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(54) **A coupling for coupling of one or more hoses to a cleaning machine**

(57) A coupling for coupling one or more hoses to a cleaning machine comprising at least one connector for the connecting of a hose to be cleaned with a pillar and at least one pillar for the connection of the connector with a cleaning machine, wherein the pillar comprises a longitudinal hollow body with at least two open ends comprising; a longitudinal guidance part, situated towards a first end; and a second end opposite to the first end in longitudinal direction; wherein the guidance part is provided with a thickening for the fixing of the connector to the guidance part, which thickening comprises a first slope facing the first end, which slope has an angle with the guidance part between 5 and 45 degrees; and comprises a second slope facing the second end, which slope has an angle with the guidance part between 30 and 60 degrees.

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A coupling for coupling of one or more hoses to a cleaning machine

This invention relates to a coupling for coupling one or more hoses to a cleaning machine, a cleaning machine provided with such a coupling and a pillar for such coupling. The present invention in particular relates to coupling elements to be used in endoscope cleaning machines.

Medical devices, such as endoscopes, need to be treated, in particular rinsed, cleaned and sterilized, after use. To that end typically washing or cleaning machines are used, to automatically rinse or clean used equipment. An example of such machine is for instance known from EP0271157. In such a machine, a washing medium is prepared and fed to a washing post, washing outlet or pipe connection on a washing section of the machine. This post, outlet or pipe is then typically connected to the instrument to be treated, for instance to a connector in the endoscope.

The present invention aims to provide an improved coupling between a cleaning machine and devices to be treated.

The invention thereto provides a coupling for coupling one or more hoses to a cleaning machine comprising at least one connector for the connecting of a hose to be cleaned with a pillar and at least one pillar for the connection of the connector with a cleaning machine, wherein the pillar comprises a longitudinal hollow body with at least two open ends comprising; a substantially longitudinal guidance part, situated towards a first end, for the guidance of the connector over the pillar; and a second end opposite to the first end in longitudinal direction, for connecting the pillar to a cleaning machine; and wherein the guidance part is provided with a thickening for the fixing of the connector to the guidance part, which thickening comprises a first slope facing the first end, which slope has an angle with the guidance part between 5 and 45 degrees, preferably between 15 and 25 degrees and even more preferably substantially 20 degrees, for guiding the connector over the thickening from the first end of the guidance part; and comprises a second slope facing the second end, which slope has an angle with the guidance part between 30 and 60 degrees, preferably between 40 and 50 degrees, even more preferably substantially 45 degrees for creating a predetermined resistance to

prevent undesired shifting of the connector with the pillar, especially undesired shifting in the direction towards the first end.

During cleaning it is preferable that the hose remains coupled to the machine, even though the coupling is exposed to increased pressures. For this purpose, hoses can be coupled to the pillars in a tight manner, which allows them to resist high pressures, but also makes it difficult to uncouple the hose from the cleaning machine. It is a drawback of such systems that it is not possible to use one hand only for the coupling since it takes a lot of force to uncouple the hose from the cleaning machine.

The angles of the slopes on both sides of the thickening can be chosen together with the material properties of the pillar and the connector, such that a balance is created between the ease of use in coupling and decoupling on one hand and on the other hand good sealing properties in the coupled state. To that end, each slope may serve a different function. The first slope for instance increases ease of use by smoothening mainly the coupling action of the user, with a gradual increase in thickness to gradually increase the force required to push the hose onto the pillar. The second slope for instance increases the resistance to prevent undesired uncoupling, wherein the slope is typically steeper than the first slope, putting up a resistance to prevent uncoupling. The angles of the first and second slope should be understood as an angle measured from the plane of the slope with an imaginary axis through the hollow body in the longitudinal direction, or alternatively the angle may be determined between the slope and a tangential line along the outside of the body.

When there is a movement in the direction from the second end to the first end (so a movement away from the pillar), the thickening will cause a resistance in this movement, thus preventing undesired shifting towards the first end in a coupled state. The angle of the second slope of preferably substantially 45 degrees creates a resistance such that it is possible to facilitate that the connector may be uncoupled from the pillar when desired because the created resistance can be overcome by the force of at least one hand. Advantage of the coupling according to the present invention is that it is possible to couple and uncouple the hose with one hand. Preferably the connector is substantially symmetrical in design, such that

there is no difference for a right-handed or left-handed user. As a result, the coupling is user friendly for both left-or right-handed users.

In a coupled state a cleaning liquid is guided through the pillar, the connector to the hose for cleaning the hose coupled to the pillar. The coupling according to the present invention provides a balance between better sealing properties in coupled state and the possibility to uncouple the connector from the pillar without using a large force. The construction of the guidance part of the pillar increases the ease of use by the prevention of buckling. The connector may have at least two free ends, one of which is to be connected to the pillar. Another free end of the connector may be used to couple the connector with a device to be cleaned with the cleaning machine. That free end may for instance be used to attach to a cleaning port or cleaning attachment of an endoscope to be cleaned. That free end may also be used to couple the connector to a flexible tube, which tube in turn is to be attached to a cleaning port or cleaning attachment. The flexible tube allows the device to be distanced from the pillar to some extent.

In an embodiment of the present invention between the slopes a thickening or protruding section is present, wherein the thickening between the slopes comprises a plane wherein the plane runs substantially parallel to the guidance part. The plane may be substantially flat and extends between the two slopes for example. It is conceivable that the plane has a width that is equal over the length. The plane may also be slightly ribbed. This plane between the slopes provides for a good grip in a coupled position of the connector on the pillar. The ratio between smooth guidance for coupling and decoupling and a good fixation in the coupling state may be balanced by changing the angles of the slopes as well as the thickness and dimension of the thickening or protruding section. This balance is found for example in a preferred embodiment, wherein the plane of the thickening extends in the longitudinal direction over a length between 1 and 3 mm, preferably between 1.5 and 2.5 mm and even more preferably over substantially 2 mm.

In an embodiment, the thickening comprises a trapezoidal cross-section in the longitudinal direction of the pillar. The first and second slope and the plane of the thickening may form part of the trapezoid, wherein the base of the trapezium shape

may be formed by the guidance part of the pillar. Such shape allows guiding over the pillar as well as resisting removal from the pillar to some extent.

In an embodiment of the present invention, the thickening extends, substantially completely, around the guidance part, thus forming a ring-shaped thickening around the pillar. The thickening is preferably uninterrupted along the circumference of the pillar. This has the advantage that it improves the sealing properties of the coupling around the complete pillar, and no channel or leak of washing or rinsing liquid occurs.

In a preferred embodiment of the present invention, the outer size of the cross-section of the thickening of the pillar is larger than the outer size of the guidance part, with the outer size of the cross-section between 1.1 and 1.5 times larger, preferably between 1.25 and 1.35 and even more preferably about 1.3 times the outer size of the guidance part. Experiments have shown that these dimensions provide good sealing properties and provide for an easy to use coupling and decoupling with the connector on the pillar. The outer size of the thickening is for instance the maximal diameter of the thickening, wherein the outer size of the guidance part is the maximal diameter of the guidance part, excluding the thickening.

To increase the ease of use even further, it is conceivable that in an embodiment of the coupling a stopping surface is located between the at least two ends of the pillar. Such stopping surface provides an indication for the connector that is coupled onto the pillar, or that the connector has progressed along a predetermined distance over the pillar. Once the connector, in particular the elbow fitting of the connector, touches the stopping surface during the coupling, this indicates that the connector is placed in the correct position for the coupled state. It also prevents that the connector is placed too far over the pillar with damage to the connector as a potential consequence. In an embodiment the stopping surface is arranged on the first slope, facing the first end, more in particular arranged on the transition of the guidance part to the first slope.

The pillar of the coupling may also be provided with a ring-shaped protrusion between the thickening and the second end, for example a ring-shaped flange, preferably with a substantially flat surface facing the first end. It is preferred that

between the connector and the surface facing the first end of the pillar a small space is left open in a coupled state, to allow passage of cleansing fluid to avoid congestion of dirt between the connector and the pillar.

In a preferred embodiment of the present invention the spacing between the transition of the second slope to the plane of the thickening and the ring-shaped protrusion is substantially 6mm in the longitudinal direction. Experiments have shown that said spacing provides good properties for the resistance caused by the second slope in the coupled state, such that the connector remains coupled while the coupling is in use for cleaning a hose by a cleaning machine.

Experiments also showed improved sealing properties for an embodiment wherein the outer size of the cross section of the thickening is substantially equal to the spacing between the transition of the second slope to the plane of the thickening and the stopping surface. For example, the diameter of the thickening, perpendicular to the longitudinal direction, is substantially equal to the spacing between the transition of the second slope to the plane of the thickening and the surface facing the first end of the pillar of the ring-shaped protrusion.

An example of an easy to use pillar with a stopping surface is a pillar wherein the first slope of the thickening serves as a stopping surface. The stopping surface preferably extends along a distance around the pillar and is uninterrupted such that is provides a stopping surface around the circumference of the pillar.

In an embodiment, the connector of the coupling comprises a tube, for example manufactured from a polymer or a plastic, in particular silicone. The use of a tube as part of the connector increases the flexibility of the material properties to use for the connector. It is conceivable that the tube is manufactured from silicone with a hardness between 65-75 Shore, preferably 69-71 Shore, even more preferably 70 Shore, these values should be read as Shore hardness on the Shore A hardness scale. This hardness is the result of experiments to determine good sealing properties but also provide for easy coupling and uncoupling. In this embodiment the silicone tube ensures a seal in cooperation with the pillar at the location of the thickening.

In a preferred embodiment, the connector comprises an elbow fitting or pipe connection and a tube. The tube and the elbow fitting cooperate and together form the connector, wherein the tube is placed around the elbow fitting before the connector is used in the coupling. The elbow fitting may be connected to a hose at one end and at the other end the elbow fitting is connected to the tube. In the coupling state the elbow fitting will touch the pillar. An indication may be present for a proper placement of the elbow fitting, for instance when the elbow fitting touches the stopping surface. The tube will touch the pillar at the location of the thickening for good sealing properties. Preferably, when the coupling is in a coupled state, a spacing is present between the head end of the tube of the connector and the pillar, preferably with the ring-shaped protrusion. The head end of the tube, the end opposite to the elbow fitting, will not touch the pillar but a small space will be present to avoid congestion of any dirt or other small particles. The small space allows cleansing fluid to pass through. It is preferred that between the connector and the surface facing the first end of the pillar a small space is left open in a coupled state, to allow passage of cleansing fluid to avoid congestion of dirt between the connector and the pillar. To allow the passage of cleansing fluid, the spacing may extend in a longitudinal direction and may have a maximum opening in the longitudinal direction of 1 mm, preferably 0,5mm, and even more preferably maxim 0.2mm. The side of the connector which is not to be attached to the pillar may be arranged to be coupled to a device to be cleaned, for instance to an endoscope, or to a flexible tube which is to be coupled to the device.

This type of a connector is advantageous because it allows for an easy change in orientation of two sides of the connector. One end of the connector may be aligned with the pillar, whereas another end of the connector may be arranged perpendicular to the pillar.

In an embodiment of the present invention it is conceivable that the connector is slidable over the first end of the pillar, for instance such that the connector can slide to a predetermined position in a coupled state. This predetermined position may be visible by an indicator on the connector or the pillar may be configured to indicate this predetermined position, for instance by a stopping surface or by a part of the connector touching the top of the pillar.

To increase the ease of use when coupling and decoupling it is advantageous if the connector of the coupling comprises an elbow fitting, which comprises an angle of substantially 90 degrees with the connector, for the coupling and uncoupling of a hose to a cleaning machine. This angle makes it possible to couple and decouple with one hand only, since for coupling only a movement in one direction is necessary. The pillar may for instance extend mainly vertically from the cleaning machine. The connector then also extends mainly vertically. When the connector is provided with an elbow fitting of about 90 degrees, one end of which is attached to the vertically extending connector, the other end is oriented mainly horizontally, which allows a straight tube to be connected to the horizontal end. This tube can be connected to a device to be cleaned over a horizontal distance, without risking the tube to be bent.

For proper cleaning of hoses, it is advantageous if a relatively high pressure can be used for the cleaning, while the hose remains connected to the pillar. The coupling may thus be configured to keep the connector coupled to the pillar under a working pressure of maximal substantially 1500mbar, preferably maximally 1250 mbar, more in particular maximally 1050mbar when a hose is coupled. On average, the working pressure will be around 1000mbar when the device is operational, and in particular the working pressure is between 950mbar and 1050 mbar. This is advantageously achieved by balancing the material properties of the connector as well as the angles of the surfaces of the pillar and dimension or thickness of the protruding portion of the pillar.

It is beneficial when the first end, or free end, of the guidance part is rounded. This smoothens and simplifies the set up of the connector on the pillar, in particular because it prevents the occurrence of buckling. Preferably the guidance part is rounded such that it automatically aligns the connector and the pillar, such that the connector can slide onto the pillar. The rounded portion of the guidance part may for example form part of an arc with a radius of about 0,4 mm. The rounded edge of the guidance part also facilitates correct alignment onto the guidance part.

For a user of the coupling according to the present invention, it is possible to couple a hose with one hand only, as the coupling may be configured for the decoupling of the connector with a maximum force of 30N, preferably maximum force of

substantially15N in a wet condition and a maximum force of 25N when in dry condition. These relative low forces allow repetitive use of the coupling and complies with most working conditions.

The invention also relates to a cleaning machine for the cleaning of one or more hoses provided with a coupling according to the present invention. In an embodiment of the cleaning machine it is possible that multiple pillars are positioned next to each other, preferably wherein each pillar is provided with a corresponding connector. This way, multiple hoses may be cleaned simultaneously which increases the productivity of the cleaning machine

The invention also relates to a pillar for a coupling for the coupling of one or more hoses to a cleaning machine.

The invention will be further elucidated by several examples and with reference to the appended figures, wherein

- figure 1 schematically shows an embodiment of part of a coupling according to the present invention;
- figure 2 shows an embodiment of a pillar according to the present invention;
- figure 3 schematically shows a cross-section of an embodiment of a coupling according to the present invention;
- figure 4 shows a part of a cleaning machine according to the present invention comprising multiple pillars, each connected to a hose.

In above mentioned figures the same reference numbers are used for equivalent features.

Figure 1 schematically shows an embodiment of part of a coupling 10 of a hose 2 for use in an endoscope to a connector 3 for connecting the hose to be cleaned with a pillar (shown in Fig. 2). In this embodiment the connector 3 comprises two elements, an elbow fitting 4 making an angle of substantially 90 degrees and a silicone tube 5. The hose 2 plus connector 3 may be connected to a pillar as shown in Figure 2. A cross-section of the total coupling using this part of an embodiment according to the present invention is shown in Figure 3.

Figure 2 shows an embodiment of a pillar 20 for a coupling according to the present invention. The pillar 20 comprises a longitudinal hollow body 11 with at least two open ends 11a and 11b for guiding a cleaning liquid from a cleaning machine through the pillar towards a hose to be cleaned, wherein the open end 11b is coupled to the cleaning machine and the opposite end 11a to the connector 3 (as shown in Fig. 3). The longitudinal hollow body 11 comprises a substantially longitudinal guidance part 12, located towards the first end 11a, for the guidance of the connector 3 onto the pillar 20. The guidance part 12 is provided with a thickening 13 for fixing the connector to the guidance part 12. The connection of the connector 3 onto the pillar 20 may be done by sliding the connector 3 over the guidance part 12 onto the pillar 20. The thickening 13 in this embodiment is provided with a first slope 14 facing the first end 11a with an angle of substantially 20 degrees for guiding the connector over the thickening 13 during coupling. The thickening 13 also comprises a second slope 15 of substantially 45 degrees, which slope 15 creates a predetermined resistance to prevent undesired shifting of the connector with the pillar 20, or worst case from the pillar 20 while cleaning. The resistance of the second slope 15 is chosen such that the resistance can be overcome by one hand during decoupling. The thickening 13 extends around the guidance part 12 of the pillar 20 in a ring-shaped form for improved sealing properties. In this embodiment the end of the guidance part 12 is defined by a ring-shaped protrusion 17 located between the two ends 11a,11b, for indicating that the connector 3 is at its position for a correct coupling. The part 21 of the pillar on the side of the ring-shaped protrusion 17 opposite to the guidance part 12 is used for a connection with a cleaning machine. This part 21 of the pillar 20 may have various shapes that are corresponding with the connection to the cleaning machine.

Figure 3 shows a cross-sectional view of an embodiment of a coupling 30 according to the present invention, using the embodiment of the pillar 20 from Figure 2 and the connector 3 and hose 2 as shown in Figure 1. In this figure it is clearly shown that the connector 3 comprises two elements, an elbow fitting 4 with an angle of approximately 90 degrees and a silicone tube 5. The material properties of the tube 5 and the angles of the slopes 14,15 are selected based on the desired resistance during coupling, uncoupling and operation. The elbow fitting 4 comprises a hollow body for guidance of the cleaning liquid. The hollow body has two ends 4a and 4b and is provided with slopes on the outside of both ends for a

proper connection with the hose 2 on one end 4a and the silicone tube 5 at the other end 4b. The connector 3 connects the hose 2 to the pillar 20, which pillar can be connected to a cleaning machine. To make the connection of the connector 3 with the pillar 20, the connector 3 is slid onto the guidance part 12 over the thickening 13 for fixing of the connector 3 onto the pillar 20. In this embodiment the thickening 13 also provides a sealing location to prevent leakage of cleaning liquid during operation. The thickening 13 comprises a plane 18 between the slopes 14,15 wherein the plane 18 runs substantially parallel to the tangential line of the guidance part 12.The cross-section shows that the thickening 13 also has a trapezoidal cross-section with its base aligned with the guidance part 12 and wherein the plane 18 forms the top of the trapezium shape. The slopes 14,15 form part of the trapezium shape as well, with the slope 14 having an angle of 20 degrees between the tangential line of the slope 14 and the tangential line of the guidance part 12 and the slope 15 with an angle of 45 degrees between the tangential line of the slope 15 and the tangential line of the guidance part 12. The end 11a of the pillar 20 is rounded for improved alignment of the connector 3 with the pillar 20 for coupling. The rounded portion 19 of the guidance part 12 forms part of an arc with a radius of about 0,4 mm. The connector is positioned properly when the elbow fitting 4 is stopped by the stopping surface 16. Between the silicone tube 5 of the connector 3 and the ring-shaped surface facing the first end of the ring-shaped protrusion 17 a small space is visible. This small space is used for cleansing fluid to avoid accumulation of dirt on the pillar. In this embodiment the outer size A of the cross-section of the thickening 13 of the pillar is larger than the outer size B of the guidance part 12, with the outer size A approximately 1.3 times the outer size B of the guidance part 12. In this embodiment the outer size A is 6mm, the outer size B is 4.6mm and the spacing between the stopping surface 16 and the surface of the ring-shaped protrusion 17 facing the first end 11a is around 10mm. In this shown embodiment the distance C between the stopping surface 16 and the surface of the ring-shaped protrusion 17 facing the first end, is substantially 10mm.

Figure 4 shows an embodiment of a cleaning machine 40 according to the present invention. In the housing 41 of the machine 40 multiple pillars 20a,20b,20c,20d,20e,20f,20g,20h are connected to the cleaning machine 40, wherein each pillar 20a,20b,20c,20d,20e,20f,20g,20h extends vertically from the

housing 41 of the cleaning machine 40. Each pillar 20a,20b,20c,20d,20e,20f,20g,20h is connected to a hose 2a,2b,2c,2d,2e,2f,2g,2h via a connector 3a,3b,3c,3d,3e,3f,3g,3h, wherein each connector has an angle of approximately 90 degrees. In this figure it is shown that due to the 90 degrees angle of the connector 3a,3b,3c,3d,3e,3f,3g,3h, each hose 2a,2b,2c,2d,2e,2f,2g,2h may be cleaned in a horizontal way without bending of the hose 2a,2b,2c,2d,2e,2f,2g,2h. Due to this configuration multiple hoses 2 may be connected in an efficient way to a cleaning machine.

The above described figures are meant for illustrative purposes and are not limitative to the invention as claimed in the following claims.

Conclusies

1. Koppeling voor het koppelen van een of meer slangen aan een schoonmaakmachine, omvattende:

- ten minste één connector voor het verbinden van een slang die schoongemaakt moet worden, met een pilaar; en
- ten minste één pilaar voor de verbinding van de connector met een schoonmaakmachine, waarbij de pilaar een longitudinaal hol lichaam omvat met twee open einden omvattende:
    - een hoofdzakelijk longitudinaal geleidingsdeel, geplaatst in de richting van een eerste einde, voor het geleiden van de connector over de pilaar;
    - een tweede einde dat tegenover het eerste einde aanwezig is in lengterichting, voor het verbinden van de pilaar aan een schoonmaakmachine; en
    - waarbij het geleidingsdeel is voorzien van een verdikking voor het fixeren van de connector op het geleidingsdeel, welke verdikking:
        - een eerste helling omvat die is gericht naar het eerste einde, waarbij de helling een hoek heeft met het geleidingsdeel tussen 5 en 45 graden, bij voorkeur tussen 15 en 25 graden, en bij meer voorkeur rondom 20 graden, voor het geleiden van de connector over de verdikking vanaf het eerste einde van het geleidingsdeel; en
        - een tweede helling omvat die is gericht naar het tweede einde, waarbij de helling een hoek heeft met het geleidingsdeel tussen 30 en 60 graden, bij voorkeur tussen 40 en 50 graden, en bij meer voorkeur rondom 45 graden, voor het creëren van een vooraf bepaalde weerstand om ongewenste verschuiving van de connector over de pilaar te voorkomen.

2. Koppeling volgens conclusie 1, waarbij de verdikking tussen de hellingen een vlak omvat welk vlak hoofdzakelijk parallel ligt aan het geleidingsdeel.

3. Koppeling volgens conclusie 2, waarbij het vlak van de verdikking zich uitstrekt in de lengterichting over een lengte tussen 1 en 3 mm, bij voorkeur tussen 1,5 en 2,5 mm en bij meer voorkeur rondom 2 mm.

4. Koppeling volgens een van de voorgaande conclusies, waarbij de verdikking een trapezoïdale doorsnede omvat in de lengterichting van de pilaar.

5. Koppeling volgens een van de voorgaande conclusies, waarbij de verdikking zich uitstrekt rondom het geleidingsdeel.

6. Koppeling volgens een van de voorgaande conclusies, waarbij de buitenafmeting van de doorsnede van de verdikking van de pilaar groter is dan de buitenafmeting van het geleidingsdeel, waarbij de buitenafmeting van de doorsnede tussen 1,1 en 1,5 maal groter, bij voorkeur tussen 1,25 en 1,35 maal groter, en bij meer voorkeur 1,3 maal groter is dan de buitenafmeting van het geleidingsdeel.

7. Koppeling volgens een van de voorgaande conclusies, waarbij een aanslagoppervlak is geplaatst tussen de ten minste twee einden.

8. Koppeling volgens conclusie 7, waarbij de eerste helling dient als een aanslagoppervlak.

9. Koppeling volgens een van de voorgaande conclusies, waarbij de pilaar is voorzien van een ringvormige uitstulping tussen de verdikking en het tweede einde, bij voorbeeld een ringvormige flens, bij voorkeur met een hoofdzakelijk vlak oppervlak dat gericht is naar het eerste einde.

10. Koppeling volgens een van de voorgaande conclusies, waarbij de connector een buis omvat, bij voorbeeld vervaardigd van een polymeer of een plastic.

11. Koppeling volgens conclusie 10, waarbij de buis is vervaardigd van een silicone met een hardheid tussen 65-75 Shore, bij voorkeur 69-71 Shore, meer bij voorkeur 70 Shore, op een schaal van Shore A hardheid.

12. Koppeling volgens een van de voorgaande conclusies, waarbij de connector een elleboogfitting en een buis omvat.

13. Koppeling volgens een van de conclusies 10-12, waarbij in gekoppelde status een afstandsruimte aanwezig is tussen het hoofdeinde van de buis van de connector en de pilaar die bij voorkeur is voorzien van de ringvormige uitstulping.

14. Koppeling volgens conclusie 13, waarbij de afstandsruimte zich in lengterichting uitstrekt en een maximale opening in lengterichting heeft van 1 mm, bij voorkeur 0,5 mm, en bij meer voorkeur maximaal 0,2 mm.

15. Koppeling volgens een van de conclusies 12-14, waarbij de elleboogfitting een hoek omvat van hoofdzakelijk 90 graden voor het koppelen en ontkoppelen van een slang aan een schoonmaakmachine.

16. Koppeling volgens een van de voorgaande conclusies, waarbij de connector verschuifbaar is over het eerste einde van de pilaar, zodanig dat de connector kan worden verschoven naar een vooraf bepaalde positie in een gekoppelde status.

17. Koppeling volgens een van de voorgaande conclusies, waarbij het eerste einde van het geleidingsdeel is afgerond.

18. Schoonmaakmachine voor het schoonmaken van één of meer slangen, welke is voorzien van een koppeling volgens een van de voorgaande conclusies.

19. Schoonmaakmachine volgens conclusie 18, waarbij een aantal pilaren naast elkaar zijn geplaatst, en bij voorkeur elke pilaar is voorzien van een corresponderende connector.

20. Pilaar voor de verbinding van een connector met een schoonmaakmachine, waarbij de pilaar een longitudinaal hol lichaam omvat, met ten minste twee open einden welke omvatten:

- een hoofdzakelijk longitudinaal geleidingsdeel, geplaatst in de richting van een eerste einde, voor het geleiden van de connector over de pilaar;

- een tweede einde dat tegenover het eerste einde aanwezig is in lengterichting, voor het verbinden van de pilaar aan een schoonmaakmachine; en
- waarbij het geleidingsdeel is voorzien van een verdikking voor het fixeren van de connector op het geleidingsdeel, welke verdikking:
    - een eerste helling omvat die is gericht naar het eerste einde, waarbij de helling een hoek heeft met het geleidingsdeel tussen 5 en 45 graden, bij voorkeur tussen 15 en 25 graden, en bij meer voorkeur rondom 20 graden, voor het geleiden van de connector over de verdikking vanaf het eerste einde van het geleidingsdeel; en
    - een tweede helling omvat die is gericht naar het tweede einde, waarbij de helling een hoek heeft met het geleidingsdeel tussen 30 en 60 graden, bij voorkeur tussen 40 en 50 graden, en bij meer voorkeur rondom 45 graden, voor het creëren van een vooraf bepaalde weerstand om ongewenste verschuiving van de connector over de pilaar te voorkomen.

21. Pilaar volgens conclusie 20, waarbij de verdikking tussen de hellingen een vlakte omvat waarbij de vlakte zich hoofdzakelijk parallel uitstrekt aan de lengterichting van de pilaar.

22. Pilaar volgens conclusie 21, waarbij de vlakte van de verdikking zich in lengterichting uitstrekt over een lengte tussen 1 en 3 mm, bij voorkeur tussen 1,5 en 2,5 mm, en bij meer voorkeur rondom 2 mm.

23. Pilaar volgens conclusie 20-22, waarbij de verdikking een trapezoïdale doorsnede omvat in de lengterichting van de pilaar.

24. Pilaar volgens conclusie 20-23, waarbij de verdikking zich uitstrekt rondom het geleidingsdeel.

25. Pilaar volgens conclusie 20-24, waarbij de buitenafmeting van de doorsnede van de verdikking van de pilaar groter is dan de buitenafmeting van het geleidingsdeel, waarbij de buitenafmeting van de doorsnede tussen 1,1 en 1,5

maal groter, bij voorkeur tussen 1,25 en 1,35 maal groter, en bij meer voorkeur 1,3 maal groter is dan de buitenafmeting van het geleidingsdeel.

26. Pilaar volgens conclusie 20-25, waarbij een aanslagoppervlak is geplaatst tussen de ten minste twee einden.

27. Pilaar volgens conclusie 20-26, welke is voorzien van een ringvormige uitstulping tussen de verdikking en het tweede einde, bij voorbeeld een ringvormige flens

28. Pilaar volgens conclusie 20-27, waarbij de buitenafmeting van de doorsnede van de verdikking hoofdzakelijk 6 mm is, in de richting loodrecht op de lengterichting.

29. Pilaar volgens conclusie 27 of 28, waarbij de buitenafmeting van de doorsnede van de verdikking hoofdzakelijk gelijk is aan de afstandsruimte tussen tussen de overgang van de tweede helling naar de vlakte van de verdikking, en de ringvormige uitstulping.

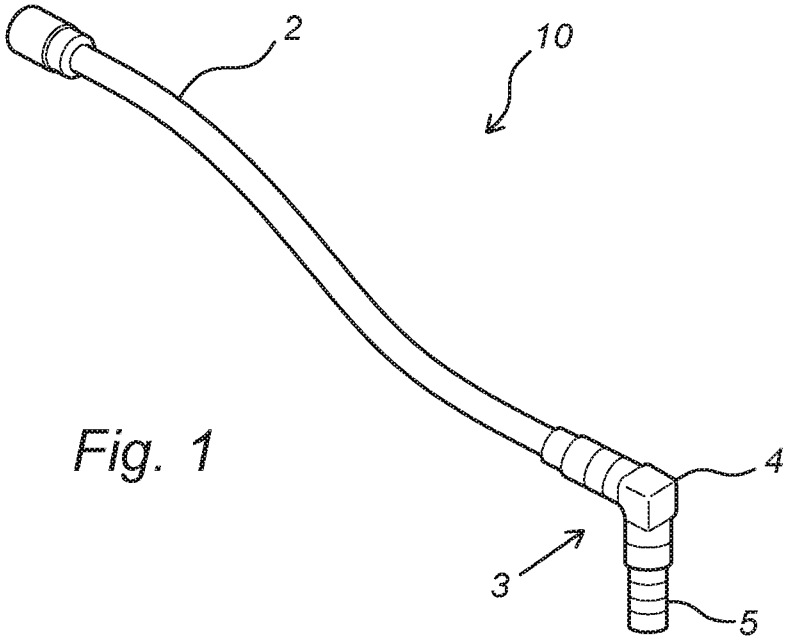

Fig. 1

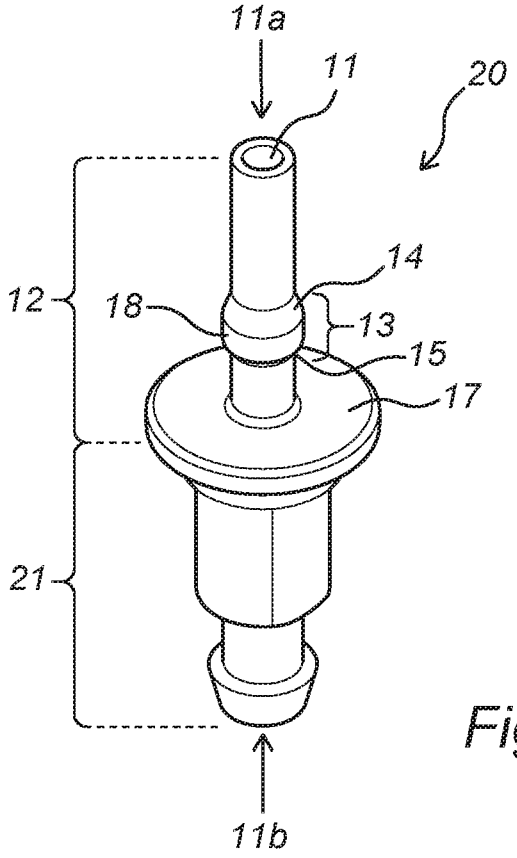

Fig. 2

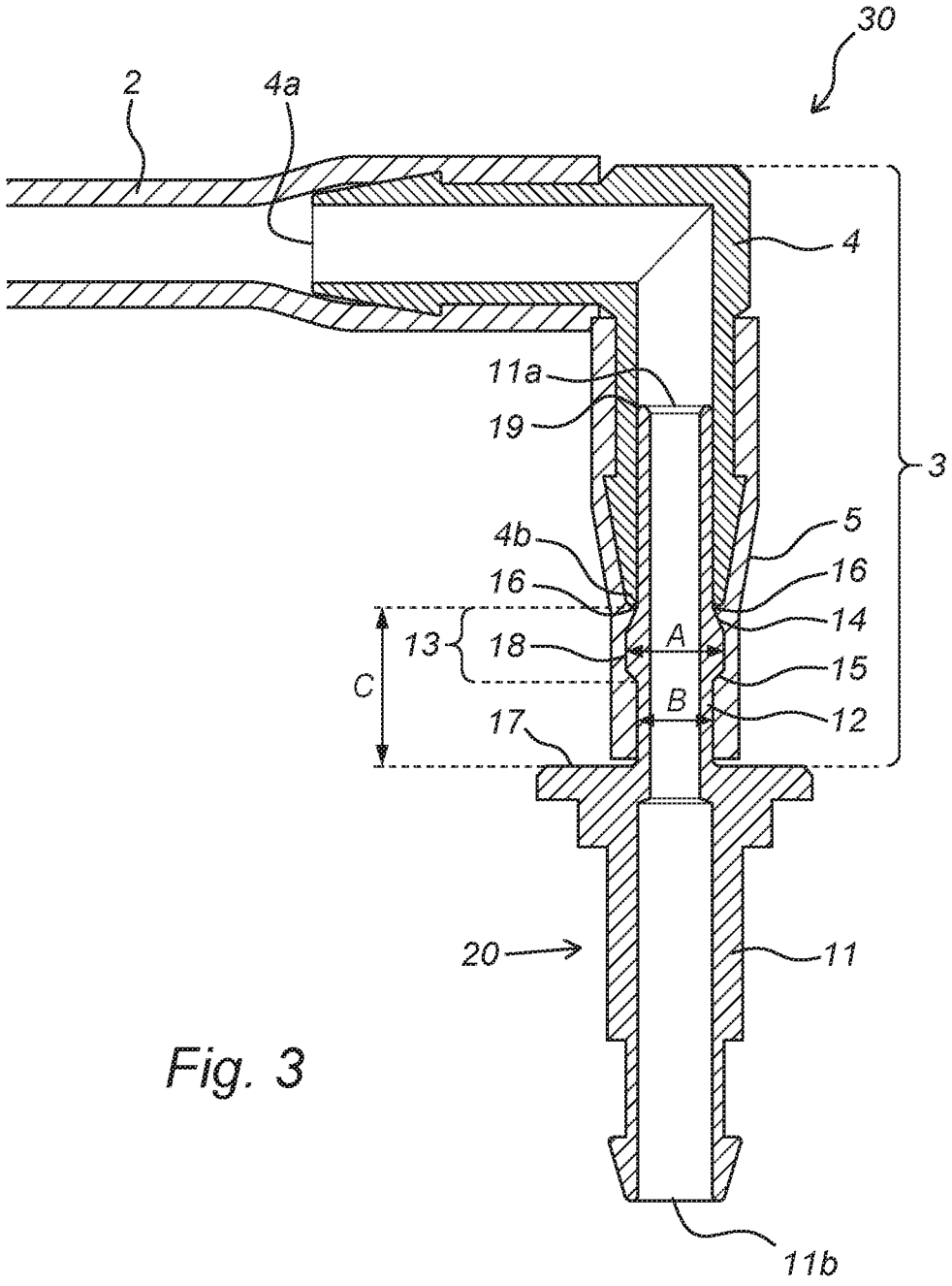

Fig. 3

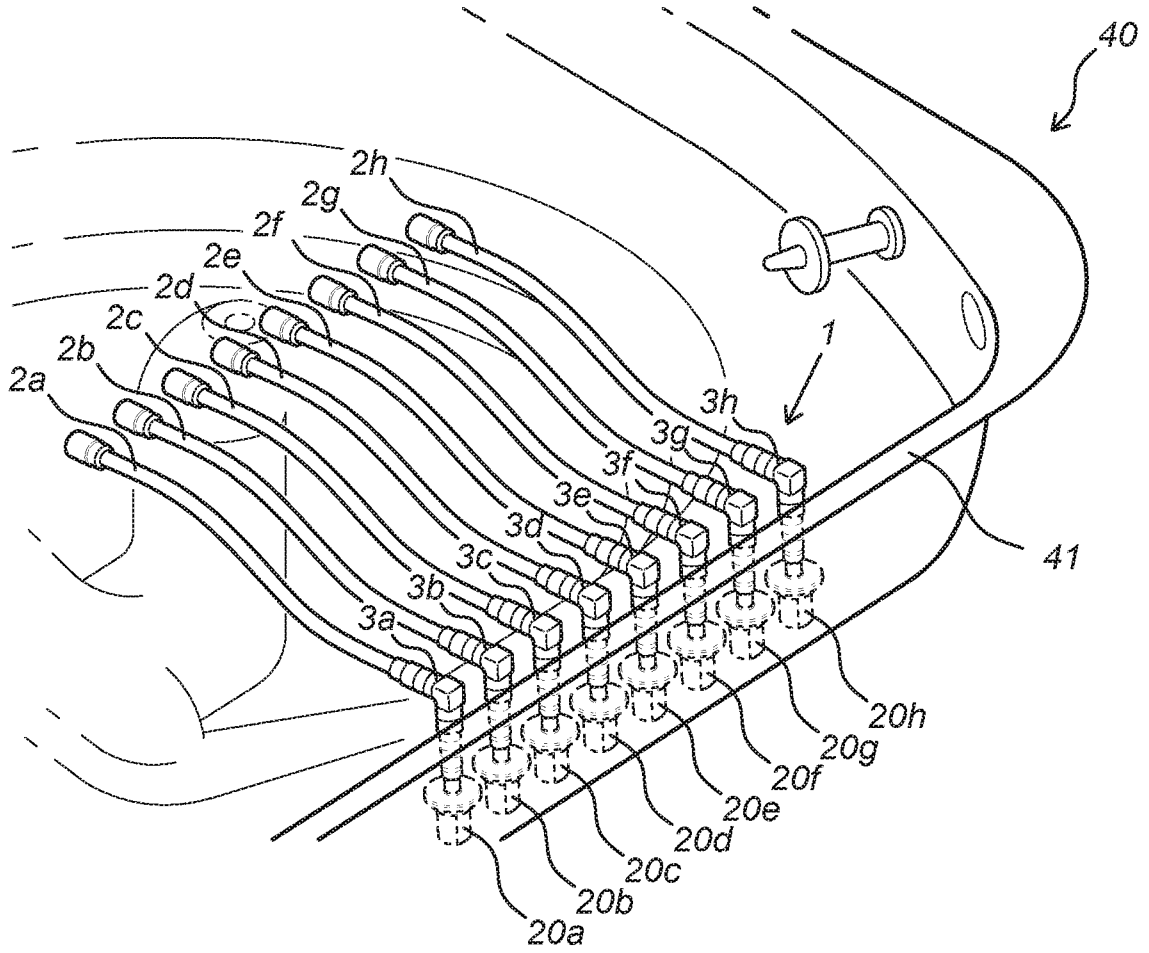
40
2h
2g
2f
2e
2d
2c
2b
2a
1
3h
3g
3f
3e
3d
3c
3b
3a
41
20h
20g
20f
20e
20d
20c
20b
20a

Fig. 4

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
Nederlands aanvraag nr. **2026093**	Indieningsdatum **20-07-2020**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **WASSENBURG MEDICAL B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **19-09-2020**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN76940**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

Zie onderzoeksrapport

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**Zie onderzoeksrapport**

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 2026093

A. CLASSIFICATIE VAN HET ONDERWERP
INV. A61B90/70
ADD. F16L37/084 F16L33/20 F16L33/18

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

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
A61B F16L

Onderzochte andere documentatie dan de mimimum 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)
EPO-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	US 2015/068022 A1 (MENOR ERIC D [US]) 12 maart 2015 (2015-03-12)	1,2, 4-17,20, 21,23-29
Y	* alineas [0002], [0004], [0024] - [0026], [0031]; figuren 1,2,3 *	3,18,19, 22
Y	US 2013/307265 A1 (SEKINO YOHEI [JP]) 21 november 2013 (2013-11-21) * alineas [0106] - [0108]; figuur 16 *	3,22
Y	EP 2 098 185 A1 (OLYMPUS MEDICAL SYSTEMS CORP [JP]) 9 september 2009 (2009-09-09) * alinea [0036]; figuur 2 *	18,19
X	US 5 879 033 A (HAENSEL MATHIAS [DE] ET AL) 9 maart 1999 (1999-03-09) * kolommen 1,2; figuur 3 *	20

☐ 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 octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), 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 octrooiaanvrage, 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
10 maart 2021

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
Koolen, Ninah

Formulier PCT/ISA/201 (tweede blad) (Januari 2004)

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 2026093

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 2015068022 A1	12-03-2015	BR 112012010204 A2	24-09-2019
		CN 102639913 A	15-08-2012
		EP 2494254 A2	05-09-2012
		KR 20120099244 A	07-09-2012
		US 2011101680 A1	05-05-2011
		US 2015068022 A1	12-03-2015
		WO 2011053682 A2	05-05-2011
US 2013307265 A1	21-11-2013	JP 5758640 B2	05-08-2015
		JP 2012163132 A	30-08-2012
		KR 20140008353 A	21-01-2014
		TW 201250147 A	16-12-2012
		US 2013307265 A1	21-11-2013
		WO 2012105525 A1	09-08-2012
EP 2098185 A1	09-09-2009	CN 101513341 A	26-08-2009
		EP 2098185 A1	09-09-2009
		JP 5220435 B2	26-06-2013
		JP 2009195400 A	03-09-2009
		KR 20090090282 A	25-08-2009
		US 2009205687 A1	20-08-2009
US 5879033 A	09-03-1999	BR 9713988 A	08-02-2000
		CZ 294232 B6	10-11-2004
		DE 19650601 A1	10-06-1998
		EP 0848201 A1	17-06-1998
		ES 2177879 T3	16-12-2002
		JP 3283528 B2	20-05-2002
		JP 2000509792 A	02-08-2000
		US 5879033 A	09-03-1999
		WO 9825067 A1	11-06-1998

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN76940	20.07.2020		NL2026093

International Patent Classification (IPC)
INV. A61B90/70 ADD. F16L37/084 F16L33/20 F16L33/18

Applicant
WASSENBURG MEDICAL 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
	Koolen, Ninah

Application number

WRITTEN OPINION

NL2026093

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	3, 6, 11, 12, 14, 15, 18, 19, 22, 25, 28, 29
	No:	Claims	1, 2, 4, 5, 7-10, 13, 16, 17, 20, 21, 23, 24, 26, 27
Inventive step	Yes:	Claims	
	No:	Claims	1-29
Industrial applicability	Yes:	Claims	1-29
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

1 **Re Item V**

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

Reference is made to the following documents:

D1 US 2015/068022 A1 (MENOR ERIC D [US]) 12 maart 2015 (2015-03-12)

D2 US 2013/307265 A1 (SEKINO YOHEI [JP]) 21 november 2013 (2013-11-21)

D3 EP 2 098 185 A1 (OLYMPUS MEDICAL SYSTEMS CORP [JP]) 9 september 2009 (2009-09-09)

D4 US 5 879 033 A (HAENSEL MATHIAS [DE] ET AL) 9 maart 1999 (1999-03-09)

1.1 The present application does not meet the criteria of patentability, because the subject-matter of the broadest independent claim 20 is not new (see also point 2.1).

D1 discloses (the references in parentheses applying to this document):

A pillar (Fig. 2 Ref. 16) for a coupling of a connector with a cleaning machine (§24 suitable for "fluid-tight hose assembly", §2), wherein the pillar comprises a longitudinal hollow body with at least two open ends (§24-25, Figs. 1, 2):

o a substantially longitudinal guidance part (§25, Fig. 2 Ref. 24), located towards the first end, for the guidance of the connector onto the pillar (§26)

o a second end part (§24, Fig. 2 Ref. 22), located opposite of the first end in the longitudinal direction, for connecting of the pillar with a cleaning machine (§24)

o wherein the guidance part comprises a thickening (Fig. 1 Ref. 34, §25) for fixing the connector to the guidance part, the thickening further comprising

• a first slope facing the first end (Fig. 3 Ref. 102), wherein the slope has an angle with the guidance part of between 5 and 45 degrees (§31 "angled at 135 degrees relative to datum 105"), preferably between 15 and 25 degrees, and more preferably substantially 20 degrees, for guiding the connector over the thickening from the first end of the guidance part

• a second slope facing the second end (Fig. 3 Ref. 104), wherein the slope has an angle with the guidance part of between 30 and 60 degrees (§31 "angled at 45 degrees relative to horizontal datum 105"), preferably between 40 and 50

degrees, and more preferably substantially 45 degrees, for creating a predetermined resistance to prevent undesired shifting of the connector with the pillar.

1.2 It is noted that the subject-matter of independent claim 20 is also not new over the disclosure of D4 (Fig. 3, col. 1 L3-12, col. 1 L30-39, col. 2 L28-31).

1.3 The additional features relating to the construction of the thickening, the pillar and the connector, the coupling comprising at least a connector and at least a pillar defined in dependent claims 1, 2, 4, 5, 7-10, 13, 16, 17, 21, 23, 24, 26, 27 are also disclosed in D1 (§4, §24-26, §31, Figs. 1-3), so that said claims also lack novelty.

1.4 The additional features relating to the measurements of the thickening, the material of the tube, the elbow fitting, and the spacing in the coupled state defined in dependent claims 6, 11, 12, 14, 15, 25, 28, 29 are considered to be a minor constructional details and a choice of material within the scope of possibilities available to the person skilled in the art, so that said claims lack an inventive step.

1.5 The additional features relating to the constructional details of the plane of the thickening defined in dependent claims 3, 22 are already known from D2 (§106-108, Fig. 16), where said features have been employed for their already known uses. The use of known features for their already known purposes does not require an inventive step.

1.6 The additional features relating to the cleaning machine defined in dependent claims 18, 19 are already known from D3 (§36, Fig. 2), where said features have been employed for their already known uses. The use of known features for their already known purposes does not require an inventive step.

2 **Re Item VII**

Certain defects in the application

2.1 Claim 1 comprises all the features of claim 20. Hence, claim 1 should be reformulated as a claim dependent on claim 20.

2.2 Independent claim 1 is not in the two-part form, with those features known in combination from the prior art being placed in the preamble and the remaining features being included in the characterising part.

2.3 The features of the claims are not provided with reference signs placed in parentheses.

2.4 The relevant background art disclosed in D1 is not mentioned in the description, nor is this document identified therein.