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(54) **Applikátor tömítőmassza peremvarratra történő applikálásához, és hozzátartozó üzemeltetési eljárás**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

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APPLICATOR FOR APPLYING A SEALING COMPOUND TO AN EDGE-RAISED SEAM AND ASSOCIATED OPERATING METHOD

DESCRIPTION

The invention concerns an applicator for applying a coating agent to a component, particularly for applying a sealant to a flanged seam on a rear side of a motor vehicle body component, the applicator particularly being able to project through a gap between two overlapping motor vehicle body components.

Motor vehicle body components (e.g. doors or bonnets) often have so-called flanged seams, in the case of which a sheet part is flanged around an edge of another sheet part, it then being possible to adhesively bond the two sheet parts to one another. Here, there is the danger that moisture penetrates into the gap between the two sheet parts and leads to corrosion there. It is therefore known to apply a sealant to the flanged seam between the two sheet parts in order to seal the flanged seam and, as a result, to reliably prevent the penetration of moisture and corrosion connected therewith.

When motor vehicle body doors are being coated, the sealant is applied to the flanged seam manually in practice by workers, who first open the relevant door and then apply the sealant to the flanged seam manually. As long as the sheets do not overlap, a manual application with the door closed is also possible.

However, the high outlay in terms of personnel and the associated costs are a disadvantage of this manual application of the sealant to the flanged seam.

Moreover, trial applications of the sealant to the flanged seam automatically by a coating robot have been carried out in the prior art. However, such trials for the automation of the application of the sealant have hitherto entailed considerable problems in practice, for various reasons.

On the one hand, the sealant could only be applied to the flanged seam in the case of doors and bonnets of motor vehicle bodies if the doors and bonnets are first opened, which entails additional outlay.

On the other hand, the application of the sealant to the flanged seam requires extremely high positional accuracy of the coating robot used, which is only possible with sensor-assisted positional control with readjustment of the position of the robot in accordance with the positional deviations detected. In automatic application of the sealant to the flanged seam, the outlay for equipment to achieve the necessary positional accuracy endangers the cost-effectiveness achievable by saving in terms of personnel.

An applicator is further known from the subsequently published patent DE 10 2007 037 865 B3, which enables an automatic, robot-assisted application of sealant to a flanged seam. To this end, the known applicator has a flexible joint, as a result of which the requirements on the positional accuracy of the robot used are reduced to a reasonable level.

Problematic in the case of the sealing of flanged seams in the region of motor vehicle doors is the fact that, on account of the crash-friendly construction of the motor vehicle doors, the motor vehicle doors move behind the respective wing in the closed state. This has the consequence that the applicator in accordance with the patent according to DE 10 2007 037 865 B3 cannot be pushed through the gap between the motor vehicle door and the wing, as these components overlap one another. In the case of the sealing of flanged seams in the region of motor vehicle doors, the motor vehicle doors must therefore hitherto be opened in order to make the flanged seams accessible for the application of the sealant.

The opening of the motor vehicle doors for the application of the sealant onto the respective flanged seam requires cycle time however, which gets lost for the actual application of the sealant. Under certain circumstances, this can lead to a plurality of operating cycles being required for the application of the sealant to the various flanged seams of the motor vehicle body.

Furthermore, the opening of the motor vehicle doors for the application of the sealant to the flanged seams requires an additional handling robot, which is associated with increased investment costs and a larger space requirement in the painting station.

Further, reference is also to be made to US 2 968 441 as prior art.

Finally, reference is made to the following prior art:

DE 10 2007 036 585 A1, JP 2001-149841, JP 07275766, DE 10 2004 039 684 A1, DE 199 45 537 C1, JP 7-232110, US 3 402 741, DE 10 2007 037 865 B3, US 29 68 441, US 4 368 686, WO 00/09438, Presentation of Dr. Stefan Meier of Daimler at the DFO conference "Automatisierte Nahtabdichtung an Türen und Klappen im angebauten Zustand", 22.04.2008, DE 199 36 716 A1, EFTEC presentation relating to flanged weld sealing "Automatische Bördelnahtversiegelung in der Lackiererei - eine echte Herausforderung zur Kostensenkung", Bruno Stegmaier et al., Sealing Nozzle Catalogue of EFTEC "SEALING NOZZLE EXAMPLE CATALOGUE", WO 2009/149854 A1, article "Formgedächtnislegierungen", Dr.-Ing. Dirk Helm, presentation on SCA customer days.

The invention is therefore based upon the object of creating an applicator which makes it possible, without opening a motor vehicle door, to seal a flanged seam located on the rear side of the motor vehicle door with sealant.

Generally, the invention is based on the object of creating an applicator which can project through a gap between overlapping components, in order to apply a coating agent (e.g. sealant) on the rear side of the components.

Furthermore, the invention is based on the object of specifying an operating method for an applicator of this type.

This object is achieved by an applicator according to the invention and an associated operating method in accordance with the subsidiary claims.

The invention comprises the general technical teaching of constructing the applicator in such a manner that the applicator can also project through a gap between overlapping components from the front side to the rear side of the components, in order to apply coating agent on the rear side of the components. For example, the applicator can here be introduced into the gap region in the longitudinal direction of the flanged seam, which is possible for example at the front end of a gap region.

The invention therefore provides a nozzle carrier (e.g. a tube), which is curved a plurality of times and as a result enables the positioning of the nozzle guided by the nozzle carrier through the gap between the overlapping components on the rear side of the components, in order to apply coating agent there.

Preferably, the nozzle carrier is essentially double-L-shaped, that is to say the nozzle carrier consists essentially of two mutually adjacent, in each case L-shaped, sections. It is alternatively also possible, however, that the nozzle carrier is essentially S-shaped. Decisive is merely the fact that the nozzle carrier is shaped in such a manner that the nozzle carrier can position the nozzle through the gap between the adjacent overlapping components on the rear side of the components in the manner required for the coating process.

In a preferred exemplary embodiment, the nozzle carrier has an essentially U-shaped section at its distal end with a distal leg, a proximal leg and a connecting leg, the connecting leg connecting the proximal leg to the distal leg. In operation, the U-shaped section of the nozzle carrier then encompasses a side edge of the component to be coated through a gap, so that the distal leg with the nozzle is located behind the component to be coated and the proximal leg is located in front of the component to be coated, whilst the connecting leg of the U-shaped section projects through the gap. Here, the nozzle is arranged at the distal leg of the U-shaped section or integrated directly into this and discharges the coating agent from the rear forwards onto the rear side of the component to be coated. The proximal leg and/or the distal leg of the U-shaped section of the nozzle carrier preferably have a leg length of more than 2 cm, 4 cm, 6 cm or more than 10 cm, the advantageous leg length depending on the component geometry.

In the previously described preferred exemplary embodiment with a U-shaped section at the distal end of the nozzle carrier, the nozzle carrier preferably has three curvatures, namely - starting from the nozzle - initially two curvatures with the same direction of curvature and then a curvature with an opposite direction of curvature. The invention is not limited to a certain number of curvatures with respect to the nozzle carrier, however. Rather, the invention also comprises applicators with a nozzle carrier with two or more than three curvatures. Decisive is merely the fact that the nozzle carrier is shaped in such a manner that it can

project through a gap between two adjacent laterally overlapping components onto the rear side of the components.

Between the individual curvatures, the nozzle carrier preferably has essentially straight sections, however, in the context of the invention, depending on the component geometry in the region of the space, a continuously curved nozzle carrier can also be used.

Furthermore, the individual curvatures of the nozzle carrier are preferably essentially right-angled. It is, however, alternatively also possible that the individual curvatures of the nozzle carrier in each case have an angle of curvature of at least 70° or at least 80°. Furthermore, it is possible that the individual curvatures of the nozzle carrier in each case have an angle of curvature of at most 110° or at most 100°.

Furthermore, it is to be mentioned that the nozzle carrier preferably runs in a plane. It is theoretically also possible however, depending on the component geometry in the region of the gap, that the individual legs of the nozzle carrier do not run in a plane.

In a preferred exemplary embodiment of the invention, the nozzle carrier has four legs which are angled at right angles to one another in each case and form a double-L. The distal leg of the nozzle carrier here runs essentially parallel to the component rear side and applies the coating agent (e.g. sealant) preferably essentially at right angles to the component rear side. Two further legs adjoin this distal leg, which project through the gap and are angled at right angles to one another. Finally, a proximal leg is provided, which is positioned, for example, by a coating robot.

It has previously already been mentioned that the nozzle carrier is preferably a hollow inlet pipe through which the coating agent is conveyed to the nozzle. The invention also claims protection however for an alternative embodiment, in the case of which, the nozzle carrier merely has a mechanical function and is not used for conveying the coating agent, the coating agent then being able to flow for example through a hose line embedded into the nozzle carrier to the nozzle.

Furthermore, it is to be mentioned that the nozzle carrier consists of a material which is elastic and has a shape memory. This offers the advantage that the nozzle carrier assumes it original and constructively predetermined shape again following a collision with the components to be coated, which is necessary for a highly precise positioning of the nozzle. According to the invention, the material with a shape memory is a nickel-titanium alloy, such as TitanFlex® for example.

Further, there is the option in the context of the invention that the applicator has at least one additional nozzle, such as for example a flat stream nozzle, a round jet nozzle, an airless nozzle or a further nozzle for flanged seam sealing. This enables a combination operation, in which alternately with the same applicator, flanged seams are sealed and other coatings are undertaken or another coating agent is applied.

Furthermore, the invention comprises not only the previously described applicator according to the invention as a single component, but also a coating installation for flanged seam sealing on motor vehicle body components with such an applicator.

In the case of a coating installation of this type, a measuring device is preferably provided, which measures the geometry of the applicator and in particular of the nozzle carrier, in order to check whether the nozzle carrier still has the predetermined shape or has in the meantime been deformed due to a collision with the components to be coated. A measuring device of this type can for example have a light barrier which detects the outer contour of the applicator and particularly of the nozzle carrier.

Further, the coating installation according to the invention preferably has a cleaning device, in order to blow off the applicator or the nozzle and to clean them of possibly adhering coating material and/or to rinse them with a rinsing agent, whereby cleaning devices of this type are known from the prior art and therefore do not have to be described in more detail.

Here, it is advantageous if the measuring device for measuring the geometry of the applicator is structurally integrated into the cleaning device. On the one hand, construction space is saved. On the other hand, the geometry of the applicator can be measured in this manner during the cleaning, as a result of which cycle time is saved.

Further, the applicator according to the invention also can have a joint between the nozzle carrier and the connection flange used for fixing on the robot, which joint enables an avoiding movement of the nozzle carrier relatively to the connection flange. This

offers the advantage that a collision between the applicator and the components to be coated does not lead immediately to damaging of the applicator, as the nozzle carrier can yield due to the joint. A joint of this type is described in the already mentioned patent DE 10 2007 037 865 B3, so that the content of this patent is to be included in the present description to its full extent.

Finally, the invention also comprises an operating method for an applicator, the operating method standing out in that the applicator projects through a gap between two adjacent, mutually overlapping components from the front side to the rear side of the adjacent components, in order to apply coating agent on the rear side of the components.

Here, the applicator is preferably moved along the gap, in order to apply an elongated path of the sealant to the flanged seam.

It is important here that the introduction of the applicator through the gap and the application of the coating agent is possible, whilst the motor vehicle door is closed.

Other advantageous further developments of the invention are characterised in the dependent claims or will be explained in more detail below together with the description of the preferred exemplary embodiments of the invention, with reference to the figures. In the figures.

Figure 1 shows a gap region with two overlapping motor vehicle body components and the applicator according to the invention, which projects through the gap in order to apply sealant to a flanged seam on the rear side,

Figure 2 shows a side view of a motor vehicle body with the gaps in which the adjacent motor vehicle body components overlap, which makes the use of the applicator according to the invention necessary,

Figure 3 shows a side view of an exemplary embodiment of an applicator according to the invention, and

Figure 4 shows a side view of a further exemplary embodiment of an applicator according to the invention as well as a measuring device for measuring the geometry of the applicator according to the invention, and

Figure 5 shows a measuring device for measuring the geometry of the applicator.

Figure 1 shows the region of a gap 1 between a motor vehicle door 2 and a wing 3 (fender), the motor vehicle door 2 overlapping with the wing 3 in the closed state shown in the drawing, in order to improve crash safety.

The motor vehicle door 2 has an inner panel 4 and a sheet metal panel 5, the sheet metal panel 5 being flanged around an angled edge of the inner panel 4. In the region of the angled edge, the inner panel 4 is connected to the sheet metal panel 5 by means of an adhesive layer 6. In this construction, there is the danger that, in the region of the flanged seam, moisture enters into the gap between the angled edge of the inner panel 4 and the flanged edge of the sheet metal panel 5 and causes corrosion. The flanged seam between the inner panel 4 and the sheet metal panel 5 is therefore sealed with a sealant 7, in order to prevent the penetration of moisture into the flanged seam, the sealant 7 extending at right angles to the drawing plane over the entire length of the flanged seam. The application of the sealant 7 here takes place by means of an applicator 8 according to the invention, which projects through the gap 1 between the motor vehicle door 2 and the wing 3, as is also explained in detail.

The applicator according to the invention is positioned by a multiple-axis robot and has a connection flange 9 for mounting on the robot, the robot not being illustrated for simplification.

A tubular nozzle carrier 10 is mounted on the connection flange 9 of the applicator 8. On the one hand, the nozzle carrier 10 is used for the mechanical guiding of a nozzle 11 which is arranged on the distal end of the nozzle carrier 10. On the other hand, the nozzle carrier 10 is used for passing through the sealant from the connection flange 9 to the nozzle 11, to which end the nozzle carrier 10 is realised in a hollow manner.

The nozzle carrier 10 has four legs 12, 13, 14, 15, which are arranged at right angles to one another in each case, the distal legs 12, 13, 14 of the nozzle carrier 10 forming a U-shaped section which encompasses the angled edge of the inner panel 5 with the flanged seam. The geometry of the applicator 8 shown enables the nozzle 11 to project through the gap 1 between the motor vehicle door 2 and the wing 3 onto the rear side of the motor vehicle door 2 and of the wing 3, in order to apply the sealant 7 to the flanged seam located there. Here, it is not necessary that the motor vehicle door 2 is opened in advance, so that a handling

robot for opening the motor vehicle door 2 can be dispensed with.

Figure 2 shows a side view of a motor vehicle body 16 with a plurality of flanged seams 17, 18, 19, 20, 21 which can be sealed with the sealant 7 using the applicator 8 shown in Figure 1.

Figure 3 shows a preferred exemplary embodiment of the applicator 8 according to the invention, which differs slightly from the exemplary embodiment according to Figure 1.

So, the leg 14 of the nozzle carrier 10 has an angle of curvature $\alpha \approx 80°$ with respect to the leg 15 of the nozzle carrier 10.

By contrast, the leg 13 has an angle of curvature $\beta \approx 80°$ with respect to the leg 14 of the nozzle carrier 10.

Finally, the leg 12 of the nozzle carrier 10 has an angle of curvature $\chi = 90°$ with respect to the leg 13, as is also the case in the exemplary embodiment according to Figure 1.

Figure 4 shows a modified exemplary embodiment which substantially tallies with the exemplary embodiment according to Figure 1, the angle of curvature $\alpha = \beta = \chi = 90°$.

Finally, Figure 5 shows a measuring device 17 for measuring the geometry of the applicator 8. To this end, the measuring device 17 has a light barrier 18 which scans the outer contour of the applicator 8 and particularly of the nozzle carrier 10. The measuring of the geometry of the applicator 8 advantageously enables the recognition of deformations of the applicator 8, which for example can originate from collisions between the applicator 8 and the motor vehicle door 2 or the wing 3.

Here, it is to be mentioned that the measuring device 17 can preferably be integrated into a cleaning device which is used to clean the applicator 8 by means of blowing off or by means of rinsing with a rinsing agent. The integration of the measuring device 17 into the cleaning device offers the advantage that construction space and cycle time are saved, as the measuring of the applicator 8 can take place during the cleaning of the applicator 8 which is required anyway.

The invention is not limited to the preferred exemplary embodiments described above. Rather, a multiplicity of variants and modifications is possible, which likewise make use of the inventive idea and therefore fall within the protective scope.

List of reference numerals:

1	Gap
2	Motor vehicle door
3	Wing
4	Inner panel
5	Sheet metal panel
6	Adhesive layer
7	Sealant
8	Applicator
9	Connection flange
10	Nozzle carrier
11	Nozzle
12-15	Leg
16	Motor vehicle body
17	Measuring device
18	Light barrier

APPLIKÁTOR TÖMÍTŐMASSZA PEREMVARRATRA TÖRTÉNŐ APPLIKÁLÁSÁHOZ, ÉS HOZZÁTARTOZÓ ÜZEMELTETÉSI ELJÁRÁS

SZABADALMI IGÉNYPONTOK

1. Applikátor (8) rétegképző anyagnak alkatrészre (2) történő applikálásához, különösen tömítőmasszea (7) applikálásához gépjármű karosszéria alkatrész hátoldalán levő peremvarratra, különösen két egymást fedő gépjármű karosszéria alkatrész közötti résen (1) keresztül,

a) fúvókával (11) a rétegképző anyag leadásához az alkatrész (2) hátoldalára, és

b) hosszan kinyúló, hajlított fúvókatartóval (10), hogy az a fúvókát (11) a réteggel ellátandó alkatrész (2) elülső oldalától kiindulva a réteggel ellátandó alkatrész (2) hátoldalán pozicionálja,

c) ahol a fúvókatartó (10) többszörösen meg van hajlítva,

azzal jellemezve, hogy

d) a fúvókatartó (10) olyan anyagtól áll, amely elasztikus, és alak-emlékező képessége van, nevezetesen titán-nikkel ötvözet.

2. Az 1. igénypont szerinti applikátor (8), **azzal jellemezve,**

a) **hogy** a fúvókatartó (10) lényegében kettős L alakú, vagy lényegében s alakú, és

b) **hogy** a fúvókatartó (10) két szomszédos, oldalt egymást átlapoló gépjármű karosszéria alkatrész (2, 3) közötti résen keresztül a gépjármű karosszéria alkatrész (2, 3) elülső oldalától a hátsó oldalára átnyúlik.

3. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve,**

a) **hogy** a fúvókatartónak (10) disztális végén, lényegében u alakú szakaszban (12, 13, 14) egy disztális leágazása (12), egy proximális leágazása (14) és egy összekötő leágazása (13) van, amely a proximális leágazást (14) összeköti a disztális leágazással (12), és/vagy

b) **hogy** a fúvókatartó (10) u alakú szakasza (12, 13, 14) üzem közben a rétegezendő alkatrész (2) oldalperemét egy résen (1) keresztül körülfogja, úgy, hogy a disztális leágazás (12) a fúvókával (10) a réteggel ellátandó alkatrész (2) mögött, és a proximális leágazás (14) a réteggel ellátandó alkatrész (2) előtt található, míg az összekötő leágazás (13)keresztülhalad a résen (1), és/vagy

c) **hogy** a fúvóka (11) az u alakú szakasz (12, 13, 14) disztális leágazásán (12) van elrendezve, és a rétegképző anyagot hátulról előre a réteggel ellátandó alkatrés (2) hátoldalára applikálja, és/vagy

d) **hogy** fúvókatartó (10) u alakú szakaszának (12, 13, 14) proximális leágazása (14) és disztális leágazása (12) több mint 2cm, 4cm, 6cm, 8cm, vagy több mint 10cm leágazás hosszal rendelkezik.

4. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve,**

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e) **hogy** a fúvókatartónak (10) legalább két, vagy legalább három hajlítása van, és/vagy

f) **hogy** a fúvókatartó (10) a hajlítások között lényegében egyenes szakaszokkal rendelkezik, és/vagy

g) **hogy** a fúvókatartó (10) egyes hajlításai mindig lényegében derékszögűek, és/vagy

h) **hogy** a fúvókatartó (10) egyes hajlításai mindig legalább 70°-os, vagy legalább 80°-os szögben hajlítottak, és/vagy

i) **hogy** a fúvókatartó (10) egyes hajlításai mindig maximum 110°-os, vagy maximum 100°-os szögben hajlítottak, és/vagy

j) **hogy** a fúvókatartó (10) egyes hajlításai, legalább részben, ellenkező irányba vannak meghajlítva, és/vagy

k) **hogy** a fúvókatartó (10) a fúvókától (11) kiindulva, először két azonosan irányított hajlításai, és azután egy szembehelyezett irányítással rendelkezik, és/vagy

l) **hogy** a fúvókatartó (10) egy síkban fut.

5. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve,**

a) **hogy** a fúvókatartónak (10) disztális első leágazása (12) van, amely a fúvókát hordozza,

b) **hogy** a fúvókatartónak (10) második leágazása (13) van, amely az első leágazással (12) határos, és az első leágazással (12) szemben meghatározott hajlítási szöggel (χ) meg van hajlítva, ahol a hajlítási szög (χ) az első leágazás (12) és a második leágazás (13) között 70° és 110° közötti,

c) **hogy** a fúvókatartónak (10) harmadik leágazása (14) van, amely határos a második leágazással (13), és a második leágazással (13) szemben meghatározott hajlítási szöggel (β) meg van hajlítva, ahol a hajlítási szög (β) a második leágazás (13) és a harmadik leágazás (14) között 70° és 110° közötti,

d) **hogy** a fúvókatartónak (10) negyedik leágazása (15) van, amely határos a harmadik leágazással (14), és a harmadik leágazással (14) szemben meghatározott hajlítási szöggel (α) meg van hajlítva, ahol a hajlítási szög (α) a harmadik leágazás (14) és a negyedik leágazás (15) között 70° és 110° közötti.

6. Az 5. igénypont szerinti applikátor, **azzal jellemezve,**

a) **hogy** az első leágazás (12) és a harmadik leágazás (14) lényegében egymással párhuzamos, és/vagy

b) **hogy** a második leágazás (13) és a harmadik leágazás (14) lényegében egymáshoz képest párhuzamos, és/vagy

c) **hogy** a fúvóka (11) a rétegképző anyagot lényegében a negyedik leágazáshoz (15) képest párhuzamosan, a negyedik leágazás irányában (15) lövelli ki.

7. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve, hogy** a fúvókatartó (10) üreges bevezetőcső, amelyen keresztül a rétegképző anyag a fúvókához (11) vezethető.

8. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve, hogy** a fúvókatartó (10) TitanFlex® anyagból van.

9. Az előző igénypontok egyike szerinti applikátor (8), **azzal jellemezve, hogy** rendelkezésre áll egy kiegészítő fúvóka (11), ahol a kiegészítő fúvóka (11)

a) Flatstream-fúvóka (11),

b) Kerekaugár fúvóka (11),

c) Airless-fúvóka (11), vagy

d) fúvóka (11) peremvarrat tömítéshez.

10. Rétegfelhordó berendezés peremvarrat tömítéséhez gépjármű karoszéria alkatrészeken, az előző igénypontok egyike szerinti applikátorral (8).

11. A 10. igénypont szerinti rétegfelhordó berendezés, **azzal jellemezve,**

a) **hogy** a rétegfelhordó berendezésnek van egy beméró berendezése (17), amely beméri az applikátort (8),
b) **hogy** a beméró berendezésnek (17) fotocellás védőberendezése (18) van, és/vagy
c) **hogy** az applikátor (8) lefúvásához, és/vagy mosásához egy tisztítókészülék áll rendelkezésre, és/vagy
d) **hogy** a beméró berendezés (17) építésileg integrálva van a tisztítókészülékbe.

12. Az 1.-9. igénypontok egyike szerinti üzemeltetési eljárás egy applikátorhoz (8) rétegképző anyag, különösen tömítőmassza (7) applikálásához, ahol

a) az applikátor (8) többszörösen meghajlított fúvókatartóval (10) rendelkezik, és két szomszédos alkatrész (2, 3) közötti résen (1) keresztül benyúlik a szomszédos alkatrészek (2, 3) elülső oldaláról a hátoldalára, ahol a két szomszédos alkatrész (2, 3) oldalirányban egymást állapolja, és
b) az applikátorral azután a két szomszédos alkatrész egyikére (2) a hátoldalon a rétegképző anyagot felhordjuk,

azzal jellemezve, hogy

c) a fúvókatartó (10) olyan anyagból áll, amely elasztikus és alakra emlékező.

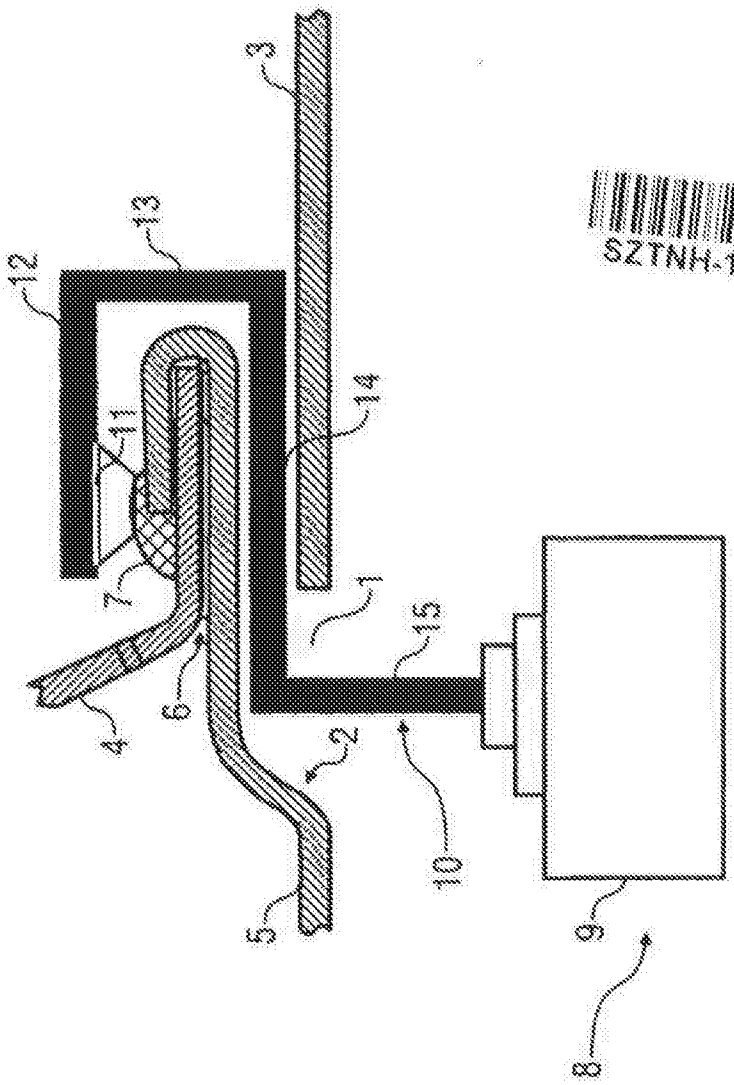
13. A 12. igénypont szerinti üzemeltetési eljárás, **azzal jellemezve,**

a) **hogy** az applikátort (8) a rés (1) mentén mozgathatjuk, és/vagy
b) **hogy** az applikátort (8) többtengelyes robottal mozgathatjuk, és/vagy
c) **hogy** az applikátor (8) geometriáját beméríjük, különösen fotocellás védőberendezéssel (18), és/vagy
d) **hogy** a két alkatrész egyike (2, 3) gépkocsiajtó (2), és/vagy
e) **hogy** az applikátort (8) keresztülvezetjük a résen (1), és applikáljuk a tömítőanyagot (7), miatt a gépkocsiajtó (2) zárva van.

14. A 12.-13. igénypontok egyike szerinti üzemeltetési eljárás, **azzal jellemezve, hogy** a következő lépéseket hajtjuk végre:

megtisztítjuk az applikátort (8) levegővel történő átfúvással, vagy egy tisztítófolyadékkal, és/vagy mosogatószerrel való mosogatással, ahol az aplikátor (8) geometriáját a tisztítás alatt mérjük.

15. Az applikátor (8) alkalmazása az 1.-9. igénypontok egyike szerint egy tömítőmassza (7) applikálásához egy gépkocsi karoszéria alkatrész (2), különösen egy gépkocsiajtó peremvarratára.



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Fig. 1

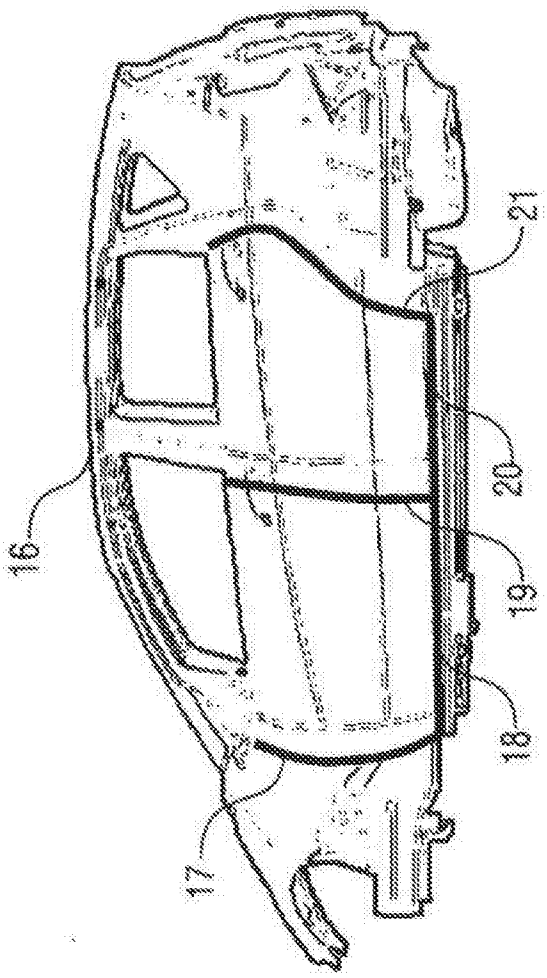


Fig. 2

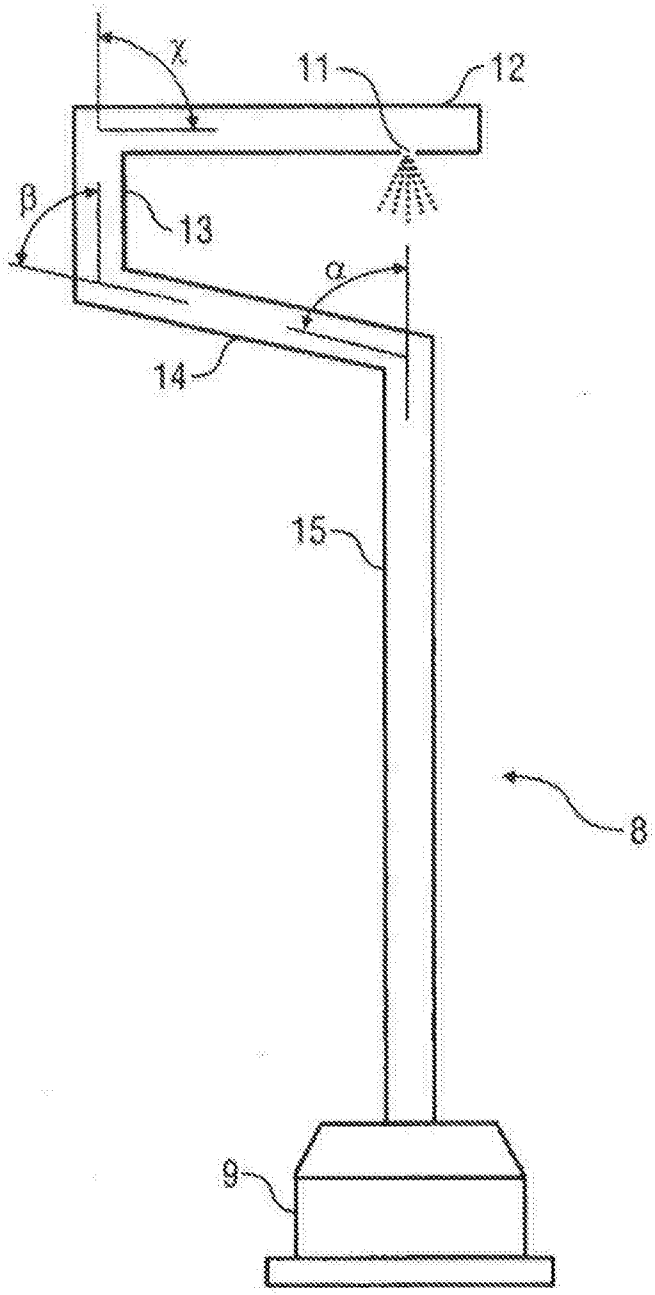


FIG. 3

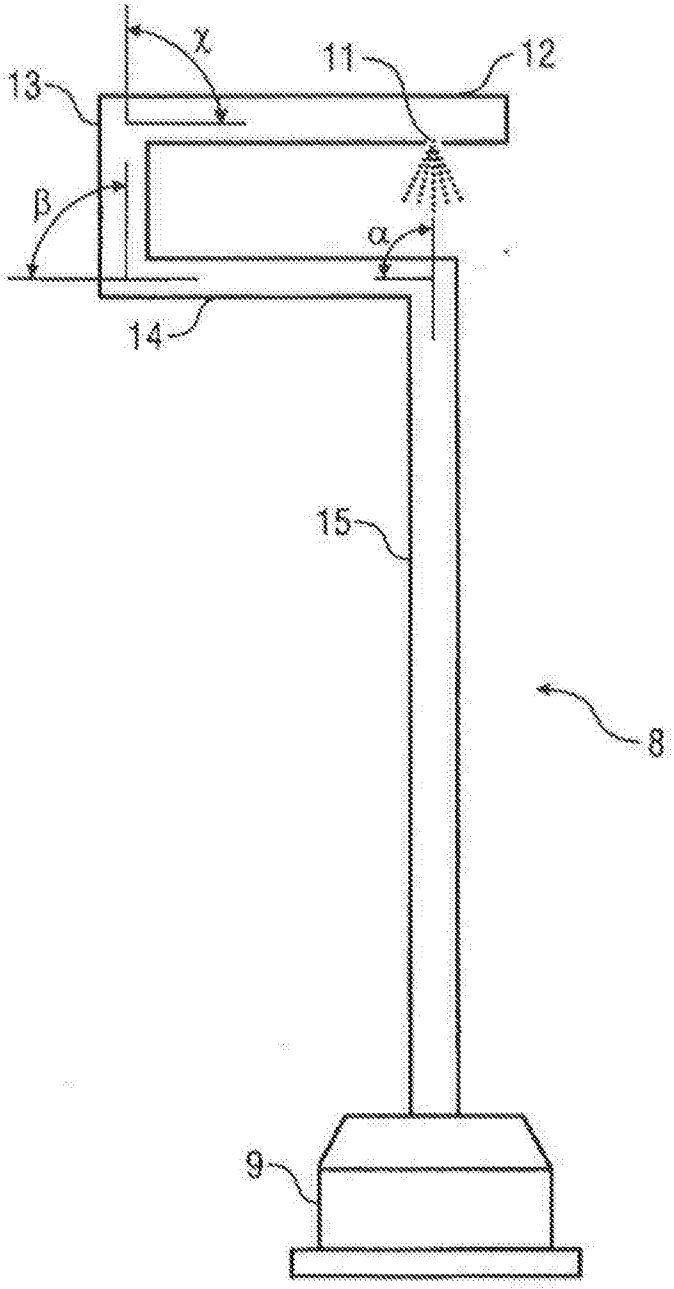


FIG. 4

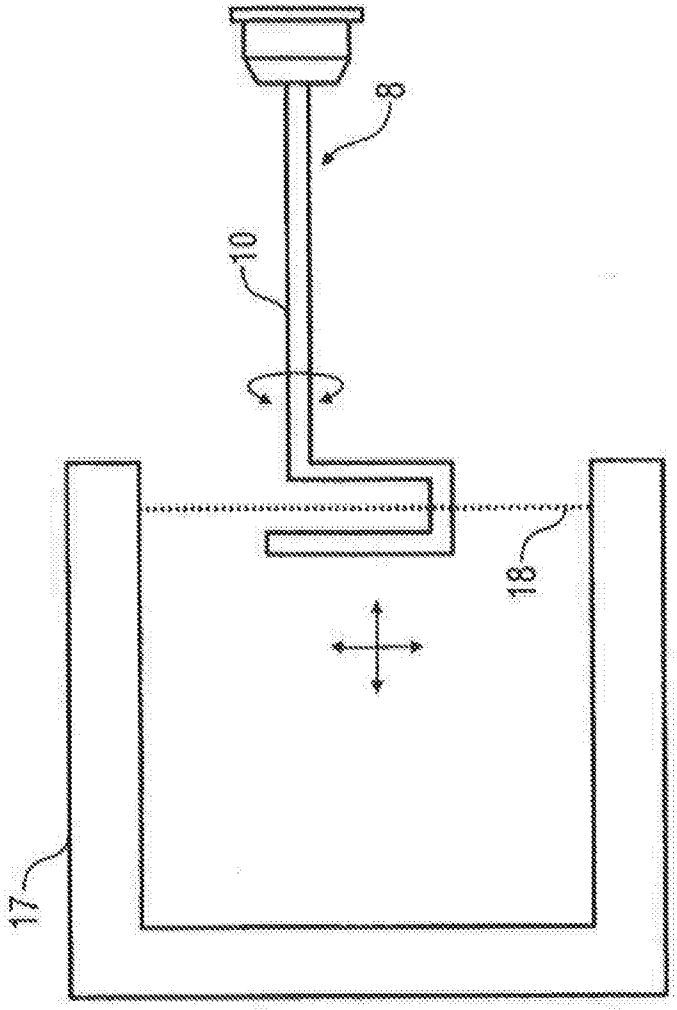


Fig. 5