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Device for cleaning a stylus of a measuring probe.

(57)

The invention relates to a device for cleaning a stylus of a measuring probe, said device comprising:
- a cleaning chamber for accommodating said stylus during a cleaning process, said cleaning chamber comprising an opening for introducing and removing said stylus in and from said cleaning chamber;
- supply means for supplying a cleaning agent, for example a cleaning liquid or aerosol, and/or a drying agent, for example air, into said cleaning chamber for cleaning and/or drying said stylus.
The invention further relates to an assembly of such a device and a measuring machine.

DEVICE FOR CLEANING A STYLUS OF A MEASURING PROBE

The invention relates to a device for cleaning a stylus of a measuring probe.

5 For measuring objects a measuring machine is used, which measuring machine comprises a measuring probe with a stylus. The measuring device may be any type of measuring device, for example a 3D measuring device. In particular, said measuring device may be part of a processing machine
10 for measuring tools of the processing machine. If the stylus of the measuring probe is polluted, for example if dust or other particles attach thereto, measuring may not take place accurately.

 It is an object of the invention to provide a device
15 for cleaning a stylus of a measuring probe. In particular it may be an object of the invention to provide a device for cleaning a said stylus during a measurement process.

 This object is achieved by a device according to the preamble, said device comprising:

20 - a cleaning chamber for accommodating said stylus during a cleaning process, said cleaning chamber comprising an opening for introducing and removing said stylus in and from said cleaning chamber, and

 - supply means for supplying a cleaning agent, for
25 example a cleaning liquid or aerosol, and/or a drying agent, for example air, into said cleaning chamber for cleaning and/or drying said stylus.

 Said device according to the invention provides a cleaning chamber in which said stylus may be introduced via
30 said opening. After introducing said stylus in said cleaning chamber preferably first a cleaning agent is supplied to said cleaning chamber for cleaning said stylus and preferably second a drying agent is supplied to said

cleaning chamber for drying said stylus. After cleaning and/or drying said stylus said stylus may be removed from said cleaning chamber via said opening and a measuring process may be continued or started.

5 In an embodiment of the device according to the invention, said supply means comprise at least one supply opening or nozzle discharging into said cleaning chamber for supplying said cleaning agent and/or said drying agent into said cleaning chamber.

10 An advantage of the supply opening or nozzle is that said cleaning agent and/or said drying agent may be sprayed or blown in the direction of the stylus.

 In a preferred embodiment of the device according to the invention said supply means comprise at least three said
15 supply openings or nozzles.

 An advantage of multiple supply openings or nozzles, in particular three or more supply openings or nozzles, is that said cleaning agent and/or said drying agent may be sprayed or blown in the direction of said stylus from different
20 locations in the cleaning chamber, such that the whole outer surface of said stylus may be cleaned and/or dried. It is noted that said supply means may comprise any number of supply openings or nozzles, for example, three, four, five, six, seven, eight, nine, ten, or even more supply openings
25 or nozzles, such that the stylus is sprayed or blown from a plurality of directions.

 Preferably said supply openings or nozzles are spaced apart at substantial equal angular distances and are arranged for supplying said cleaning agent and/or said
30 drying agent to a common location, in which common location said stylus may be located during cleaning and/or drying.

 A stylus is a very sensitive measurement tool.
Supplying the cleaning agent and/or drying agent to the

stylus may cause the stylus to register incorrect measurement data influenced by said cleaning agent and/or said drying agent, which measurement data is thus not representative for the object that is being measured before
5 and after cleaning of the stylus. If said stylus is held in said common location and receives said cleaning agent and/or said drying agent from said equally spaced supply openings or nozzles the different flows of cleaning agent and/or drying agent will balance out or will be in an equilibrium
10 at the common location such that said stylus will not be influenced by the cleaning agent and/or drying agent and will not register incorrect measurement data. Such an embodiment of the device according to the invention has the advantage that the measuring process does not need to be
15 stopped during cleaning of the stylus, because this will not influence the measurement process.

In another embodiment of the device according to the invention said supply opening or an outlet opening of said nozzle has a maximum diameter of 4 mm, preferably a maximum
20 diameter of 1 mm, more preferably a maximum diameter of 0.5 mm, even more preferably a diameter of approximately 0.2 mm.

Such a relatively small supply opening or outlet opening of said nozzle provides the advantage that the cleaning agent and/or drying agent is sprayed or blown with
25 relatively high pressure in the direction of the stylus.

It is noted that the diameter of the supply opening or outlet opening of said nozzle may have any size falling within said maximum ranges.

In yet another embodiment of the device according to
30 the invention said device comprises a body surrounding said cleaning chamber, thereby defining a space between said body and said cleaning chamber, said body comprising an inlet opening for supplying said cleaning agent and/or said drying

agent into said space, wherein said supply opening(s) or nozzle(s) connect said space to the inner space of said chamber.

5 In such an arrangement only one inlet opening has to be provided, independent of the number of supply openings or nozzles. The pressure of the cleaning agent and/or drying agent is hereby equal for all supply openings or nozzles. In particular in combination with the embodiment comprising equally spaced supply openings or nozzles this may support
10 the effect of not influencing the stylus during cleaning and/or drying.

In yet another embodiment of the device according to the invention said device comprises a plurality of said cleaning chambers arranged at different positions,
15 preferably in accordance with a shape of a plurality of styli of said measuring probe, each chamber comprising a said opening for introducing and removing said a stylus of said plurality of styli in and from said cleaning chamber.

By providing a plurality of cleaning chambers each
20 comprising a said opening for introducing and removing a respective stylus of said plurality of styli of said probe in and from said cleaning chambers it is possible to clean a probe with multiple styli, for example arranged in a complex shape.

25 Said plurality of cleaning chambers may be provided in one body as well as in a plurality of bodies. The bodies of the plurality of bodies may be arranged in different positions and/or angles, for example in accordance with a shape of a plurality of styli of said measuring probe

30 In yet another embodiment of the device according to the invention at least one recess is provided that extends from said cleaning chamber(s) for accommodating a pen like body that holds the stylus at its outer end.

In yet another embodiment of the device according to the invention said comprises a means for closing said opening or said plurality of openings for introducing and removing said stylus or said plurality of styli.

5 Said opening(s) may preferably be closed when no stylus or styli is/are present in said cleaning chamber. This embodiment of the device is in particular advantageous if said stylus or styli is part of a measuring machine that is part of a processing machine. During processing (waste)
10 particles, such as shavings, dust, or the like, may be formed that may otherwise enter said opening(s) of said cleaning chamber, but are now prevented from entering the opening(s) by said closing means.

In yet another embodiment of the device according to
15 the invention said device comprises at least one of:

- a pressure regulator for adjusting a pressure of said cleaning agent and/or said drying agent;
- a dispensing system for dispensing said cleaning agent, in particular for creating an aerosol of cleaning
20 agent particles in air;
- a control unit for controlling said pressure regulator and/or said dispensing system and/or said supply means.

Practically said control unit is arranged for setting
25 at least one of:

- a time period for supplying said cleaning agent and/or said drying agent to said cleaning chamber;
- a pressure of said pressure regulator;
- an amount of cleaning agent and/or drying agent to be
30 supplied.

In yet another embodiment of the device according to the invention said device comprises a detector for detecting a presence of said stylus or said styli, wherein said

control unit is arranged for controlling said pressure regulator and/or said dispensing system and/or said supply means in accordance with detecting the presence of said stylus or said styli.

5 In such an embodiment cleaning and/or drying may take place only after detecting the presence of said stylus or said styli, such that no cleaning agent and/or drying agent is wasted.

10 In yet another embodiment of the device according to the invention said pressure regulator regulates said pressure such that said pressure is between 0.5 bar to 6 bar, for example between 2 to 4 bar, for example between 2.5 bar to 3 bar.

15 The invention also relates to an assembly of a device according to any of the claims 1 - 13 and a measuring machine.

20 The measuring machine may be any type of measuring device, for example a 3D measuring device. In particular, said measuring device may be part of a processing machine for measuring tools of the processing machine. In particular said measuring machine comprises a measuring probe comprising a stylus or a plurality of styli.

25 In an embodiment of the assembly according to the invention said assembly comprises means for displacing said cleaning chamber and said stylus or styli with respect to each other.

30 The stylus or styli may be displaced for introduction into and removal from said cleaning chamber and/or for displacing back and forth in a particular direction said stylus or styli back and forth in a particular direction during cleaning. Alternatively said cleaning chamber(s) may be displaced for a same reason. In another embodiment said

cleaning chamber(s) may be displaced in accordance with a shape or size of said stylus or styli.

It is preferred that said stylus or styli is not influenced during cleaning, such that cleaning may take place during a measuring process and said measuring process is not influenced nor has to be stopped. Alternatively, said measuring machine is arranged for temporarily stopping measuring or registration of measurement data during cleaning of said stylus or styli.

The invention further relates to an assembly according to claim 14, 15 or 16, comprising a plurality of said cleaning chambers arranged at different positions, preferably in accordance with a shape of a plurality of styli of said measuring probe, each chamber comprising a said opening for introducing and removing said a stylus of said plurality of styli in and from said cleaning chamber.

The invention will now be explained in more detail with reference to figures illustrated in a drawing, wherein:

- figures 1A-1C show a first embodiment of the device according to the invention and a stylus, wherein figure 1A is a perspective view, figure 1B is a longitudinal cross section and figure 1C is a perspective view at the height of the supply openings;

- figure 2 is a flow diagram of supplying the device of figure 1 with a cleaning agent and/or drying agent;

- figures 3A and 3B are a perspective view of a second embodiment of the device according to the invention comprising a closing means, wherein figure 3A shows the closing means in a first, closed position and figure 3B shows the closing means in a second, open position;

- figure 4 is a perspective view of a third embodiment of the device according to the invention;

- figure 5 is a perspective view of a fourth embodiment of the device according to the invention and a plurality of styli;

5 - figures 6A-6D are a perspective view of a fifth embodiment of the device according to the invention, wherein figure 6A and 6B show the assembled device and figures 6C and 6D show a body and a cleaning chamber, respectively;

- figure 7 is a perspective view of a sixth embodiment of the device according to the invention;

10 - figure 8 is a perspective view of a seventh embodiment of the device according to the invention, and

- figure 9 is a perspective view of an eight embodiment of the device according to the invention.

15 In the figures same elements are denoted by same reference numerals.

Figures 1A-1C show a device for cleaning a stylus 1 of a measuring probe 2 of a measuring machine (not shown). Said device comprises a body 3 with a cleaning chamber 4 for accommodating said stylus 1 during a cleaning process. The
20 cleaning chamber 4 comprises an opening 5 for introducing and removing said stylus 1 in and from said cleaning chamber 3. Between the body 3 and the cleaning chamber 4 a space 6 is defined. To said space 6 an inlet opening 7 is connected for supplying a cleaning agent and/or a drying agent into
25 said space 6. Said cleaning agent may be any suitable cleaning agent, such as a cleaning liquid, a cleaning gas or a cleaning aerosol in which cleaning liquid droplets are contained in a gas, for example air. Said drying agent may be any suitable drying agent, for example a drying gas,
30 particularly air. Eight said supply openings 8 connect said space 6 to the inner space of said cleaning chamber 4 for supplying the cleaning agent and/or drying agent to said cleaning chamber 4. The eight supply openings 8 are spaced

apart at substantial equal angular distances α , wherein α is 45° with eight supply openings 8, and are arranged for supplying said cleaning agent and/or said drying agent to a common location 9, in which common location 9 said stylus 1
5 may be located during cleaning and/or drying. The cleaning chamber 4 of the device of figures 1A - 1C is cylindrical, wherein the supply openings 8 are arranged tangentially in said cylindrical wall, such that the supply openings 8 are arranged for supplying the cleaning agent and/or drying
10 agent in a radial direction, and wherein said stylus 1 is held in the center of the cleaning chamber 4 at the height of the supply openings 8. The applicant has found that in such a configuration with 8 equally distributed supply openings 8 spraying or blowing in radial direction and the
15 stylus 1 held in the center the stylus 1 is not influenced by said cleaning agent and/or drying agent, such that the measuring process does not need to be stopped during cleaning.

Optionally, during cleaning and/or drying said stylus 1
20 may be moved back and forth in the direction 10 for exposing all parts of the stylus 1 to the cleaning agent and/or drying agent. Alternatively said cleaning chamber 4 may be moved back and forth in the direction 10. The direction 10 is parallel to the longitudinal direction of the cleaning
25 chamber 4.

As is shown in figure 1B, the diameter of the supply opening 8 decreases in the direction of the cleaning chamber 4, thereby increasing the pressure and/or speed of the cleaning agent and/or drying agent. The diameter of the
30 supply opening 8 at the entrance to the cleaning chamber 8 is 0.2 mm in the example of figures 1A - 1B, which has proven to provide a suitable pressure and/or speed for directing the cleaning agent and/or drying agent to the

stylus 1 without influencing the stylus 1. It is noted, that any suitable diameter may be chosen.

As is shown in figure 1A, said device comprises a detector 11 for detecting a presence of said stylus 1. Upon
5 detecting said stylus 1 a cleaning process may be initiated.

The body 3 and detector 11 are both mounted to a base 12. The base 12 may be arranged horizontally on a table or other support, or may be attached vertically to a support.

Figure 2 shows a flow diagram of supplying the device
10 of figure 1 with said cleaning agent and/or said drying agent. A gas, for example air, is provided via a tube 20 or the like to a pressure regulator 21 for adjusting the pressure of the gas. The pressure of the gas is for example set between 0.5 bar to 6 bar, for example between 2 to 4
15 bar, for example between 2.5 bar to 3 bar. The gas under pressure is then supplied to a flow controller 23, which directs the gas to either tube 24 or the like or to tube 26 or the like. Tube 24 connects to a dispenser 25, in which dispenser 25 a cleaning agent is dispensed into said gas,
20 such that cleaning liquid particles are contained in said gas. Said gas containing cleaning liquid particles is then fed to the space 6 and thereby the cleaning chamber via tube 27 and tube 28. Tube 26 directly connects to tube 28, such that the gas may be supplied to the space 6 and cleaning
25 chamber 4 as said drying agent. A control unit is provided for controlling said pressure regulator 21, the amount of liquid dispensed in dispenser 25, and the flow controller 23 for controlling the time period for providing the gas to the space 6 first via the dispenser 25 for cleaning the stylus 1
30 and then directly via tubes 26, 28 for drying the stylus 1 after cleaning. For example, first the stylus 1 is cleaned for several seconds and then the stylus 1 is dried for

several seconds. Said time periods may be suitably chosen and are not limited hereto.

Figures 3A and 3B are a perspective view of a second embodiment of the device according to the invention. Said device according to the second embodiment differs only from the device according to the first embodiment in that the device comprises a closing valve 30 that is displaceable between a first, closed position as shown in figure 3A in which first position the valve 30 closes the opening 5 and a second, open position as shown in figure 3B in which second position the valve 30 does not close the opening 5. The valve 30 may be constantly held in its first position for closing the opening 5 and thereby protecting the cleaning chamber 4 from the outer environment, in particular protecting the cleaning chamber 4 from dust and other particles entering therein via the opening 5, and may be temporary displaced to its second position for releasing the opening 5 such that the stylus 1 may be introduced in the cleaning chamber 4 for cleaning the stylus 1. After cleaning the valve 30 is returned to its first position.

The valve 30 shown in figures 3A and 3B rotates between its first and second position. It will be clear for the skill person that the valve may be displaced in any suitable way, for example by displacing the valve in translation. Instead of a valve any suitable closing means may be provided. A sealing may optionally be provided between said closing means or valve 30 and said opening 5.

It is noted that only the difference between the second embodiment of the device as shown in figures 3A and 3B with respect to the first embodiment of the device as shown in figures 1A - 1C is described here. For a further description of the device according to figures 3A and 3B the reader is referred to the description of figures 1A - 1C.

Figure 4 is a perspective view of a third embodiment of the device according to the invention. Said device according to the third embodiment differs only from the device according to the first embodiment in that the cleaning chamber 4 and the opening 5 have a hexagonal cross section instead of a round cross section. In each of the six wall sections of the cleaning chamber 4 a supply opening is arranged, such that in total six supply openings are provided (not shown). The supply openings are preferably arranged at the same height in the longitudinal direction of the cleaning chamber 4, i.e. at the same longitudinal distance from the opening 5, and are preferably each arranged in the middle of each wall section seen in the transverse direction of the cleaning chamber 4 and wall section, such that the supply openings are spaced apart at equal angular distances α , wherein α is 60° . The supply openings are arranged for supplying said cleaning agent and/or said drying agent to a common location, which is the central longitudinal axis of the opening 5 and the cleaning chamber 4.

It is noted that instead of a hexagonal cross section each suitable polygonal cross section may be chosen. The supply openings may be provided in each wall section or in part of the wall sections.

It is further noted that only the difference between the third embodiment of the device as shown in figure 4 with respect to the first embodiment of the device as shown in figures 1A - 1C is described here. For a further description of the device according to figure 4 the reader is referred to the description of figures 1A - 1C.

Figure 5 is a perspective view of a fourth embodiment of the device according to the invention. Said device according to the fourth embodiment differs only from the

device according to the first embodiment in that it comprises five openings 5 for receiving five styli 1 of a different type of measuring probe 2. The openings 5 are arranged in an upper surface of one body 3 in accordance
5 with the shape of the styli 1 and are mutually connected via recesses 40, such that the five styli 1, which are held by pen like elements 41 at their outer ends, may simultaneously be introduced in a respective cleaning chamber 4 for cleaning the styli 1, preferably simultaneously. Each
10 opening 5 provides entrance to a cleaning chamber 4, wherein each cleaning chamber 4 may comprise one or more supply openings for supplying the cleaning agent and/or drying agent. If a plurality of supply openings are provided to each cleaning chamber 4, the supply openings of each
15 cleaning chamber 4 may be spaced apart at equal angular distances and may be arranged tangentially for supplying the cleaning agent and/or drying agent in radial direction.

It is noted that any suitable number of cleaning chambers 4 with openings 5 may be provided, for example in
20 accordance with the shape of the styli 1 of the measuring probe 2.

It is further noted, that the plurality of cleaning chambers 4 provided in the one body 4 are mutually connected via recesses 40 and may therefore also be seen as one
25 cleaning chamber 4.

It is further noted that only the difference between the fourth embodiment of the device as shown in figure 5 with respect to the first embodiment of the device as shown in figures 1A - 1C is described here. For a further
30 description of the device according to figure 5 the reader is referred to the description of figures 1A - 1C.

Figures 6A - 6D are a perspective view of a fifth embodiment of the device according to the invention. Said

device according to the fifth embodiment differs from the device according to the first embodiment in that four recesses 40 are provided which extend from the central opening 5 in the upper surface of the body 3 to the outer, cylindrical circumference of the body 3. The opening 5 provides entrance to one central cleaning chamber 4 for receiving one of five styli 1 of the measuring probe 2 at a time. If the central, lower stylus 1 is introduced in the opening 5 in the upper surface of the body 3, the other four styli 1 extend outwards of the body 3 via the four circumferential recesses 40, which recesses 40 accommodate the pen like elements 41 of the probe 2 that hold the styli 1 at their outer ends (see figure 6A). Each of the other four styli 1, which are arranged in the same plane, may be introduced in the opening 5 via a respective recess 40, without the need to rotate the probe 2 with styli 1 (see figure 6B).

Figures 6C and 6D show the two elements forming the body 3 and cleaning chamber 4 in a disassembled state. Figure 6D shows that each recess 40 comprises a sealing body 50 surrounding the recess 40 over a part of the outer periphery thereof. The sealing body 50 seals the space 6 shown in figures 6C and 6D by being located against the inner wall of the body 3 and an upstanding annular protrusion 51 in the assembled state of figure 6A.

It is noted that only the differences between the fifth embodiment of the device as shown in figures 6A - 6D with respect to the first embodiment of the device as shown in figures 1A - 1C is described here. For a further description of the device according to figures 6A - 6D the reader is referred to the description of figures 1A - 1C.

Figure 7 is a perspective view of a sixth embodiment of the device according to the invention. Said device according

to the sixth embodiment differs from the device according to the first embodiment in that it comprises five bodies 3, each body 3 comprising a cleaning chamber 4 and an opening 5. The embodiment of figure 7 is also suitable for cleaning the styli 1 of the probe 2 of figures 5 and 6. The central, lower stylus 1 is introduced in the cleaning chamber 4 of the centrally arranged body 3, which is the same body 3 with cleaning chamber 4 as the one shown in figures 1A - 1C. The other four styli 1, that are located in the same plane, are introduced in a respective cleaning chamber 4 of a respective body 3 that is located around the centrally arranged body 3 via opening 5 and recess 40 for accommodating the pen like element 41 as shown in figures 5 and 6. The bodies 3, each comprising a recess 40, are more or less similar to the body 3 shown in figures 6A - 6D, with the difference that it comprises only one recess 40. For a further description of those bodies 3 the reader is referred to the description of figures 6A - 6D. The bodies 3 are arranged such that each recess 30 is directed to the centrally arranged body 3, in accordance with the shape of the styli 1.

It is noted that only the differences between the sixth embodiment of the device as shown in figure 7 with respect to the first embodiment of the device as shown in figures 1A - 1C is described here. For a further description of the device according to figure 7 the reader is referred to the description of figures 1A - 1C.

Figure 8 is a perspective view of a seventh embodiment of the device according to the invention. Said device according to the seventh embodiment differs from the device according to the sixth embodiment in that the four outer bodies 3 are displaceable with respect to the centrally arranged body 3, such that the distance between each of the

four outer bodies 3 and the centrally arranged body 3 is adjustable. The four outer bodies 3 are arranged on guiding rails 60 and displaceable along the length thereof. By adjusting the distance between each of the four outer bodies 3 and the centrally arranged body 3 it is possible to adapt the device to the size of a particular probe 2 with styli 1.

It is noted that only the difference between the seventh embodiment of the device as shown in figure 8 with respect to the sixth embodiment of the device as shown in figure 7 is described here. For a further description of the device according to figure 8 the reader is referred to the description of figure 7.

Figure 9 is a perspective view of an eight embodiment of the device according to the invention. Said device according to the eight embodiment differs from the device according to the first embodiment in that it comprises two bodies 3, each with a cleaning chamber 4 and an opening 5. The bodies 3 are each similar to the one shown in figures 1A - 1C. A first body 3 and the detector 11 are arranged on a base 12a, which configuration is more or less similar to the configuration shown in figure 1A. The second body 3 is arranged on a base 12b, which is attached to the base 12a under an angle of 90° with attachment means 70. The probe 2 with styli 1 of figures 5 and 6 may be cleaned with the device according to figure 9 by rotating the styli 1 in only one plane, wherein the lower, central stylus 1 may be cleaned in the cleaning chamber 4 of the body 3 located on base 12a or 12b and wherein the other four styli 1 may be cleaned in the cleaning chamber 4 of the body 3 located on the other base 12b or 12a.

It is noted that only the differences between the eight embodiment of the device as shown in figure 9 with respect to the first embodiment of the device as shown in figures 1A

- 1C is described here. For a further description of the device according to figure 9 the reader is referred to the description of figures 1A - 1C.

5 The invention is not restricted to the variants shown in the drawing, but it also extends to other preferred embodiments that fall within the scope of the appended claims.

CONCLUSIES

1. Meetstiftreinigingsinrichting voor het reinigen van een meetstift van een meetkop, welke inrichting omvat:

- 5 - een reinigingskamer voor het accommoderen van de meetstift gedurende een reinigingsproces, welke reinigingskamer een opening voor het inbrengen en verwijderen van de meetstift in en uit de reinigingskamer omvat;
- 10 - toevoermiddelen voor het toevoeren van een reinigingsmiddel, bijvoorbeeld een reinigingsvloeistof of aerosol, en/of een droogmiddel, bijvoorbeeld lucht, in de reinigingskamer voor het reinigen en/of drogen van de meetstift.

15

2. Inrichting volgens conclusie 1, waarbij de toevoermiddelen ten minste één toevoeropening of spuitmond omvatten, die uitmondt in de reinigingskamer voor het toevoeren van het reinigingsmiddel en/of het droogmiddel in
20 de reinigingskamer.

3. Inrichting volgens conclusie 2, waarbij de toevoermiddelen ten minste drie genoemde toevoeropeningen of spuitmonden omvatten.

25

4. Inrichting volgens conclusie 3, waarbij de toevoeropeningen of spuitmonden op afstand van elkaar zijn opgesteld op in hoofdzaak gelijke hoekafstanden en zijn ingericht voor het toevoeren van het reinigingsmiddel en/of
30 het droogmiddel naar een gemeenschappelijke locatie, in welke gemeenschappelijke locatie de meetstift zich kan bevinden gedurende reinigen en/of drogen.

5. Inrichting volgens een der voorgaande conclusies 2 - 4, waarbij de toevoeropening of een uitlaatopening van de spuitmond een maximale diameter van 4 mm, bij voorkeur een maximale diameter van 1 mm, meer bij voorkeur een maximale
5 diameter van 0,5 mm, nog meer bij voorkeur een maximale diameter van ongeveer 0,2 mm bezit.

6. Inrichting volgens een der voorgaande conclusies 2 - 5, omvattende een lichaam, dat de reinigingskamer omgeeft,
10 waarbij een ruimte tussen het lichaam en de reinigingskamer is gedefinieerd, welk lichaam een inlaatopening voor het toevoeren van het reinigingsmiddel en/of het droogmiddel in de ruimte omvat, waarbij de toevoeropening(en) of spuitmond(en) de genoemde ruimte met de binnenruimte van de
15 kamer verbinden.

7. Inrichting volgens een der voorgaande conclusies, omvattende een aantal reinigingskamers die op verschillende posities zijn opgesteld, bij voorkeur in overeenstemming met
20 een vorm van een aantal meetstiften van de meetkop, waarbij elke kamer een genoemde opening voor het inbrengen en verwijderen van een meetstift van het aantal meetstiften in en uit de reinigingskamer omvat.

25 8. Inrichting volgens een der voorgaande conclusies, omvattende ten minste één uitsparing die zich uitstrekt vanaf de reinigingskamer(s) voor het accommoderen van een penachtig lichaam, dat de meetstift aan zijn buiteneinde vasthoudt.

30

9. Inrichting volgens een der voorgaande conclusies, omvattende middelen voor het sluiten van de opening of het

aantal openingen voor het inbrengen en verwijderen van de meetstift of het aantal meetstiften.

10. Inrichting volgens een der voorgaande conclusies,
5 omvattende ten minste één van:
- een drukregelaar voor het instellen van een druk van het reinigingsmiddel en/of het droogmiddel;
 - een afgeefstelsel voor het afgeven van het reinigingsmiddel, in het bijzonder voor het creëren van een
10 aerosol van reinigingsmiddeldeeltjes in lucht;
 - een aanstuureenheid voor het aansturen van de drukregelaar en/of het afgeefstelsel en/of de toevoermiddelen.
- 15 11. Inrichting volgens conclusie 10, waarbij de aanstuureenheid is ingericht voor het instellen van ten minste één van:
- een tijdsduur voor het toevoeren van het reinigingsmiddel en/of het droogmiddel aan de
20 reinigingskamer;
 - een druk van de drukregelaar;
 - een hoeveelheid toe te voeren reinigingsmiddel en/of droogmiddel.
- 25 12. Inrichting volgens conclusie 10 of 11, omvattende een detector voor het detecteren van een aanwezigheid van de meetstift of de meetstiften, waarbij de aanstuureenheid is ingericht voor het aansturen van de drukregelaar en/of het afgeefstelsel en/of de toevoermiddelen in overeenstemming
30 met het detecteren van de aanwezigheid van de meetstift of de meetstiften.

13. Inrichting volgens conclusie 10, 11 of 12, waarbij de drukregelaar de druk zodanig regelt, dat de druk tussen 0,5 - 6 bar, bijvoorbeeld tussen 2 - 4 bar, bijvoorbeeld tussen 2,5 - 3 bar is.

5

14. Samenstel van een meetstiftreinigingsinrichting volgens een der conclusies 1 - 13 en een meetinrichting, welke meetinrichting een meetkop met een meetstift of een aantal meetstiften omvat.

10

15. Samenstel volgens conclusie 14, omvattende middelen voor het ten opzichte van elkaar verplaatsen van de reinigingskamer en de meetstift of meetstiften.

15

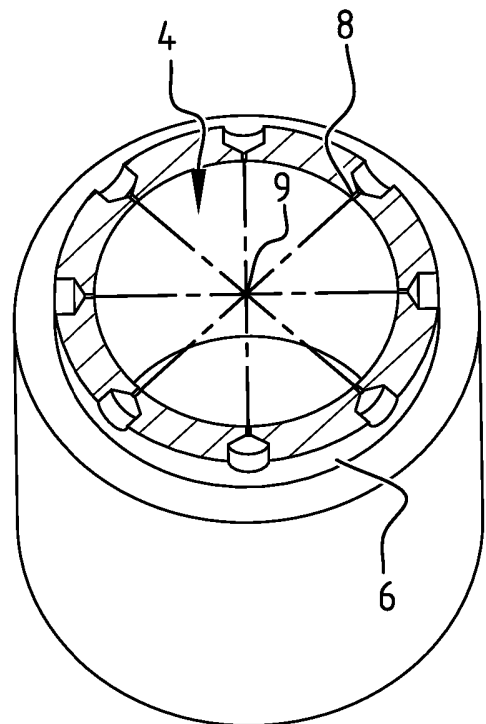
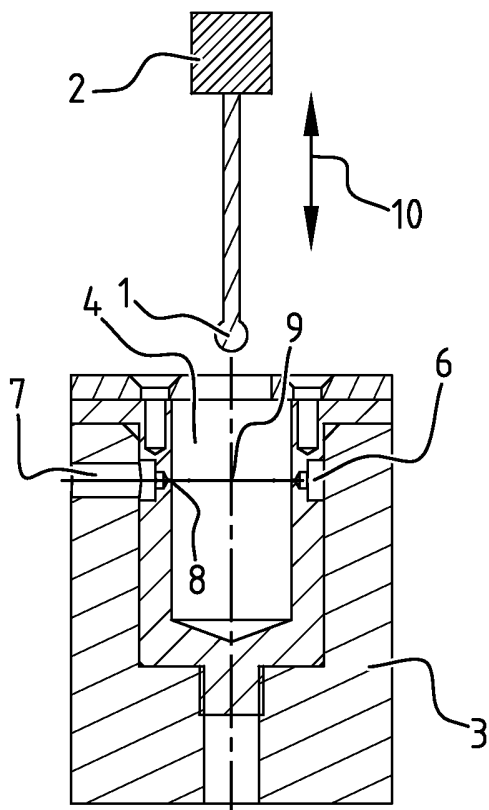
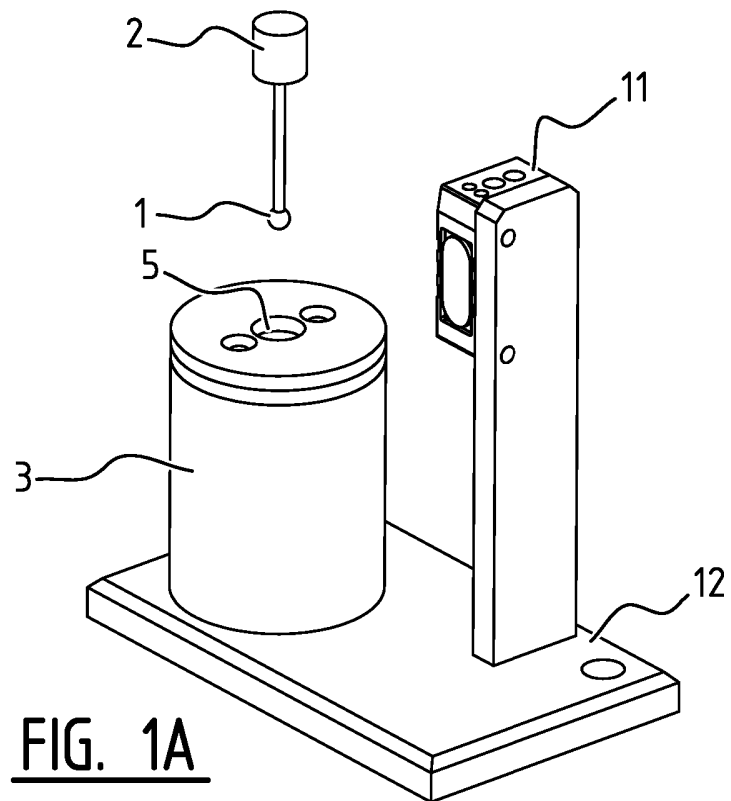
16. Samenstel volgens conclusie 14 of 15, waarbij de meetinrichting is ingericht voor het tijdelijk stoppen van het meten of het registreren van meetdata gedurende het reinigen van de meetstift of de meetstiften.

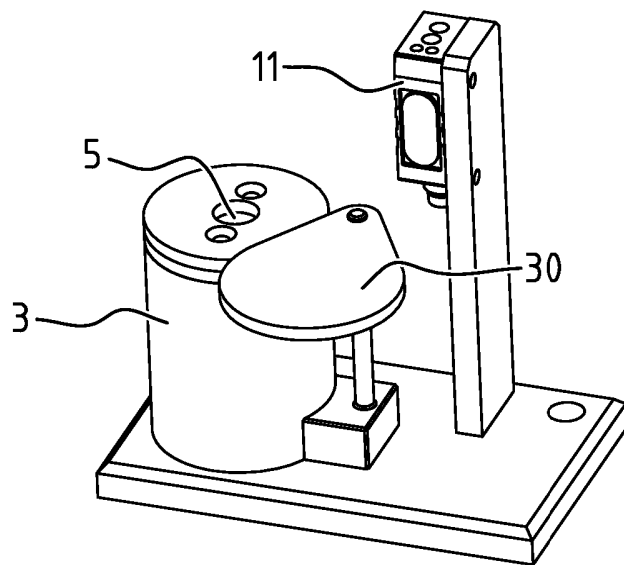
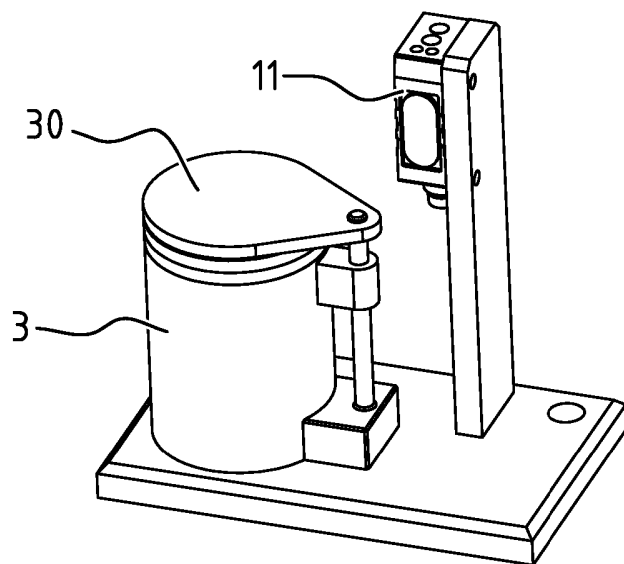
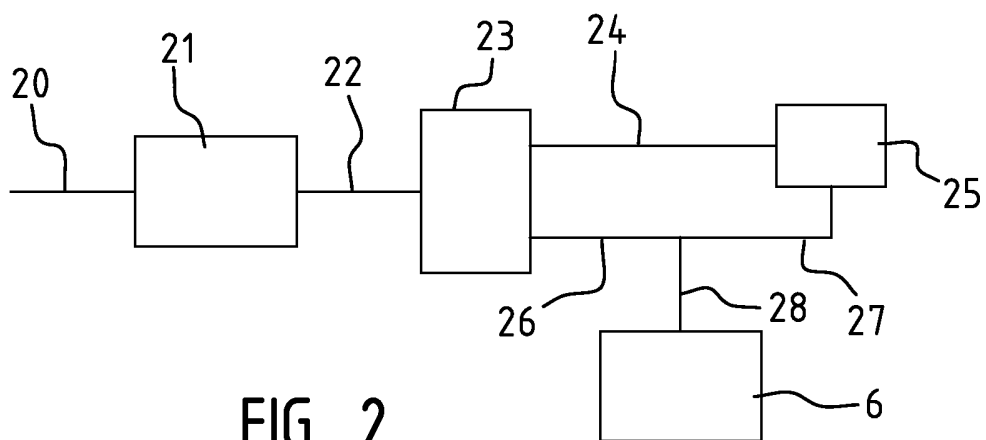
20

17. Samenstel volgens conclusie 14, 15 of 16, omvattende een aantal reinigingskamers dat op verschillende posities is opgesteld, bij voorkeur in overeenstemming met een vorm van een aantal meetstiften van de meetkop, waarbij elke kamer een genoemde opening voor het inbrengen en verwijderen van

25

een meetstift van het aantal meetstiften in en uit de reinigingskamer omvat.





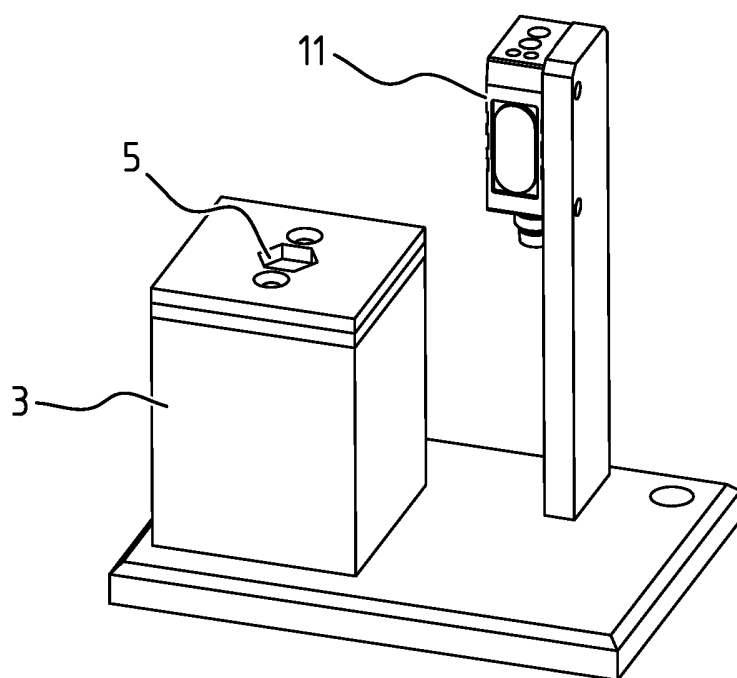


FIG. 4

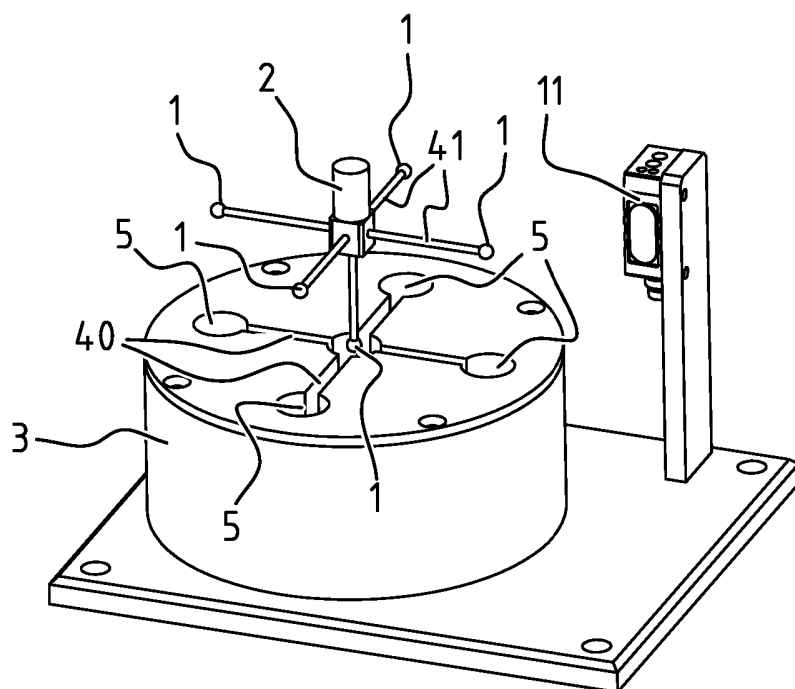
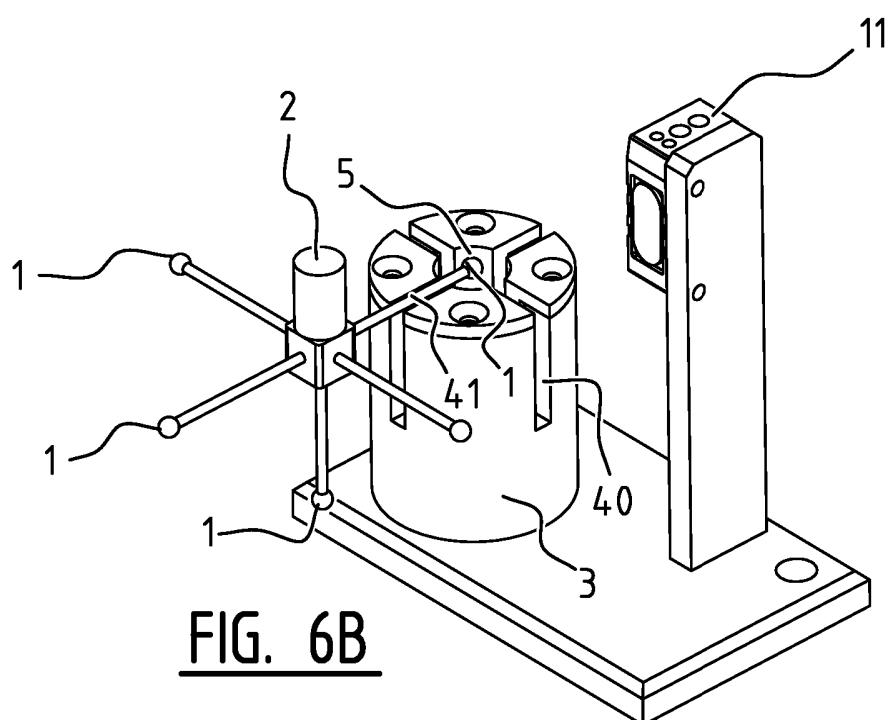
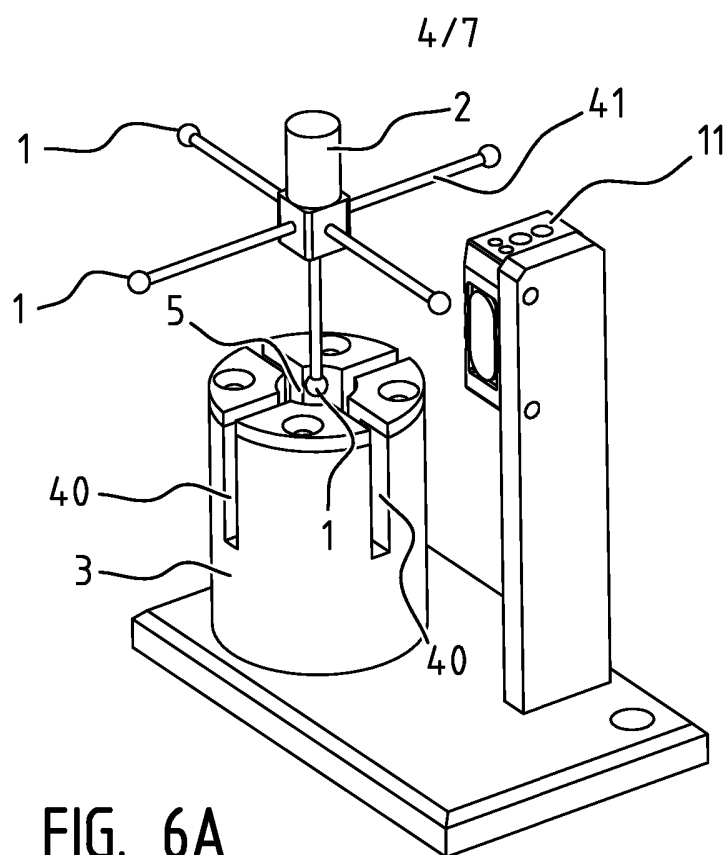


FIG. 5



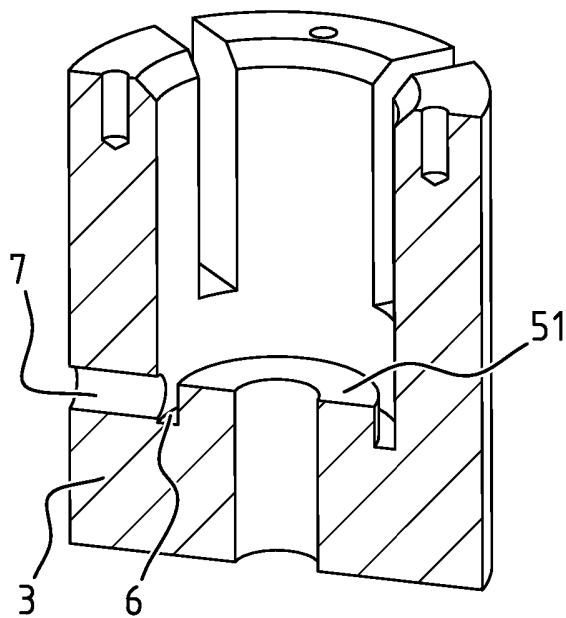


FIG. 6C

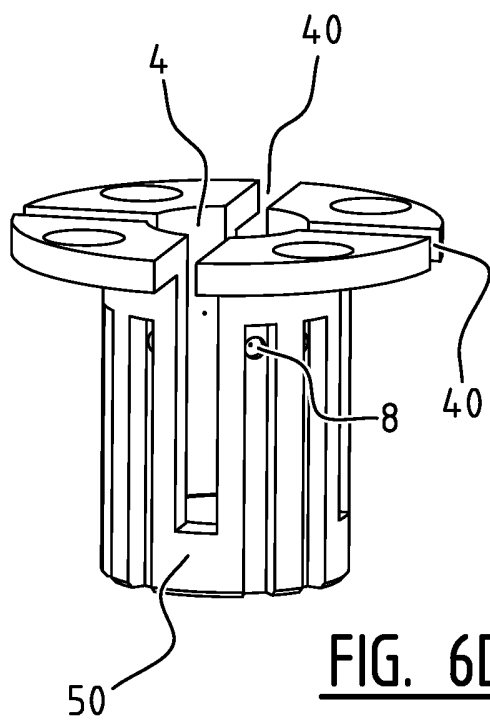


FIG. 6D

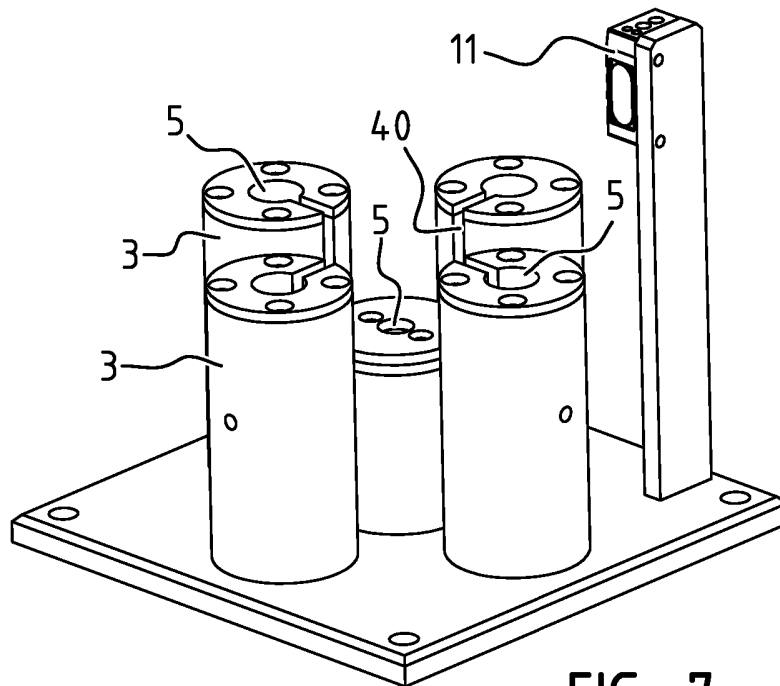


FIG. 7

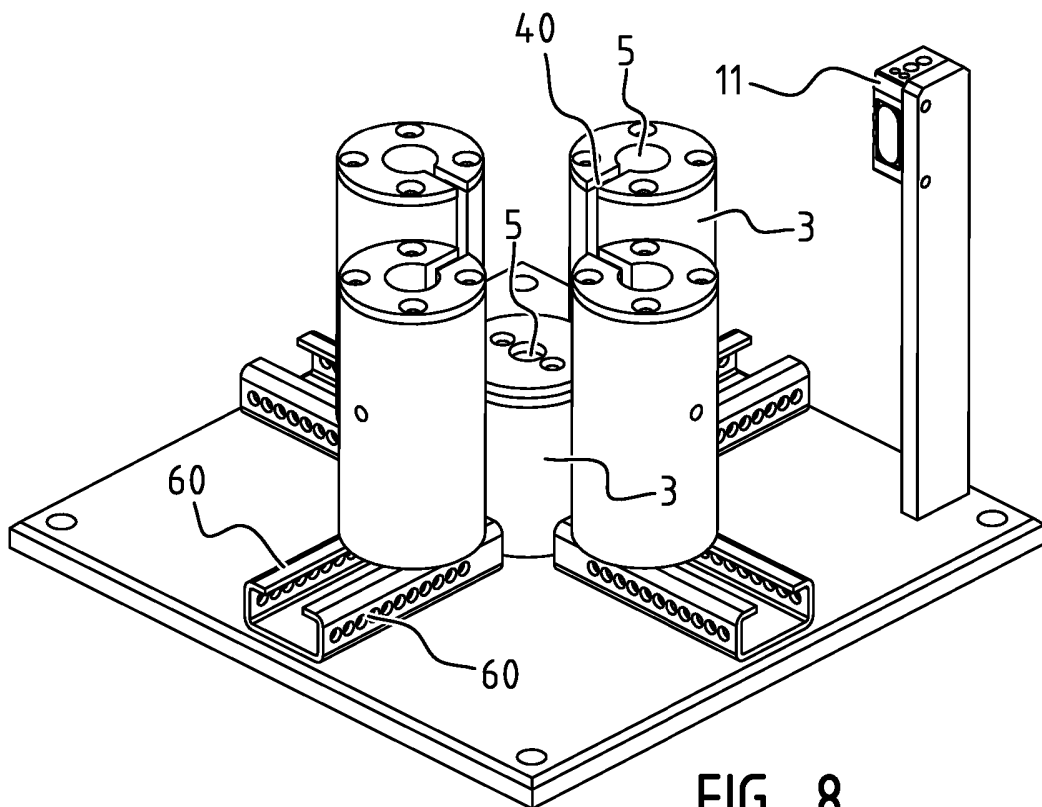
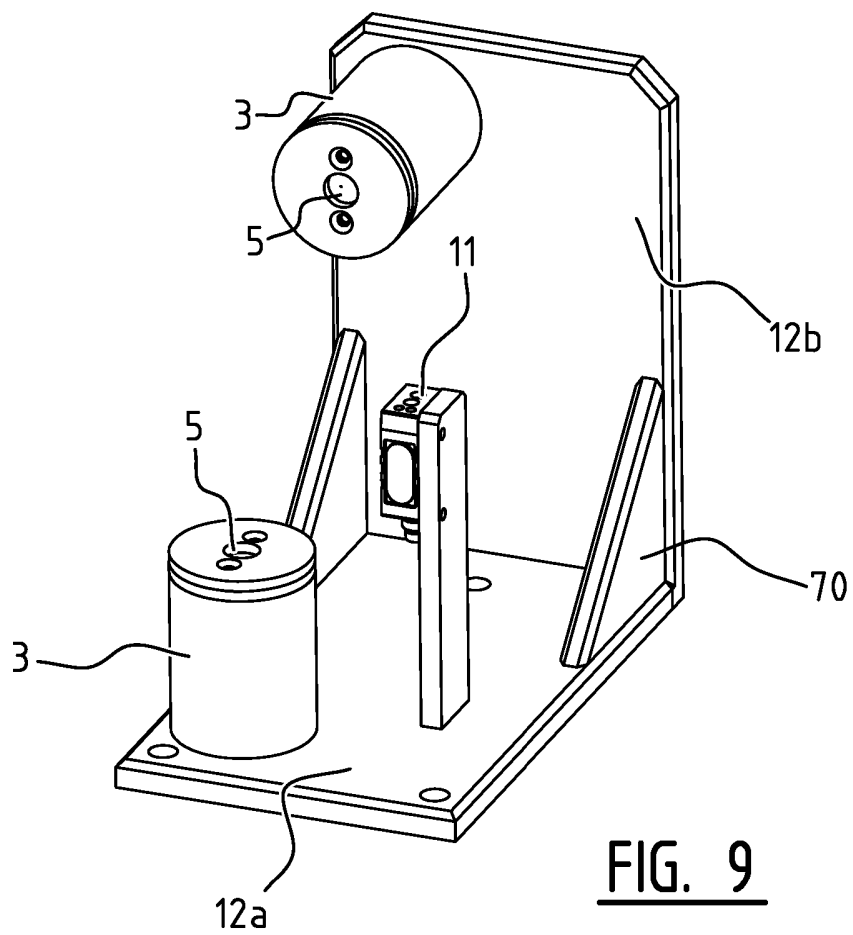


FIG. 8



SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	3R/2OW51/ChP/1
Nederlands aanvraag nr.	Indieningsdatum
2011710	31-10-2013
	Ingeroepen voorrangsdatum
Aanvrager (Naam)	
F.G.J. Lammertink Beheer B.V.	
Datum van het verzoek voor een onderzoek van internationaal type	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr.
08-02-2014	SN 61381
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC)	
B08B3/02 G01N35/10 B08B5/02 F26B21/00	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC	B08B G01N F26B
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III. ☐	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV. ☐	GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2011710

A. CLASSIFICATIE VAN HET ONDERWERP

INV. B08B3/02 G01N35/10
ADD. B08B5/02 F26B21/00

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B08B G01N F26B

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EP0-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	EP 2 025 418 A1 (HITACHI HIGH-TECHNOLOGIES CORPORATION) 18 februari 2009 (2009-02-18) * samenvatting * * alinea [0022] * * alinea [0025] - alinea [0027] * * alinea [0030] - alinea [0031] * * conclusies * * figuren *	1-16
X	WO 2013/099498 A1 (HITACHI HIGH-TECHNOLOGIES CORPORATION) 4 juli 2013 (2013-07-04) * samenvatting * * figuren * ----- -/-	1-5,7, 9-16

☒ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

30 juni 2014

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

De bevoegde ambtenaar

van der Zee, Willem

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2011710

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	DE 196 10 607 A1 (BOEHRINGER MANNHEIM GMBH) 25 september 1997 (1997-09-25) * samenvatting * * kolom 1, regel 3 - regel 6 * * kolom 4, regel 17 - regel 52 * * kolom 5, regel 7 - regel 55 * * conclusies * * figuren * -----	1-7,9-16
X	DE 102 07 499 A1 (EVOTEC OAL AG) 25 september 2003 (2003-09-25) * samenvatting * * alinea [0001] - alinea [0002] * * alinea [0009] - alinea [0023] * * alinea [0034] - alinea [0039] * * conclusies * * figuren * -----	1-5,7, 9-16
X	US 2008/099057 A1 (DUNFEE ET AL) 1 mei 2008 (2008-05-01) * samenvatting * * alinea [0034] - alinea [0043] * * conclusies * * figuren * -----	1-5,7, 9-16
X	WO 97/01750 A1 (COULTER INTERNATIONAL CORP.) 16 januari 1997 (1997-01-16) * samenvatting * * bladzijde 1, regel 4 - regel 7 * * bladzijde 3, regel 27 - bladzijde 4, regel 7 * * bladzijde 4, regel 31 - bladzijde 6, regel 8 * * conclusies * * figuren * -----	1-5,7, 9-16

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2011710

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
EP 2025418	A1	18-02-2009	AT 511923 T 15-06-2011
			CN 101363872 A 11-02-2009
			EP 2025418 A1 18-02-2009
			JP 2009042067 A 26-02-2009
			US 2009041622 A1 12-02-2009
WO 2013099498	A1	04-07-2013	JP 2013134142 A 08-07-2013
			WO 2013099498 A1 04-07-2013
DE 19610607	A1	25-09-1997	DE 19610607 A1 25-09-1997
			EP 0888553 A2 07-01-1999
			EP 1213588 A1 12-06-2002
			JP 2000506979 A 06-06-2000
			US 6422248 B1 23-07-2002
			US 2002185161 A1 12-12-2002
			WO 9735173 A2 25-09-1997
DE 10207499	A1	25-09-2003	GEEN
US 2008099057	A1	01-05-2008	EP 2076323 A2 08-07-2009
			US 2008099057 A1 01-05-2008
			WO 2008057758 A2 15-05-2008
WO 9701750	A1	16-01-1997	JP 3590072 B2 17-11-2004
			JP H10505427 A 26-05-1998
			US 5603342 A 18-02-1997
			WO 9701750 A1 16-01-1997

WRITTEN OPINION

File No. SN61381	Filing date (day/month/year) 31.10.2013	Priority date (day/month/year)	Application No. NL2011710
International Patent Classification (IPC) INV. B08B3/02 G01N35/10 ADD. B08B5/02 F26B21/00			
Applicant F.G.J. Lammertink Beheer B.V.			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☒ Box No. VIII Certain observations on the application

	Examiner van der Zee, Willem
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WRITTEN OPINION

Application number
NL2011710

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	13
	No: Claims	1-12, 14-16
Inventive step	Yes: Claims	
	No: Claims	1-16
Industrial applicability	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2011710

Box No. VII Certain defects in the application

see separate sheet

Box No. VIII Certain observations on the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1: EP-A1-2025418

D2: WO-A1-2013/099498

D3: DE-A1-19610607

D4: DE-A1-10207499

D5: US-A1-2008/0099057

D6: WO-A1-97/01750

2 The following is stated under reference to Item VIII of this Written Opinion, whereby it is to be noted that unclear features remaining in the claims cannot be employed for assessing novelty or inventive step.

2.1 The document D1 discloses (the references in brackets applying to this document and the expressions in italics relating to the unclarities stated under Item VIII) an "inrichting voor het reinigen van een meetstift van een meetkop, welke inrichting omvat:

- een reinigingskamer (10) voor het accommoderen van de meetstift gedurende een reinigingsproces, welke reinigingskamer (10) een opening (see figures 1 and 3) voor het inbrengen en verwijderen van de meetstift in en uit de reinigingskamer (10) omvat;

- toevoermiddelen (23) voor het toevoeren van een reinigingsmiddel~~en~~, *bijvoorbeeld* een reinigingsvloeistof *of* aerosol (see paragraph 0030), *en/of* een droogmiddel, *bijvoorbeeld* lucht (see paragraph 0031), in de reinigingskamer (10) voor het reinigen *en/of* drogen van de meetstift".

The subject-matter of independent claim 1 is therefore deprived of novelty and hence, the present application does not meet the criteria of patentability.

2.2 It is to be noted, that the subject-matter of independent claim 1 is equally disclosed by the documents D2-D6, cf. the passages cited in the Search Report.

- 3 The subject-matter of independent claim 1 is already known (see paragraph 2 above). The requisite unity of invention therefore no longer exists inasmuch as a technical relationship involving one or more of the same or corresponding special technical features does not exist between the subject-matter of dependent claims **2-16**. Nevertheless, the following statements in respect of dependent claims **2-16** are made in this written opinion.

Dependent claims **2-16** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements with respect to inventive step, the reasons being as follows:

- 3.1 The additional features of dependent claims **2-12** and **14-16** are known in the field concerned, cf. the passages cited in the Search Report with regard to the documents D1 (for claims **2-4**, **6-8** **10**, **11** and **14-16**), D2 (for claims **2-5**, **9-11** and **14-16**), D3 (for claims **2-4**, **6**, **10-12** and **14-16**), D4 (for claims **2-4**, **7**, **10**, **11** and **14-16**), D5 (for claims **2-4**, **7**, **10**, **11** and **14-16**) and D6 (for claims **2**, **10**, **11** and **14-16**).
- 3.2 The additional features of dependent claim **13** merely concern features which a skilled person would select in accordance with the circumstances, without the exercise of inventive skill. It would therefore be obvious to the person skilled in the art, to apply these features with corresponding effect to an "inrichting voor het reinigen van een meetstift van een meetkop" according to any one of the documents D1-D6, thereby arriving at an "inrichting voor het reinigen van een meetstift van een meetkop" according to claim **13**.

- 4 Claims **1-16** meet the requirement of industrial applicability.

Re Item VII

Certain defects in the application

The following is to be noted:

- 1 The documents D1-D6 have not been identified in the description and their relevant background art has not been briefly discussed.
- 2 The features of the claims are not provided with reference signs placed in parentheses.

Re Item VIII

Certain observations on the application

The following is remarked:

- 1 Claims **1** and **4** comprise typing errors (cf. the expressions "van een reinigingsmiddelen" in claim **1** and "droegen" in claim **4**).
- 2 Expressions such as "voor het reinigen van een meetstift van een meetkop" in claim **1** are to be interpreted as "geschikt voor het reinigen van een meetstift van een meetkop".
- 3 The terms "bijvoorbeeld" in claims **1**, **5** and **13**, "bij voorkeur" in claim **7**, and "in het bijzonder" in claim **10**, have no limiting effect on the scope of these claims and the features associated with these terms are to be regarded as entirely optional.
- 4 The expressions containing the wording "en/of" in claims **1**, **2**, **4**, **6** and **10-12** cause a lack of clarity because it is not clear whether the features in these expressions are optional or essential.
- 5 It is to be noted, that alternatives cf. the expressions "of" in claims **1-6**, **9-12**, **15** and **16**, and "ten minste één van" in claims **10** and **11**, are considered technically equivalent and substitutable.
- 6 The terms "in hoofdzaak" in claim **4**, and "ongeveer" in claim **5**, cause a lack of clarity because it is not clear what the limits of the technical features concerned are.
- 7 Bracketed expressions in claims **6** and **8** which are not reference signs cause a lack of clarity.
- 8 The subject-matter of claim **7** is defined by its relationship to a second entity, i.e. the "meetkop" (cf. the expression "in overeenstemming met een vorm van een aantal meetstiften van de meetkop"), which is not part of the claimed entity. Claim **7** therefore lacks clarity.