

A FRAME ASSEMBLY FOR SUPPORTING PRINTING SCREENS, A FRAME SUPPORT MECHANISM FOR SUPPORTING THE SAME, AND A METHOD OF MOUNTING PRINTING SCREENS IN A SCREEN PRINTING MACHINE

The present invention relates to a frame assembly for supporting de-mountable printing screens, often alternatively referred to as stencils or foils, for use in a screen printing machine, a frame support mechanism for supporting the same, and a method of mounting printing screens in screen printing machines.

A printing screen, typically comprising a screen sheet formed of a metal or plastic, includes apertures which define the pattern to be printed, with the screen being located over an object to be printed and printing medium forced through the apertures to provide the required print.

De-mountable printing screens are finding increasing favour as compared to glued screens. Key benefits include ease of use, cheaper replacement cost, improved handling logistics in not requiring the frame to be returned when requiring a replacement printing screen, and fewer frames are needed as many printing screens can be used in one frame. Various competing systems are in use, including the VECTORGUARD (RTM) frame system, as supplied by DEK INTERNATIONAL GMBH (Zürich, Switzerland), and disclosed in WO-A-2003/093012.

The current frame systems for printing liquid print media onto planar substrates require the printing screens to be loaded and tensioned in frames externally of the screen printing machines, using a loading/unloading jig. In requiring the removal of the frame from the screen printing machine, the print head, typically a squeegee mechanism, has to be lifted clear of the frame, and also any residual print medium has to be removed from the printing screen. The size and weight of the frame and accompanying foil make this operation awkward, and the need to remove the residual print medium can make the process particularly time consuming.

It is an aim of the present invention to provide an improved frame assembly and frame supporting mechanism, which allows for the *in situ* replacement of printing screens. Although printing screens are only slightly smaller in size than the supporting frame, printing screens are considerably lighter and easier to handle.

In one aspect the present invention provides a frame assembly for tensioning a printing screen, the frame assembly comprising: a frame unit to which a printing screen is in use tensioned; and a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions.

The present invention also extends to a screen printing machine incorporating the above-described frame assembly.

In another aspect the present invention provides a screen printing machine, comprising: a frame unit to which a printing screen is in use tensioned; and a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions.

In a further aspect the present invention provides a frame support mechanism for supporting a frame assembly which includes a de-mountable printing screen, the frame support mechanism comprising: a frame support member to which a frame assembly is in use mounted, wherein the frame assembly comprises a screen loading member which is movable between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded in an operative position in the frame assembly, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions; and an actuator mechanism which is operable to actuate the at least one actuator element of the frame assembly to move the screen loading member of the frame assembly between the screen-receiving and loaded positions.

The present invention also extends to a screen printing machine incorporating the above-described frame support mechanism.

In a still further aspect the present invention provides a screen printing machine, comprising: a frame support member to which a frame assembly is in use mounted, wherein the frame assembly comprises a screen loading member which is movable between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded in an operative position in the frame assembly, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions; and an actuator mechanism which is operable to actuate the at least one actuator element of the frame assembly to move the screen loading member of the frame assembly between the screen-receiving and loaded positions.

In a yet further aspect the present invention provides a frame assembly for tensioning a printing screen, the frame assembly comprising: a frame unit to which a printing screen is in use tensioned, wherein the frame unit includes a support station adjacent an inner edge thereof onto which a print head can be parked prior to separation of the printing screen from the frame unit, such as to provide for removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.

The present invention also extends to a screen printing machine incorporating the above-described frame assembly.

In a still yet further aspect the present invention provides a screen printing machine, comprising: a frame unit to which a printing screen is mounted; and a support station onto which a print head can be parked prior to separation of the printing screen from the frame support member, such as to provide for removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame support member.

In yet another aspect the present invention provides a method of mounting a printing screen in a screen printing machine, comprising the steps of: providing a frame unit to which a printing screen is mounted; providing a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit; moving the screen loading member to the screen-receiving position; loading a printing screen into the screen loading member when positioned in the screen-receiving position; and moving the screen loading member to the loaded position in which the printing screen is loaded into the frame unit.

In yet still another aspect the present invention provides a method of mounting a printing screen in a screen printing machine, comprising the steps of: providing a frame unit to which a printing screen is mounted; providing a support station adjacent an inner edge of the frame unit onto which a print head can be parked prior to separation of the printing screen from the frame unit; and parking a print head on the support station prior to removing the printing screen from the frame unit, thereby enabling removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.

Preferred embodiments of the present invention will now be described hereinbelow by way of example only with reference to the accompanying drawings, in which:

Figure 1 illustrates a perspective view from below of a frame assembly for tensioning a printing screen in accordance with a preferred embodiment of the present invention;

Figure 2 illustrates a perspective view from above of the frame assembly of Figure 1;

Figure 3 illustrates in enlarged scale a fragmentary perspective view (region A in Figure 1) from below of one corner of the frame assembly of Figure 1;

Figure 4 illustrates a first vertical sectional view (along section I-I in Figure 1) through the frame assembly of Figure 1, where mounted in a frame supporting mechanism in accordance with a preferred embodiment of the present invention;

Figure 5 illustrates a second vertical sectional view (along section II-II in Figure 1) through one of the frame members of the frame assembly of Figure 1;

Figures 6(a) to (e) illustrate the operation of the frame assembly of Figure 1 when mounting a printing screen thereto; and

Figures 7(a) and (b) illustrate steps in the operation of the frame assembly of Figure 1 when de-mounting a printing screen therefrom.

Figures 1 to 5 illustrate a frame assembly 100 for tensioning a printing screen 101 in accordance with a preferred embodiment of the present invention.

In this embodiment, as illustrated in Figure 4, the screen 101 comprises a screen sheet 102, typically formed of a metal or plastic, which includes a pattern of apertures through which a printing medium is printed, and engagement members 103 at each of the edges of the screen sheet 102 by which the screen 101 is tensioned. WO-A-2003/093012 discloses examples of such printing screens.

The frame assembly 100 comprises a frame unit 104 to which the screen 101 is tensioned and a loading mechanism 105 for loading the screen 101 into the frame unit 104.

The frame unit 104 comprises first, second, third and fourth frame members 106a-d, in this embodiment elongate members, for engaging respective edges of the screen 101, and first, second, third and fourth corner pieces 107a-d which connect the respective ends of the frame members 106a-d. In this embodiment the frame members 106a-d are connected to the corner pieces 107a-d by screws, but in an alternative embodiment the frame members 106a-d and the corner pieces 107a-d could be configured to be a press-fit connection.

The frame members 106a-d each comprise a frame element 109, which frame elements 109 are connected to the respective corner pieces 107a-d, in this embodiment by screws, such as to define a rigid frame, a plurality of engagement elements 111 for engaging a respective edge of the screen 101,

in this embodiment through the engagement member 103 at the respective edge of the screen 101, which engagement elements 111 are pivotally coupled to the frame element 109 such as to be pivotable in one, tensioning sense to tension the screen 101 and the other, opposite sense to allow for fitting and removal of the screen 101, and a plurality of biasing elements 117 for applying a biasing force to respective ones of the engagement elements 111, which biasing force acts to bias the engagement elements 111 to pivot in the tensioning sense and apply a tension to the respective edge of the screen 101. In this embodiment the provision of a plurality of engagement elements 111 for engagement with each edge of the screen 101 facilitates the application of a controlled tension across the length of each edge of the screen 101. In addition, the provision of a plurality of engagement elements 111 for engagement with each edge of the screen 101 allows for each edge of the screen 101 to be tensioned with a predeterminable tension profile, for example, to a higher tension at the respective ends.

Each of the frame elements 109 includes a central, elongate cavity 119 in which the respective engagement elements 111 are disposed along the length thereof, and a pivot bead 121, in this embodiment a part-circular bead, which extends along the length of the cavity 119 to which the respective engagement elements 111 are pivotally hinged, as will be described in more detail hereinbelow. In this embodiment the engagement elements 111 of each frame member 106a-d are juxtaposed in end-to-end relation. In an alternative embodiment the engagement elements 111 of each frame member 106a-d could be disposed in spaced relation.

Each of the frame elements 109 further includes an elongate, screen recess 123 at a lower, mounting surface for receiving the engagement member 103 at the respective edge of the screen 101 and into which the respective engagement elements 111 extend to engage the engagement member 103, and a guide 125 at an inner edge over which the screen sheet 102 of the screen 101 is tensioned.

In this embodiment the frame elements 109 are fabricated from an extrusion, here an aluminum extrusion, with the extrusion being sectioned at the required lengths.

Each of the engagement elements 111 comprises a body 127 which includes a pivot recess 129, in this embodiment a part-circular recess, which extends along the length thereof and in which the pivot bead 121 of the respective frame element 109 is held captive, whereby the engagement elements 111 are captively pivotable to the respective frame elements 109.

Each of the engagement elements 111 further includes a first, engagement arm 131 which extends into the screen recess 123 in the respective frame element 109 for engagement with the engagement member 103 at the respective edge of the screen 101. In this embodiment the engagement arm 131 extends substantially orthogonally to the lower, mounting surface of the respective frame element 109. In this embodiment the engagement arm 131 comprises a continuous bar, but in other embodiments can have any desired form, for example, as a comb structure for engaging slots which provide the engagement member 103 at the respective edge of the screen 101.

Each of the engagement elements 111 further includes a second, biasing arm 133 which is engaged by respective ones of the biasing elements 117, in this embodiment by a pair of the biasing elements 117, such as to bias the engagement element 111 to pivot in the tensioning sense, whereby the distal end of the engagement arm 131 is biased in a direction outwardly from the inner edge of the respective frame element 109 to tension the respective edge of the screen 101. In this embodiment the biasing arm 133 extends substantially parallel to the lower, mounting surface of the respective frame element 109 in a direction towards the outer edge of the respective frame element 109. In this embodiment the biasing elements 117 are configured to apply a biasing force to the biasing arm 133 in a direction substantially orthogonal to the lower mounting surface of the respective frame element 109.

Each of the engagement elements 111 further includes a third, operating arm 135 which allows for operation of the engagement elements 111 to enable the fitting of the screen 101, as will be described in more detail hereinbelow. In this embodiment the operating arm 135 extends substantially parallel to the lower, mounting surface of the respective frame element 109 in a direction towards the inner edge of the respective frame element 109.

In this embodiment the engagement elements 111 are fabricated from an extrusion, here an aluminum extrusion, with the extrusion being sectioned at the required lengths.

The frame unit 104 further comprises a counter-biasing element 141 which is operable, in this embodiment commonly, to engage the operating arms 135 of each of the engagement elements 111 to apply a counter-biasing force to the operating arms 135, such as to counter-bias the engagement elements 111 to overcome the normal biasing force of the biasing elements 117 and cause the engagement elements 111 to adopt a position in which the screen 101 is released from engagement with the engagement elements 111, such as to allow for the fitting or removal of the screen 101. In this embodiment the counter-biasing element 141 comprises a single elongate inflatable bladder 143, here a pneumatic bladder, which is threaded through the central cavities 119 of the frame elements 109 adjacent the operating arms 135 of the engagement elements 111 and through the corner pieces 107a-d, as illustrated in Figure 3, and a fluid connector 145, here a quick-fit pneumatic connector, which is connected to one end of the bladder 143 such as to allow for inflation and deflation of the bladder 143 by a separate actuator (not illustrated), with the other end of the bladder 143 being closed. In this embodiment the fluid connector 145 is mounted in one of the corner pieces 107a-d, here the first corner piece 107a. In this embodiment the counter-biasing element 141 is configured to apply a counter-biasing force to the operating arms 135 in a direction substantially orthogonal to the lower, mounting surface of the respective frame elements 109.

As illustrated in Figure 5, the frame unit 104 further comprises a support station 147 which is located adjacent the inner edge of the frame element 109 of one of the frame members 106a-d, in this embodiment the first frame member 106a, onto which a print head PH, such as a squeegee mechanism, can be parked, such as to support the print medium PM which is being operated upon by the print head PH and thereby allow for the screen 101 to be changed without requiring any special action in relation to the print head PH and in particular the print medium PM, typically the removal of the print medium PM from the surface of the screen 101 as would otherwise be required.

In this embodiment the support station 147 includes a planar, sheet element 149, which extends inwardly from the lower surface of the frame element 109 and has a sufficient width to receive the print head PH thereon. In this embodiment the sheet element 149 has a tapered leading edge 151, such as to facilitate the movement of the print head PH thereonto.

The screen loading mechanism 105 comprises a loading member 153 which is movably coupled to the frame unit 104 between a screen-receiving position, as illustrated in Figure 6(c), in which the loading member 153 is spaced from the frame unit 104 to allow the screen 101 to be loaded into the loading member 153, and a loaded position, as illustrated in Figure 6(d), in which the screen 101 is located at the frame unit 104 at a position which allows for tensioning of the screen 101, and at least one actuator element 154, in this embodiment a plurality of actuator elements 154a-d which are coupled to the loading member 153 such as to move the loading member 153 between the screen-receiving and loaded positions on actuation.

In this embodiment the loading member 153 comprises a plurality of support elements 155 which are movably coupled to the frame elements 109 of respective ones of the frame members 106a-d, in this embodiment first, second and third support elements 155a, b, c which are movably coupled to

the frame elements 109 of the second, third and fourth frame members 106b, c, d and together define a U-shaped section when viewed from above, which allows for the screen 101 to be slid thereinto and captively received.

In this embodiment the support elements 155a-c comprise elongate elements which extend along the lengths of the respective ones of the frame elements 109.

The support elements 155a-c each define a support surface 159, on which the screen 101 is supported, and a guide surface 161, which acts to guide the screen 101 to the required position for loading the screen 101 into the frame unit 104. In this embodiment the support elements 155a, b, c comprise L-shaped bars, the inner faces of which define the support and guide surfaces 159, 161. With this configuration, the opposing support elements 155a, c, in this embodiment at the frame elements 109 of the second and fourth frame members 106b, d, act as lateral guides as the screen 101 is slid onto the loading member 153, and the other, rear support element 155b acts as a rear guide, which defines a stop to the extent of insertion of the screen 101.

In this embodiment the actuator elements 154a-d are coupled to the respective ends of the support elements 155a-c, with the third and fourth actuator elements 154c, d being commonly coupled to the ends of the first and second support elements 155a, b and the second and third support elements 155b, c, respectively.

In this embodiment the actuator elements 154a-d extend from respective ones of the corner pieces 107a-d, here in symmetrical relation, and at the respective sides of the frame assembly 100. This configuration advantageously provides for actuation of the actuator elements 154a-d irrespective of the extent to which the frame assembly 100 is inserted into the screen printing machine, and thereby allows for manual positioning of the frame assembly 100 by the operator to a desired position, and is not constrained to a position as defined by the actuator elements 154a-d.

In this embodiment, as illustrated in Figure 4, the actuator elements 154a-d each comprise an actuator pin 171 which projects from the other, upper surface of the frame unit 104 to which the support member 153 is located, and a biasing element 173, here a resilient element, such as a compression spring, which is operative normally to bias the actuator pin 171 to an extended, rest position, as illustrated in Figure 6(a), in which the support member 153 is in the loaded position. With this configuration, the actuator pins 171 can be moved from the extended, rest position to a depressed, actuated position, as illustrated in Figure 6(b), in which the actuator pins 171 are depressed and the support member 153 is moved to the screen-receiving position for allowing the screen 101 to be loaded thereinto or removed therefrom.

Figure 4 illustrates a frame support assembly 201 in accordance with a preferred embodiment of the present invention, in this embodiment of a screen printing machine, where supporting the frame assembly 100.

The frame support assembly 201 comprises first and second frame support members 203a, b, in this embodiment elongate members, which are disposed in opposed relation to receive opposite frame members 106d, b of the frame assembly 100.

In this embodiment the frame support members 203a, b each comprise a support element 205, here in the form of a shelf, which defines a support surface 207 for supporting the frame members 106d, b of the frame assembly 100.

In this embodiment the frame support assembly 201 further comprises a frame clamping mechanism 209 for clamping the frame assembly 100 to the frame support assembly 201.

In this embodiment the frame clamping mechanism 209 comprises first and second clamp units 211a, b, which are associated with respective ones of the first and second frame support members 203a, b and operative to clamp the frame assembly 100 to the frame support assembly 201.

In this embodiment the first and second clamp units 211a, b each comprise at least one piston element 213, here comprising a piston 215 and a piston rod 217, which is actuated by the piston 215 to clamp the frame assembly 100 to the frame support members 203a, b of the frame support assembly 201.

In an alternative embodiment the frame assembly 100 could be permanently mounted in the screen printing machine, but such permanent mounting does not allow for any "rough" manual positioning of the frame assembly 100 relative to the printing zone.

In another alternative embodiment the frame elements 109 of the frame assembly 100 could be formed as an integral part of the screen printing machine, and in one embodiment define part of the chassis or supporting frame of the screen printing machine. This configuration advantageously reduces the complexity and weight of the screen printing machine, in avoiding the need for a separate frame support assembly 201, which is necessarily of bulky construction to support the relatively-large frame assembly 100.

The frame support assembly 201 further comprises an actuator mechanism 221 for actuating the actuator elements 154a-d of the loading mechanism 105 of the frame assembly 100.

In this embodiment the actuator mechanism 221 comprises first and second actuator units 223a, b, which are associated with respective ones of the first and second frame support members 203a, b and operative to actuate the actuator elements 154a-d of the loading mechanism 105 of the frame assembly 100.

In this embodiment the actuator units 223a, b each comprise an actuator element 225, in this embodiment an elongate plate which extends over a length corresponding to the length of the frame members 106d, b, and at least one piston element 227, in this embodiment a plurality of piston elements 227, here each comprising a piston 235 and a piston rod 237, which is actuated by the piston 235 to drive the actuator element 225 to actuate the actuator elements 154a-d of the loading mechanism 105 of the frame assembly 100.

Operation of the frame assembly 100 and the frame support assembly 201 will now be described hereinbelow.

The fitting of a printing screen 101 to the frame assembly 100 will now be described hereinbelow with reference to Figures 6(a) to (e).

Figure 6(a) illustrates the normal, rest configuration of the frame assembly 100.

In a first operation, the counter-biasing element 141 is actuated, in this embodiment by inflating the bladder 143, to apply a counter-biasing force to the operating arms 135 of the engagement elements 111, such as to counter-bias the engagement elements 111 to overcome the normal biasing force of the biasing elements 117 and cause the engagement elements 111 to adopt a screen-receiving position for receiving the screen 101, and the actuator elements 154a-d are actuated, here by depression of the actuator pins 171 thereof by the actuator units 223a, b of the frame support assembly 201, such as to move the screen support member 153 to the screen-receiving position, in this embodiment in a spaced, lowered position relative to the frame members 106a-d of the frame unit 104, as illustrated in Figure 6(b).

As illustrated in Figure 6(c), the screen 101 is then located in position on the screen support member 153, in this embodiment by sliding the screen 101 into the support member 153 to a loaded position.

Following loading of the screen 101 into the screen support member 153, the actuator elements 154a-d are returned to the first, rest position, in this embodiment by actuating the actuator units 223a, b of the frame support assembly 201 to release the biasing force from the actuator pins 171 thereof, whereby the screen support member 153 is moved to the loaded position, as illustrated in Figure 6(d), in which the engagement members 103 at the edges of the screen 101 are located in the screen recesses 123 in the frame elements 109 of the respective frame members 106a-d.

Following mounting of the screen 101 to the frame unit 104, the counter-biasing element 141 is de-actuated, in this embodiment by deflating the bladder 143, which de-actuation causes the engagement elements 111 to be pivoted by the biasing force of the biasing elements 117 in the tensioning sense, such as to tension the respective edges of the screen 101, as illustrated in Figure 6(e).

The removal of a printing screen 101 from the frame unit 104 is achieved by performing the reverse sequence of operations, but with the additional step of parking a print head PH, in this embodiment a squeegee mechanism comprising a pair of opposed blades, on the support station 147 prior to separation of the screen 101 from the frame unit 104, as illustrated in Figures 7(a) and (b), such as to support the print medium PM which is being operated upon by the print head PH and thereby allow for the screen 101 to be changed without requiring any special action in relation to the print head PH and in particular the print medium PM, typically the removal of the print medium PM from the surface of the screen 101 as would otherwise be required.

Finally, it will be understood that the present invention has been described in its preferred embodiments and can be modified in many different ways without departing from the scope of the invention as defined by the appended claims.

In one alternative embodiment the frame members 106a-d could each include a single, elongate engagement element 111.

In other alternative embodiments the biasing elements 117 could be provided by any kind of resilient element, whether tensioned or compressed.

In yet another alternative embodiment the biasing elements 117 could be provided by actuatable elements, for example, an inflatable bladder of the kind as embodied in relation to the counter-biasing element 141.

Also, in the described embodiments the inflatable bladder 143 of the counter-biasing element 141 is pneumatically operated, but in other embodiments could be hydraulically operated.

CLAIMS

1. A frame assembly for supporting a printing screen, the frame assembly comprising:
a frame unit to which a printing screen is in use supported; and
a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions.
2. The frame assembly of claim 1, wherein the screen loading mechanism comprises a plurality of actuator elements.
3. The frame assembly of claim 2, wherein the actuator elements are arranged to allow for loading of the frame assembly into a screen printing machine in more than one position.
4. The frame assembly of any of claims 1 to 3, wherein the frame unit comprises a plurality of frame members, and the screen loading member comprises a plurality of support elements which are movably coupled to respective ones of the frame members.
5. The frame assembly of claim 4, wherein the screen loading member comprises at least two support elements which are disposed in opposed relation slidably to receive a printing screen.

6. The frame assembly of claim 5, wherein the screen loading member comprises three support elements which together define a U-shaped profile when viewed from above, with first and second of the screen support elements being disposed in opposed relation slidably to receive a printing screen from the one, proximal ends thereof and the other, third screen support element extending between the other, rear ends thereof.
7. The frame assembly of any of claims 4 to 6, wherein the frame members comprise elongate members and the screen support elements comprise elongate elements which extend along a length of the respective frame members.
8. The frame assembly of claim 7 when appendant upon claim 2, wherein the actuator elements are coupled to respective ends of the screen support elements.
9. The frame assembly of any of claims 1 to 8, wherein the at least one actuator element comprises a movable body which is coupled to the screen support member and extends from the frame unit, such as to be actuatable by an external actuator to be moved between a first position in which the screen loading member is in the loaded position and a second position in which the screen loading member is in the screen-receiving position.
10. The frame assembly of claim 9, wherein the at least one actuator element further comprises a biasing element which normally biases the movable body to the first position, with the movable body being moved to the second position against the bias of the biasing element.
11. The frame assembly of claim 9 or 10, wherein the first position is an extended position, in which the movable body extends from the frame

unit and the second position is a depressed position, in which the movable body is depressed into the frame unit.

12. The frame assembly of any of claims 1 to 11, wherein the frame unit includes a support station adjacent an inner edge thereof onto which a print head can be parked prior to separation of the printing screen from the frame unit, such as to enable removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.
13. The frame assembly of claim 12, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
14. The frame assembly of claim 13, wherein the platform comprises a sheet element.
15. A screen printing machine incorporating the frame assembly of any of claims 1 to 14.
16. The screen printing machine of any of claims 1 to 15, wherein the frame unit is provided at least in part by a chassis or supporting frame of the screen printing machine.
17. The screen printing machine of claim 16, wherein the frame unit is provided by a chassis or supporting frame of the screen printing machine.
18. The screen printing machine of claim 16 or 17, wherein the frame unit is an integral part of the screen printing machine.
19. A screen printing machine, comprising:

a frame unit to which a printing screen is in use supported; and
a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions.

20. The screen printing machine of claim 19, wherein the at least one actuator element comprises a movable body which is coupled to the screen support member and extends from the frame unit, such as to be actuatable by an external actuator to be moved between a first position in which the screen loading member is in the loaded position and a second position in which the screen loading member is in the screen-receiving position.
21. The screen printing machine of claim 20, wherein the at least one actuator element further comprises a biasing element which normally biases the movable body to the first position, with the movable body being moved to the second position against the bias of the biasing element.
22. The screen printing machine of claim 20 or 21, wherein the first position is an extended position, in which the movable body extends from the frame unit and the second position is a depressed position, in which the movable body is depressed into the frame unit.
23. The screen printing machine of any of claims 19 to 22, wherein the screen loading mechanism comprises a plurality of actuator elements.

24. The screen printing machine of any of claims 19 to 23, wherein the frame unit comprises a plurality of frame members, and the screen loading member comprises a plurality of support elements which are movably coupled to respective ones of the frame members.
25. The screen printing machine of claim 24, wherein the screen loading member comprises at least two support elements which are disposed in opposed relation slidably to receive a printing screen.
26. The screen printing machine of claim 25, wherein the screen loading member comprises three support elements which together define a U-shaped profile when viewed from above, with first and second of the screen support elements being disposed in opposed relation slidably to receive a printing screen from the one, proximal ends thereof and the other, third screen support element extending between the other, rear ends thereof.
27. The screen printing machine of any of claims 24 to 26, wherein the frame members comprise elongate members and the screen support elements comprise elongate elements which extend along a length of the respective frame members.
28. The screen printing machine of claim 27 when appendant upon claim 23, wherein the actuator elements are coupled to respective ends of the screen support elements.
29. The screen printing machine of any of claims 19 to 28, wherein the at least one actuator element comprises a movable body which is coupled to the screen support member and extends from the frame unit, such as to be actuatable by an external actuator to be moved between a first position in which the screen loading member is in the loaded position

and a second position in which the screen loading member is in the screen-receiving position.

30. The screen printing machine of claim 29, wherein the at least one actuator element further comprises a biasing element which normally biases the movable body to the first position, with the movable body being moved to the second position against the bias of the biasing element.
31. The screen printing machine of claim 29 or 30, wherein the first position is an extended position, in which the movable body extends from the frame unit and the second position is a depressed position, in which the movable body is depressed into the frame unit.
32. The screen printing machine of any of claims 19 to 31, further comprising:
a support station adjacent an inner edge thereof onto which a print head can be parked prior to separation of the printing screen from the frame unit, such as to enable removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.
33. The screen printing machine of claim 32, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
34. The screen printing machine of claim 33, wherein the platform comprises a sheet element.
35. The screen printing machine of any of claims 19 to 34, wherein the frame unit is provided at least in part by a chassis or supporting frame of the screen printing machine.

36. The screen printing machine of claim 35, wherein the frame unit is provided by a chassis or supporting frame of the screen printing machine.
37. The screen printing machine of claim 35 or 36, wherein the frame unit is an integral part of the screen printing machine.
38. A frame support mechanism for supporting a frame assembly which includes a de-mountable printing screen, the frame support mechanism comprising:
a frame support member to which a frame assembly is in use supported, wherein the frame assembly comprises a screen loading member which is movable between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded in an operative position in the frame assembly, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions; and
an actuator mechanism which is operable to actuate the at least one actuator element of the frame assembly to move the screen loading member of the frame assembly between the screen-receiving and loaded positions.
39. The frame support mechanism of claim 38, wherein the frame assembly comprises a plurality of actuator elements which are disposed at opposite edges thereof, the frame support member comprises first and second frame support elements which are disposed in opposed relation to support respective ones of the opposite edges of the frame assembly, and the actuator mechanism comprises first and second actuator units which are operative to actuate the actuator elements at the respective edges of the frame assembly.

40. The frame support mechanism of claim 39, wherein the actuator units each comprise an engagement element for engaging the actuator elements at the respective edge of the frame assembly, and at least one drive element which is operable to drive the engagement element to actuate the actuator elements at the respective edge of the frame assembly.
41. The frame support mechanism of claim 40, wherein the at least one drive element comprises a piston element.
42. The frame support mechanism of any of claims 38 to 41, wherein the frame assembly comprises a frame unit to which the screen support member is movably coupled.
43. The frame support mechanism of claim 42, wherein the frame unit comprises a plurality of frame members, and the screen loading member comprises a plurality of screen support elements which are movably coupled to respective ones of the frame members.
44. The frame support mechanism of claim 43, wherein the frame members comprise elongate members and the screen support elements comprise elongate elements which extend along a length of the respective frame members.
45. The frame support mechanism of claim 44 when appendant upon claim 39, wherein the actuator elements are coupled to respective ends of the screen support elements.
46. The frame support mechanism of any of claims 43 to 45, wherein the screen loading member comprises at least two screen support elements which are disposed in opposed relation slidably to receive a printing screen.

47. The frame support mechanism of claim 46, wherein the screen loading member comprises three screen support elements which together define a U-shaped profile when viewed from above, with first and second of the screen support elements being disposed in opposed relation slidably to receive a printing screen from the one, proximal ends thereof and the other, third screen support element extending between the other, rear ends thereof.
48. The frame support mechanism of any of claims 38 to 47, further comprising:
a support station onto which a print head can be parked prior to unloading of the printing screen from the frame unit, such as to enable removal of the print head and associated print medium from the printing screen prior to unloading of the printing screen from the frame unit.
49. The frame support mechanism of claim 48, wherein the support station is located adjacent an inner edge of the frame unit.
50. The frame support mechanism of claim 49, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
51. The frame support mechanism of claim 50, wherein the platform comprises a sheet element.
52. A screen printing machine incorporating the frame support mechanism of any of claims 38 to 51.

53. The screen printing machine of claim 52, wherein the frame support member is provided at least in part by a chassis or supporting frame of a screen printing machine.
54. The screen printing machine of claim 53, wherein the frame support member is provided by a chassis or supporting frame of the screen printing machine.
55. The screen printing machine of claim 53 or 54, wherein the frame support member is an integral part of the screen printing machine.
56. A screen printing machine, comprising:
 - a frame support member to which a frame assembly is in use supported, wherein the frame assembly comprises a screen loading member which is movable between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded in an operative position in the frame assembly, and at least one actuator element which is coupled to the screen loading member and actuatable to move the screen loading member between the screen-receiving and loaded positions; and
 - an actuator mechanism which is operable to actuate the at least one actuator element of the frame assembly to move the screen loading member of the frame assembly between the screen-receiving and loaded positions.
57. The screen printing machine of claim 56, wherein the frame assembly comprises a plurality of actuator elements which are disposed at opposite edges thereof, the frame support member comprises first and second frame support elements which are disposed in opposed relation to support respective ones of the opposite edges of the frame assembly, and the actuator mechanism comprises first and second actuator units

which are operative to actuate the actuator elements at the respective edges of the frame assembly.

58. The screen printing machine of claim 57, wherein the actuator units each comprise an engagement element for engaging the actuator elements at the respective edge of the frame assembly, and at least one drive element which is operable to drive the engagement element to actuate the actuator elements at the respective edge of the frame assembly.
59. The screen printing machine of claim 58, wherein the at least one drive element comprises a piston element.
60. The screen printing machine of any of claims 56 to 59, wherein the frame assembly comprises a frame unit to which the screen support member is movably coupled.
61. The screen printing machine of claim 60, wherein the frame unit comprises a plurality of frame members, and the screen loading member comprises a plurality of screen support elements which are movably coupled to respective ones of the frame members.
62. The screen printing machine of claim 61, wherein the frame members comprise elongate members and the screen support elements comprise elongate elements which extend along a length of the respective frame members.
63. The screen printing machine of claim 62 when appendant upon claim 57, wherein the actuator elements are coupled to respective ends of the screen support elements.
64. The screen printing machine of any of claims 61 to 63, wherein the screen loading member comprises at least two screen support elements

which are disposed in opposed relation slidably to receive a printing screen.

65. The screen printing machine of claim 64, wherein the screen loading member comprises three screen support elements which together define a U-shaped profile when viewed from above, with first and second of the screen support elements being disposed in opposed relation slidably to receive a printing screen from the one, proximal ends thereof and the other, third screen support element extending between the other, rear ends thereof.
66. The screen printing machine of any of claims 56 to 65, further comprising:
a support station onto which a print head can be parked prior to unloading of the printing screen from the frame unit, such as to enable removal of the print head and associated print medium from the printing screen prior to unloading of the printing screen from the frame unit.
67. The screen printing machine of claim 66, wherein the support station is located adjacent an inner edge of the frame unit.
68. The screen printing machine of claim 67, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
69. The screen printing machine of claim 68 wherein the platform comprises a sheet element.
70. The screen printing machine of any of claims 56 to 69, wherein the frame support member is provided at least in part by a chassis or supporting frame of a screen printing machine.

71. The screen printing machine of claim 70, wherein the frame support member is provided by a chassis or supporting frame of the screen printing machine.
72. The screen printing machine of claim 70 or 71, wherein the frame support member is an integral part of the screen printing machine.
73. A frame assembly for supporting a printing screen, the frame assembly comprising:
a frame unit to which a printing screen is in use supported, wherein the frame unit includes a support station adjacent an inner edge thereof onto which a print head can be parked prior to separation of the printing screen from the frame unit, such as to provide for removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.
74. The frame assembly of claim 73, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
75. The frame assembly of claim 74, wherein the platform comprises a sheet element.
76. A screen printing machine incorporating the frame assembly of any of claims 73 to 75.
77. The screen printing machine of claim 76, wherein the frame unit is provided at least in part by a chassis or supporting frame of the screen printing machine.

78. The screen printing machine of claim 78, wherein the frame unit is provided by a chassis or supporting frame of the screen printing machine.
79. The screen printing machine of claim 77 or 78, wherein the frame unit is an integral part of the screen printing machine.
80. A screen printing machine, comprising:
a frame unit to which a printing screen is in use supported; and
a support station onto which a print head can be parked prior to separation of the printing screen from the frame support member, such as to provide for removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame support member.
81. The screen printing machine of claim 80, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
82. The screen printing machine of claim 81, wherein the platform comprises a sheet element.
83. The screen printing machine of any of claims 80 to 82, wherein the frame unit is provided at least in part by a chassis or supporting frame of the screen printing machine.
84. The screen printing machine of claim 83, wherein the frame unit is provided by a chassis or supporting frame of the screen printing machine.
85. The screen printing machine of claim 83 or 84, wherein the frame unit is an integral part of the screen printing machine.

86. A method of mounting a printing screen in a screen printing machine, comprising the steps of:
providing a frame unit to which a printing screen is supported;
providing a screen loading mechanism for loading a printing screen into and unloading a printing screen from the frame unit, wherein the screen loading mechanism comprises a screen loading member which is movably coupled to the frame unit between a screen-receiving position in which a printing screen can be loaded into or removed from the screen loading member and a loaded position in which the printing screen is loaded into the frame unit;
moving the screen loading member to the screen-receiving position;
loading a printing screen into the screen loading member when positioned in the screen-receiving position; and
moving the screen loading member to the loaded position in which the printing screen is loaded into the frame unit.
87. The method of claim 86, wherein the screen loading mechanism comprises at least one actuator element which is coupled to the screen loading member, and the steps of moving the screen loading member are performed by actuating the at least one actuator element.
88. The method of claim 87, wherein the screen loading mechanism comprises a plurality of actuator elements which are coupled to the screen loading member, and the steps of moving the screen loading member are performed by actuating the actuator elements.
89. The method of any of claims 86 to 88, wherein frame unit and the screen loading mechanism are provided as a removable frame assembly.

90. The method of claim 89 when appendant upon claim 88, wherein the actuator elements are arranged to allow for loading of the frame assembly into a screen printing machine in more than one position.
91. The method of any of claims 86 to 90, wherein the frame unit comprises a plurality of frame members, and the screen loading member comprises a plurality of support elements which are movably coupled to respective ones of the frame members.
92. The method of claim 91, wherein the screen loading member comprises at least two support elements which are disposed in opposed relation slidingly to receive a printing screen.
93. The method of claim 92, wherein the screen loading member comprises three support elements which together define a U-shaped profile when viewed from above, with first and second of the screen support elements being disposed in opposed relation slidingly to receive a printing screen from the one, proximal ends thereof and the other, third screen support element extending between the other, rear ends thereof.
94. The method of any of claims 91 to 93, wherein the frame members comprise elongate members and the screen support elements comprise elongate elements which extend along a length of the respective frame members.
95. The method of claim 94 when appendant upon claim 88, wherein the actuator elements are coupled to respective ends of the screen support elements.
96. The method of any of claims 86 to 95, wherein the at least one actuator element comprises a movable body which is coupled to the screen support member and extends from the frame unit, such as to be actuatable by an external actuator to be moved between a first position

in which the screen loading member is in the loaded position and a second position in which the screen loading member is in the screen-receiving position.

97. The method of claim 96, wherein the at least one actuator element further comprises a biasing element which normally biases the movable body to the first position, with the movable body being moved to the second position against the bias of the biasing element.
98. The method of claim 96 or 97, wherein the first position is an extended position, in which the movable body extends from the frame unit and the second position is a depressed position, in which the movable body is depressed into the frame unit.
99. The method of any of claims 86 to 98, wherein the frame unit includes a support station adjacent an inner edge thereof onto which a print head can be parked prior to separation of the printing screen from the frame unit, and further comprising the step of:
parking a print head on the support station prior to the step of moving the printing screen to the screen-receiving position, thereby enabling removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.
100. The method of claim 99, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
101. The method of claim 100, wherein the platform comprises a sheet element.

102. A method of mounting a printing screen in a screen printing machine, comprising the steps of:
providing a frame unit to which a printing screen is supported;
providing a support station adjacent an inner edge of the frame unit onto which a print head can be parked prior to separation of the printing screen from the frame unit; and
parking a print head on the support station prior to removing the printing screen from the frame unit, thereby enabling removal of the print head and associated print medium from the printing screen prior to separation of the printing screen from the frame unit.
103. The method of claim 102, wherein the support station comprises a platform which extends inwardly from a lower surface of the respective edge of the frame unit, such as to allow for sliding movement of the print head thereonto.
104. The method of claim 103, wherein the platform comprises a sheet element.