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(54) Squeegee element.

(57) Squeegee element (1) for pressing a viscous mass containing at least one other constituent through perforations of a movable stencil onto an advancing substrate, which element is at least provided with a squeegee feed device for feeding a viscous mass to the squeegee element, wherein said squeegee feed device interacts with a discharge device of a mixing device (4, 4b, 15), which is detachably fixed in the squeegee element (1). Said mixing device (4, 4b, 15) is provided with a first feed device (13, 14) for viscous mass and at least one other feed device (6, 12) for another constituent of the viscous mass, and can be connected to a mixing device drive element (4a). The squeegee element (1) is further connected to a closable container (15) for a component (11) of the viscous mass, said container having an outflow aperture in the cover (8) of the container (5).

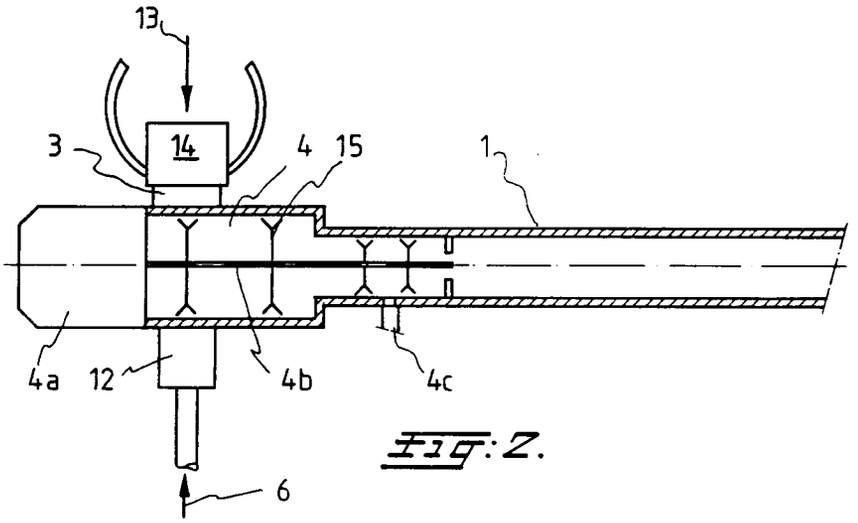

Fig. 2.

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The invention relates to a squeegee element for pressing a viscous mass containing at least one other constituent through perforations of a movable stencil onto an advancing substrate, which element is at least provided with a squeegee feed device for feeding a viscous mass to the squeegee element.

Such an element has already been known for quite a long time and is used in printing devices of all kinds.

In a rotary screen printing device, printing medium, for example, is fed in through a squeegee situated inside the periphery of the printing block comprising a rotary screen printing stencil. The squeegee is in contact with the rotating stencil during the printing operation; the printing medium is fed in in the wedge angle between the wall of the stencil and the squeegee, and through the hydrodynamic pressure occurring is pressed outwards through the perforations in the pattern parts of the stencil and deposited in pattern form on the web to be printed, which is conveyed in contact with the stencil.

The squeegee used can also be a squeegee of the so-called closed type, in which the pressure in the squeegee is the determining factor for the quantity of printing medium passing out through the pattern parts.

The printing medium used in the state of the art is a fully prepared printing medium, generally comprising a base medium and an additive concentrate which are mixed in a specific ratio in order to obtain the desired colour depth or covering degree.

The additive concentrate can therefore be a pigment concentrate. An uncoloured pigment, for example titanium dioxide, can also be present to provide a certain covering degree.

The base medium can be, for example, a water-based base medium such as is used in textile printing. The base medium can also be solvent-based, or this base medium can be a base medium in which a solvent which is not miscible with water is emulsified in an aqueous thickening medium.

An aqueous base medium which is used in textile printing contains, for example, water, a thickening agent, one or more emulsifiers, pH adjustment agents and surfactants.

A solvent-based medium can contain, for example, PVC, a plasticizer such as dioctyl phthalate, and turpentine. An emulsion system contains a thickening agent dissolved in water and a quantity of emulsified solvent such as turpentine, and a surfactant. When printing with such a complete printing medium there is always the disadvantage that on completion of a printing run a quantity of printing medium which must be described as chemical waste is left. The costs of such residual quantities are generally considerable, both as regards their material costs and as regards their preparation and their removal or destruction.

The object of the present invention is to provide a squeegee element which cuts out the necessity for prior mixing of the viscous mass to be used, made up of at least two components.

This object is achieved according to the invention in that the squeegee feed device interacts with a discharge device of a mixing device, which is provided with at least a first feed device for viscous mass and at least one other feed device for another constituent to be included in the viscous mass.

Such a squeegee element makes it possible to combine and mix the components of the viscous material in the element itself, and thus to minimize the quantity of waste.

The components making up the viscous material to be fed to the squeegee element will normally consist of a base medium generally composed of an uncoloured printing paste and an additive concentrate in the form of a pigment concentrate.

It is pointed out that mixing of the additive concentrate with the base medium virtually directly before pressing of the mixture formed onto a stencil is also attractive because a potential risk of, for example, pigment flocculation is avoided in this way.

In addition, the device according to the invention makes it possible to obtain greater efficiency of the printing pastes in the printing shop through the fact that the estimated quantity of coloured printing paste for the printing of a particular design no longer has to be prepared in advance.

The mixing device is preferably fixed detachably in the squeegee element, in particular in the mixing space present therein. Such an arrangement is expedient when the squeegee element has to be cleaned, for example for a design change. Of course, it is possible to provide the mixing space of the squeegee element with means for automatic cleaning of the squeegee element.

The mixing device to be used in the squeegee element can be of any known type, for example a (worm) screw, kneader, stirrer etc.

The feed means for feeding a viscous mass to the squeegee element comprise a pump system which can supply an accurately defined volume flow. Of course, this pump system is designed in such a way that very simple cleaning is possible.

According to a preferred embodiment of the squeegee element according to the invention, the mixing device can be connected to a mixing device drive element which is preferably of the rotary drive type.

The speed of rotation of the mixing device is

preferably set depending on the viscosity of the material pressed out of the squeegee element. This setting can be carried out in a manner known per se with the aid of viscosity sensors near the outflow apertures of the squeegee element, which sensors are coupled to a mixing device drive element.

The speed of rotation of the mixing device is, however, preferably set depending on the temperature change of the viscous material present in the mixing device, which temperature change is produced through the rotation. A fairly constant viscosity of the material pressed out of the squeegee element can thus be ensured, so that a design of constant quality can be obtained.

The squeegee element according to the invention is preferably detachably connected to at least one closable container for a component of the viscous mass. If the squeegee element is used for applying a design in colour on a substrate, the base medium for this, i.e. the clear printing paste, will be fed from a container of a known type by a pump system to the mixing space of the present squeegee element. This pump system must, of course, supply an accurately defined volume flow, the pump preferably being a displacement-type pump.

The pigment concentrate, on the other hand, is stored in the above-mentioned closable container.

The outflow aperture for drawing the viscous material from the container is preferably provided in the cover of said container.

According to an expedient embodiment, the cover of the closable container is made in the form of a plunger. This means that on downward movement of the cover the edges thereof will scrape along the walls of the container, so that the contents of the container can be used as fully as possible for the envisaged purpose. Besides, by moving the cover downwards in the container, the contents of the container are pressed through the outflow aperture present in the cover. The viscous material pressed out of the container by means which are known per se is then conveyed to one of the feed apertures of the squeegee element and mixed there with the other component, in this case the base medium.

The outflow aperture of the container is preferably connected to a pipe of such length that the free end thereof extends into the viscous material present in the container.

In this way the plunger cover does not come into contact with the viscous material present, in this case the colour concentrate, but only with the container and the pipe.

This gives the considerable advantage that when there are design changes no cleaning steps have to be undertaken, because the container is also the storage medium, and no paste prepared for use remains behind in the system.

The material from the various containers is preferably supplied in a fixed ratio to the base medium.

The closable container is preferably placed in a pressure chamber. This makes it possible to press the plunger/the cover uniformly to the bottom of the container.

The closable container, placed in a pressure chamber or otherwise, is preferably mounted on a vibrating device. The vibrations produced can in fact reduce the viscosity of the often thixotropic colour concentrate, and the release of air present in the material is improved.

The invention is explained in greater detail below with reference to the appended drawing, in which:

Fig. 1 shows schematically a squeegee element according to the invention, connected to a closable container;

Fig. 2 shows a cross-section through a squeegee element according to Fig. 1;

Fig. 3 shows a cross-section through a closable container usable according to the invention, placed in a pressure chamber; and

Fig. 4 shows a side view of a closable container, in the opened position.

Fig. 1 shows schematically in side view a part of a squeegee element 1 according to the invention, for applying the printing medium to a stencil. This printing medium is generally made up of two components, a base medium and an additive concentrate, usually a colour concentrate. The two components are generally used in the form of a paste, i.e. a viscous mass.

The base medium is supplied from a stock container (not shown) through feed aperture 3 to the mixing space 4. The additive concentrate is also fed to mixing space 4 from container 5. Reference number 2 indicates a supporting structure for the squeegee element.

Fig. 2 shows a cross-section of a squeegee element according to the invention. The squeegee element 1 contains a mixing space 4 at the feed side thereof.

Mixing space 4 is provided with two feed apertures on which nozzles 3, 12 are fixed. The mixing space contains fixing elements (not shown in the drawing) for detachably fixing a mixing device. The mixing device to be used can be of any type, provided that good mixing of the infed constituents is ensured. In Fig. 2 said mixing device is shown schematically by a shaft 4b on which vanes 15 are fitted.

The mixing expediently takes place in mixing space 4 through rotation of the mixing device 4b, 15. A drive element is present in 4a for that purpose.

The speed of rotation is preferably set depending on the viscosity of the material pressed out of the squeegee element.

The speed of rotation of the mixing device expediently depends on the temperature increase in the mixture formed, which temperature increase is produced by mixing.

Reference number 14 indicates a pump system for feeding the base medium to mixing space 4 in accurately defined volumes. This pump system is preferably a displacement-type pump and is generally known to the expert.

The additive concentrate is supplied through pipe 6 from container 5, as shown in greater detail in Figs. 3 and 4.

Metering pump 14 is designed in such a way that it is very simple to clean.

It is pointed out that, due to the fact that the base medium and the additive concentrate are mixed at a point in time directly before applying to a substrate, the quantity of mixture remaining unused is minimal, in fact only the quantity present in the mixing space.

For cleaning of the mixing space of the squeegee element according to the invention, this space is provided with a connection point for cleaning fluid, indicated by 4c. During the cleaning the mixing device can be removed from the squeegee element. It is, however, also possible to carry out an automatic cleaning cycle, in which cleaning solvent is fed in through the feed nozzle 12, and is discharged through 4c, with the mixing device being set in operation.

Fig. 3 shows a container 5 for additive concentrate 11.

More particularly, container 5 is provided with a cover 8, which can move up and down and is provided with scraper edges 16. An outflow aperture, on which a hose connection socket 7 is fitted, is provided in the cover. This hose connection socket is connected at one side to a feed pipe 6 for feeding in the additive concentrate to the mixing space 4 of the squeegee element according to the invention and at the other side to a pipe 10 of such length that the free end thereof extends into the viscous additive concentrate present in the container 5.

The cover 8 of the container 5 is therefore in the form of a plunger. This has the great advantage that when said plunger is pressed downwards the viscous additive concentrate moves up in pipe 10 and pipe 6, but only the container and the pipes come into contact with the additive concentrate. This means that when there are design changes no additional containers need be cleaned, because the present container also forms the storage medium. When there is a design change, the pipe with the additive concentrate need only be placed and stored on the container.

The container with the additive concentrate is expediently placed in a pressure chamber 9.

Since the colour concentrates used are often thixotropic, the viscosity thereof can be reduced by providing vibrations. For that purpose, the container is connected to a vibrating device. Providing vibrations also ensures that the release of air bubbles enclosed in the mass is also promoted.

Claims

1. Squeegee element (1) for pressing a viscous mass containing at least one other constituent through perforations of a movable stencil onto an advancing substrate, which element (1) is at least provided with a squeegee feed device for feeding a viscous mass to the squeegee element (1), characterised in that the squeegee feed device interacts with a discharge device of a mixing device (4, 4b, 15), which is provided with at least a first feed device (13, 14) for viscous mass and at least one other feed device (6, 12) for another constituent to be included in the viscous mass, said mixing device being detachably fixed in the squeegee element (1).

2. Squeegee element according to claim 1 characterised in that the mixing device (4, 4b, 15) can be connected to a mixing device drive element (4a), preferably for rotary driving.

3. Squeegee element according to claim 2, characterised in that the speed of rotation can be set depending on the viscosity of the material pressed out of the squeegee element (1).

4. Squeegee element according to claim 2, characterised in that the speed of rotation can be set depending on a temperature change of the viscous material present in the mixing device (4, 4b, 15), produced through the rotation.

5. Squeegee element according to one or more of the claims 1 to 4, characterised in that the squeegee element (1) is detachably connected to at least one closable container (5) for a component (11) of the viscous mass.

6. Squeegee element according to claim 5, characterised in that the outflow aperture for drawing the viscous material from the container (5) is provided in the cover (8) of said container (5).

7. Squeegee element according to claim 5 or 6, characterised in that the cover (8) of the con-

tainer (5) is designed in the form of a plunger.

8. Squeegee element according to claims 5 to 7, characterised in that the outflow opening of the container (5) is connected to a pipe (6) of such length that the free end thereof extends into the viscous material (11) present in the container (5).

9. Squeegee element according to claims 5 to 8, characterised in that the container (5) is accommodated in a pressure chamber (9).

10. Squeegee element according to claims 5 to 9, characterised in that the container (5) is fixed to a vibrating device.

11. Device for applying a viscous mass to a substrate, comprising a squeegee (1) for pressing the viscous mass onto the advancing substrate, characterised in that it contains a squeegee element according to one or more of the preceding claims.

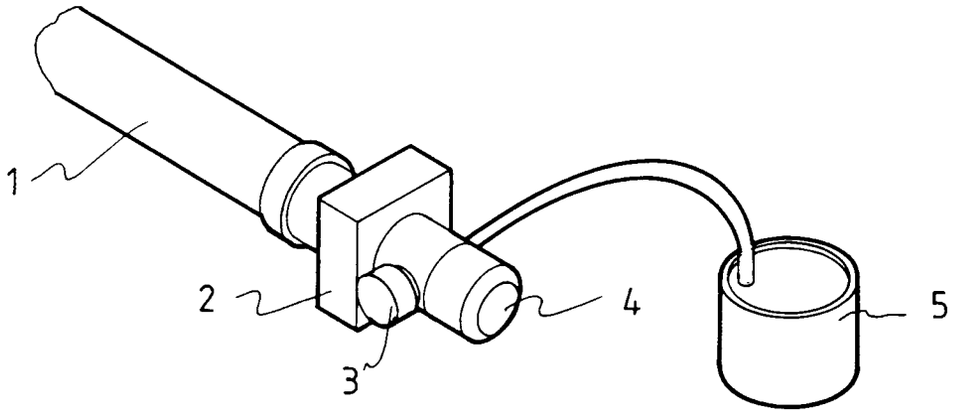

Fig: 1.

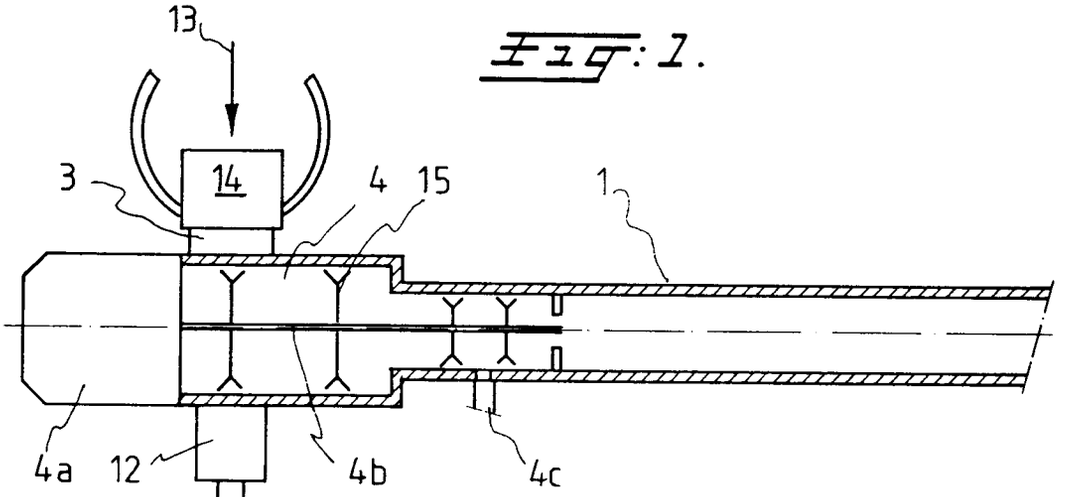

Fig: 2.

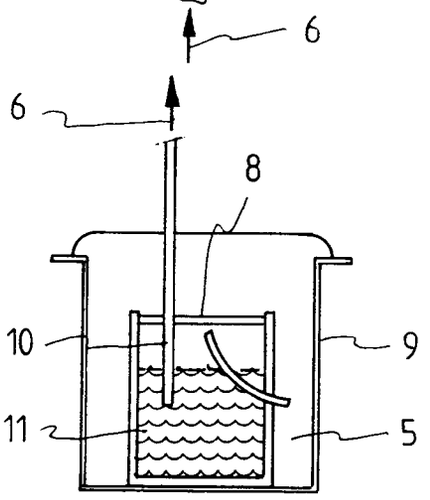

Fig: 3

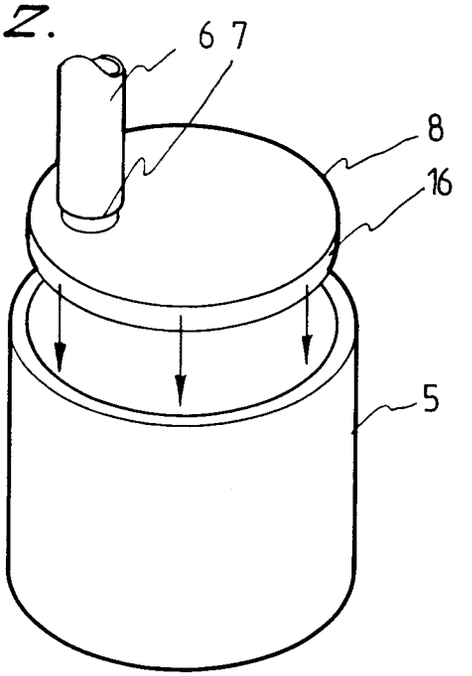

Fig: 4

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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 3162

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	NL-A-7 407 465 (STORK BRABANT B.V.) * the whole document *	1 2-10	B41F15/40 B41F31/02
Y	FR-A-1 452 762 (OAFFER S.A.) * the whole document *	2	
Y	FR-A-2 444 564 (M.A.N. ROLAND DRUCKMASCHINEN) * page 6, line 1 - line 38; figure 4 *	3,4	
Y A	DE-A-1 914 683 (NORRIS FROME LTD.) * page 4, line 23 - line 30; figure 1 *	5 1	
Y	FR-A-1 054 800 (SOCIETE ANONYME GILLET-THAON) * page 4, left column, line 33 - line 46; figure 3 *	6,8,9	
Y	US-A-4 716 829 (WENZEL) * the whole document *	10	
X	FR-A-2 355 657 (PRANDONI S.P.A.) * the whole document *	1,2	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B41F
Y	NL-A-7 510 711 (TEXTILANA) * page 12, line 11 - line 23; figure 7 *	7	
A	FR-A-1 472 809 (ENEA COLAPINTO) * claims 1,2; figure 1 *	6,8,9	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 MARCH 1992	MEULEMANS J.P.

CATEGORY OF CITED DOCUMENTS

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