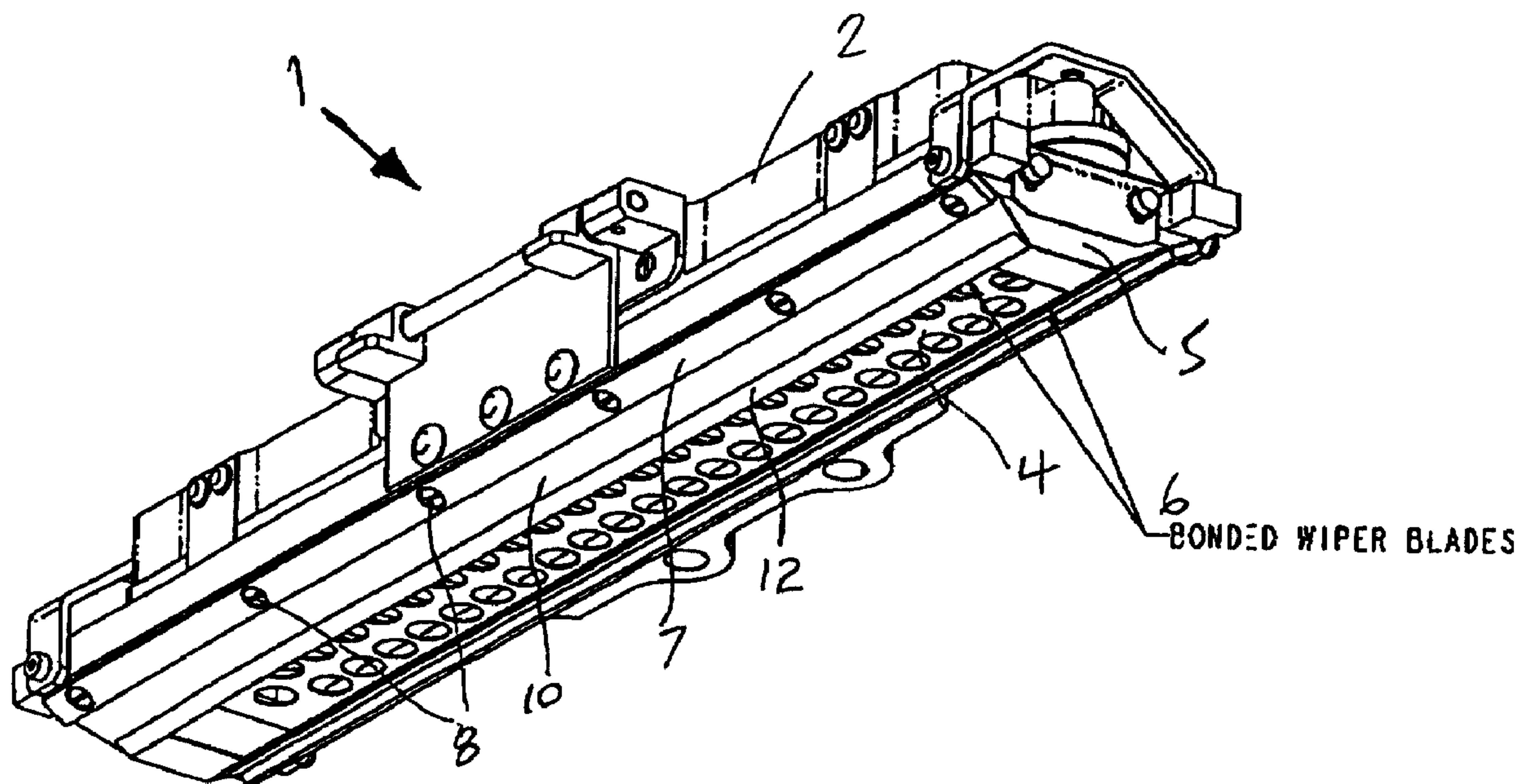




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(54) **AMELIORATIONS APORTEES A DES TETES D'IMPRESSION**
(54) **IMPROVEMENTS RELATING TO PRINT HEADS**



(57) La présente invention concerne une raclette (6), destinée à la sérigraphie, qui comprend une bande en matériau synthétique fixée par une de ses extrémités longitudinales, de manière adjacente, à une tête d'impression. Durant l'impression, cette raclette est en contact avec un cadre et forme avec lui un angle en avant. La raclette (6) comprend sur son autre extrémité longitudinale un élément métallique (12) de renfort qui agit aussi comme segment d'usure et se trouve en contact avec le cadre durant l'impression. La présente invention concerne aussi une tête d'impression destinée à un dispositif de sérigraphie.

(57) A wiper blade (6) for screen printing comprising a web of synthetic material to be mounted adjacent one longitudinal edge thereof on a print head (1), extending towards a screen and having a leading angle during a printing operation, the wiper blade (6) having, at the other longitudinal edge thereof, a metallic reinforcing member (12) which also acts as a wear strip and contacts the screen during the printing operation. A print head for a screen printer is also described.

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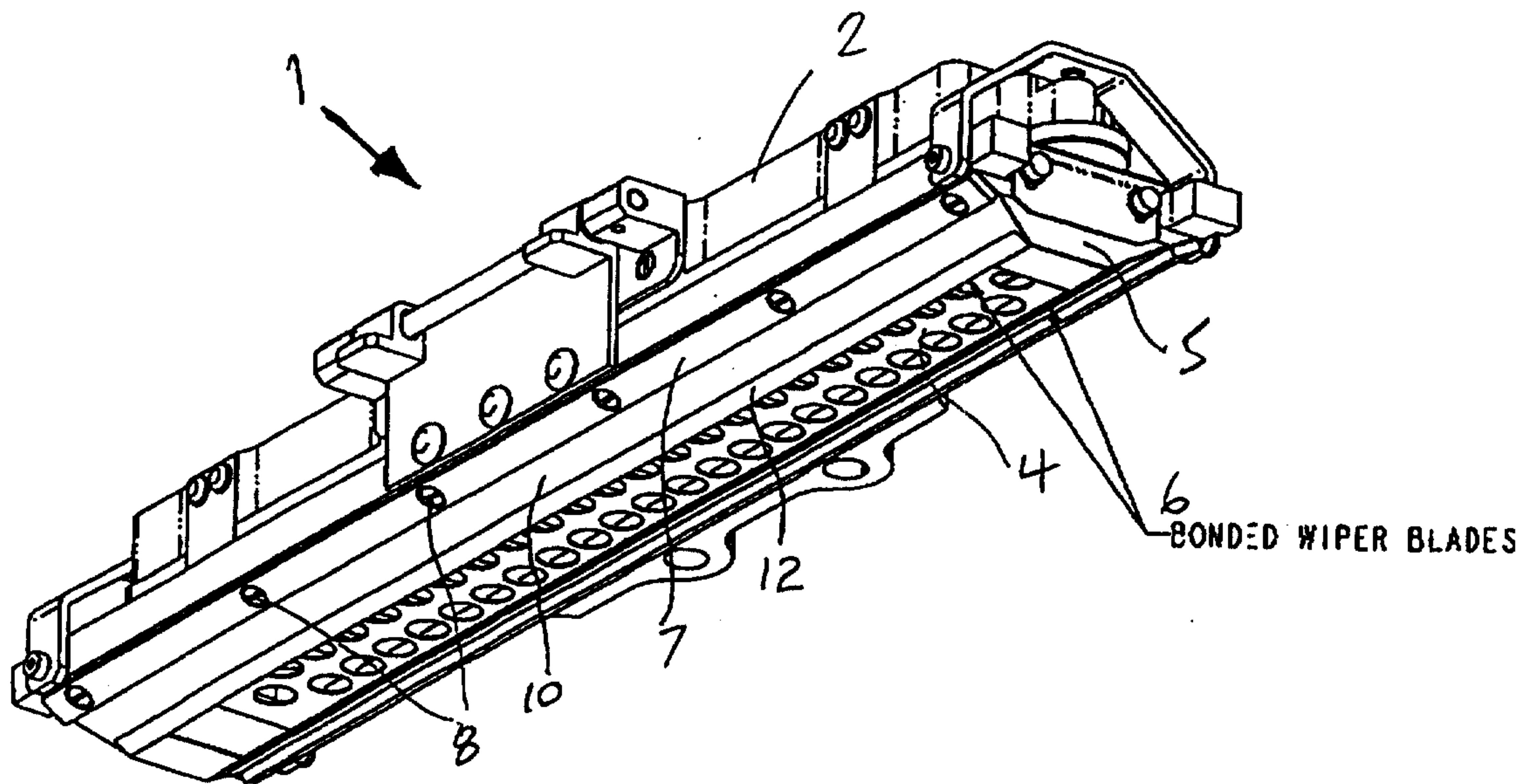
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(57) Abstract

A wiper blade (6) for screen printing comprising a web of synthetic material to be mounted adjacent one longitudinal edge thereof on a print head (1), extending towards a screen and having a leading angle during a printing operation, the wiper blade (6) having, at the other longitudinal edge thereof, a metallic reinforcing member (12) which also acts as a wear strip and contacts the screen during the printing operation. A print head for a screen printer is also described.

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IMPROVEMENTS RELATING TO PRINT HEADS

The invention relates to print heads. In particular, a first aspect relates to wiper blades (such as wiper blades used in screen printing), and a second aspect relates to print heads (such as print heads employed in screen printing).

- 5 Traditionally screen printing machines used a squeegee blade which was dragged at an angle over a printing screen to press a substance to be printed through open apertures in the screen, a reservoir of the substance to be printed being drawn across the screen in the form of a bead maintained between the screen and the wiper blade.
- 10 The specification of co-pending Application PCT/EP97/05761 describes an improved form of screen printing wherein, instead of the substance to be printed lying on the screen and being dragged thereacross by a squeegee blade, the substance is contained within a chamber the open end of which is pressed against the screen, the substance being moved towards the screen by means such as a piston which can place
- 15 the substance to be printed under pressure. At least one long flexible wiper is provided, the wiper extending transverse to the direction of displacement of the device over the stencil and transverse to the direction of displacement of the substance to be printed towards the screen, the wiper being inclined inwardly to extend across the open end of the chamber and arranged such that when the chamber is pushed
- 20 against the screen and the product is pushed under pressure through the screen, the wiper acts to provide a scraping action for lifting paste off the screen and to provide a "rolling" action of the paste. Thus rather than having a trailing angle, as in squeegees used for traditional printing, a wiper in the new form of printing has a leading angle.
- 25 It has been proposed that such wipers be formed of polyester material such as those sold under the Trademark Mylar.

According to a first aspect of the invention, there is provided a print head for screen printing, the print head comprising: a chamber for substance to be printed, said chamber having an open end; means for driving substance to be printed through

30 the open end of the chamber and onto a screen; and at least one wiper blade provided at the open end of the chamber, the wiper blade comprising a web of synthetic

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material which is mounted at a leading angle adjacent one longitudinal edge thereof to said print head; characterised in that: the other longitudinal edge of said blade is provided with a metallic reinforcing member which contacts the screen during a printing operation; the wiper blade is mounted to said print head so that said metallic reinforcing member scrapes across said screen during a printing operation to lift substance to be printed from said screen; and in that the metallic reinforcing member acts as a wear strip to increase wear resistance of the wiper blade as the blade is scraped across the screen during a printing operation.

Preferably, the thickness of the metallic member is equal to or less than that of the synthetic wiper blade.

Preferably, the width of the metallic member is equal to or less than that of the synthetic wiper blade.

More preferably, the metallic member is of a thickness between 10 and 70% of the thickness of the synthetic wiper blade, preferably around 20% thereof, and is of a width of 10 to 40% of the width of the wiper blade, preferably around 23% thereof. The metallic member can be flush with the free edge of the synthetic wiper blade (ie. zero projection), or can project from the free edge of the blade by up to 30% of its width. Preferably the metallic reinforcement and wear strip is formed of stainless steel which increases the rigidity of the synthetic wiper blade while allowing the wiper blade still to flex and bend and increasing its resistance to wear. It can give greatly enhanced and consistent print quality from the printing operation. The metallic member could be of spring steel, titanium or a variety of other materials known to persons skilled in the art.

In one embodiment, given by way of example, the wiper blade was formed of polyester and a metal reinforcement strip of stainless steel, the wiper blade was of an overall length of 340 millimetres, had six slots in one edge thereof through which screws could project to mount the wiper blade on a print head, was 22 millimetres in width and 0.5 millimetres in thickness and the stainless steel blade was secured by adhesive to the opposite edge to said edge in which the slots were provided for mounting screws, had a length the same as that of the wiper blade, a width of 5 millimetres, a thickness of 0.1 millimetres and an overhang beyond the free edge

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of the wiper blade of 0.5 millimetres.

A further aspect of the invention seeks to further enhance the screen printing process described in the above-mentioned co-pending application.

As described above, the previously proposed process employs a chamber
5 within which printing product is provided. As the chamber is used, product is dispensed and the quantity of product in the chamber is gradually reduced. When the chamber is exhausted, it must be replaced with a fresh chamber before the printing process can continue. The used chamber is then either returned to the manufacturer for replenishment, which is expensive, or thrown away, which is wasteful and
10 potentially environmentally damaging. In either case, the printing process must be halted to allow the chamber to be changed.

To alleviate at least some of these and other problems, the second aspect of the invention provides a self-contained print head for a screen printer, the print head comprising: a body, a receptacle for printing product, said printing product being
15 dispensable from said receptacle through an orifice, one or more charging apertures in said body which provide access to the receptacle and by means of which said receptacle may be recharged as required with printing product; and a respective sealing means associated with each of said one or more charging apertures and operable to allow or disable access to said receptacle; characterised in that said
20 sealing means are operable to disable access to said receptacle to prevent printing product from being dispensed from a respective aperture during a printing operation and operable to allow the injection of printing product into said receptacle when said print head is not involved in a printing operation, said receptacle being rechargeable by means of an external printing product injector temporarily engageable with one or
25 more of said charging apertures and operable to inject printing product into said receptacle as required to recharge said receptacle.

This aspect of the invention allows the user of the chamber to inject printing product into the chamber to recharge it, and therefore avoids the expense and waste associated with previously proposed arrangements.

30 The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

3a

Figures 1, 2 and 3 are views of a print head provided with wiper blades according to the invention comprising respectively a perspective view from the underside, one end and one side; an elevation from said one end; and a perspective view from the other end, above and the other side;

5 Figure 4 is a plan view of a wiper blade according to the invention;

Figure 5 is a sectional view on line V-V of Figure 4 to a greatly increased scale;

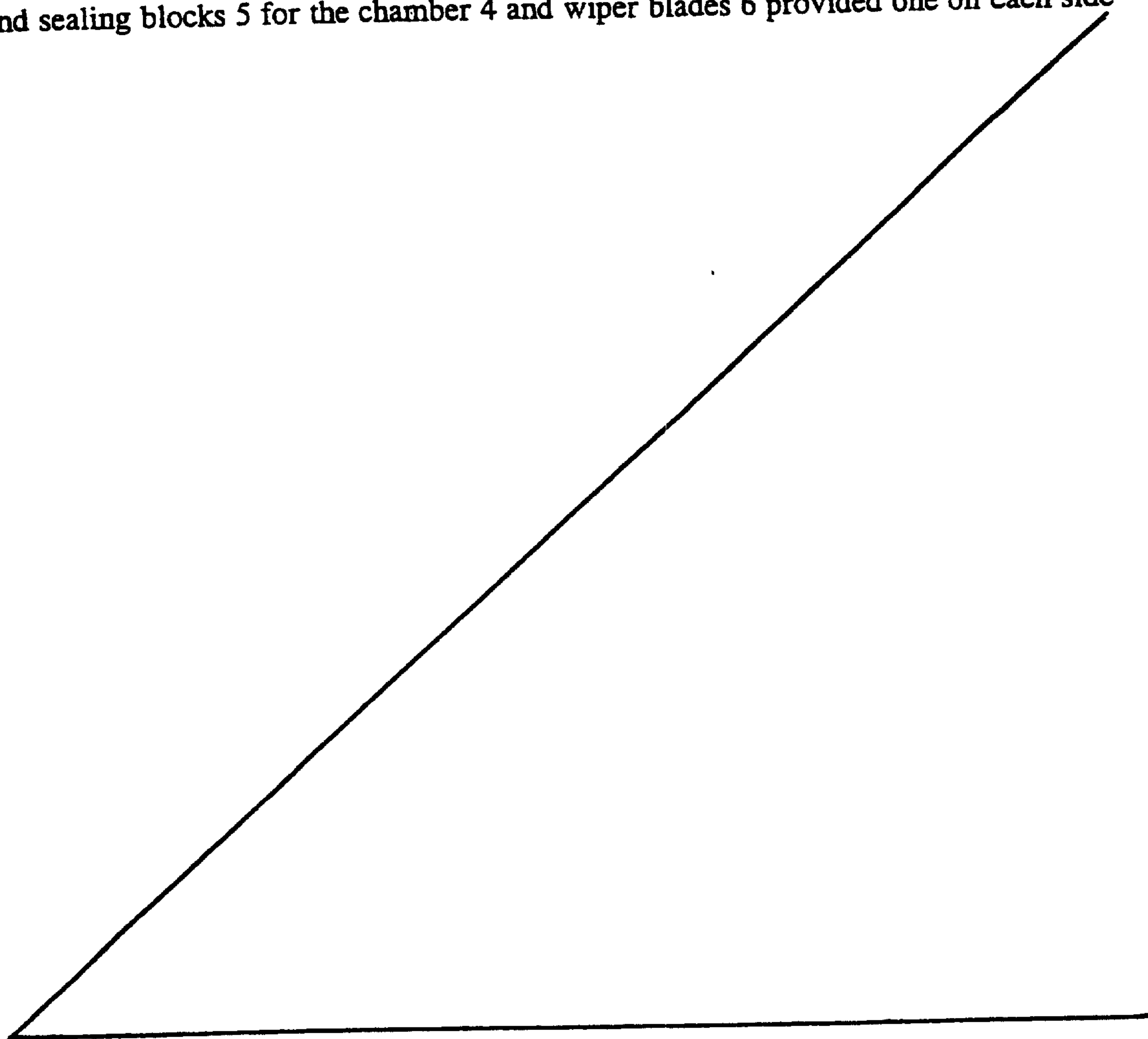
Figure 6 is an enlarged view of the lower part of Figure 5;

Figure 7 is a front elevational view of a print head;

10 Figure 8 is a cross-sectional view along the line X-X of Figure 7; and

Figure 9 is a cross-sectional view along the line A-A of Figure 7.

Referring to the drawings and firstly to Figures 1 to 3, a print head 1 comprises a body 2 with an underneath chamber 4 to receive product to be printed, end sealing blocks 5 for the chamber 4 and wiper blades 6 provided one on each side



of the chamber 4, each wiper blade 6 being clamped by means of a mounting bar 7 having apertures therein through which screws 8 project, the screws 8 also extending through slots in the edge of the respective wiper blade 6 and engaging in screw threaded apertures in the body 2.

5 It should be noted that the one of the wiper blades 6 which is effective during a printing operation is the blade which is at the trailing side of the chamber 4 having regard to the direction of movement of the print head 1, and that the wiper blade 6 is at a leading angle to the screen which in use is provided below the print head 1 but which is not shown in Figures 1 to 3. The blade 6 which during a print operation is
10 on the leading side of the head having regard to the direction of movement of the head acts only in a sealing sense. The print head is pressed downwardly to force the blade against the screen. Pressure is also applied to the substance to be printed in the chamber 4 to force substance through the screen. The pressure applied to the substance also acts on the leading wiper blade 6 to press it downwardly against the
15 screen and effect a seal, but that wiper blade 6 does not effect a scraping action since there is no substance on the upper surface of the screen in front of it. A print head of the kind shown in Figures 1 to 3 can be used to effect a printing operation in either of the two directions shown by the double-headed arrow 9 in Figure 2.

Referring to Figures 4 to 6, each wiper blade 6 is formed as a flat strip 10 of
20 polyester 21.5 millimetres in width, 0.5 millimetres in thickness and 340 millimetres in length. In one edge 10a it has six slots 11 to receive the shanks of the screws 8. Adjacent its other edge 10b there is provided, adhered to the strip 6, a metallic strip 12 of stainless steel of the same length as the wiper blade 6, 5 millimetres in width and 0.1 millimetres in thickness. The metallic strip 12 projects, as shown in
25 Figure 6, by a portion 12a beyond the adjacent edge 10b of the polyester strip 10 by approximately 0.5 millimetres and, as shown in Figure 1, the metallic strip 12 is provided on the underside of the polyester strip 10 in its operative position such that it is the metallic strip 12 which contacts the screen during a printing operation and not the polyester strip 10. The metallic strip 12 thus gives rigidity to the wiper blade
30 6 while still allowing the wiper blade 6 to flex and bend and also increases the wear resistance of the wiper blade 6 thereby to provide for consistent print quality in

operation.

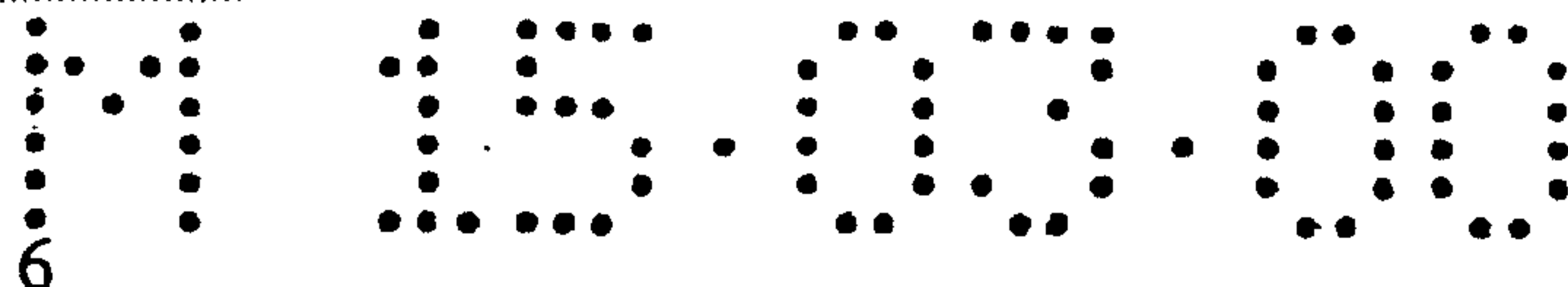
As mentioned above, Figure 7 shows a front elevational view of a print head 30 according to a second aspect of this invention. The print head 30 is superficially similar to that described above with reference to Figures 1 to 6, and comprises a body 32 which is hollow and defines a printing product receptacle from which the printing product may be dispensed through a printing product orifice 34. Either side of the printing product orifice 34, there is provided a pair of wiper blades 36 (only one of which is visible) which are each secured to the body 32 by means of screws or other suitable means 38.

With reference to Figure 8, the body 32 comprises an upper section 35, a middle section 37 and a lower section 38 (although the body could alternatively comprise a pair of removable sections, if desired). Each of these sections are removably detachable from one another. The sections 35, 37 and 38 together define the body 32 and the printing product receptacle.

In the preferred arrangement, the upper, middle and lower sections of the body are held together by screws which attach the upper section to the middle section, and by further screws 39 (Figure 7) which attach the middle section to the lower section 38. An o-ring seal 50 is provided between the middle and lower sections, and a diaphragm 52 is provided between the upper and middle sections. The diaphragm 52 may be of rubber or any other suitable material and preferably has a top-hat-shaped cross-section.

As shown in Figure 8, the diaphragm 52 extends into the cavity defined by the upper section 35. Pressure is applied, in use, between the diaphragm and the walls of the upper section to drive the diaphragm, and hence the printing product, towards the orifice 34. A rubber diaphragm is preferred as rubber has elastic properties which, when the pressure is removed, cause the diaphragm to attempt to move towards its initial position and therefore reduce the likelihood of printing product being dispensed from the orifice when it is not needed.

In the depicted embodiment, the printing product receptacle is defined by the inner walls of the diaphragm 52 housed in the upper section 35, the middle section and the lower section 38. As shown in Figure 7, the body 32 includes one or more



sealing means 40 in a front wall thereof. In the preferred embodiment, three sealing means 40 are provided in the front wall of the print head 30, but a larger or smaller number may be provided, and they need not necessarily be located in the front wall of the print head 30. Preferably, the sealing means each comprises a valve assembly 5 such as a ball valve. Alternatively, the sealing means could each comprise a cap for closing a channel to the interior of the printing product receptacle.

As shown in Figure 9, in the preferred embodiment each valve assembly 40 comprises a channel 46 within which a ball 42 is movably retained. When the print head 30 is in use, pressure applied to the receptacle for printing product forces the 10 ball 42 against a seat 46 thereby closing the passageway to the interior of the print head 30. At other times (for example when the print head is being relocated in the printing apparatus (not shown) and pressure is released from the printing product receptacle), fresh printing product may be injected under pressure into the print head 30 by means of one or more of the valve assemblies 40 to move the ball 42 to open 15 the passageway 46. The print head 30 may remain in the printing apparatus or may be removed therefrom when the recharging of the print head 30 occurs.

As an alternative to a valve assembly, a simple cap or plug or bung could be provided. The cap would, when in place, close the channel to the printing product receptacle and could be snap fittable with the channel, or could screw-threadably 20 engage with the interior or exterior wall of the channel. The plug or bung would be push-fittable into a friction fit with the walls of the channel. Further alternatives will also be apparent.

It will be understood that this second aspect of the invention may be employed in combination with the above described first aspect, or alternatively, may be 25 employed in other types of print head - for example, such as those described in the above mentioned co-pending application.

Finally, it will be understood that various aspects of the invention have been described herein by way of example only and that modifications may be made within the scope of the invention.

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CLAIMS

1. A print head (1) for screen printing, the print head comprising:
a chamber (4) for substance to be printed, said chamber having an open end;
means for driving substance to be printed through the open end of the chamber
5 and onto a screen; and
at least one wiper blade (6) provided at the open end of the chamber (4), the
wiper blade comprising a web (10) of synthetic material which is mounted at a
leading angle adjacent one longitudinal edge thereof to said print head;
characterised in that:
10 the other longitudinal edge of said blade (6) is provided with a metallic
reinforcing member (12) which contacts the screen during a printing operation;
the wiper blade (6) is mounted to said print head (1) so that said metallic
reinforcing member (12) scrapes across said screen during a printing operation to lift
substance to be printed from said screen; and
15 in that the metallic reinforcing member (12) acts as a wear strip to increase
wear resistance of the wiper blade (6) as the blade is scraped across the screen during
a printing operation.
2. A print head according to Claim 1, wherein the metallic member (12) is of a
20 thickness that is less than or equal to that of the synthetic wiper blade (10).
3. A print head according to Claim 1 or Claim 2, wherein the metallic member
(12) is of a thickness between 10 and 70% of the thickness of the synthetic wiper
blade.
- 25 4. A print head according to any of Claims 1 to 3, wherein the metallic member
(12) is of a thickness of approximately 20% of the thickness of the synthetic wiper
blade.
- 30 5. A print head according to any of Claims 1 to 4, wherein the metallic member
(12) is of a width that is less than or equal to that of the synthetic wiper blade.

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6. A print head according to any preceding claim, wherein the metallic member (12) is of a width of 10 to 40% of the width of the wiper blade.
7. A print head according to any preceding claim, wherein the metallic member (12) is of a width of approximately 23% of the wiper blade.
8. A print head according to any preceding claim, wherein the metallic member (12) is flush with the free edge of the blade (6), or projects beyond the free edge of the synthetic wiper blade by up to 30% of the width of the metallic member.
9. A print head according to any preceding claim, wherein the metallic reinforcement and wear strip is of stainless steel.
10. A print head according to any preceding claim, comprising a pair of said wiper blades (6) located either side of said open end.
11. A self-contained print head (1; 30) for a screen printer, the print head comprising:
- a body (32),
 - a receptacle (52, 37, 38) for printing product, said printing product being dispensable from said receptacle through an orifice (34),
 - one or more charging apertures (40) in said body which provide access to the receptacle and by means of which said receptacle may be recharged as required with printing product; and
 - a respective sealing means (42, 44) associated with each of said one or more charging apertures and operable to allow or disable access to said receptacle; characterised in that said sealing means (42, 44) are operable to disable access to said receptacle (52, 37, 38) to prevent printing product from being dispensed from

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a respective aperture (40) during a printing operation and operable to allow the injection of printing product into said receptacle when said print head is not involved in a printing operation, said receptacle (52, 37, 38) being rechargeable by means of an external printing product injector temporarily engageable with one or more of said charging apertures (40) and operable to inject printing product into said receptacle as required to recharge said receptacle.

12. A print head according to Claim 11, comprising a pair of blades (36) according to any of Claims 1 to 9 located on either side of said orifice (34).

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13. A print head according to Claim 11 or 12, wherein said receptacle is defined by at least some of the inner walls (37, 38) of said body.

14. A print head according to Claim 13, wherein said receptacle is defined by a diaphragm (52) clamped between opposite inner walls (35, 37) of the body and a portion of said body inner walls (37, 38).

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15. A print head according to Claim 14, wherein said diaphragm (52) has a "top-hat" shaped cross-section.

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16. A print head according to Claim 14 or Claim 15, wherein said diaphragm (52) is of rubber.

17. A print head according to any of Claims 14 to 16, wherein said body comprises at least two portions (35, 37) separable from one another, said diaphragm (52) being clamped between two (35, 37) of said portions.

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18. A print head according to any of Claims 11 to 17, wherein said receptacle comprises a second body that is removable from said print head.

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19. A print head according to any of Claims 11 to 18, wherein a said sealing

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means comprises a valve having a ball (42) retained within a channel (46) in a respective charging aperture (40), said ball being movable from an open position wherein printing product may be injected under pressure into said receptacle to a closed position wherein the ball prevents the dispensation of printing product from a

5 said aperture and vice versa.

20. A print head according to Claim 19, wherein the ball (42) is spring biased to close a respective aperture.

10 21. A print head according to any of Claims 11 to 18, wherein a said sealing means comprises a cap or a plug or a bung for closing a respective charging aperture.

~~clamped between two of said portions.~~

~~19. A print head according to any of Claims 11 to 18, wherein said receptacle comprises a second body that is removable from said print head.~~

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20. A print head according to any of Claims 11 to 19, wherein a said sealing means comprises a valve having a ball retained within a channel in a respective charging aperture, said ball being movable from an open position wherein printing product may be injected under pressure into said receptacle to a closed position wherein the ball prevents the dispensation of printing product from a said aperture and vice versa.

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21. A print head according to Claim 20, wherein the ball is spring biased to close a respective aperture.

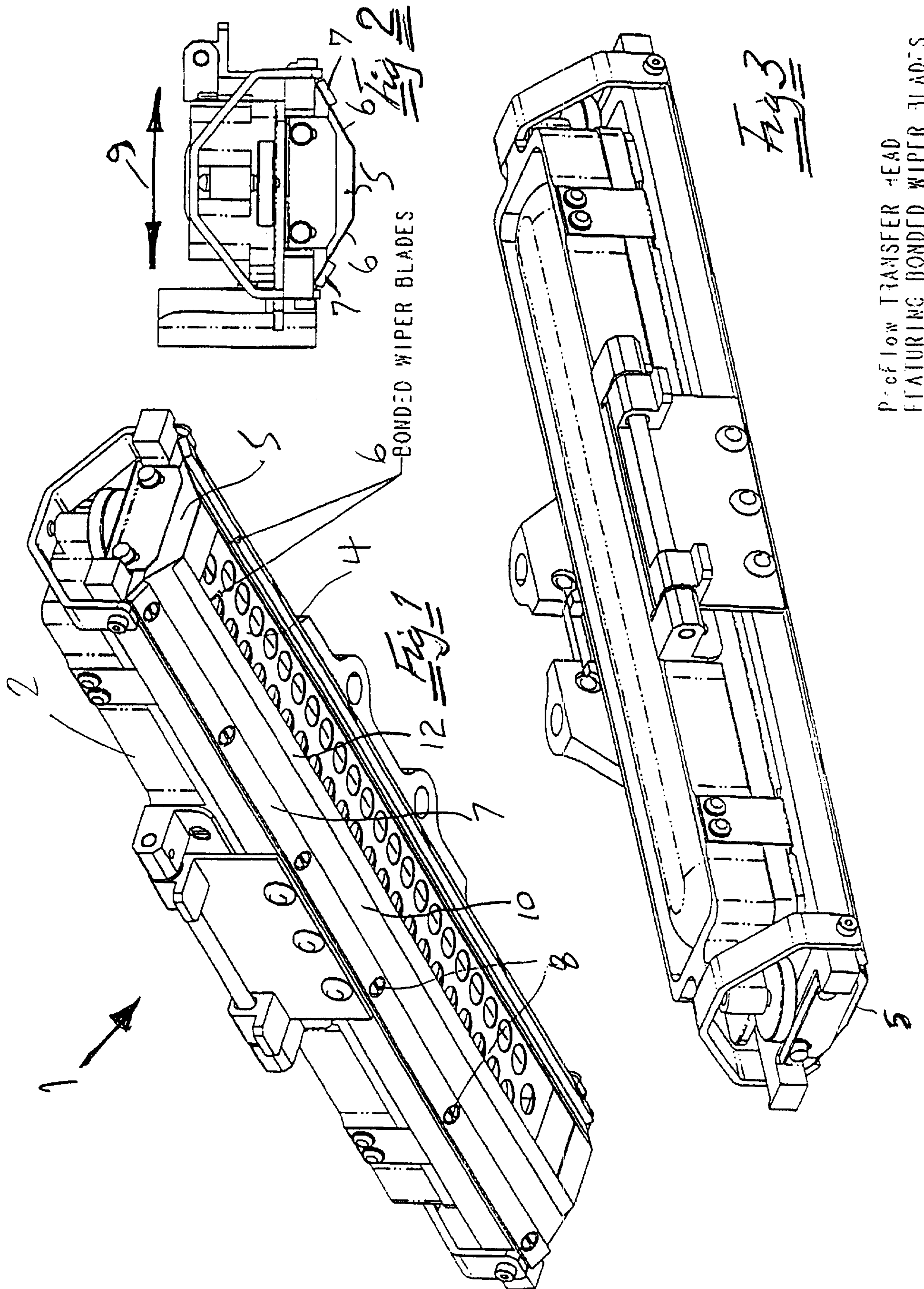
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22. A print head according to any of Claims 11 to 19, wherein a said sealing means comprises a cap or a plug or a bung for closing a respective charging aperture.

23. A blade substantially as hereinbefore described with reference to any of Figures 1 to 6 of the accompanying drawings.

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24. A print head substantially as hereinbefore described with reference to Figures 7 to 9 of the accompanying drawings.



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