 8 into direct account, provided that the printing table 2 and the stencil frame are able to move freely past the gripper registered position. Thus, registration of the gripper in relation to the chassi 10, via the stop means 13, is quite independent of the stop position of the table 2 and the frame 5 (stencil 4).

If the frame is allowed to move to the left still further than is shown in Figure 3, the frame 5 and stencil carried thereby will be located in a non-registered position which is even more unrelated to the position of the gripper 8, the print material 3 and the printer chassi 10.

The gripper 8 includes a plurality of anvil surfaces 8b and a plurality of raisable and lowerable fingers 8a which, in the registered position shown in Figure 3, are intended to grip firmly the leading edge part 3a of the print material 3.

Upon movement from the illustrated (Figure 3) positional settings of the gripper 8, the print material 3, the printing table 2, the stencil 4 and the stencil frame 5, and also upon the return movement of the printing table and stencil effected in order to apply print to the print material, the stencil will move first relative to the gripper 8 and the print material 3 until the gripper 8 engages a second stop means which is formed when the surfaces 14 and 15 are brought into abutment with one another, whereupon the stencil is registered in this position relative to the the gripper 8 and printing can commence, with the gripper 8, the print material 3, the stencil 4 and stencil frame 5 in mutually registered positions.

For the purpose of enabling the position of the first stop means 13 to be adjusted, and therewith also the registered position of the gripper 8, there is provided an externally screw threaded pin which is intended to coact with an internally screw threaded sleeve in a manner to effect said adjustment. The pin and sleeve are not shown, for the sake of simplicity.

The printing table 2 and the stencil frame 5 can thus be permitted to pass slightly beyond the registered position of the gripper 8, which will take its registering position relative to the chassi 10, suitably to grip and collect print material 3 which has been registered in an exact position by other means, for a subsequent printing sequence.

As before described, the registered position of the gripper 8 can be adjusted, by means of the adjustable stop 13. This adjustment will preferably be maintained for a number of printing sequencies.

In order to clarify the technical deliberations associated with the present invention still further, it can be mentioned that in the case of printers of this kind, the stencil frame and stencil are moved to and fro in the stencil frame and stencil are moved to and fro in response to the forward and backward movement of the cylindrical printing table, this movement defining the prevailing printing speed.

It will be obvious that considerable masses are in oscillatory motion, resulting in considerable kinetic energy and that it is difficult to bring these masses in the stencil frame and the cylidrical printing table to a stop in precisely one and the same terminal position irrespective of the printing speed.

It is thus desirable to register solely the print material in relation to solely the gripper indepently of the orientation of the stencil and the printing table in said terminal position, and therewith ignore the inexactitude caused by heavy oscillating masses in the prevailing stop position of the printing table and stencil frame, with stencil.

Accordingly, it is proposed in accordance with the invention that the gripper 8 is mounted so as to be freely pivotable on the printing table and so that when in a printing position or return position is pressed against a stop in the printing table 2, causing the the gripper 8, when moved to the left in Figure 1, to stop against a first stop 13 which is stationary in relation to the printer chassi 10 and to grip print material 3 in this registered position, while allowing the the frame 5 and the printing table 2 to travel further, preferably much further. The gripper 8 will still be located in its registered position, due to the fact that it is freely pivotal.

When the frame 5 and stencil 4 are to move back,

in the opposite direction in Figure 3, during a printing sequence, relative movement occurs initially between the printing table (and the stencil 4 and frame 5) and the gripper 8, but when, as a result of this relative movement, the gripper 8 takes a correctly registered position relative to the frame 5 and the stencil 4, the gripper will accompany the movement of the stencil 4 and the printing table 2, through coaction via the second stop means (14, 15).

Consequently, upon movement in the opposite direction, shown in Figure 2 and 3, the gripper 8 can be brought to its registered position in relation to the printer chassi 10 by the stop 13 with only a small uptake of energy, irrespective of the relative stop positions of the frame 5 and the printing table 2, when gripping or collecting print material 3.

Before commencement of an actual printing sequence, the gripper 8 is first registered relative to the frame 5 and the stencil 4, through rotary movement of the cylindrical printing table 2, whereafter the actual printing sequence takes place with the gripper 8, the print material 3, the frame 5 and the stencil 4 in their correct registered relative positions.

For the sake of simplicity, like parts have been identified with like reference signs in Figures 1, 2 and 3, although some parts have been omitted from the Figure 2 and 3 embodiment.

The movement damping device which functions as the first stop means 13 may be modified to form a well defined terminal position (a first stop) for the gripper 8. In this case the gripper 8 is held against the stop with the aid of the spring force generated by a spring 16.

In Figure 3, the forward end of the gripper 8 intended to grip the leading edge part of print material is shown to be raised slightly in the registered position of the gripper.

It will be seen from Figures 2 and 3 that the gripping means 8a and 8b of the gripper 8 are disposed on the outer end of an elongated element 20, which is pivotally mounted at the other end thereof.

The elongated element is intended to extend in a direction related to a radius 21 on the curved printing table 2, such that outer end of the element 20 and the gripping means 8a 8b will be located on one side of the radius while the pivotal attachment, referenced 20a, will be located on the opposite side of said radius.

The angle subtended herebetween is referenced "a" in Figure 2..

The pivot attachment 20a is located at a distance "b" from the centre of rotation 2'of the cylindrical printing table 2, this distance being suitably from 15 to 50% of the length of the radius, preferably about 30%.

The elongated element 20 is also intended to slope from the pivot attachment 20a at a small angle "a" to the direction of movement of the table 2, when the table returns to and beyond the registered position of the gripper 8, upon completion of a printing sequence.

When the gripper 8 is located in its registered position against the stop 13 and when the printing table is permitted to pass beyond this position, the elongated element 20 will rotate about its lower pivot attachment 20a such as to extend more in the direction of the radius 21, the angle "a" therewith being decreased. The gripper will therewith be raised above the printing surface 2a of the printing table 2, as particularly shown in Figure 3.

When a printing sequence is to commence, the gripper 8 will return to the position shown in Figure 2.

Figure 3 shows, in broken lines, the position of the pivot attachment 20a when the gripper 8 abuts the stop 13.

Figures 2 and 3 are enlarged views of an auxiliary device 30 which is effective in slowing down movement of the gripper in a direction towards the stop position and /or in accelerating movement of the gripper away from said stop position. In the case of the illustrated embodiment, this device has the form of a forked roller arrangement.

The forked device has tines or legs 31 and 32 which are intended to embrace a pin 33 on the gripper 8, before the gripper 8 reaches its registered stop position.

The forked roller arrangement 30 is stationary in relation to the chassi 10 and is rotatable about an axis 34 related to the chassi.

Movement of the gripper to the left in the Figure can now be taken up by the forked roller arrangement 30 in a

When the gripper 8 is located in its registered position against the stop 13 and when the printing table is permitted to pass beyond this position, the elongated element 20 will rotate about its lower pivot attachment 20a such as to extend more in the direction of the radius 21, the angle "a" therewith being decreased. The gripper will therewith be raised above the printing surface 2a of the printing table 2, as particularly shown in Figure 3.

When a printing sequence is to commence, the gripper 8 will return to the position shown in Figure 2.

Figure 3 shows, in broken lines, the position of the pivot attachment 20a when the gripper 8 abuts the stop 13.

Figures 2 and 3 are enlarged views of an auxiliary device 30 which is effective in slowing down movement of the gripper in a direction towards the stop position and/or in accelerating movement of the gripper away from said stop position. In the case of the illustrated embodiment, this device has the form of a forked roller arrangement.

The forked device has tines or legs 31 and 32 which are intended to embrace a pin 33 on the gripper 8, before the gripper 8 reaches its registered stop position.

The forked roller arrangement 30 is stationary in relation to the chassi 10 and is rotatable about an axis 34 related to the chassi.

Movement of the gripper to the left in the Figure can now be taken up by the forked roller arrangement 30 in a known manner, as a result of the pivoting movement of said arrangement.

As soon as the forked roller 30 takes over the movement of the gripper 8 and retards said gripper, the gripper will cease to coact with the table 2 and the distance between the two surfaces 14 and 15 will increase.

The gripper is located in this position and is pressed towards this position as a result of the retardation forces acting on the printing table 2.

When the gripper 8 has been brought to the registered position shown in Figure 3, the forked roller arrangement 30 will have rotated to the position shown in Figure 3.

Upon commencement of a printing sequence, the printing table is accelerated to the right in the Figure while at the same time the forked roller arrangement 30 is activated in the direction of the arrow shown, this movement forcing upon the gripper 8 an initial movement to the right.

Consequently, conditions have been created in which the otherwise large impact forces that are generated when the surface 15 on the printing table 2 strikes the surface 14 of the gripper 8 are reduced.

By adapting the speed of movement of the forked roller arrangement 30, occurrent impact forces can be reduced considerably, by ensuring that the speed of movement of the gripper 8 conforms fully, or at least substantially fully, with the speed at which the printing table is moving at the time of the mutual abutment of the two surfaces 14 and 15.

It will be understood that the described and illustrated embodiments are not restrictive of the invention and that modifications can be made within the scope of the inventive concept as expressed in the following claims.

Claims

1. A silk screen printer (1) which includes a printing table (2) adapted for the application of print to print material (3); a stencil frame (5) which carries a stencil (4) and which is located above the printing table (2); a squeegee arrangement (7) for pressing the stencil against the printing table and therewith transfer print onto print material (3) located between the printing table and the stencil (4); and a gripper (8) which is intended to grip the print material at its leading edge part, as seen in the direction of movement, during at least a part of a printing sequence, characterised in that the gripper (8) is arranged for movement relative to the printing table (2) in a direction commensurate with a longitudinal extension of the printing table (2); and in that the gripper (8) in a registered stop position is stationarily related to a first stop, irrespective of the stop position of the printing table subsequent to said table having passed the said stop position with the gripper.

2. A printer according to claim 1, characterised by spring means (16) effective in pressing the gripper (8) against a stop (12); and by means for adjusting the position of the stop.

3 A printer according to claim 1, characterised in that said first stop (12, 13) is mounted on and is fixed in relation to the chassi (10) or stand of the printer.

4 A printer according to claim 1, 2 or 3, characterised in that the printing table (2) and the stencil frame are arranged in a manner such as to move beyond a position in which solely the gripper (8) is in a registered position.

5 A printer acccording to claim 1, characterised in that the stop (12, 13) has the form of a movement damping means with a clearly defined terminal position.

6. A printer according to claim 5, characterised in that that the stop has the form of a hydraulic device or the like.

7. A printer according to claim 1 comprising a cylindrical printing table (2), characterised in that the arrangement is such that the forward end of the gripper intended for gripping or holding print material is raised slightly when the gripper is located in a registered position.

8. A printer according to claim 7, characterised in that the gripper (8) is located on the outer end of an elongated element (20) which is pivotally attached at the other end (20a) thereof.

9. A printer according to claim 8, characterised in that the elongated element (20) extends in the direction of a radius of the curved printing table (2); and in that the outer end of the element and the gripper (8) are located on one side of said radius and the pivot attachment (20a) is located on the other side thereof.

10. A printer according to claim 9, characterised in that the pivot attachment (20a) is spaced from the centre of rotation (2′) of the curved printing table (2).

11. A printer according to claim 8 or claim 9, charcterised in that the elongated element (20) is intended to slope from the pivot attachment (20a) towards the movement direction of the printing table (2) when the printing table returns to and passes beyond the gripper registering position subsequent to a printing sequence.

12. A printer according to claim 11, characterised in that the arrangement is such that when the gripper (8) is located in a registered position and the printing table continues to move past this position, the elongated element (20) will turn so as to extend in the direction of the radius and therewith lift the gripper (8) proud of the surface (2a) of the printing table (2).

13. A printer according to claim 1, characterised by means which coact with the gripper (8) in a manner to retard the gripper in its movement towards the stop position and/or to accelerate said gripper away from said stop position.

14. A printer according to claim 13, charactyerised in that said means has the form of a forked roller arrangement.

15. A printer according to claim 13 or claim 14, characterised in that said means is intended to coact with the gripper before the gripper is located in its registered stop position, such as to slow down the gripper over a short movement path; and in that said means is intended to accelerate the gripper away from said stop position before the gripper is overtaken by the

printing table.

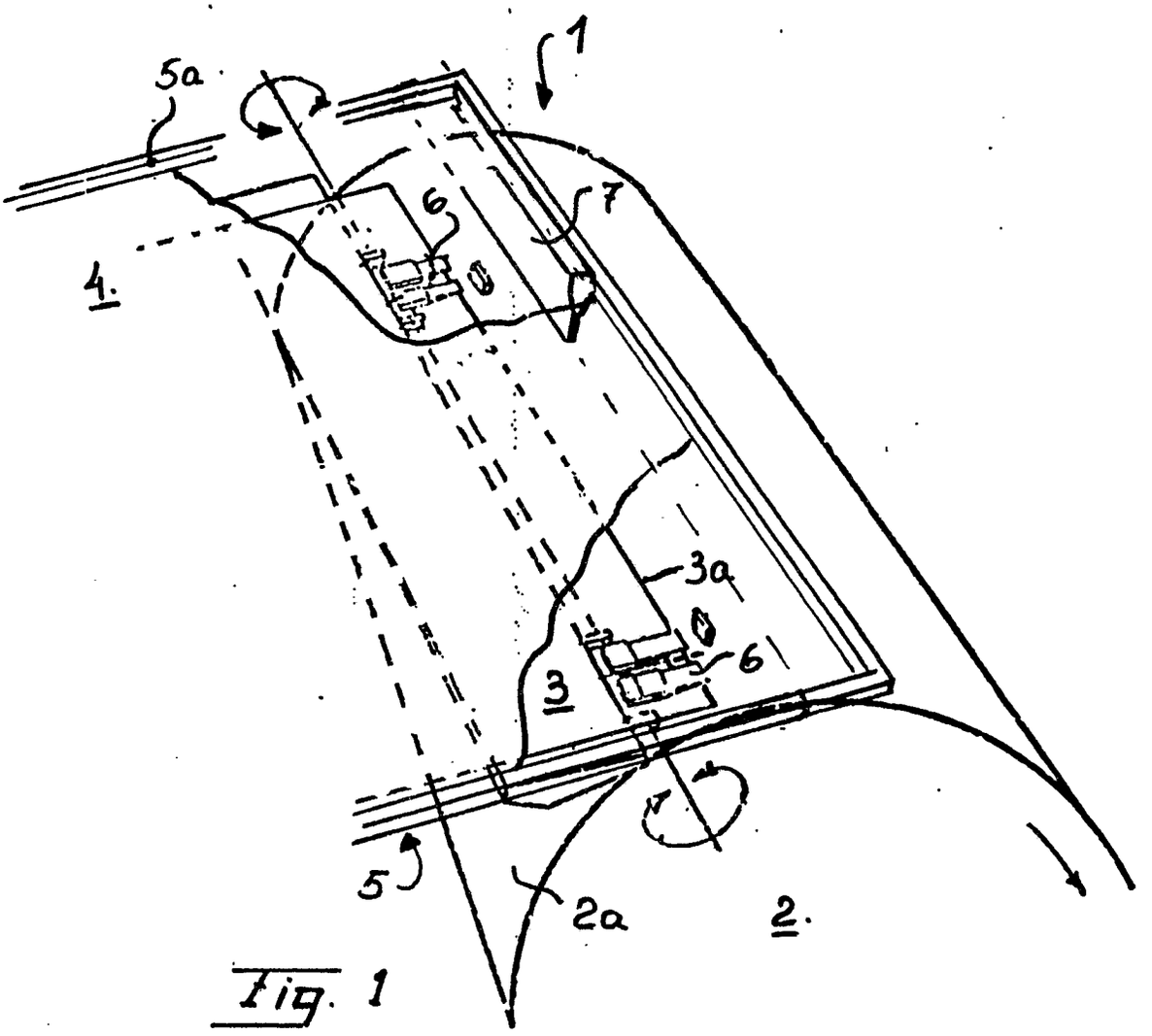

Fig. 1

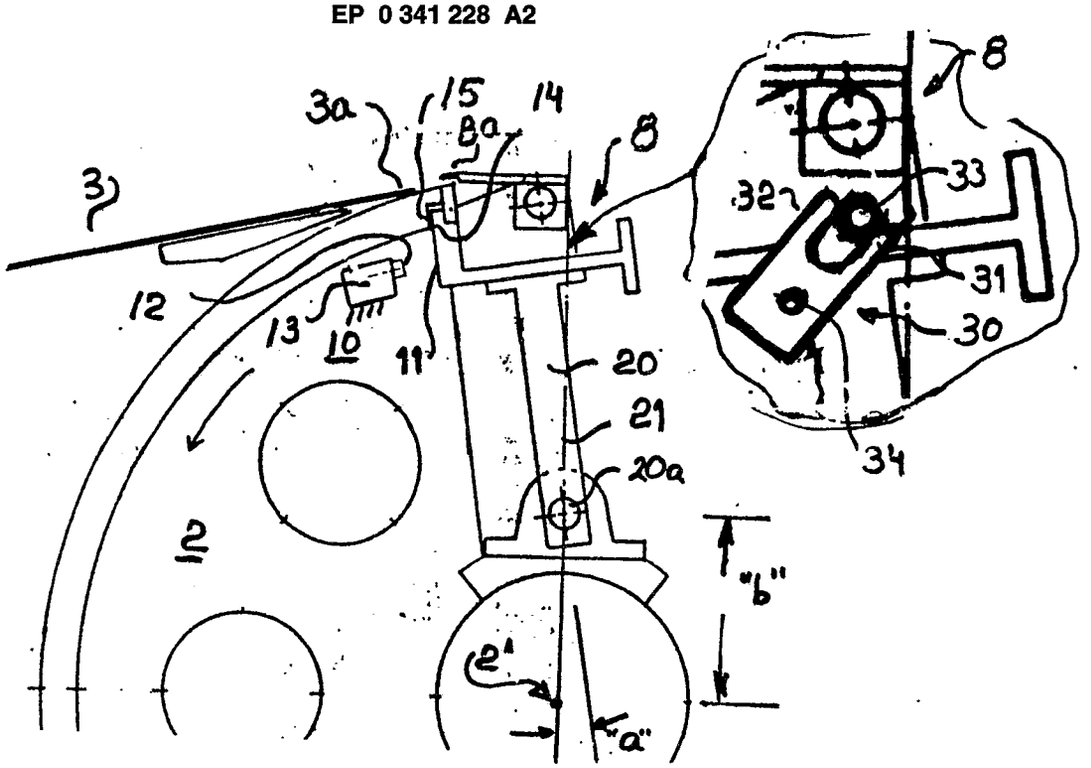
3a
15
14
8a
8
3
12
13
10
11
20
21
20a
2
"b"
"a"
8
33
32
31
30
34

Fig. 2

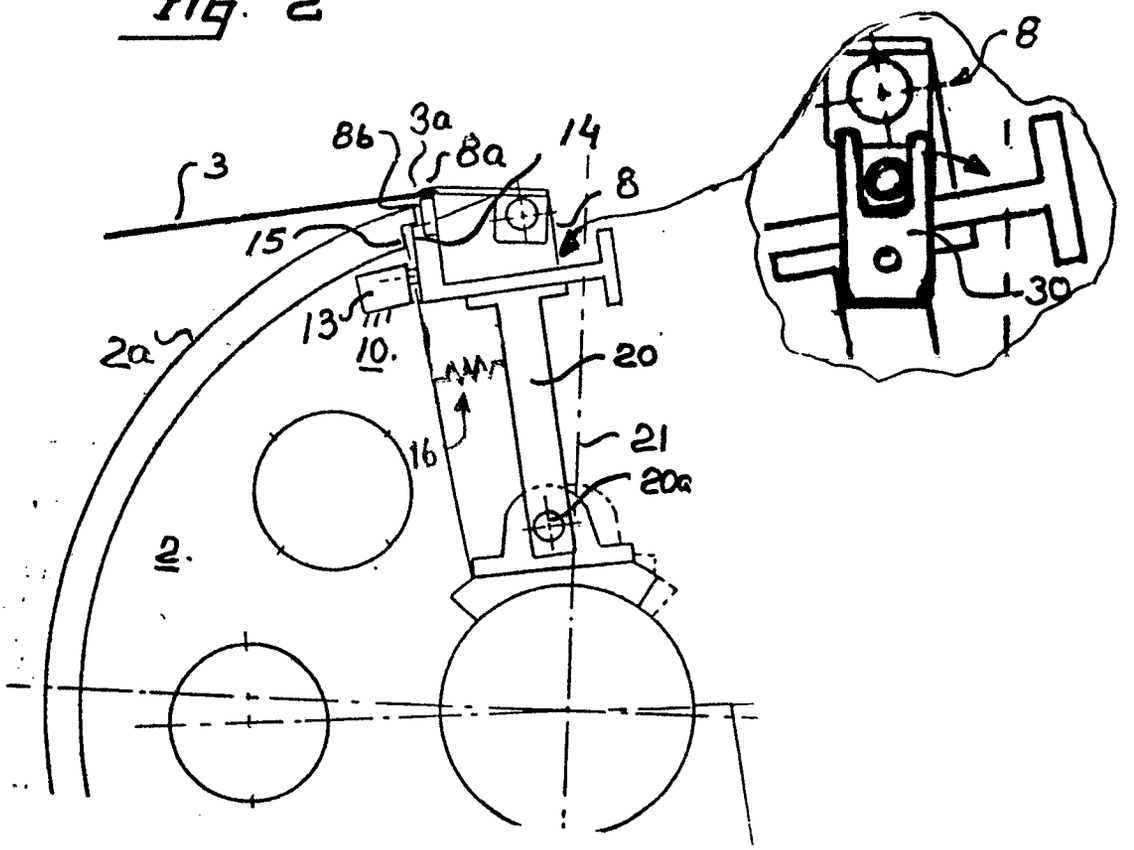
8
8b
3a
8a
14
3
15
8
13
10
2a
20
16
21
20a
2
1
30

Fig. 3