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(54) **METHOD AND DEVICE FOR SELECTIVE SPRAY APPLICATION OF SCENTED PRINTING MATERIAL**

VERFAHREN UND VORRICHTUNG FÜR SELEKTIVE SPRÜHVORRICHTUNG VON PARFÜMIERTEM DRUCKMATERIAL

PROCÉDÉ ET DISPOSITIF POUR L'APPLICATION SÉLECTIVE PAR PULVÉRISATION DE MATÉRIAU D'IMPRESSION PARFUMÉ

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Description

[0001] The object of the invention is a method and a device for selective spray application of a scented printing material.

[0002] According to the invention, the scented printing material is applied to any desired field or fields on a moving printing substrate with the use of hydrodynamic or pneumatic spraying.

[0003] The special area of use of the invention are printing houses in which a scented printing material, preferably containing an aroma substance in the form of microcapsules, is applied. The printing material is applied onto a moving printing substrate which is preferably a paper web.

[0004] In the prior art, there are known methods of applying a transparent scented varnish or a scented printing ink with the use of offset printing, rotogravure printing or flexographic printing techniques. Known methods of applying a scented varnish or a scented printing ink involve the use of the same technique as in the printed polygraphic product. Thus, these processes use a method of applying an additional colour by means of an additional unit of printing machine. These known processes of applying a scented varnish or a scented printing ink have a number of limitations which include:

- the need to use an expensive printing unit only in order to apply a scented varnish or a scented printing ink, which requires designing the need of printing with a scented varnish or a scented printing ink already at the stage of construction and assembly of the printing machine;
- the printing units used have limited possibilities as regards the number of types of scented varnishes or scented printing inks to no more than 2-3 per one side of a typical printing sheet having a width of 1 meter, wherein when using a single printing unit, it is not possible to print several different scented fields located in a single row in the direction of the moving printing substrate;
- offset printing, rotogravure printing or flexographic printing techniques do not allow direct control of the amount of the applied scented varnish;
- in case of applying, onto the printing substrate, a transparent scented printing varnish, it is not possible to use colorimetric techniques to control the amount of the applied scented varnish, which hinders the control of accuracy of application of this varnish;
- use of an additional unit of printing machine for the application of scented varnishes or scented printing inks, due to the inability of this unit to independently adjust some parameters of this unit, such as, among others, rotational speed of rollers of the inking unit and of the damping unit, requires the use of scented varnishes or scented printing inks having similar rheological parameters.

[0005] International patent application published under number WO04/060683 entitled "High-speed inkjet printing for vibrant and crockfast graphics on web materials or end-products" discloses a method of inkjet printing at high speed on web materials or end products of multicolour technological images. The method includes providing at least two printheads operating at a high frequency which are capable of processing printing inks changing their phase and ensure activation of the printheads so that at least two printing inks changing their phase pass through these heads. However, this known method for the purpose of printing with a scented ink also requires the use of an additional printing unit and furthermore does not ensure printing on several different scented fields located in a single row in the direction of the moving printing substrate.

[0006] The essence of the method of selective spray application of a scented printing material on any chosen field of printing sheet on a moving printing substrate is the use of spray application of a scented printing material. Application of a scented printing material on any chosen field or on any chosen fields of the moving printing substrate is implemented by means of properly selected spray nozzles in the form of hydrodynamic spraying or pneumatic spraying. Preferably, the moving printing substrate is a paper web. Preferably, the printing material is a scented varnish or a scented ink in the form of an aqueous dispersion containing an aroma substance in the form of microcapsules.

[0007] The scented printing material selectively applied, in the form of hydrodynamic spraying, onto the moving printing substrate is applied by a brief, ranging from 1 ms to 200 ms, opening of an electromagnetically- or pneumatically-controlled valve which supplies the scented printing material under pressure to a hydrodynamic spray nozzle. The pressure under which the scented printing material is introduced to the hydrodynamic spray nozzle is in the range of 1 MPa to 50 MPa. Diameter of the outlet opening of the hydrodynamic spray nozzle is preferably about 20 μm to 500 μm. The hydrodynamic spray nozzle is mounted at a distance of 0.02 m to 0.20 m from the moving printing substrate. The speed of the moving printing substrate depends on the type of printing machine or other polygraph machine and usually ranges from 0.5 m/s to 20.0 m/s. Mounting of the hydrodynamic spray nozzle with parameters specified by the present invention at a distance of 0.02 m to 0.20 m above or below the moving printing substrate allows for spraying the scented printing material onto the moving printing substrate in the form of a trace having a rectangular shape with the use of the scented printing material in an amount of 1.0 g/m^2 to 10.0 g/m^2.

[0008] In the method according to the invention for spray application of a scented printing material, also a pneumatic spray nozzle is used. Preferably, the diameter of the outlet opening of the pneumatic spray nozzle ranges from 0.1 mm to 1.0 mm. The pneumatic spray nozzle is supplied with a scented printing material having a low

pressure, and even with the use of a vacuum ranging from (-)0.05 MPa to (+)1.00 MPa. Additionally, compressed air having a pressure preferably in the range of 0.1 MPa to 3.0 MPa is introduced to the pneumatic spray nozzle. Spraying of the scented printing material onto the moving printing substrate through the pneumatic spray nozzle occurs as a result of entrainment of particles of the scented printing material by a jet of compressed air having a pressure in the range of 0.1 MPa to 3.0 MPa. Enabling and disabling the spraying of the scented printing material is implemented through the closing and opening of the compressed air supply to the pneumatic nozzle.

[0009] Through synchronisation of the opening cycle of the control valve of the hydrodynamic or pneumatic spray nozzle with the rotations of the printing machine or other polygraph machine, and also through the adjustment of the opening time of the control valve, size of the printed scented field and its location along the implemented print direction are determined. Through moving away or bringing closer of the hydrodynamic or pneumatic spray nozzle from or to the moving printing substrate, size of the printed scented field is adjusted perpendicularly along the print direction. Position of the printed scented field across the print direction is implemented by changing the position of the hydrodynamic or pneumatic spray nozzle transversely to the print direction of the moving printing substrate.

[0010] Pressure adjustment, in the hydrodynamic spray nozzle, of the scented printing material supplied to the nozzle or adjustment of the flow rate of the supplied scented printing material and/or the pressure of the spraying air in the pneumatic spray nozzle allow for the control of the amount of scented printing material sprayed onto the moving printing substrate. This adjustment is preferably automatically controlled by an installed feedback system which compares signals concerning the printing speed, coming from the printing machine or other polygraph machine, with signals of opening time of the control valve, and with signals of flow rate of the supplied scented printing material, preferably from a pump dispensing the scented printing material or from a flow meter, and is intended to ensure a stable application of the scented printing material at a varying printing speed.

[0011] A device for selective spray application of a scented printing material with the use of hydrodynamic spraying consists of a tank for the scented printing material, said tank having a built-in circulation pump preventing sedimentation of this printing material. The circulation pump is connected to a high-pressure positive displacement pump supplied, from the network, with compressed air having a pressure adjustable by means of an electrically-controlled reducing valve. The high-pressure positive displacement pump is connected, through a high-pressure pipe, to an application head consisting of an electrically- or pneumatically-controlled valve and a hydrodynamic spray nozzle mounted above or below the moving printing substrate. Preferably, the spray nozzle is mounted at an angle of 20° to 90° in relation to the moving printing substrate. The high-pressure positive displacement pump ensures a constant pressure of the printing material the value of which is adjustable at the outlet of the high-pressure pump within the range of 1.0 MPa to 50.0 MPa. A filter, a pressure gauge and a flow meter are mounted to the high-pressure pipe. The device for spray application of the scented printing material has a controller mounted which is connected to the central control system of the printing machine or other polygraph machine, to the flow meter, to the electrically-controlled reducing valve, and to the electrically-controlled valve mounted in the application head. The printing unit of the printing machine or other polygraph machine has an inductive sensor of the printing cylinder position mounted which is connected to the controller of the device for spray application of an scented varnish.

[0012] The device for selective spray application of the scented printing material with the use of pneumatic spraying consists of a tank for the printing material, equipped with a circulation pump preventing its sedimentation and connected, through a pipe, to the application head. The application head consists of an electrically-controlled compressed air valve and of a nozzle for pneumatic spraying, situated at a distance of 0.02 m to 0.20 m from the moving printing substrate. A filter, a pressure gauge and a flow meter are mounted to the pipe connecting the circulation pump to the application head. The device controller is connected to the control system of the printing machine, to the flow meter, to the electrically-controlled compressed air valve in the application head. The printing unit of the printing machine is equipped with an inductive sensor of the printing cylinder position connected to the device controller.

[0013] The hydrodynamic or pneumatic spray nozzles constitute the primary spray system of the device for selective spray application of the scented printing material. This device is preferably releasably mounted to the printing machine or other polygraph machine between the last printing assembly and the drying device. Mounting, to a single printing machine or to other polygraph machine, of several devices each of which comprises a system of spray nozzles mounted consisting of several hydrodynamic or pneumatic spray nozzles allows for the multiplication of the number of simultaneously-used scented printing materials having different aromas to be printed on one side of the end product. This also allows for printing of multiple scented fields of different sizes in arbitrarily selected locations on the moving printing substrate. These fields are printed with the scented printing material on a page or on a printing sheet. Releasable mounting of the device for selective hydrodynamic or pneumatic spray application of the scented printing material allows for the use of the same device in other printing machines or in other polygraph machines.

[0014] The advantage of the method and device for selective spray application of the scented printing material according to the invention is a simple method of spray-

ing onto the moving printing substrate. The method of selective spray application of the scented printing material allows for the use, in a single printing machine or in other single polygraph machine, of several devices for spraying thereof, which enable a simultaneous application of several types of scented printing materials. The method according to the invention allows for applying simultaneously any amount of scented printing materials as well as any type of varnishes, inks and other printing materials. In the method according to the invention, there are not any limitations to the intended location of the scented fields printed on the moving printing substrate. The method of selective spray application of the scented printing material allows for simultaneous application of scented printing materials having different rheological parameters due to the fact that each application path of the scented printing material is independent and is adjusted separately. Furthermore, the method of selective spray application ensures easy and effective control of the amount of the applied scented printing material, which eliminates the need to perform additional measurements of the amount of the scented printing material applied to the finished product.

[0015] The advantage of the device for selective spray application of the scented printing material according to the invention is its simple structure and small size. The device for printing of scented fields on the moving printing substrate is releasably mounted to existing printing machines and other polygraph machines without any need for extending thereof by an additional printing unit. The structure of the device is portable, which allows for the moving of the device between operating printing machines or between other operating polygraph machines, depending on the needs.

[0016] Example: Printing of selective hydrodynamic spray with a scented printing material, as one example possible to use, was conducted in a web printing machine of Goss Sunday 2000 type. In the example of the method of selective spray application of the printing material, scented dispersion varnish "Strawberry" by Schubert International was used as the printing material. A laterally-nicked hydrodynamic nozzle by Nordson having a diameter of 0.075 mm was used for the application. The scented varnish was supplied to the hydrodynamic nozzle by a high-pressure pump by Nordson, while the control of the process of applying the scented varnish was conducted by a PLC controller clocking the frequency of opening and closing of the hydrodynamic nozzle. Speed of the moving printing substrate in the form of a paper web in the web printing machine was 7.75 m/s. Pressure of the scented varnish at the inlet to the hydrodynamic nozzle was about 12.0 MPa. The distance between the head with mounted the hydrodynamic nozzle and the moving paper web was 0.125 m. Spraying of the scented varnish was conducted from the top of the web of the moving paper. The head with the mounted hydrodynamic nozzle was placed in a web printing machine before introducing the paper web into the furnace, immediately after the last printing unit of the printing machine. As a result of the selective application of the scented varnish onto the moving paper web, a compact field with the dimensions of 0.08 m x 0.12 m arranged on the printing sheet in locations agreed with the client was obtained on each printing sheet. Basic weight of the scented varnish applied on the printing sheet of paper was 4.75 g/m^2.

[0017] Despite the application of the scented varnish conducted at a short distance from the entrance of the web of the moving paper into a drying device in which the process of drying of all inks and varnishes applied onto the moving paper web during the printing process is conducted, the scented varnish was thoroughly dried and did not stick the components of the end product together. Fields printed with the scented varnish tested after 2, and then after 4 weeks from the performance of the application still had a very intense aroma.

[0018] The device for selective spray application of the scented printing material in an embodiment is shown in the drawing, in which Fig. 1 shows a diagram of the device for hydrodynamic spraying of the scented printing material in combination with the web printing machine, whereas Fig. 2 shows a diagram of the device for pneumatic spraying of the scented printing material in combination with the web printing machine.

[0019] The device for selective spray application of the scented printing material with the use of hydrodynamic spraying consists of an application head **6**, a tank **1** for the scented printing material with a circulation pump **2**. The circulation pump **2** is connected to a high-pressure positive displacement pump **3** which is supplied, from the network, with compressed air having a pressure adjustable by means of an electrically-controlled reducing valve **4**. The high-pressure pump **3** is connected through a high-pressure pipe **5** to the application head **6** consisting of an electrically-controlled valve **7** and a hydrodynamic spray nozzle **8** located above the moving printing substrate **9**. A filter **10**, a pressure gauge **11** and a flow meter **12** are mounted to the high-pressure pipe **5**. The device has a device controller **13** mounted, which is connected to a control system **14** of the printing machine **15**, to the flow meter **12**, to the electrically-controlled reducing valve **4**, to the electrically-controlled valve **7** in the application head **6**. The printing unit of the printing machine **15** is equipped with an inductive sensor **16** of the printing cylinder position connected to the device controller **13**.

[0020] The device for selective spray application of the scented printing material with the use of pneumatic spraying consists of a tank **1** for the scented printing material, equipped with a circulation pump **2**. The circulation pump **2** is connected through a pipe **23** to the application head **6** which consists of an electrically-controlled compressed air valve **25** and a pneumatic spray nozzle **26** located above the moving printing substrate **9**. A filter **10**, a pressure gauge **11** and a flow meter **12** are mounted to the pipe **23**. The device controller **13** is connected to the control system **14** of the printing machine **15**, to the flow meter **12**, to the electrically-controlled compressed

air valve **25** in the application head **6**. The printing unit of the printing machine **15** is equipped with an inductive sensor **16** of the printing cylinder position connected to the device controller **13**.

[0021] The above-described exemplary device for selective spray application of the scented printing material does not limit similar structures allowing for hydrodynamic spraying or pneumatic spraying on a moving printing substrate.

[0022] Operation of the device for hydrodynamic selective spray application of the scented printing material consists in filling, with the scented printing material, of the tank **1** for the scented printing material. Preferably, the scented printing material is in the form of an aqueous suspension of varnish and ink with aroma capsules. The circulation pump **2** takes the scented printing material from the lower part of the tank **1** for the scented printing material and passes it to the high-pressure positive displacement pump **3**. The excess of the scented printing material fed by the circulation pump **2** returns to the tank **1** for the scented printing material, ensuring a continuous circulation of the scented printing material, which prevents sedimentation thereof. The effectiveness of the circulation pump **2** ensures pumping multiple times the volume of the tank **1** for the scented printing material, most often 5-20 times per hour. The high-pressure positive displacement pump **3** supplied with compressed air having a pressure adjustable within the range of 0.1-3.0 MPa by means of the electrically-controlled reducing valve **4** ensures a constant pressure of the scented printing material at the outlet of the high-pressure positive displacement pump **3**. Pressure of the scented printing material at the outlet of the high-pressure positive displacement pump **3** is adjusted within the range of 1.0 MPa to 50.0 MPa. The scented printing material having an adjustable pressure is supplied through the pipe **5** to the application head **6**. The opening of the electrically-controlled valve **7** located in the application head **6** causes an outflow of the scented printing material through the hydrodynamic spray nozzle **8** at a high speed and its atomisation into a jet which has the form of a flattened cone. At the same time, the scented printing material is applied onto the moving printing substrate **9** from the hydrodynamic spray nozzle **8** at an adjustable distance from this substrate ranging from 0.02 m to 0.20 m. Closing of the electrically-controlled valve **7** causes termination of the outflow of the scented printing material. As a result of a printing process conducted in such a way a field of the applied scented printing substrate **9** having a width of 0.02 m to 0.10 m is formed on the moving printing substrate. This width depends on the angle of the jet in the form of a flattened cone and on the distance between the nozzle and the moving printing substrate **9**. The length of the field of the applied scented printing material ranges from 0.02 m to 0.20 m and depends on the opening time of the electrically-controlled valve **7**. The amount of the applied scented printing material depends on the speed of the moving printing substrate **9** and on the flow rate of the scented printing material flowing through the hydrodynamic spray nozzle **8**. The flow rate of the scented printing material depends on its pressure generated by the high-pressure positive displacement pump **3**. The device controller **13** reads a signal of the printing cylinder position in the printing unit of the printing machine **15** from the inductive sensor **16** of printing cylinder position, and calculates the movement speed of the printing substrate **9** based on the time between consecutive signals. Then, it calculates the desired opening and closing time of the electrically-controlled valve **7** in the application head **6** and sends a signal controlling the electrically-controlled valve **7** so that the start time of the spraying always occurs in the same preset position of the cylinder of the printing unit **15**, and its opening time corresponds to the rotation of this cylinder by a constant angle. This ensures a fixed position and size of the scented field on the product. By reading the signal from the flow meter **12** and comparing it to the number of rotations of the cylinder of the printing unit **15**, the controller calculates the amount of the applied scented printing material per one scented field and appropriately controls the electrically-controlled reducing valve **4** so as to maintain the predetermined amount of the scented printing material regardless of the impact of distorting factors. Start and stop signals of the printing machine, supplied by the control system **14** of the printing machine **15** to the device controller **13**, cause the operation of the device for hydrodynamic selective spray application of the scented printing material to start and stop, respectively.

[0023] Operation of the device for pneumatic selective spray application of the scented printing material consists in filling, with the scented printing material, of the tank **1** for the scented printing material. Preferably, the scented printing material is in the form of an aqueous suspension of varnish and ink with aroma capsules. The circulation pump **2** takes the scented printing material from the lower part of the tank **1** for the scented printing material and passes it to the application head **6**. The excess of the scented printing material fed by the circulation pump **2** returns to the tank **1** for the scented printing material, ensuring its continuous circulation and thus preventing sedimentation thereof. The effectiveness of the circulation pump **2** ensures pumping the volume of the tank 15-20 times per hour. The scented printing material is supplied through the pipe **23** to the application head **6**. Opening of the electrically-controlled valve **25** located in the application head **6** causes an outflow of the mixture of the scented printing material and compressed air through the pneumatic spray nozzle **26** and its atomisation into a jet in the form of a flattened cone. At the same time, the scented printing material is applied onto the moving printing substrate **9**, from he pneumatic spray nozzle **26** at an adjustable distance ranging from 0.02 m to 0.20 m. Closing of the electrically-controlled valve **25** causes termination of the outflow of air and scented varnish. As a result, a field of the applied scented printing material having a width of 0.02 m to 0.10 m is formed on

the moving printing substrate. This width depends on the cone angle of the jet and on the distance between the nozzle and the moving printing substrate. Length of this applied scented field ranges from 0.02 m to 0.20 m. Length of the applied scented field on the moving printing substrate **9** depends on the opening time of the electrically-controlled valve **25**. Amount of the applied scented printing material depends on the speed of the moving printing substrate **9** and on the flow rate of the scented printing material flowing through the nozzle **26**. The flow rate of the scented printing material flowing through the nozzle **26** depends on the pressure of the air supplying the application head **6**. The device controller **13** reads a signal of the printing cylinder position in the printing unit of the printing machine **15** from the inductive sensor **16** of the printing cylinder position, and calculates the movement speed of the printing substrate **9** based on the time between consecutive signals. Then, it calculates the desired opening and closing time of the electrically-controlled valve **25** in the application head **6** and sends a signal controlling the electrically-controlled valve **25** so that the start time of the spraying always occurs in the same preset position of the cylinder of the printing unit **15**, and its opening time corresponds to the rotation of this cylinder by a constant angle. This ensures a fixed position and size of the scented field on the product. By reading the signal from the flow meter **12** and comparing it to the number of rotations of the cylinder of the printing unit **15**, the device controller **13** calculates the amount of the applied scented printing material per one scented field and appropriately controls the pressure of air supplying the application head **6** so as to maintain the predetermined amount of the scented printing material regardless of the impact of distorting factors. Start and stop signals of the printing machine, supplied by the control system **14** of the printing machine **15** to the device controller **13**, cause the operation of the device for pneumatic selective spray application of the scented printing material to start and stop, respectively.

Claims

1. A method of selective spray application of an scented printing material onto a moving printing substrate, consisting in the use of hydrodynamic or pneumatic spraying for the application of the scented printing material on any chosen field or fields of the moving printing substrate (9) and is implemented by means of hydrodynamic spray nozzles (8) as hydrodynamic spraying or by means of pneumatic spray nozzles (26) as pneumatic spraying, wherein the scented printing material selectively applied in the form of hydrodynamic spraying, onto the moving printing substrate (9) is applied by a brief, ranging from 1 ms to 200 ms, opening of an electromagnetically- or pneumatically-controlled valve (7) which supplies the scented printing material under pressure to a hydrodynamic spray nozzle (8), in which the pressure introducing the scented printing material is in the range of 1.0 MPa to 50.0 MPa, and the diameter of the outlet opening of the hydrodynamic spray nozzle (8) is preferably about 20 μm to 500 μm, wherein the hydrodynamic spray nozzle (8) is mounted at a distance of 0.02 m to 0.20 m from the moving printing substrate (9), the speed of which depends on the type of printing machine (15) or other polygraph machine and usually ranges from 0.5 m/s to 20.0 m/s, which allows for spraying the scented printing material onto the moving printing substrate (9) in the form of a trace having a rectangular shape and with the use of the scented printing material in an amount of 1.0 g/m^2 to 10.0 g/m^2, whereas the spray application of the scented printing material is implemented by means of a pneumatic spray nozzle (26) onto the moving printing substrate (9), wherein the pneumatic spray nozzle (26) is supplied with the scented printing material having a low pressure, and preferably with the use of a vacuum ranging from (-)0.05 MPa to (+)1.00 MPa, wherein compressed air having a pressure of 0.1 MPa to 3.0 MPa is introduced to the pneumatic spray nozzle (26), and spraying of the scented varnish onto the moving printing substrate (9) occurs as a result of entrainment of particles of the scented printing material by a jet of compressed air, wherein enabling and disabling the spraying of the scented printing material is implemented through closing and opening of compressed air supply to the pneumatic nozzle (26).

2. The method according to claim 1, **characterised in that** the scented printing material is a scented varnish or a scented printing ink in the form of an aqueous dispersion, wherein the aroma substance is constituted by microcapsules.

3. The method according to claim 1, **characterised in that** synchronisation of the opening cycle of the control valve (7) of the hydrodynamic spray nozzle (8) or the pneumatic spray nozzle (26) with rotations of the printing machine (15) or other polygraph machine, and also adjustment of the opening time of the control valve (7) are determined through the size of the printed scented field and its location along the implemented print direction, whereas through moving away or bringing closer the hydrodynamic spray nozzle (8) or the pneumatic spray nozzle (26) from or to the moving printing substrate (9), the size of the printed scented field is adjusted perpendicularly along the print direction, wherein the position of the printed scented field across the print direction is implemented by changing the position of the hydrodynamic spray nozzle (8) or the pneumatic spray nozzle (26) transversely to the print direction of the moving printing substrate (9).

4. The method according to claim 1, **characterised in that** the control over the amount of the scented printing material applied as hydrodynamic spraying or as pneumatic spraying onto the moving printing substrate (9) is implemented through pressure adjustment, in the hydrodynamic spray nozzle (8), of the scented printing material supplied to the nozzle or through adjustment of the flow rate of the supplied scented printing material and/or the pressure of the spraying air in the pneumatic spray nozzle (26).

5. The method according to claim 1, **characterised in that** the diameter of the outlet opening of the pneumatic spray nozzle (26) ranges from 0.1 mm to 1.0 mm.

6. The method according to claim 1, **characterised in that** the moving printing substrate (9) is a moving paper web.

7. A device for selective spray application of the scented varnish, consisting of an application head (6), in which hydrodynamic spray nozzles (8) or pneumatic spray nozzles (26) are mounted, of a tank (1) for the scented printing material with a circulation pump (2) which, in the hydrodynamic spraying variant, is connected to a high-pressure positive displacement pump (3) supplied, from the network, with compressed air having a pressure adjustable by means of an electrically-controlled reducing valve (4), wherein the high-pressure pump (3) is connected through a high-pressure pipe (5) to the application head (6) consisting of an electrically-controlled valve (7) and of a hydrodynamic spray nozzle (8) located above or under the moving printing substrate (9), wherein a filter (10), a pressure gauge (11) and a flow meter (12) are mounted to the high-pressure pipe (5), furthermore the device has a device controller (13) mounted, which is connected to a control system (14) of the printing machine (15), to the flow meter (12), to the electrically-controlled reducing valve (4), to the electrically-controlled valve (7) in the application head (6), whereas the printing unit of the printing machine (15) has an inductive sensor (16) of the printing cylinder position mounted, connected to the device controller (13), and in the variant of the device using pneumatic spraying, a circulation pump (2) is connected through a pipe (23) to the application head (6) consisting of an electrically-controlled compressed air valve (25) and a pneumatic spray nozzle (26) located above or under the moving printing substrate (9), wherein a filter (10), a pressure gauge (11) and a flow meter (12) are mounted to the pipe (23), wherein the device controller (13) is connected to the control system (14) of the printing machine (15), to the flow meter (12), to the electrically-controlled compressed air valve (25) mounted in the application head (6), and the printing unit of the printing machine (15) or other polygraph machine is equipped with an inductive sensor (16) of the printing cylinder position connected to the device controller (13).

8. The device according to claim 7, **characterised in that** it is mounted to the printing machine (15) or to other polygraph machine in a releasable manner.

9. The device according to claim 7, **characterised in that** it is mounted in the printing machine (15) or in other polygraph machine between the last printing unit and the drying device.

10. The device according to claim 7, **characterised in that** the hydrodynamic spray nozzles (8) or the pneumatic spray nozzles (26) are mounted at an angle of 20° to 90° in relation to the moving printing substrate.

11. The device according to claim 7, **characterised in that** the stable application of an amount of the scented printing material with a varying printing speed is automatically implemented by an installed feedback system comparing signals of printing speed, coming from the printing machine (15) or from other polygraph machine, with signals of opening time of the electrically-controlled valve (7) (25), and with signals of flow rate of the supplied scented printing material, preferably from a pump dispensing the scented material to the tank (1) for the scented printing material or from the flow meter (12).

Patentansprüche

1. Verfahren zur selektiven Sprühapplikation von Duft-Druckstoff auf sich bewegenden Druckträger, bestehend aus dass es in der Anwendung von hydrodynamischer oder pneumatischer Sprühung zur Applikation des Duft-Druckstoffes auf (ein) beliebige(s) Feld oder Felder des sich bewegenden Druckträgers (9) besteht und mithilfe der hydrodynamischen Sprühdüsen (8) als hydrodynamische Sprühung oder mithilfe der pneumatischen Sprühdüsen (26) als pneumatische Sprühung realisiert wird, wobei der durch hydrodynamische Sprühung auf den sich bewegenden Druckträger (9) aufzutragende Duft-Druckstoff durch kurze, von 1 ms bis zu 200 ms dauernde Öffnung des elektromagnetisch oder pneumatisch gesteuerten Ventils (7) zur Zuleitung des Duft-Druckstoffes unter Druck zur hydrodynamischen Sprühdüse (8) aufgetragen wird, wobei der Einführungsdruck des Duft-Druckstoffes von 1,0 MPa bis 50,0 MPa, und der Durchmesser der Auslauföffnung der hydrodynamischen Sprühdüse (8) vorzugsweise etwa 20 μm bis 500 μm beträgt, wobei die hydrodynamische Sprühdüse (8) im von 0,02 m bis 0,20 m betragenden Abstand von dem sich bewegenden Druckträger (9) eingebaut ist, dessen Geschwindig-

keit von dem Typ der Druckmaschine (15) oder einer anderen polygrafischen Maschine abhängig ist und üblicherweise von 0,5 m/s bis 20 m/s beträgt, wodurch der Duft-Druckstoff auf den sich bewegenden Druckträger (9) in Form einer rechteckigen Spur und bei Verbrauch des Duft-Druckstoffes in der Menge von 1,0 g/m^2 bis 10,0 g/m^2 aufgesprüht wird; die Sprühapplikation des Duft-Druckstoffes mithilfe der pneumatischen Sprühdüse (26) auf den sich bewegenden Druckträger (9) erfolgt dagegen, wobei die pneumatische Sprühdüse (26) mit Duft-Druckstoff bei geringem Druck, vorzugsweise unter Anwendung von Unterdruck von (-)0,05 MPa bis (+)1,00 MPa versorgt wird, wobei zur pneumatischen Sprühdüse (26) Druckluft unter dem Druck von 0,1 MPa bis 3,0 MPa zugeführt wird, das Aufsprühen des Duftlackes auf den sich bewegenden Druckträger (9) jedoch im Ergebnis des Mitreißens der Teilchen des Duft-Druckstoffes durch den Druckluftstrom erfolgt, wobei das Ein- und Ausschalten des Aufsprühens des Duft-Druckstoffes durch das Schließen und Öffnen der Zuleitung von Druckluft zur pneumatischen Sprühdüse (26) realisiert wird.

2. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** der Duft-Druckstoff ein Duftlack oder eine Duft-Druckfarbe in Form einer Wasserdispersion ist, in der Mikrokapseln den Duftstoff bilden.

3. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** die Synchronisierung des Öffnungszyklus des Steuerventils (7) der hydrodynamischen Sprühdüse (8) bzw. der pneumatischen Sprühdüse (26) mit der Drehzahl der Druckmaschine (15) oder einer anderen polygrafischen Maschine, und auch die Regelung der Öffnungszeit des Steuerventils (7) durch die Größe des zu bedruckenden Duftfeldes und dessen Lage längs der realisierten Druckrichtung bestimmt wird; die Größe des zu bedruckenden Duftfeldes senkrecht zur Druckrichtung wird dagegen durch das Nähern bzw. Entfernen der hydrodynamischen Sprühdüse (8) bzw. der pneumatischen Sprühdüse (26) gegenüber dem sich bewegenden Druckträger (9) geregelt, wobei die Lage des zu bedruckenden Duftfeldes quer zur Druckrichtung durch Änderung der Lage hydrodynamischen Sprühdüse (8) bzw. der pneumatischen Sprühdüse (26) quer zur Bedruckrichtung des sich bewegenden Druckträgers (9) realisiert wird.

4. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** die Steuerung der Menge des als hydrodynamische Sprühung oder als pneumatische Sprühung auf den sich verschiebenden Druckträger (9) aufgetragenen Duft-Druckstoffes durch Regelung des der Duft-Druckstoffdüse in der hydrodynamischen Sprühdüse (8) zugeleiteten Druckes oder durch Regelung der Ausgabe der zugeleiteten Duft-Druckstoffes und/oder des Druckes der Besprühungsluft in der pneumatischen Sprühdüse (26) realisiert wird.

5. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** der Durchmesser der Auslauföffnung der pneumatischen Sprühdüse (26) von 0,1 mm bis 1,0 mm beträgt.

6. Verfahren nach Anspruch 1, **gekennzeichnet dadurch, dass** der sich bewegende Druckträger (9) eine sich bewegende Papierbahn ist.

7. Vorrichtung zur selektiven Sprühapplikation eines Duftlackes, dass sie aus dem Applikationskopf (6), in dem die hydrodynamischen Sprühdüsen (8) oder die pneumatischen Sprühdüsen (26) eingebaut sind und dem Behälter (1) für den Duft-Druckstoff mit der Umlaufpumpe (2) besteht, wobei die Umlaufpumpe (2) bei der Version der hydrodynamischen Sprühung mit der Hochdruck-Verdrängerpumpe (3) verbunden ist, die aus dem Versorgungsnetz mit Druckluft bei mittels des elektrisch gesteuerten Druckminderventils (4) geregeltem Druck versorgt wird, wobei die Hochdruckpumpe (3) über die Hochdruckleitung (5) mit dem Applikationskopf (6) verbunden ist, der aus dem elektrisch gesteuerten Ventil (7) und der über oder unter dem sich bewegenden Druckträger (9) angeordneten Düse zur hydrodynamischen Sprühung (8) besteht, wobei an der Hochdruckleitung (5) das Filter (10), das Manometer (11) und der Durchflussmesser (12) installiert sind; überdies besitzt die Vorrichtung die eingebaute Steuerung der Vorrichtung (13), die mit dem Steuersystem (14) der Druckmaschine (15), dem Durchflussmesser (12), dem elektrisch gesteuerten Druckminderventil (4) und dem elektrisch gesteuerten Ventil (7) in dem Applikationskopf (6) verbunden ist; im Druckwerk der Druckmaschine (15) ist dagegen ein mit der Steuerung der Vorrichtung (13) verbundener Induktionsmelder der Lage des Druckzylinders (16) eingebaut, und bei der Version der Vorrichtung mit pneumatischer Sprühung ist die Umlaufpumpe (2) über die Leitung (23) mit dem Applikationskopf (6) verbunden, der aus dem elektrisch gesteuerten Druckluftventil (25) und der über oder unter dem sich bewegenden Druckträger (9) angebrachten Düse zur pneumatischen Sprühung (26) besteht, wobei an der Leitung (23) das Filter (10), das Manometer (11) und der Durchflussmesser (12) installiert sind, wobei die Steuerung der Vorrichtung (13) mit dem Steuersystem (14) der Druckmaschine (15), dem Durchflussmesser (12) und dem in dem Applikationskopf (6) eingebauten elektrisch gesteuerten Druckluftventil (25) verbunden ist, und das Druckwerk der Druckmaschine (15) oder einer anderen polygrafischen Maschine mit einem mit der Steuerung der Vorrichtung (13) verbundenen Induktionsmelder der Lage

des Druckzylinders (16) ausgestattet ist.

8. Vorrichtung nach Anspruch 7, **gekennzeichnet dadurch, dass** es auf trennbare Art in eine Druckmaschine (15) oder eine andere polygrafische Maschine eingebaut ist.

9. Vorrichtung nach Anspruch 7, **gekennzeichnet dadurch, dass** sie in der Druckmaschine (15) oder einer anderen polygrafischen Maschine zwischen dem letzten Druckaggregat und der Trockenanlage eingebaut wird.

10. Vorrichtung nach Anspruch 7, **gekennzeichnet dadurch, dass** die hydrodynamischen Sprühdüsen (8) oder die pneumatischen Sprühdüsen (26) unter einem von 20° bis 90° betragenden Winkel zum sich bewegenden Druckträger eingebaut sind.

11. Vorrichtung nach Anspruch 7, **gekennzeichnet dadurch, dass** die stabile Mengenapplikation des Duft-Druckstoffes bei veränderlicher Druckgeschwindigkeit automatisch durch ein installiertes Rückkopplungssystem realisiert wird, das die aus der Druckmaschine (15) oder einer anderen polygrafischen Maschine ankommenden Druckgeschwindigkeitssignale mit den Signalen der Öffnungszeit des elektrisch gesteuerten Ventils (7)(25) und den vorzugsweise aus der Pumpe zur Dosierung des Duft-Druckstoffes in den Duft-Druckstoffbehälter (1) oder aus dem Durchflussmesser (12) ankommenden Mengensignalen des aufgegebenen Duft-Druckstoffes vergleicht.

Revendications

1. Procédé d'application par pulvérisation sélective d'un matériau d'impression odorant sur un support d'impression en mouvement, qui consiste à l'utilisation d'une pulvérisation hydrodynamique ou pneumatique pour l'application d'un matériau d'impression odorant sur toute zone choisie ou toutes zones choisies d'un support d'impression en mouvement (9) et est réalisée au moyen de buses de pulvérisation hydrodynamiques (8) en pulvérisation hydrodynamique ou au moyen de buses de pulvérisation pneumatiques (26) en pulvérisation pneumatique, où le matériau d'impression odorant appliqué, en pulvérisation hydrodynamique sur le support d'impression en mouvement (9), est appliqué par une brève ouverture de 1 ms à 200 ms de la vanne (7) à commande électromagnétique ou pneumatique qui conduit le matériau d'impression odorant sous pression à la buse de pulvérisation hydrodynamique (8) dans laquelle la pression d'introduction du matériau d'impression odorant est de 1,0 MPa à 50,0 MPa et le diamètre de la sortie de la buse de pulvérisation hydrodynamique (8) est avantageusement d'environ 20 à 500 pm, et la buse de pulvérisation hydrodynamique (8) est montée à une distance de 0,02 m à 0,20 m du support d'impression en mouvement (9), dont la vitesse dépend du type de machine d'impression (15) ou d'une autre machine à imprimer et est généralement comprise entre 0,5 et 20 m/s, ce qui permet au matériau d'impression odorant d'être pulvérisé sur un support d'impression en mouvement (9) sous la forme d'une trace rectangulaire et en utilisant un matériau d'impression odorant en une quantité allant de 1,0 g/m^2 jusqu'à 10,0 g/m^2, tandis que l'application par pulvérisation de matériau d'impression odorant est réalisée au moyen d'une buse de pulvérisation pneumatique (26) sur un support d'impression en mouvement (9), où la buse de pulvérisation pneumatique (26) est alimentée avec un matériau d'impression odorant à basse pression, utilisant de préférence un vide allant de (-) 0,05 MPa à (+) 1,00 MPa, où de l'air comprimé sous une pression de 0,1 MPa à 3,0 MPa est introduit dans la buse de pulvérisation pneumatique (26), tandis que la pulvérisation du vernis odorant sur le support d'impression en mouvement (9) a lieu à la suite de l'entraînement de particules de matériau d'impression odorant par le courant d'air comprimé, où l'activation et la désactivation de la pulvérisation de matériau d'impression odorant est réalisée en fermant et en ouvrant l'alimentation en air comprimé de la buse pneumatique (26).

2. Procédé selon la revendication 1, **caractérisé en ce que** le matériau d'impression odorant est un vernis odorant ou une encre parfumée sous la forme d'une dispersion aqueuse, la substance odorant étant des microcapsules.

3. Procédé selon la revendication 1, **caractérisé en ce que** la synchronisation du cycle d'ouverture de la vanne de régulation (7) de la buse de pulvérisation hydrodynamique (8) ou de la buse de pulvérisation pneumatique (26) avec la rotation de la machine d'impression (15) ou d'une autre machine à imprimer, ainsi que le réglage du temps d'ouverture de la vanne de réglage (7) est déterminé par la taille de la zone odorante à imprimer et par sa position le long du sens d'impression réalisé, d'autre part, en éloignant ou en zoomant la buse de pulvérisation hydrodynamique (8) ou la buse de pulvérisation pneumatique (26) par rapport au support d'impression en mouvement (9), la taille de la zone odorante à imprimer est ajustée perpendiculairement dans la direction d'impression, où la position de la zone odorante à imprimer dans la direction d'impression est obtenue en modifiant la position de la buse de pulvérisation hydrodynamique (8) ou de la buse de pulvérisation pneumatique (26) transversalement à la direction d'impression du support d'impression en

mouvement (9).

4. Procédé selon la revendication 1, **caractérisé en ce que** le contrôle de la quantité de matériau d'impression odorant appliqué en pulvérisation hydrodynamique ou en pulvérisation pneumatique sur un support d'impression en mouvement (9) est effectué en ajustant la pression dans la buse de pulvérisation hydrodynamique (8) du matériau d'impression odorant acheminé à la buse ou en ajustant le débit du matériau d'impression odorant et/ou la pression de l'air de pulvérisation dans la buse de pulvérisation pneumatique (26).

5. Procédé selon la revendication 1, **caractérisé en ce que** le diamètre de la sortie de la buse de pulvérisation pneumatique (26) est compris entre 0,1 mm et 1,0 mm.

6. Procédé selon la revendication 1, **caractérisé en ce que** le support d'impression en mouvement (9) est une bande de papier en mouvement.

7. Dispositif d'application par pulvérisation sélective d'un vernis odorant qui consiste en une tête d'application (6) dans laquelle sont montées les buses de pulvérisation hydrodynamiques (8) ou pneumatiques (26), un réservoir (1) pour un matériau d'impression odorant avec une pompe de circulation (2), qui, dans une version à pulvérisation hydrodynamique, est raccordée à une pompe volumétrique à haute pression (3) alimentée par le réseau d'air comprimé à une pression réglée par un réducteur à commande électrique (4), dans le cas où la pompe haute pression (3) est reliée par un conduit haute pression (5) à la tête d'application (6) constituée d'une vanne à commande électrique (7) et d'une buse de pulvérisation hydrodynamique (8) située au-dessus ou au-dessous du support d'impression en mouvement (9), où un filtre (10), un manomètre (11) et un débitmètre (12) sont installés sur le conduit haute pression (5), de plus, le dispositif est équipé d'un contrôleur (13) du dispositif, qui est relié au système de commande (14) de la machine d'impression (15), à un débitmètre (12), à un réducteur à commande électrique (4) et à une vanne à commande électrique (7) dans la tête d'application (6), et l'unité d'impression de la machine d'impression (15) comporte un capteur à induction de position du cylindre d'impression (16) connecté au contrôleur de dispositif (13), dans une variante du dispositif utilisant une pulvérisation pneumatique, la pompe de circulation (2) est reliée par un conduit (23) à la tête d'application (6) constituée d'une vanne d'air comprimé à commande électrique (25) et d'une buse de pulvérisation pneumatique (26), située au-dessus ou au-dessous du support d'impression en mouvement (9), où un filtre (10), un manomètre (11) et un débitmètre (12) sont installés sur le conduit (23), où un dispositif de commande de dispositif (13) est connecté à un système de commande (14) de la machine à imprimer (15), à un débitmètre (12) et à une vanne d'air comprimé à commande électrique (25) montée dans la tête d'application (6), et l'unité d'impression de la machine d'impression (15) ou d'une autre machine à imprimer est équipée d'un capteur à induction de position du cylindre d'impression (16) connecté au contrôleur de dispositif (13) .

8. Dispositif selon la revendication 7, **caractérisé en ce qu'**il est installé de manière séparable sur la machine d'impression (15) ou sur une autre machine à imprimer.

9. Dispositif selon la revendication 7, **caractérisé en ce qu'**il est installé dans une machine d'impression (15) ou dans une autre machine à imprimer entre la dernière unité d'impression et un dispositif de séchage.

10. Dispositif selon la revendication 7, **caractérisé en ce que** les buses de pulvérisation hydrodynamiques (8) ou pneumatiques (26) sont montées à un angle allant de 20° jusqu'à 90° par rapport au support d'impression en mouvement.

11. Dispositif selon la revendication 7, **caractérisé en ce que** l'application stable de la quantité de matériau d'impression odorant à une vitesse d'impression variable est effectuée automatiquement par le système de rétroaction installé, qui compare les signaux de vitesse d'impression provenant de la machine d'impression (15) ou d'une autre machine à imprimer avec des signaux de temps d'ouverture de la vanne à commande électrique (7) (25) et avec les signaux de débit de distribution du matériau d'impression odorant, avantageusement en provenance de la pompe du dosage du matériau odorant au réservoir du matériau odorant (1) ou du débitmètre (12).

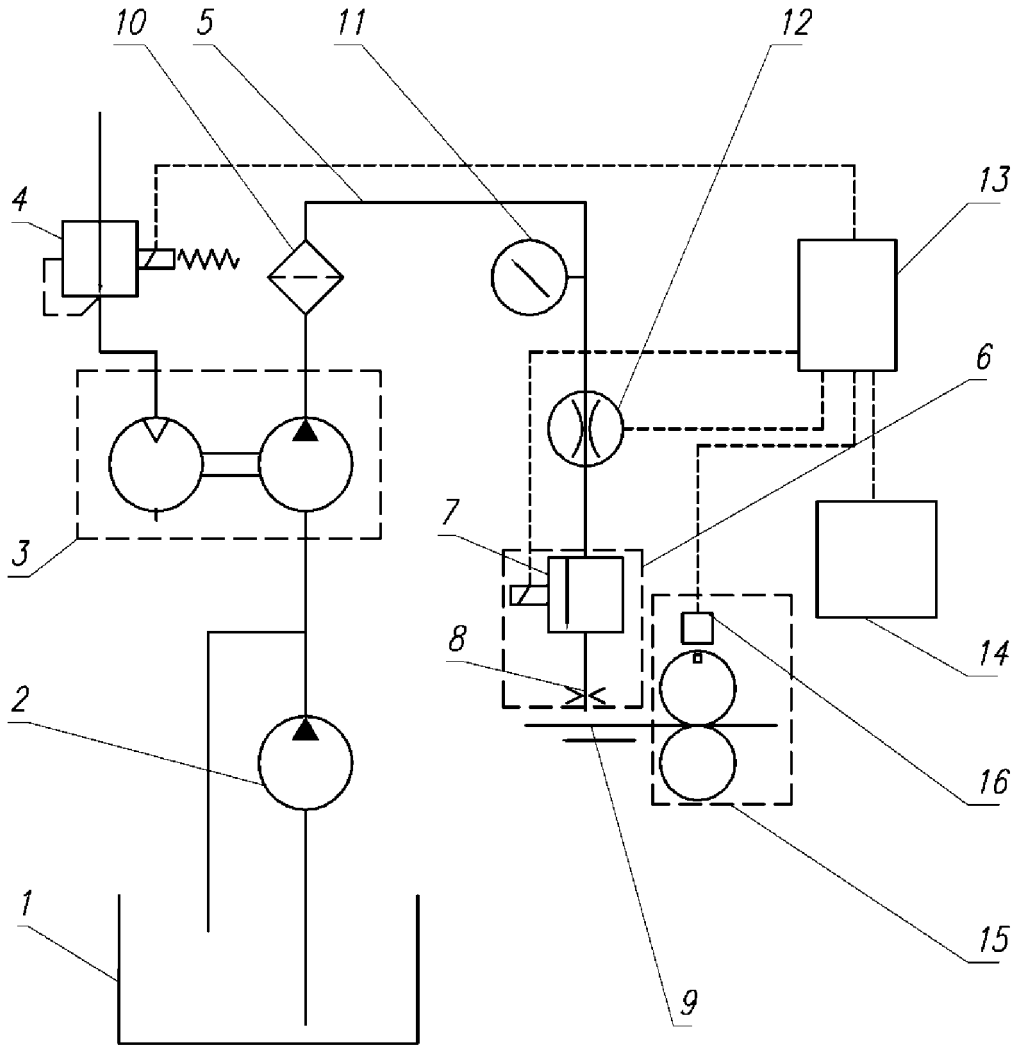

Fig. 1

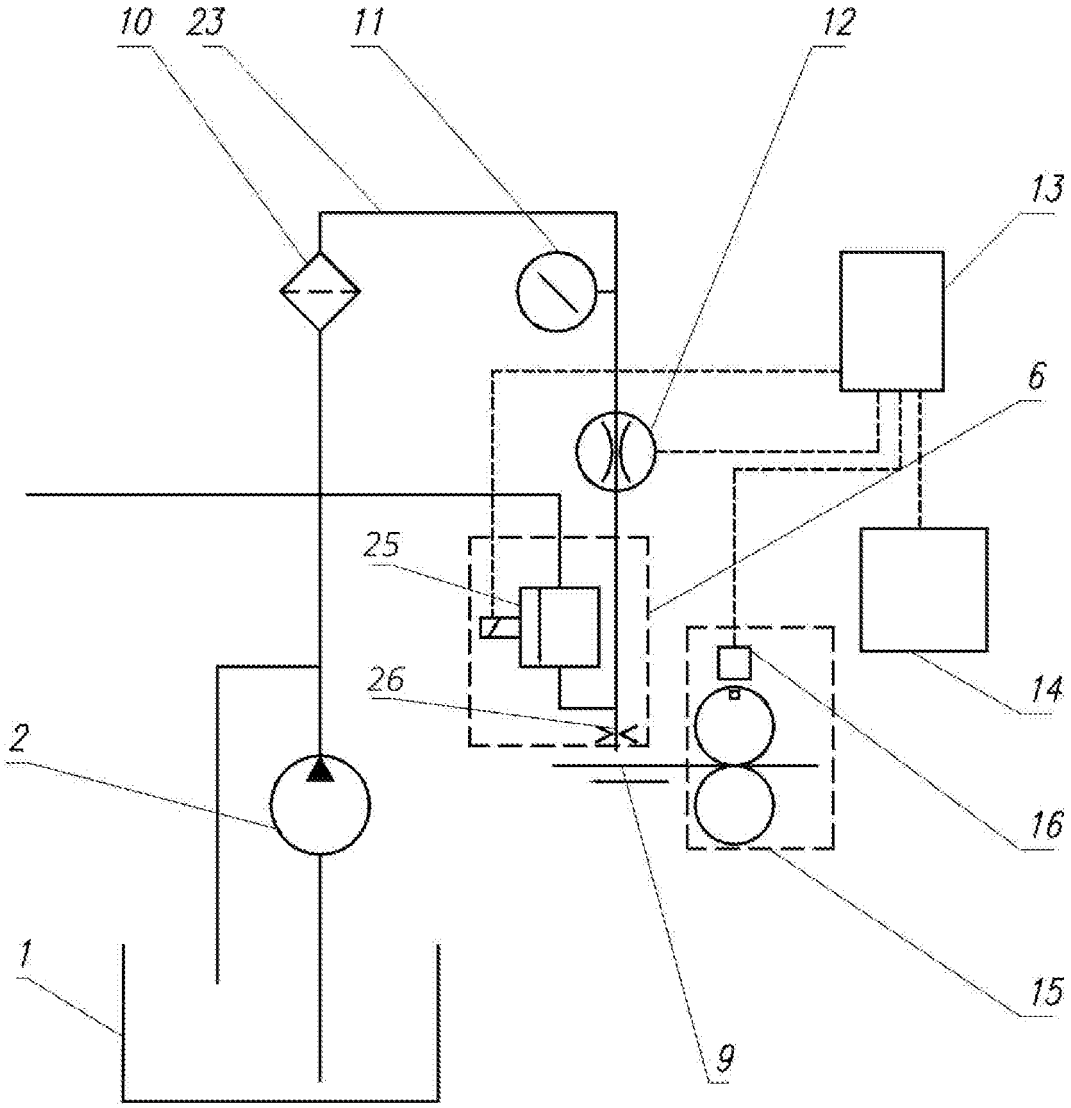

Fig. 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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