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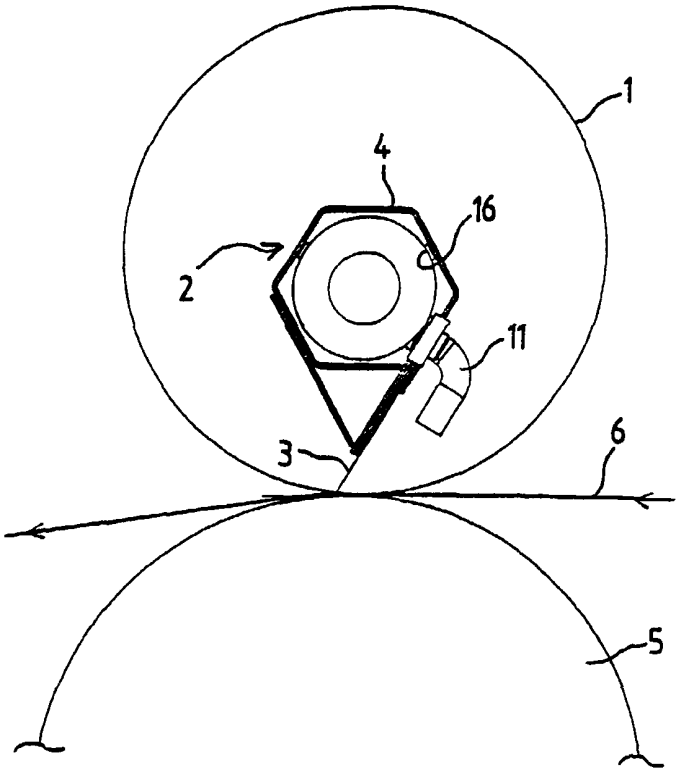
(54) Title: DEVICE FOR THE DOSING AND DISTRIBUTION OF HOTMELT

(57) Abstract

Device for the dosing and distribution of hotmelt on a substrate (6), comprising substrate throughput means (5), hotmelt supply means, and at least one hotmelt application position with a stencil (1), hotmelt distribution means and a squeegee device (2). The hotmelt distribution means comprise a hotmelt dispensing nozzle (11) and a dosing unit (10) and are provided with drive means for moving the dosing unit (10) to and fro along the squeegee device (2), the hotmelt dispensing nozzle (11) being fitted on the movable dosing unit (10).



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Short title: Device for the dosing and distribution of hotmelt

The invention relates to a device for the dosing and distribution of a hotmelt on a substrate, according to the preamble of claim 1.

Such a device is generally known and comprises a hotmelt distribution pipe extending over the entire length of a stencil along a squeegee element. The distribution pipe is provided with a large number of outflow apertures situated next to each other in the longitudinal direction. During operation, the hotmelt is supplied to one side of the distribution pipe. The outflow apertures situated next to each other have cross sections that increase by a certain step size, viewed in a direction downstream of the hotmelt supply side. This is an attempt to compensate for the fall in pressure of the hotmelt in the distribution pipe and to obtain a substantially uniform distribution of hotmelt.

A disadvantage in the case of this known device is that, depending on the type of hotmelt and the hotmelt temperature to be applied, an appropriate distribution pipe with a specific distribution and step size in outflow apertures must be used. The hotmelt temperature in particular can vary greatly, and consequently so can the viscosity of the hotmelt. Furthermore, depending on the application width on the substrate, an appropriate length of distribution pipe must be selected. This means that a user soon needs several different distribution pipes. It has been found in practice that the distribution of the hotmelt leaves much to be desired. On completion of a distribution cycle and/or on changing over to another type of hotmelt and/or on changing over to another distribution pipe, the entire hotmelt contents of the distribution pipe are lost. In particular, when a reactive hotmelt is being used, for example a hotmelt that hardens irreversibly on contact with air, special measures have to be taken to prevent undesirable permanent hardening of the hotmelt. For instance, during a fairly long stop or during storage of the distribution pipe, the distribution pipe must be placed in a solvent, or the

distribution pipe must be filled with a purge, for example a thermoplastic hotmelt that stops the reaction process of the reactive hotmelt. This again leads to large quantities of hotmelt being lost.

The object of the present invention is to provide a device in which the abovementioned disadvantages are overcome, and in particular to provide a device by means of which at different application widths and/or with different types of hotmelt optimum hotmelt distribution can be obtained in a flexible manner with one and the same distribution system.

This object is achieved according to the invention by a device according to claim 1. The device has at least one hotmelt application position for applying hotmelt to a substrate. This device can be designed both for the application of a hotmelt print and for the application of a hotmelt coating. The application position comprises a stencil and a squeegee device, and a dosing unit that is movable along the squeegee device. The dosing unit comprises a nozzle for dispensing hotmelt. The nozzle is in flow communication with hotmelt supply means. The hotmelt supply means are designed to follow the movement of the dosing unit and comprise heating means for keeping the hotmelt at the correct temperature. The dosing unit can be moved to and fro along the squeegee device by means of conveyor means and at the same time, by means of a suitable control of the supply means, can dispense a desired quantity of hotmelt at the position of a squeegee element of the squeegee device. The squeegee element presses the hotmelt through the stencil onto the substrate. Thanks to the movable dosing unit, the hotmelt can be distributed very accurately over the length of the squeegee device. The quantity of hotmelt dispensed and the application width over which the dosing unit is moved to and fro can be adjusted accurately in a simple manner. This makes the device flexible and cheap to use, and in particular readily adaptable to various types of hotmelt, different hotmelt temperatures and different application widths. Moreover, the dosing and distribution is reliable, partly due to the fact that the nozzle can be designed with a relatively large cross section, which minimises the risk of blockage. At the end of a

distribution cycle and/or on changing over to another printing width, little or no hotmelt need be lost. It is advantageous that no expensive and time-consuming measures need be taken when a reactive hotmelt is being used.

In particular, the device further comprises purge supply means, and the dosing unit is further provided with a purge dispensing nozzle that is in flow communication with the purge supply means. This means that after the completion of a distribution cycle a quantity of purge can be distributed over the length of the squeegee device using one and the same movable dosing unit. This is important particularly if a reactive hotmelt has been used. The purge flushes the reactive hotmelt out of the stencil and the squeegee device and further prevents the reactive hotmelt from undesirably continuing its reaction.

More particularly, the abovementioned purge dispensing nozzle is disposed in such a way that said nozzle opens out in the hotmelt dispensing nozzle, near the free end thereof. The supply of a small quantity of purge then suffices to expel the hotmelt from the front part of the hotmelt dispensing nozzle and to cause a sealing plug of purge medium to form there. The sealing plug prevents the hotmelt from continuing its reaction, so that it cannot, for example, further irreversibly harden to the air. In this variant of an embodiment the purge can be formed, for example, by a thermoplastic hotmelt. The formation of a sealing plug of purge medium advantageously also occurs automatically if fairly large quantities of purge are metered along the squeegee device.

Further advantageous embodiments of the invention are described in claims 4-12.

The invention also relates to a movable dosing unit according to claim 13, an assembly of such a dosing unit with a squeegee device according to claim 14, and a method according to claim 15.

The invention will be explained in greater detail with reference to the appended drawing, in which:

Fig. 1 is a diagrammatic view in cross section of an application position of a preferred embodiment of the device according to the invention;

Fig. 2 is a view in perspective of the assembly of squeegee device with dosing unit in Fig. 1;

Fig. 3 is a view in perspective of the dosing unit with supply means in Fig. 2;

Fig. 4 is a view in perspective of the squeegee device in Fig. 2;

Fig. 5 is a view from above of a variant of a movable dosing unit;

Fig. 6 is a view in longitudinal section of Fig. 5;

Fig. 7 is a view in perspective of Fig. 5;

Fig. 8 is a view of Fig. 5 with disassembled parts;

Figs. 9a and 9b respectively are very diagrammatic views of an application position with a dosing unit in a first and second position respectively;

Fig. 10 is a view according to Fig. 9 of a variant;

Fig. 11 is a view according to Fig. 9 of a further variant.

The application position in Fig. 1 comprises a drivable stencil 1 with a squeegee device 2 fitted therein. The squeegee device 2 comprises a squeegee element 3 and a bearing section piece 4. The stencil 1 is fitted above a separately drivable counterpressure roller 5 (of which only the top part is shown). A substrate 6 can be conveyed between the stencil 1 and the counterpressure roller 5. The bearing section piece 4 of the squeegee device 2 is of a hollow design. A dosing unit 10 which is movable to and fro is provided inside the hollow bearing section piece 4. The dosing unit 10 is provided with a nozzle 11 for dispensing hotmelt. The device is intended for the application of hotmelt to the substrate 6. During an application cycle the substrate 6 is conveyed along the stencil 1, the stencil 1 and the counterpressure roller 5 being driven separately. At the same time, the dosing unit 10 is moved to and fro through the bearing section piece 4. The direction of movement of the dosing unit 10 in this case is perpendicular to the direction of conveyance of the substrate 6. By way of the nozzle 11, hotmelt is distributed over the application width repeatedly during the to and fro movements of the dosing unit 10, and is dispensed near the squeegee element 3. The squeegee element 3 presses the hotmelt through the stencil 1. By

synchronising the speed of movement of the dosing unit 10 with the throughput speed of the substrate 6, it can advantageously be ensured that sufficient hotmelt is present over the entire length of the squeegee element 3 during the entire application cycle.

It can be seen clearly in Figs. 2-4 that the hollow bearing section piece 4 is provided with a longitudinal slit 15, through which the nozzle 11 projects outwards and can move to and fro.

The dosing unit 10 is provided with three friction-reducing guide elements 16, which are fitted around the external periphery and are formed by, for example, small wheels. In addition, a guide wheel 17, which rests against one of the longitudinal edges of the slit 15, is provided. This means that the dosing unit 10 can be moved to and fro with little force.

The dosing unit 10 is connected to a supply hose 20 (see Figs. 2 and 3). The supply hose 20 is supported by guide wheels 21 at one end face of the squeegee device 2. During the movement to and fro of the dosing unit 10 along the squeegee device 2, the hose 20 will move to and fro along with it.

The supply hose 20 can be provided with a single throughput line that is in flow communication with the nozzle 11. During an application cycle hotmelt is then supplied through the supply hose 20, while after an application cycle has finished purge can be supplied through the same throughput line in the supply hose 20 to the nozzle 11. The entire throughput line and nozzle are flushed clean with purge in this way. Moreover, so much purge can be supplied that the stencil 1 and the squeegee device 2 are also to some extent flushed clear of hotmelt.

Figs 5-8 show a preferred embodiment of the dosing unit 50, in which the supply hose 51 connected to the dosing unit 50 houses both a hotmelt supply line 52 and a separate purge supply line 53. The hotmelt supply line 52 is enclosed by a heating element, which serves to prevent the hotmelt from cooling down. The hotmelt supply line 52 is in flow communication with a hotmelt dispensing nozzle 55 on the dosing unit 50. The purge supply line 53 is in flow communication with a purge dispensing nozzle 56. The purge supply line 53 can likewise be enclosed by a heating element, which can serve to ensure that the purge

remains at temperature. This is advantageous in particular if a thermoplastic hotmelt is being used as purge. The purge dispensing nozzle 56 is advantageously disposed in such a way that it opens out in the hotmelt dispensing nozzle 55, near the free end thereof. If now the hotmelt supply is stopped when an application cycle has finished, and the purge supply is switched on, the result of this is that the hotmelt present in the last part of the hotmelt dispensing nozzle 55 is forced out by the purge fed in. With this the purge at the same time automatically shuts off from the environment the hotmelt still present in the hotmelt supply line 52. This is advantageous in particular if a reactive hotmelt is being used. Using a thermoplastic hotmelt as purge is then a simple way of preventing the reactive hotmelt inside the dosing unit 50 or inside the hotmelt supply line 52 from permanently hardening to the ambient air. The thermoplastic hotmelt in the last part of the hotmelt dispensing nozzle 55 forms a good seal, will not permanently harden, and can simply be forced out of the last part of the nozzle 55 at the beginning of the next application cycle by the hotmelt again being supplied through the supply line 52 to the nozzle 55.

In a variant the hotmelt supply line and the purge supply line are accommodated in separate supply hoses, each connecting to the dosing unit.

In another variant the dosing unit is provided with a separate purge dispensing nozzle which is in flow communication with a separate purge supply line.

In addition to the embodiment shown in Figs. 1-4, in which the dosing unit is guided inside a hollow part of the squeegee device, in a variant the dosing unit can also be guided over a guide section provided on the outside of a squeegee device. It is also possible to provide a separate guide section which extends over at least the application width of the application position along a squeegee device. The squeegee element used advantageously is a squeegee blade, because the latter can cut through the hotmelt threads formed in each case during printing.

The dosing unit that is movable to and fro can be conveyed to and fro along the squeegee device in several ways. Figs. 9-11 show three variants thereof.

In Figs. 9a and 9b a dosing unit 90 is connected to a rigid supply pipe 91. The latter in turn is connected to a flexible supply hose 92. The supply hose 92 can be placed as desired either in flow communication with a hotmelt supply 93 or with a purge supply 94. Drive means 95 are provided for the to and fro movement of the dosing unit 90, which drive means act upon the outer peripheral wall of the supply pipe 91. The drive means 95 are mounted on one of the end faces of a squeegee device 96, which extends through a stencil 97. By driving the drive means 95 in a suitable manner, said drive means will force the supply pipe forwards or backwards. The dosing unit 90 moves to and fro along the squeegee device along with the supply pipe 91.

The variant shown in Fig. 10 largely corresponds to that of Fig. 9, the difference being that drive means 105 in this case are mounted on a fixing point situated outside the squeegee device and the stencil. This means that the squeegee device can be removed when the device is at a standstill, without having to remove the dosing unit, the supply pipe and the drive means at the same time.

Fig. 11 shows a variant with a fully flexible supply hose 111, which can be wound onto a reel 112 and unreeled from it again. The hose is flexible, but sufficiently rigid to be able to push the dosing unit in front of it during the unreeling.

Many variants are possible in addition to the embodiments shown, in which the drive means interact with the supply means. For instance, the dosing unit can also be connected to separate movement means, for example a separate pulling and/or pushing element.

Thus a multi-purpose device for dosing and distributing hotmelt on a substrate can be obtained according to the invention. The dosing unit that is movable to and fro is easily adjustable to several application widths and different types of hotmelt to be metered and distributed. A purge dispensing nozzle, which opens out in the last part of the hotmelt dispensing nozzle, can very advantageously also be provided on the dosing unit. This minimises the loss of hotmelt outside the application cycles, and prevents the hotmelt properties from

changing in a negative sense during a fairly long standstill period.

Claims

1. Device for the dosing and distribution of hotmelt on a substrate (6), comprising:

- substrate throughput means (5);
- hotmelt supply means; and
- at least one hotmelt application position with a stencil (1), hotmelt distribution means and a squeegee device (2),

characterized in that

the hotmelt distribution means comprise a hotmelt dispensing nozzle (11), and in that a dosing unit (10) and drive means for moving the dosing unit (10) to and fro along the squeegee device (2) are provided;

the hotmelt dispensing nozzle (11) being fitted on the movable dosing unit (10).

2. Device according to claim 1, in which purge supply means and purge distribution means are further provided, the purge distribution means comprising a purge dispensing nozzle (56) fitted on the movable dosing unit (50).

3. Device according to claims 1 and 2, in which the purge dispensing nozzle (56) opens out in the hotmelt dispensing nozzle (55), near the free end thereof.

4. Device according to one of the preceding claims, in which the hotmelt supply means comprise a hotmelt supply line (52) which connects to the dosing unit (50) and is in flow communication with the hotmelt dispensing nozzle (55).

5. Device according to one of the preceding claims, in which the purge supply means comprise a purge supply line (53) which connects to the dosing unit (50) and is in flow communication with the purge dispensing nozzle (56).

6. Device according to claims 4 and 5, in which the hotmelt supply line (52) and the purge supply line (53) are packed together in one endosing body.

7. Device according to one of the preceding claims, in which the drive means (95; 105) interact with the hotmelt supply line (91; 111) and/or the purge supply line.

8. Device according to one of the preceding claims, in which guide means are provided for guiding the dosing unit (10).

9. Device according to claim 8, in which the guide means form part of the squeegee device (2).

10. Device according to claim 9, in which the squeegee device (2) comprises a hollow bearing section piece (4), inside which the movable dosing unit (10) is accommodated in such a way that it is movable to and fro.

11. Device according to claim 10, in which the movable dosing unit (10) is provided with friction-reducing guide elements (16), which are distributed around the external periphery, for the purpose of supporting the dosing unit (10) against the internal peripheral wall of the hollow bearing section piece (4).

12. Device according to claim 10 or 11, in which the hollow bearing section piece (4) is provided with a longitudinal slit (15) through which at least the hotmelt dispensing nozzle (11) extends to the outside.

13. Movable dosing unit intended for a device according to one of claims 1-12.

14. Assembly of a movable dosing unit with squeegee device intended for a device according to one of claims 1-12.

15. Method for applying a hotmelt to a substrate with a device according to one of claims 2-12, comprising the steps:

- dosing and distributing hotmelt by means of a suitable control of the drive means of the dosing unit and of the hotmelt supply means;

- pressing out the hotmelt present on the stencil as much as possible; and
- dosing and distributing purge by means of a suitable control of the drive means of the dosing unit and of the purge supply means.

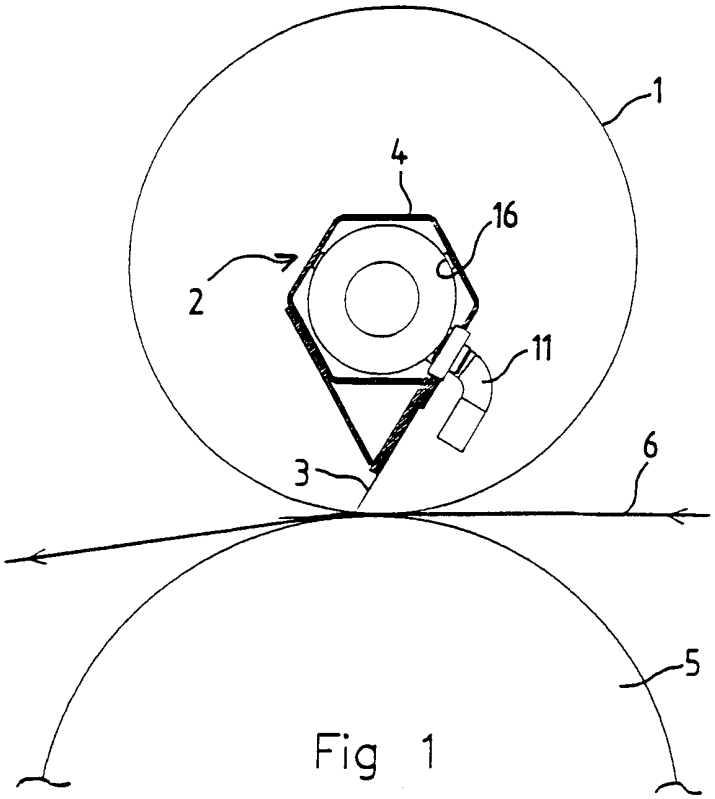


Fig 1

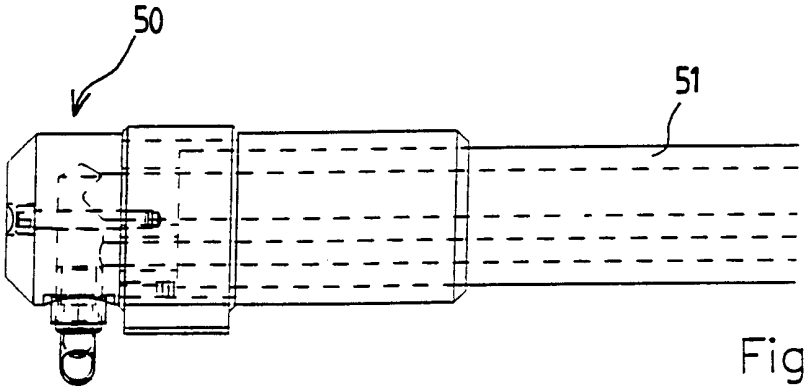


Fig 5

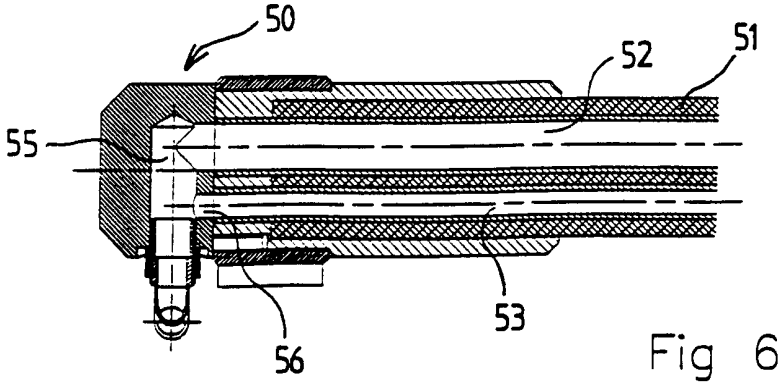


Fig 6

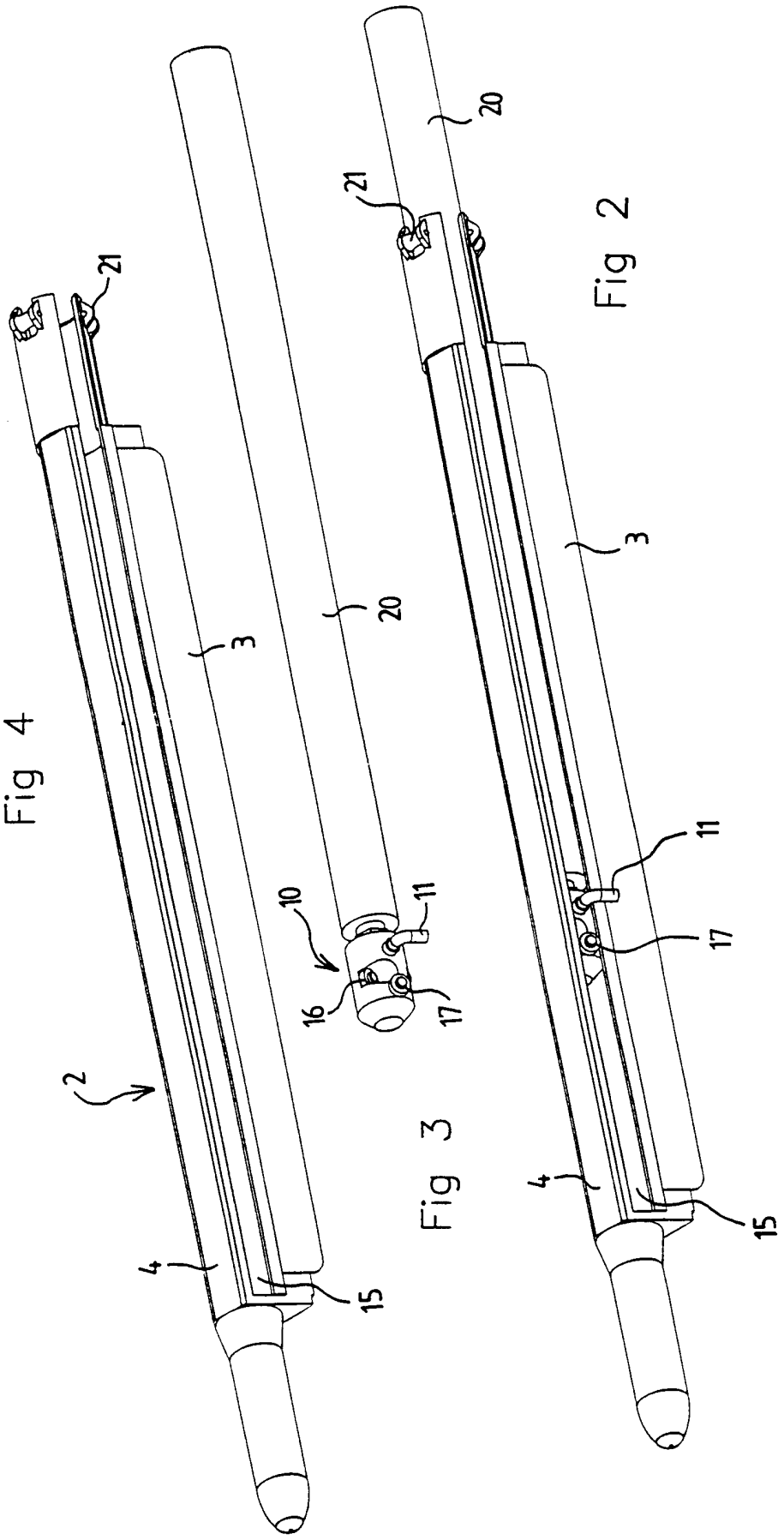


Fig 4

Fig 3

Fig 2

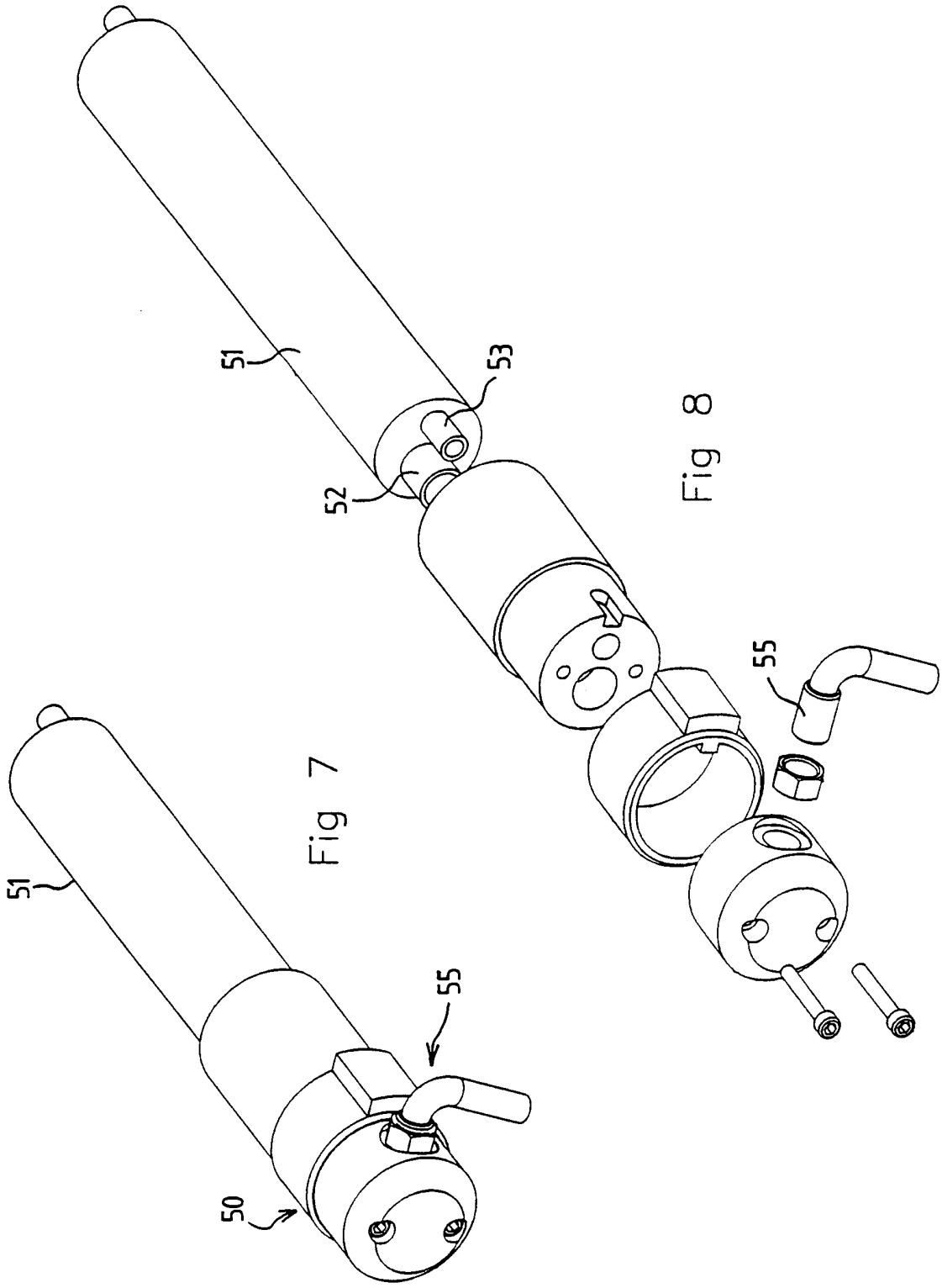


Fig 7

Fig 8

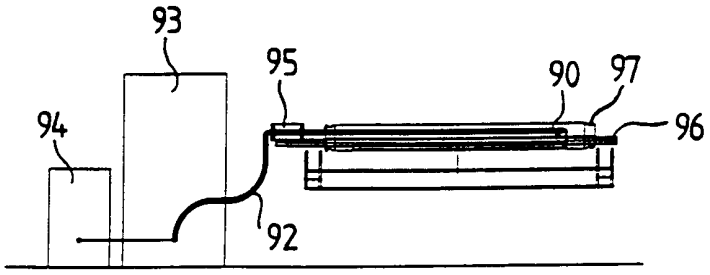


Fig 9a

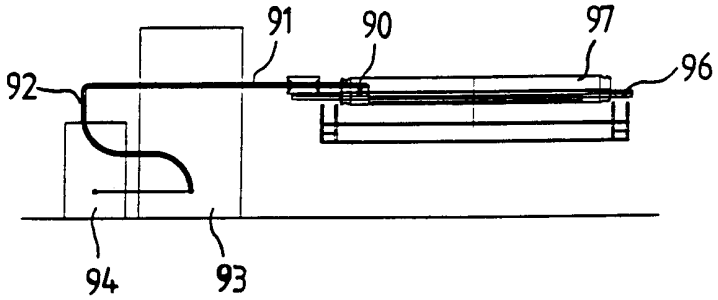


Fig 9b

Fig 10a

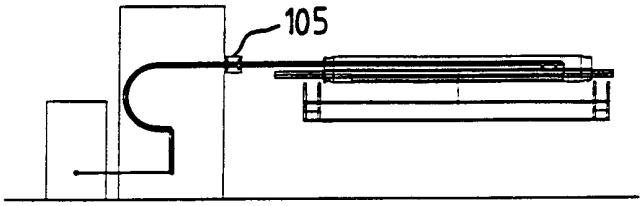
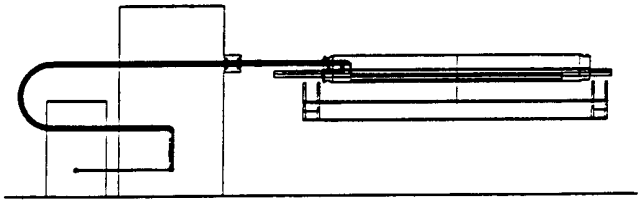


Fig 10b



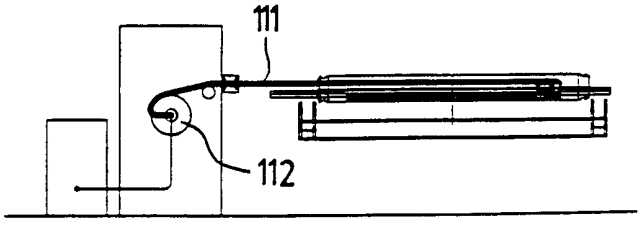


Fig 11a

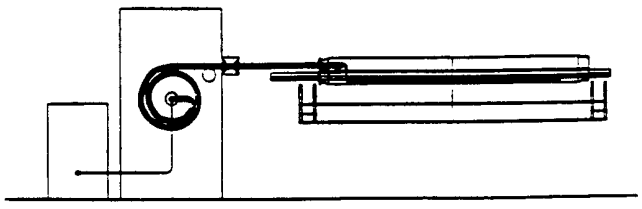


Fig 11b

INTERNATIONAL SEARCH REPORT

I ational Application No
PCT/NL 00/00292

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B41F15/40 H05K3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B41F H05K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 197 36 563 C (TRANS TEXTIL GMBH) 22 October 1998 (1998-10-22)	1,8,13
A	the whole document	2-7, 9-12,14, 15
Y	EP 0 049 362 A (MITTER MATHIAS) 14 April 1982 (1982-04-14)	1,8,13
A	abstract; claim 1; figures	2-7, 9-12,14, 15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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11 August 2000	21/08/2000

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