

(19)



(11)

EP 2 345 484 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
07.06.2017 Bulletin 2017/23

(51) Int Cl.:
B08B 3/02 (2006.01) B05B 15/06 (2006.01)

(21) Application number: **10150870.3**

(22) Date of filing: **15.01.2010**

(54) Cleaning apparatus and method

Reinigungsvorrichtung und Reinigungsverfahren

Appareil et procédé de nettoyage

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

(43) Date of publication of application:
20.07.2011 Bulletin 2011/29

(73) Proprietor: **Nilfisk A/S
2605 Brøndby (DK)**

(72) Inventor: **Krogsgård, Holger
8370, Hadsten (DK)**

(74) Representative: **Budde Schou A/S
Hauergade 3
1128 Copenhagen K (DK)**

(56) References cited:
**US-A- 5 725 322 US-A1- 2003 071 142
US-A1- 2006 255 183**

EP 2 345 484 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to an apparatus and a method for cleaning elevated structures such as residential house roofs.

[0002] In many countries roofs on residential houses get covered by organic matter, such as algae, which affect the appearance of the houses negatively. Further, the organic matter can accelerate the natural deterioration of the roof, leading to an increased need for roof maintenance and ultimately a costly roof replacement. Roof problems associated with organic matter typically occur in areas with high amounts of rain and warm winters and cold summers.

Attempts to remove organic matter from a residential house roof include mechanical cleaning relying on brooms or brushes or a high pressure water jet to forcefully remove the organic matter, and chemical cleaning where an appropriate detergent, typically mixed with water, is applied to the roof. Mechanical cleaning, using brooms or brushes or other tools which mechanically contact the roof, may lead to damage to the roof if used too forcefully. Likewise cleaning using only a high pressure water jet may also damage the roof due to the high pressure needed. A combination of a high pressure water and a detergent is therefore preferred as this reduces the risk of damaging the roof. Further the cleaning, whether mechanical or chemical, should be performable without the need for a person standing on the roof or on a ladder, i.e. preferably the cleaning should be performable by a person standing on the ground as this reduces the risk of injuries.

[0003] For cleaning of residential roofs or other elevated structures, numerous devices typically comprising long wands or poles have been described in amongst others US-2003/0071142-A1 (US6905080) which is considered as the closest prior art, US20020190145, EP2105550, DE20202532 (utility model) and FR2901718. The devices rely on an external source of high pressurized water and, if used to apply a detergent solution, requires that the detergent is provided to the devices already mixed with water. For chemical cleaning of organic deposits, the detergent, typically based on Benzalkoniumchlorid, should be mixed with water to a specific concentration for it to be effective.

For use with a standard garden hose an eaves trough cleaner is known from US5725322, the eaves trough cleaner comprising a fluid flow mechanism with an intermediate portion provided between a top end and bottom end, wherein a cross tubing is provided in the intermediate portion whereby a cleaning solution can be added via a turn valve to the water passing through the eaves trough cleaner.

[0004] A readily available source of high pressurized water for use by a consumer cleaning a residential roof is a consumer high pressure cleaner.

[0005] Although many consumer high pressure cleaners are capable of adding a detergent through an injector mounted at the high pressure pump, or an injector mounted in a lance connected to the pump, the detergent being sucked into and mixed with the water due to the pressure differences between the water and the detergent supply as the water passes the injector, the correct concentration of detergent in the water cannot be achieved as a typical consumer high pressure cleaner with an injector mounted at the pump typically only reach a concentration of around 2-5%. Increasing the concentration of detergent to water through increasing the pressure difference is possible but results in decreased performance during normal high pressure cleaning, i.e. when no detergent is added. Thus the above described devices for cleaning residential roofs cannot apply an affective mixture of detergent and water to a residential roof. Further, the above described devices do not allow a consumer to adjust the concentration of detergent, while cleaning a residential roof, without interrupting cleaning, thus making the cleaning less efficient and more time-consuming.

[0006] Techniques related to the mixing of water and detergents are described in amongst others US5669558, WO2008086952, US3361300, US20060234616 and WO9809739.

[0007] An object of the present invention is to simplify and rationalize chemical cleaning of residential roofs.

[0008] A further object of the present invention is to provide a cleaning apparatus which is usable together with a consumer high pressure cleaner by a consumer standing on the ground.

[0009] A yet further object of the present invention is to provide a cleaning apparatus capable of supplying a detergent solution to a residential roof in an effective mixture.

[0010] A further object of the present invention is to provide a method for applying a detergent solution to a residential roof.

[0011] The above objects, as well as numerous further objects which will be evident from the following detailed description of preferred embodiments of the cleaning apparatus of the present invention is according to a first aspect of the present invention obtained by a cleaning apparatus in accordance with claim 1. The elevated surface may be a surface on a residential house or other low rise building such as a wall, roof, window, the surfaces of a rain gutter, the surfaces of a chimney, but preferably a roof of a residential house. However, it is contemplated that the elevated surface could also be a surface on a bridge, a surface on a crane, a surface on a wind turbine, a surface on a vehicle etc. The elevated surface is typically 2-16 m above the user's feet.

[0012] It is however contemplated within the context of the present invention that also a depressed surface such as the walls of a manhole or a cellar staircase, where it would be expedient to achieve cleaning without actually entering the manhole or cellar staircase, could be cleaned by the cleaning apparatus according to the first aspect of the present invention.

The high pressure cleaner according to the first aspect of the present invention may be adapted to supply the fluid to the gun at high pressure. By using a high pressure cleaner a high concentration, such as 10%, of detergent in the fluid may be reached

[0013] The gun according to the first aspect of the present invention may be in fluid communication with the high pressure cleaner via a high pressure hose. The trigger may be adapted to interrupt the flow of fluid. The trigger may be connected to a main valve provided in the flow path of the fluid. The main valve may be a ball valve. The gun may be held by a user of the cleaning apparatus.

[0014] The outer tube according to the first aspect of the present invention may be attached to the gun and may surround a flexible hose for the fluid and a detergent. The outer tube may be elongated and may be made of metal or plastic.

[0015] The fluid according to the first aspect of the present invention may be water. The detergent according to the present invention may be supplied from a detergent container. The detergent may be supplied to the gun through a hose.

[0016] In the context of the present invention the term detergent is to be understood as comprising any agent useful for cleaning an object. The detergent may be for example a tenside, a soap, a surfactant, a herbicide, an acid, an abrasive, an oxidant, an enzyme etc.

[0017] The injector according to the first aspect of the present invention may be based on the Venturi effect. The injector may be enclosed in the gun or may alternatively be attached to the gun or may alternatively be provided at the gun such as on the high pressure hose or in a fitting fluidly connecting the high pressure hose to the gun.

[0018] The flexible hose according to the first aspect of the present invention may be in fluid communication with the gun. The flexible hose may be bendable, but may also be stretchable.

[0019] In the cleaning apparatus according to the first aspect of the present invention the outer tube is a telescopic tube. This is advantageous as it allows the cleaning apparatus to be more easily transportable and storageable while still allowing elevated surfaces to be reached for cleaning. The telescopic tube may include co-axial tube sections joined by locking mechanisms.

[0020] In the cleaning apparatus according to the first aspect of the present invention the cleaning apparatus further comprises a valve provided in, or at, said gun, the valve being adapted to regulate the supply of the detergent to the injector. This is advantageous as it allows a user to adjust the concentration of detergent in the fluid without interrupting cleaning by letting go of the gun.

The valve according to the first aspect of the present invention may be actuable by the user of the cleaning apparatus without interrupting cleaning. The valve may be enclosed in the gun or may alternatively be attached to the gun or may alternatively be provided at the gun such as on the hose supplying detergent from the detergent container or in a fitting fluidly connecting the hose from the detergent container to the gun. The valve may be a ball valve, a globe valve or a needle valve etc, but any valve may be used provided that it allows a regulation of the supply of the detergent to the injector. It is preferred that the valve allows stepless regulation, but the valve may also be an on-off valve.

[0021] In one preferred embodiment of the cleaning apparatus according to the first aspect of the present invention the gun further includes a main valve actuable by the trigger for interrupting the flow of the fluid and the injector is provided downstream of the main valve. By providing the injector downstream of the main valve the injector is protected from the high pressure arising when the main valve is closed. This is advantageous as it lessens the risk of leaks in the injector and allows the injector to be constructed out of less expensive materials.

[0022] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the elevated surface is a roof of a house and the cleaning apparatus is adapted to allow a user standing on the ground adjacent the house to clean the roof. By standing on the ground the safety for the user is increased.

[0023] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the high pressure cleaner is a conventional consumer high pressure cleaner.

[0024] This is advantageous as it decreases the cost for a user, which is in the possession of a consumer high pressure cleaner, wishing to clean an elevated surface.

[0025] In the context of the present invention the term conventional consumer high pressure cleaner is to be understood as comprising high pressure cleaners delivering a fluid at a maximum pressure below 200 bar.

[0026] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the trigger of the gun is lockable when triggered.

This allows the user to adjust his grip of the gun to actuate the valve to regulate the detergent supply without interrupting cleaning.

[0027] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the outer tube is may be a telescopic tube having a fully extended length of at least 2 m, such as at least 3 m, preferably at least 5 m. This is advantageous as it allows the user to clean the roof of most residential homes.

[0028] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the outer tube may be a telescopic tube comprising a plurality of co-axial tube sections joined by locking mechanisms, each of the plurality of tube sections being independently lockable in relation to an adjacent tube section.

[0029] This allows the telescopic tube to assume any length between a fully retracted length, where all tube sections

are nested within each other, to a fully extended length, thus achieving the advantage that the telescopic tube may be shortened when the fully extended length is not needed, thus simplifying the handling of the cleaning apparatus for the user.

[0030] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the cleaning apparatus further comprises a support structure adapted to support the outer tube. This simplifies the handling of the cleaning apparatus for the user.

[0031] The support structure may have a first part for supporting the outer tube and a second part being supported by the ground on which the user stands, or by an additional user of the cleaning apparatus.

[0032] In one embodiment the support structure includes a tripod or a monopod. The support structure may be telescopic. Alternatively the support structure may include a harness worn by the user and connected to the outer tube for supporting the outer tube. Alternatively the support structure may include, at the nozzle, a wheel being rollable on, or a runner being slideable over, the elevated surface to support the outer tube by supporting the nozzle on the elevated surface. The cleaning apparatus may further comprise a counterweight attached to the gun or the outer tube to counter balance the weight of the outer tube and/or the thrust from the nozzle.

[0033] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the flexible hose is a low pressure hose.

[0034] In the context of the present invention the term low pressure hose is to be understood as a hose having a maximum pressure limit before failure which is less than the pressure limit before failure of the high pressure hose establishing fluid communication between the high pressure cleaner and the gun.

[0035] This may be possible as the flexible hose may be downstream of the main valve whereby the high pressures which arise when the main valve is closed are not present in the flexible hose.

[0036] This is advantageous as the weight and cost of the flexible hose decreases. The flexible hose may have a larger flow area than the high pressure hose.

[0037] In one embodiment of the cleaning apparatus according to the first aspect of the present invention the valve is selectively actuatable to allow the detergent to be injected into the fluid at a rate adapted to achieve a concentration in the range from 0% to at least 10% detergent in the fluid.

[0038] This is advantageous as it allows the cleaning apparatus according to the first aspect of the present invention to be used for various cleaning requiring various concentrations of detergent. This also allows various types of detergents, requiring various dilutions, to be used. Further, when the concentration of detergent in the fluid is zero percent, the cleaning apparatus may be used to rinse off the elevated surface.

[0039] In one embodiment of the cleaning method the detergent is benzalkoniumchloride and the fluid is water. This is advantageous as benzalkoniumchloride is an effective detergent for cleaning an elevated surface, in particular removing organic deposits from a roof. Optionally the nozzle is angleable and/or produces a pencil jet.

[0040] This is advantageous as it increases the reach of the cleaning apparatus. Further, it is contemplated within the context of the present invention that by angling the nozzle, and thus changing the direction of the thrust from the nozzle, the handling of the cleaning apparatus may be simplified as the thrust from the nozzle may be directed to counteract the weight of the outer tube.

[0041] According to a second aspect of the present invention a method for cleaning the roof of a residential house by a user standing on the ground adjacent the house in accordance with claim 11 is provided comprising the steps of:

Providing a cleaning apparatus according to the first aspect of the present invention, and
applying the fluid and the detergent to the roof.

[0042] In a preferred embodiment of the method according to the second aspect of the present invention the method according to the second aspect of the present invention further comprises the step of:

Adjusting the valve to obtain a specific concentration of said detergent in said fluid.

[0043] This is advantageous as it allows the concentration of detergent in the fluid to be adjusted to suit the detergent used, the extent of cleaning needed and the type of roof, which increases the efficiency of the cleaning. The cleaning of the roof may comprise the removal of organic deposits selected from the group comprising algae, lichen, mold and moss, or combinations thereof, from the roof.

[0044] The cleaning apparatus according to the first aspect of the present invention has the advantage that it allows a user, while standing on the ground, to apply an effective concentration of detergent to an elevated surface such as a residential roof using a normal consumer high pressure cleaner as source of pressurized water, without the risk of falling down from the roof, thus increasing the safety of cleaning. The user may easily, and without interrupting cleaning by letting go of the gun, adjust the concentration of detergent for different types of roofs, different types of detergents and/or different types to be performed, thus simplifying and rationalizing the cleaning.

[0045] The invention and its many advantages will be described in more detail below with reference to the accompanying schematic drawings which for the purpose of illustration show some non-limiting embodiments and in which

Fig. 1 shows the cleaning of a roof using one embodiment of the cleaning apparatus according to the present invention,
 Fig. 2 shows the cleaning apparatus,
 Fig. 3 shows the gun,
 Fig. 4 shows the foam generating nozzle,
 Fig. 5 shows in cross section the gun, and
 Fig. 6 shows in cross section the injector in the gun.

[0046] Fig. 1 shows the cleaning of a roof, designated the reference numeral 12, of a residential house, designated the reference numeral 10, by a user, designated the reference numeral 30, standing on the ground, designated the reference numeral 1, adjacent the house 10. The user 30 grasps a gun, in its whole designated the reference numeral 100, in one of his hands and grasps a telescopic tube, in its whole designated the reference numeral 60, with his other hand. The telescopic tube 60 is supported by a support structure, designated the reference numeral 90, shown as a monopod, however the support structure 90 may be omitted if desired. A consumer high pressure cleaner, designated the reference numeral 40 receives water from a mains water hose, designated the reference numeral 46, and supplies pressurized water to the gun 100 via a high pressure hose, designated the reference numeral 42. Detergent is supplied to the gun 100 from a detergent container, designated the reference numeral 200 through a detergent hose, designated the reference numeral, 202. Within the gun 100 the pressurized water and the detergent are mixed, as will be described in more detail with reference to figs. 5-6 below, resulting in a detergent solution, designated the reference numeral 20, which is led through a flexible hose, designated the reference numeral 70, extending through, and surrounded by, the telescopic tube 60, to a nozzle, designated the reference numeral 80, wherefrom it is applied to the roof 12.

[0047] The consumer high pressure cleaner 40 could for example be a Nilfisk C 100.5 consumer high pressure cleaner having a maximum water pressure of about 100 bar and a water flowrate of about 440 l/h. As an alternative to placing the detergent container 200 on the ground adjacent the user 30 and supplying the detergent through the detergent hose 202, the detergent container 200 could be directly connected to the gun, omitting the detergent hose 202, whereby it could serve as a counterweight to balance the telescopic tube 70.

[0048] Further, although the outer tube of the first aspect of the present invention is shown as telescopic tube 60 in figs 1-6, a non-telescopic outer tube may also be used.

[0049] Fig. 2 shows the telescopic tube 60 in more detail. The telescopic tube includes a plurality of tube sections, one of which is designated the reference numeral 62 and a plurality of locking mechanisms, one of which is designated the reference numeral 64, each of which may be independently actuatable by the user to permit or hinder as desired the telescopic movement between two neighbouring tube sections. One end of the telescopic tube 60 is connected to a gun 100, and the other end of the telescopic tube 60 is connected to the nozzle 80.

[0050] The tube sections 62 are preferably made of metal such as aluminium, but may also be made from carbon or glass fibre reinforced plastic or composite. The locking mechanisms 64 are preferably made from plastic or metal.

[0051] Fig. 3 shows the gun 100 attached to the telescopic tube 60. The gun 100 has a handle, designated the reference numeral 102, and a trigger, designated the reference numeral 104, to allow the user 30 (not shown) to open/close the flow of pressurized water from the consumer high pressure cleaner 40 (not shown) which supplies pressurized water to the gun 100 via the high pressure hose 42. Detergent can be sucked in via a suction inlet, designated the reference numeral 106, which will be shown in more detail in fig. 6, supplied by the detergent container 200 (not shown) via the detergent hose 202. A control knob, designated the reference numeral 108, is located on the gun 100 where it can be easily manipulated by the user 30 (not shown). The flow of pressurized water is mixed with the detergent and the resulting detergent solution 20 (not shown) is led to the nozzle 80 (not shown) via the flexible hose 70 which runs through the telescoping tube 60. The flexible hose 70 forms a loop, designated the reference numeral 72, which accumulates any excess of flexible hose 70 and allows the flexible hose 70 to move, as indicated in fig. 3 by the double arrow designated the reference sign A, into, or out of the gun 100 as the telescopic tube 60 is extended or retracted respectively. The telescopic tube 60 may for example be retracted for convenient storage. The internal routing of the flexible hose will be described in more detail with reference to fig. 5 below.

[0052] The gun is typically molded out of plastics which may be carbon or glass fibre reinforced. The gun may also be made of metal. Preferably the gun 100 is made from two molded halves assembled by screws.

[0053] The flexible hose 70 is typically made out of rubber or plastics, which may be reinforced by Kevlar or other synthetic fibres.

[0054] Fig. 4 shows the nozzle 80 connected to the telescopic tube 60 ejecting the detergent solution 20 as a pencil jet. The nozzle 80 includes an pivoting connection, designated the reference numeral 82, allowing the detergent solution 20 to be directed, and a tip, designated the reference numeral 84, which allows the detergent solution to be applied to the roof as a pencil jet or as a wider spray by turning the tip 84 as desired by the user 30 (not shown). The nozzle 80 is

typically molded out of plastic but may include metal components in the tip.

[0055] Fig. 5 shows in cross section the gun 100. The trigger 104 activates a main valve, designated the reference numeral 110, which allows pressurized water to flow from the consumer high pressure cleaner 40 (not shown) via the high pressure hose 42 and an inlet, designated the reference numeral 112, to an outlet, designated the reference numeral 114. An injector, in its whole designated the reference numeral 150, is connected to the main valve 110 and the outlet 114 to allow detergent supplied by the detergent container 200 (not shown) via detergent hose 202 to be sucked from the suction inlet 106 through a valve, designated the reference numeral 116, for mixing with the pressurized water. The telescopic tube 60 is attached to the gun 100 and the flexible hose 70 leads the detergent solution from the outlet 114, in the loop 72, through an aperture, designated the reference numeral 118, into the gun 100 and through the telescopic tube 60 to the nozzle 80 (not shown). The flexible hose 70 is anchored to the nozzle 80 and the outlet 114, thus it may run freely within the gun 100 and the telescopic tube 60, allowing any excess of flexible hose 70, such as when the telescopic tube 60 is retracted, to be expelled from the telescopic tube 60 and the gun 100 through the aperture 118 as indicated by the double arrow A to accumulate in the loop 72.

[0056] Fig. 6 shows in cross section the injector 150. The flow of pressurized water from the consumer high pressure cleaner 40 (not shown), indicated by an arrow designated the reference numeral 44, draws in detergent, indicated by an arrow designated the reference numeral 204, due to the high velocity, and subsequently the reduced pressure, of the pressurized water as it passes a restriction, designated the reference numeral 152, in the injector 150. The detergent valve 116 can be actuated through rotation of the control knob 108 (not shown), thereby reducing or increasing the flow of detergent indicated by the arrow 204.

List of reference signs and numerals with reference to the figures:

A. Double arrow indicating movement of the flexible hose 70
1. Ground
10. Residential house
12. Roof
20. Detergent solution
30. User
40. Consumer high pressure cleaner
42. High pressure hose
44. Arrow indicating flow of pressurized water
46. Mains water hose
60. Telescopic tube
62. Tube section
64. Locking mechanism
70. Flexible hose
72. Loop
80. Nozzle
82. Pivoting connector
84. Tip
90. Support structure
100. Gun
102. Handle
104. Trigger
106. Suction inlet
108. Valve control knob
110. Main valve

(continued)

5	112. Inlet
	114. Outlet
	116. Valve
	118. Aperture
10	150. Injector
	152. Restriction
	200. Detergent container
	202. Detergent hose
15	204. Arrow indicating flow of detergent

Claims

1. A cleaning apparatus for cleaning an elevated surface comprising, in combination:

a high pressure cleaner (40),
a gun (100) having a trigger (104) for opening/closing the flow of fluid delivered from the high pressure cleaner (40),
an injector for a detergent (150) provided in the flow path of said fluid,
an outer telescopic tube (60) surrounding a flexible hose (70) for the fluid and the detergent, wherein said flexible hose (70) is terminated in a nozzle (80) attached to the distal end of said outer telescopic tube whereby a valve (116) is provided in, or at, said gun (100), said valve (116) being adapted to regulate the supply of said detergent to said injector (150).

2. The cleaning apparatus according to any preceding claim, said gun (100) further including a main valve (110) actuable by said trigger (104) for interrupting the flow of said fluid and said injector (150) being provided downstream of said main valve (110).

3. The cleaning apparatus according to any preceding claim, said elevated surface being a roof (12) of a house (10) and said cleaning apparatus being adapted to allow a user (30) standing on the ground (1) adjacent said house (10) to clean said roof (12).

4. The cleaning apparatus according to any preceding claim, said high pressure cleaner being a conventional consumer high pressure cleaner (40).

5. The cleaning apparatus according to any preceding claim, said trigger (104) of said gun (100) being lockable when triggered.

6. The cleaning apparatus according to any of the claims 1-5, said telescopic tube (60) having a fully extended length of at least 2 m, such as at least 3 m, preferably at least 5 m.

7. The cleaning apparatus according to any of the claims 1-6, said telescopic tube (60) comprising a plurality of co-axial tube sections (62) joined by locking mechanisms (64), each of said plurality of tube sections (62) being independently lockable in relation to an adjacent tube section.

8. The cleaning apparatus according to any preceding claim, said cleaning apparatus further comprising a support structure (90) adapted to support said outer telescopic tube.

9. The cleaning apparatus according to any preceding claim, said flexible hose (70) being a low pressure hose.

10. The cleaning apparatus according to any preceding claim, said nozzle (80) being angleable and/or producing a pencil jet.

11. A method for cleaning the roof (12) of a residential house (10) by a user (30) standing on the ground adjacent said house (10) comprising the steps of:

Providing a cleaning apparatus according to any preceding claim, and
applying said fluid and said detergent to said roof (12).

12. The method according to claim 11, said detergent being applied to said roof (12) in a concentration in the range from 0% to at least 10% detergent in said fluid.

13. The method according to any of the claims 11-12, said detergent being benzalkoniumchloride and said fluid being water.

Patentansprüche

1. Reinigungsvorrichtung zum Reinigen einer erhöhten Oberfläche umfassend, in Kombination:

einen Hochdruckreiniger (40),
eine Pistole (100) mit einem Abzug (104) zum Öffnen/Schließen der Flüssigkeit, die von dem Hochdruckreiniger (40) geliefert wird,
einen Injektor (150) für ein Reinigungsmittel, der in dem Strömungsweg der Flüssigkeit vorgesehen ist,
ein äußeres teleskopisches Rohr (60), das einen flexiblen Schlauch (70) für die Flüssigkeit und das Reinigungsmittel umgibt, wobei der flexible Schlauch (70) in einer Düse (80) beendet ist, die zu dem distalen Ende des äußeren teleskopischen Rohrs befestigt ist, wodurch ein Ventil (116) in, oder an, der Pistole (100) vorgesehen ist, wobei das Ventil (116) dazu eingerichtet ist, die Zufuhr des Reinigungsmittels zu dem Injektor (150) zu regulieren.

2. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei die Pistole (100) ferner ein Hauptventil (110) umfasst, der durch den Abzug (104) betätigbar ist zum Unterbrechen der Strömung der Flüssigkeit, und der Injektor (150) stromabwärts des Hauptventils (110) vorgesehen ist.

3. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei die erhöhte Oberfläche ein Dach (12) eines Hauses (10) ist, und die Reinigungsvorrichtung dazu eingerichtet ist, es einem Benutzer (30), der auf dem Boden (1) benachbart zu dem Haus (10) steht, zu ermöglichen, das Dach zu reinigen (12).

4. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei der Hochdruckreiniger ein konventioneller Konsumhochdruckreiniger (40) ist.

5. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei der Abzug (104) der Pistole (100) verriegelbar ist, wenn ausgelöst.

6. Reinigungsvorrichtung nach einem der Ansprüche 1-5, wobei das teleskopische Rohr (60) eine voll erweiterte Länge von mindestens 2 m, wie zum Beispiel mindestens 3 m, bevorzugt mindestens 5 m, aufweist.

7. Reinigungsvorrichtung nach einem der Ansprüche 1-6, wobei das teleskopische Rohr (60) eine Vielzahl von koaxialen Rohrabschnitten (62) umfasst, die durch Verriegelungsmechanismen (64) verbunden sind, wobei jeder der Vielzahl von Rohrabschnitten (62) in Relation zu einem benachbarten Rohrabschnitt unabhängig verriegelbar ist.

8. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei die Reinigungsvorrichtung ferner eine Stützstruktur (90) umfasst, die dazu eingerichtet ist, das äußere teleskopische Rohr zu stützen.

9. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei der flexible Schlauch (70) ein Niederdruckschlauch ist.

10. Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, wobei die Düse (80) winkelbar ist und/oder einen Punktstrahl herstellt.

11. Verfahren zum Reinigen des Dachs (12) eines Wohnhauses (10) durch einen Benutzer (30), der benachbart zu

dem Haus (10) auf dem Boden steht, umfassend die folgenden Schritte:

Bereitstellen einer Reinigungsvorrichtung nach einem der vorstehenden Ansprüche, und
Aufbringen der Flüssigkeit und des Reinigungsmittels auf dem Dach (12).

12. Verfahren nach Anspruch 11, wobei das Reinigungsmittel auf dem Dach (12) in einer Konzentration in dem Bereich von 0% bis mindestens 10% Reinigungsmittel in der Flüssigkeit aufgebracht wird.
13. Verfahren nach einem der Ansprüche 11-12, wobei das Reinigungsmittel Benzalkoniumchlorid ist, und die Flüssigkeit Wasser ist.

Revendications

1. Appareil de nettoyage pour le nettoyage d'une surface élevée comprenant, en combinaison:
un nettoyeur à haute pression (40),
un pistolet (100) ayant un déclencheur (104) pour l'ouverture/la fermeture d'un débit de fluide livré du nettoyeur à haute pression (40),
un injecteur pour un détergent (150) fourni dans la trajectoire dudit fluide,
un tube télescopique extérieur (60) qui entoure un tuyau flexible (70) pour le fluide et le détergent, où ledit tuyau flexible (70) se termine en un gicleur (80) fixé à l'extrémité distale dudit tube télescopique extérieur par lequel une vanne (116) est fournie dans ledit, ou audit, pistolet (100), ladite vanne (116) étant adaptée pour réguler l'apport dudit détergent audit injecteur (150).
2. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ledit pistolet (100) incluant en outre une vanne principale (110) qui peut être actionnée par ledit déclencheur (104) pour interrompre le débit dudit fluide et ledit injecteur (150) étant fourni en aval de ladite vanne principale (110).
3. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ladite surface élevée étant un toit (12) d'une maison (10) et ledit appareil de nettoyage étant adapté pour permettre à un utilisateur (30) étant debout sur le sol (1) adjacent à ladite maison (10), de nettoyer ledit toit (12).
4. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ledit nettoyeur à haute pression étant un nettoyeur à haute pression de consommateur conventionnel (40).
5. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ledit déclencheur (104) dudit pistolet (100) étant verrouillable lorsqu'il est déclenché.
6. Appareil de nettoyage selon l'une quelconque des revendications 1 à 5, ledit tube télescopique (60) ayant une longueur étendue totale d'au moins 2 m, telle qu'au moins 3 m, préférablement au moins 5 m.
7. Appareil de nettoyage selon l'une quelconque des revendications 1 à 6, ledit tube télescopique (60) comprenant une pluralité de sections de tubes co-axiales (62) étant jointes par des mécanismes de verrouillage (64), chacune de ladite pluralité de sections de tube (62) étant verrouillable indépendamment par rapport à une section de tube adjacente.
8. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ledit appareil de nettoyage comprenant en outre une structure de support (90) adaptée pour supporter ledit tube télescopique extérieur.
9. Appareil de nettoyage selon l'une quelconque des revendications précédentes, ledit tuyau flexible (70) étant un tuyau à basse pression.
10. Appareil de nettoyage selon l'une quelconque des revendications précédentes, le gicleur (80) pouvant être ajusté au niveau de l'angle et/ou pouvant produire un jet en éventail.
11. Procédé pour le nettoyage du toit (12) d'une maison d'habitation (10) par un utilisateur (30) étant debout sur le sol adjacent à ladite maison (10) comprenant les étapes de:

EP 2 345 484 B1

fournir un appareil de nettoyage selon l'une quelconque des revendications précédentes, et appliquer ledit fluide et ledit détergent audit toit (12).

5 **12.** Procédé selon la revendication 11, ledit détergent étant appliqué audit toit (12) dans une concentration dans l'ordre de 0% à au moins 10% de détergent dans ledit fluide.

13. Procédé selon l'une quelconque des revendications 11 à 12, ledit détergent étant du chlorure de benzalkonium et ledit fluide étant de l'eau.

10

15

20

25

30

35

40

45

50

55

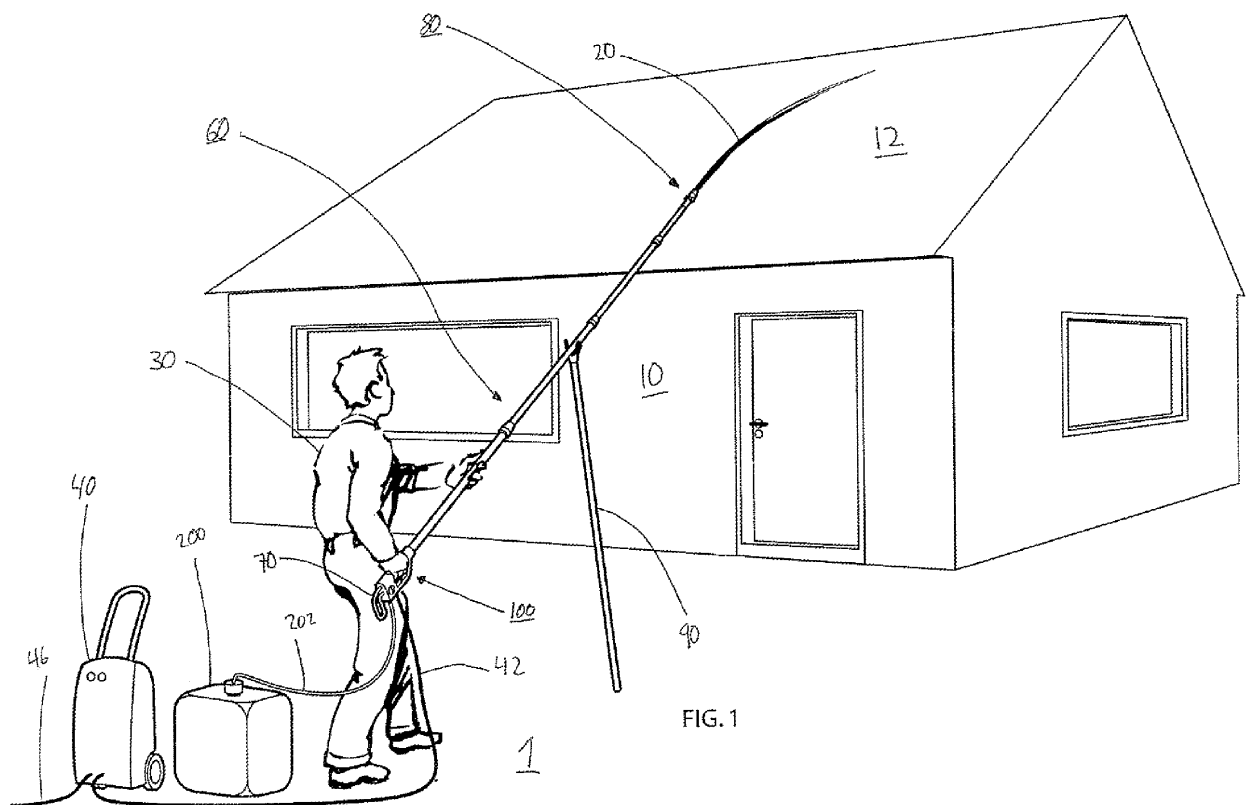


FIG. 2

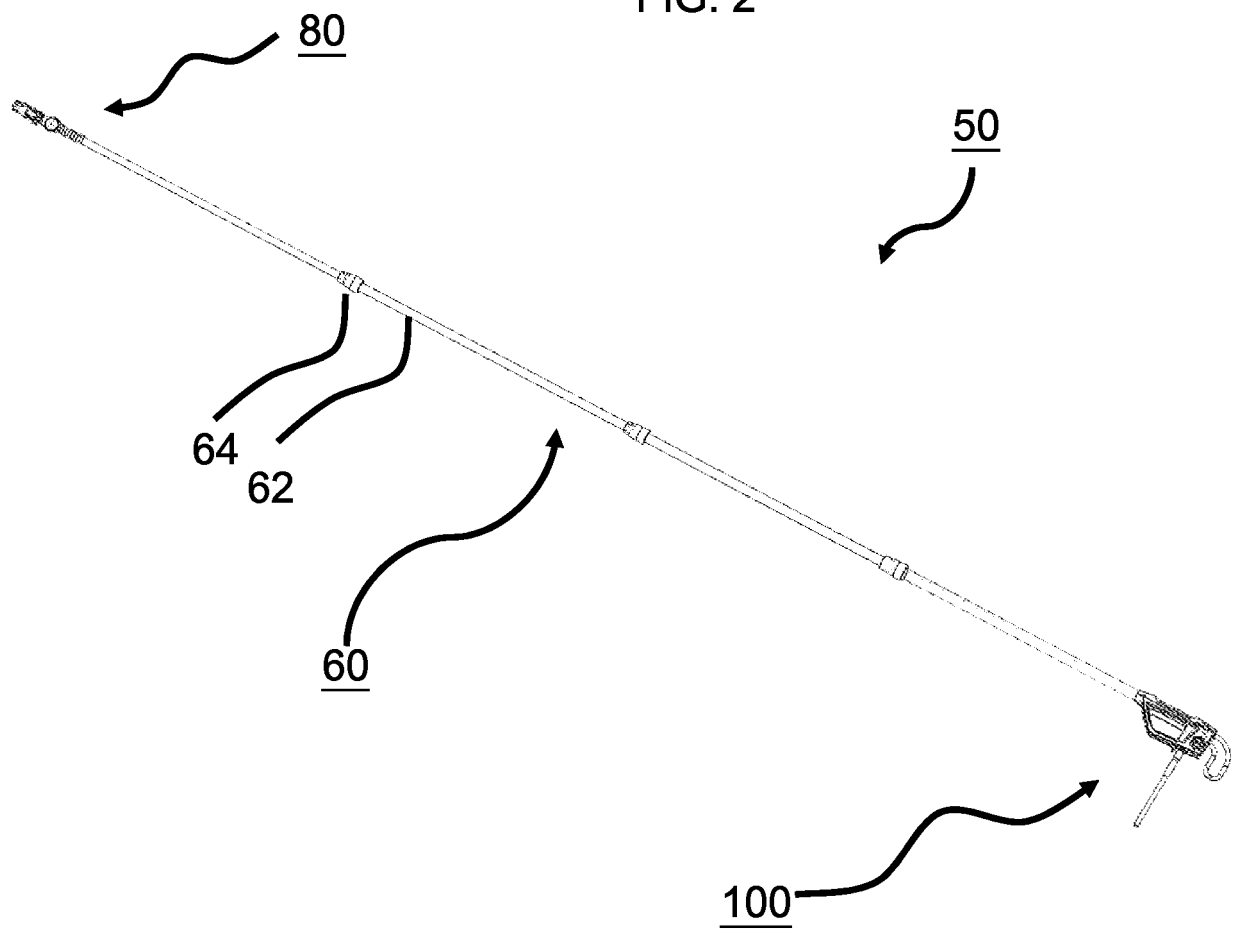


FIG. 3

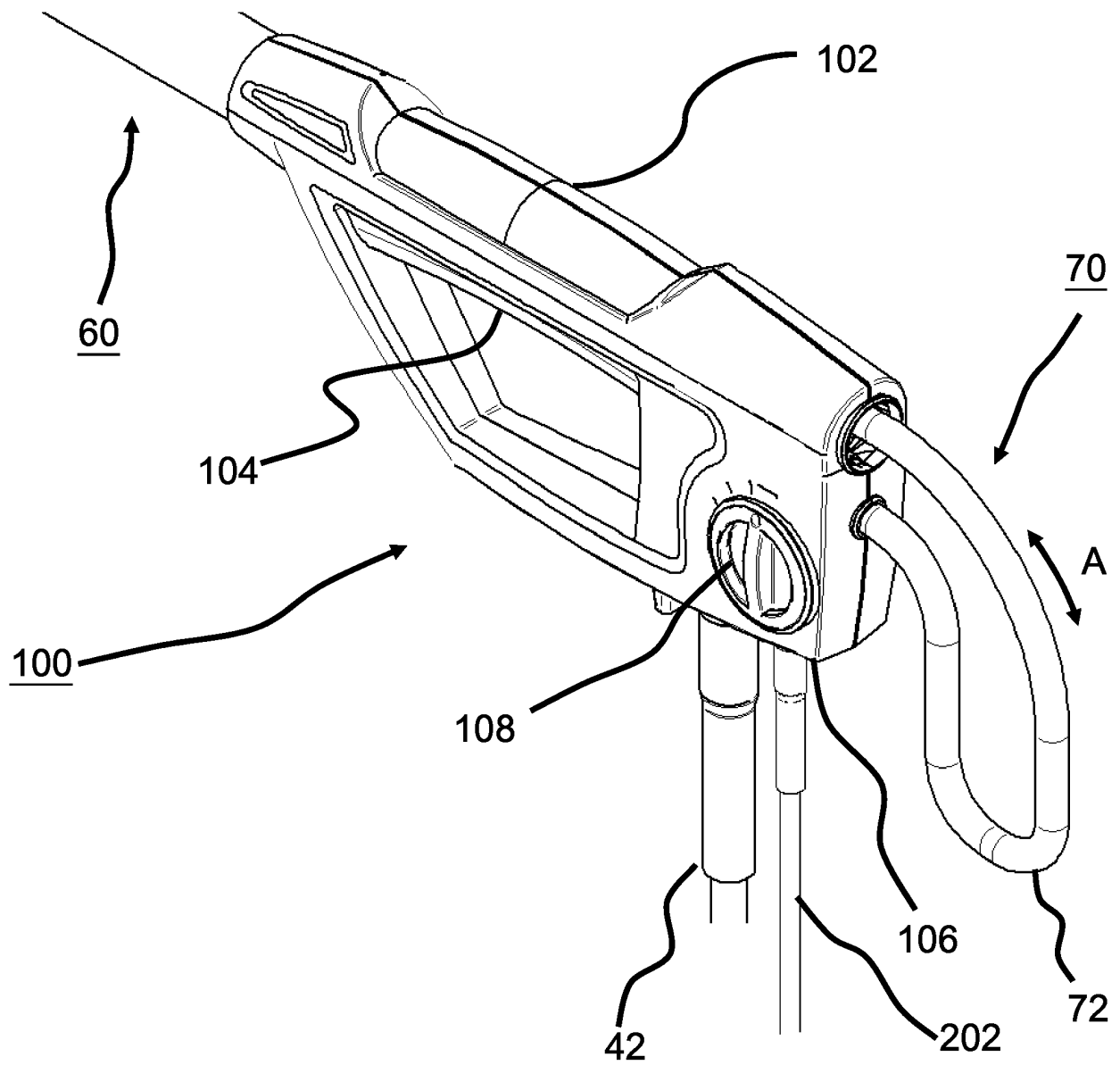


FIG. 4

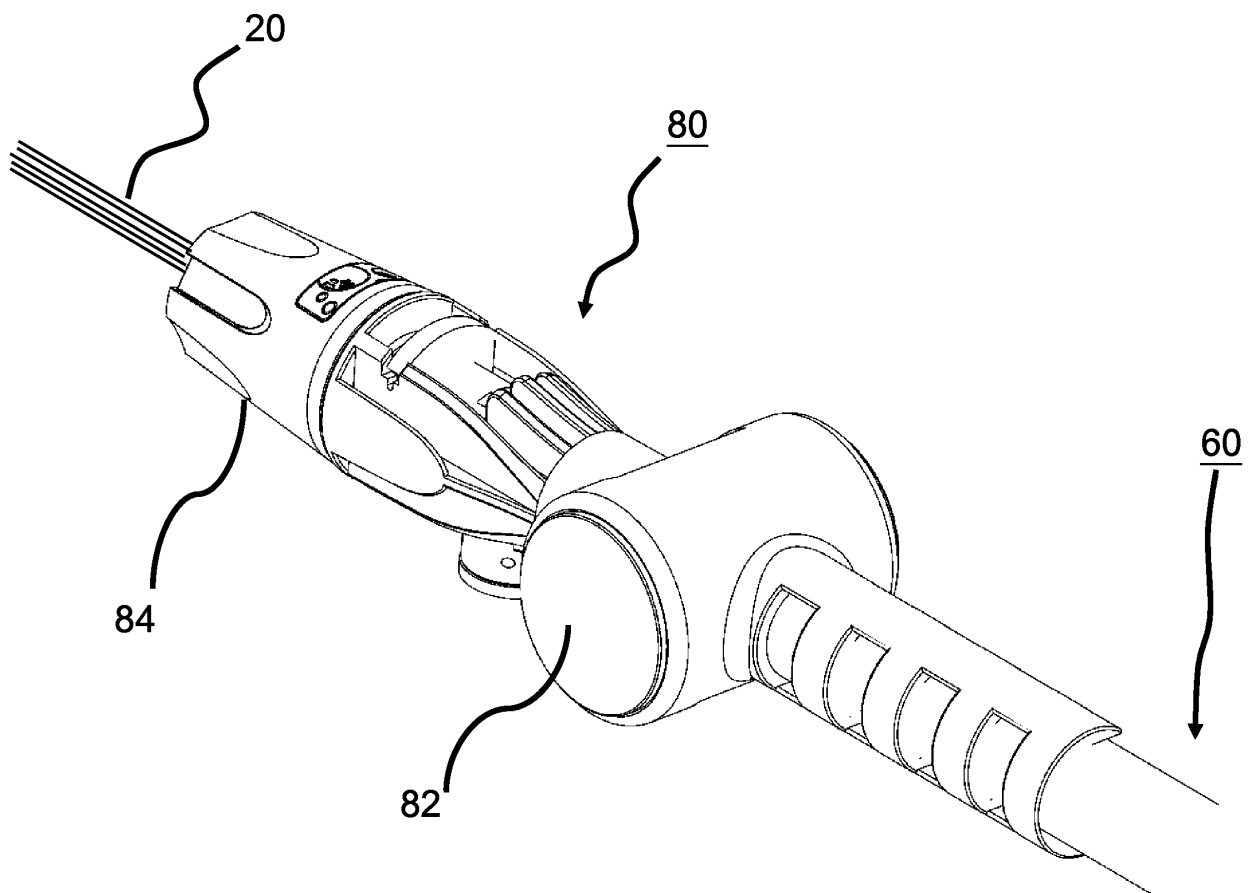


FIG. 5

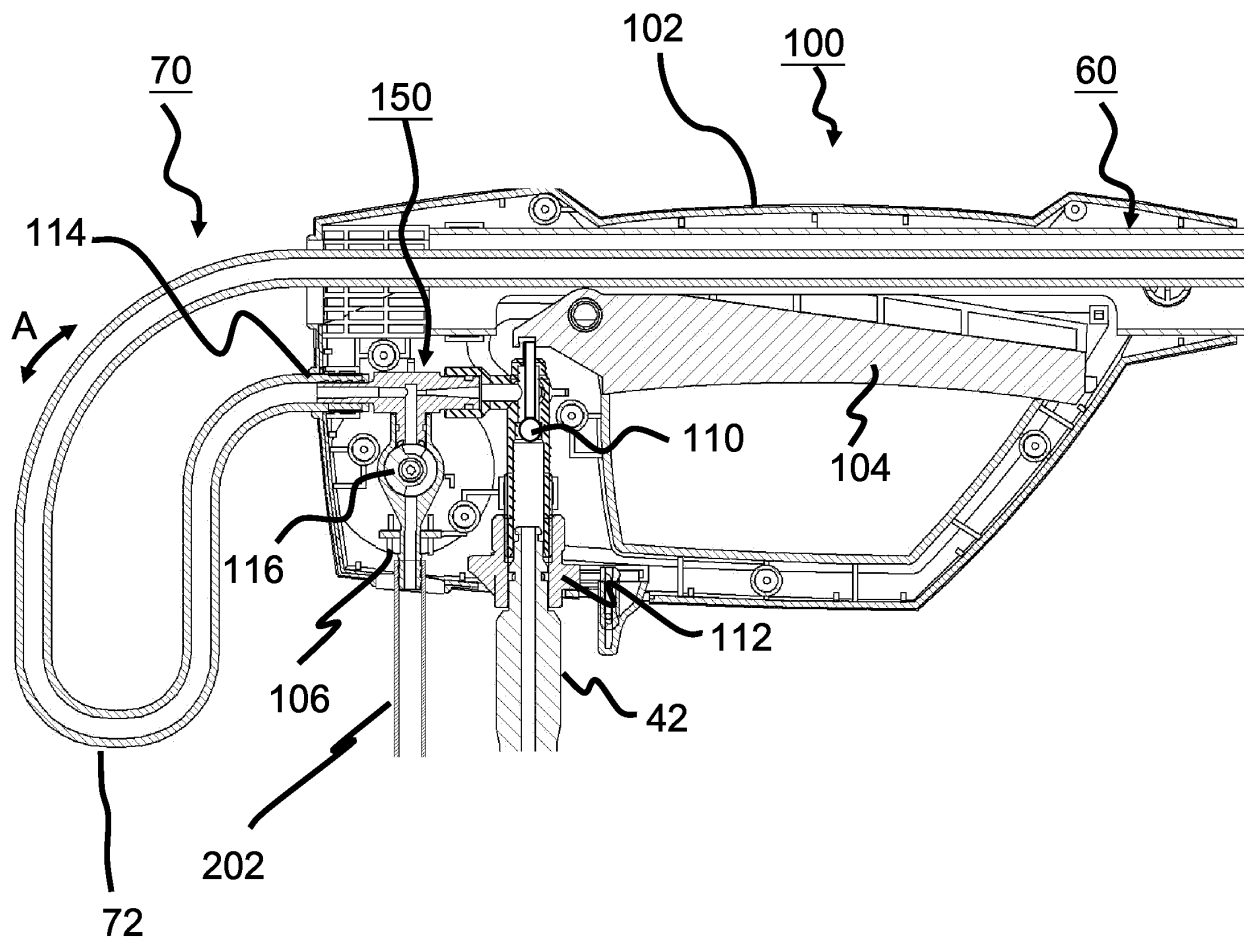
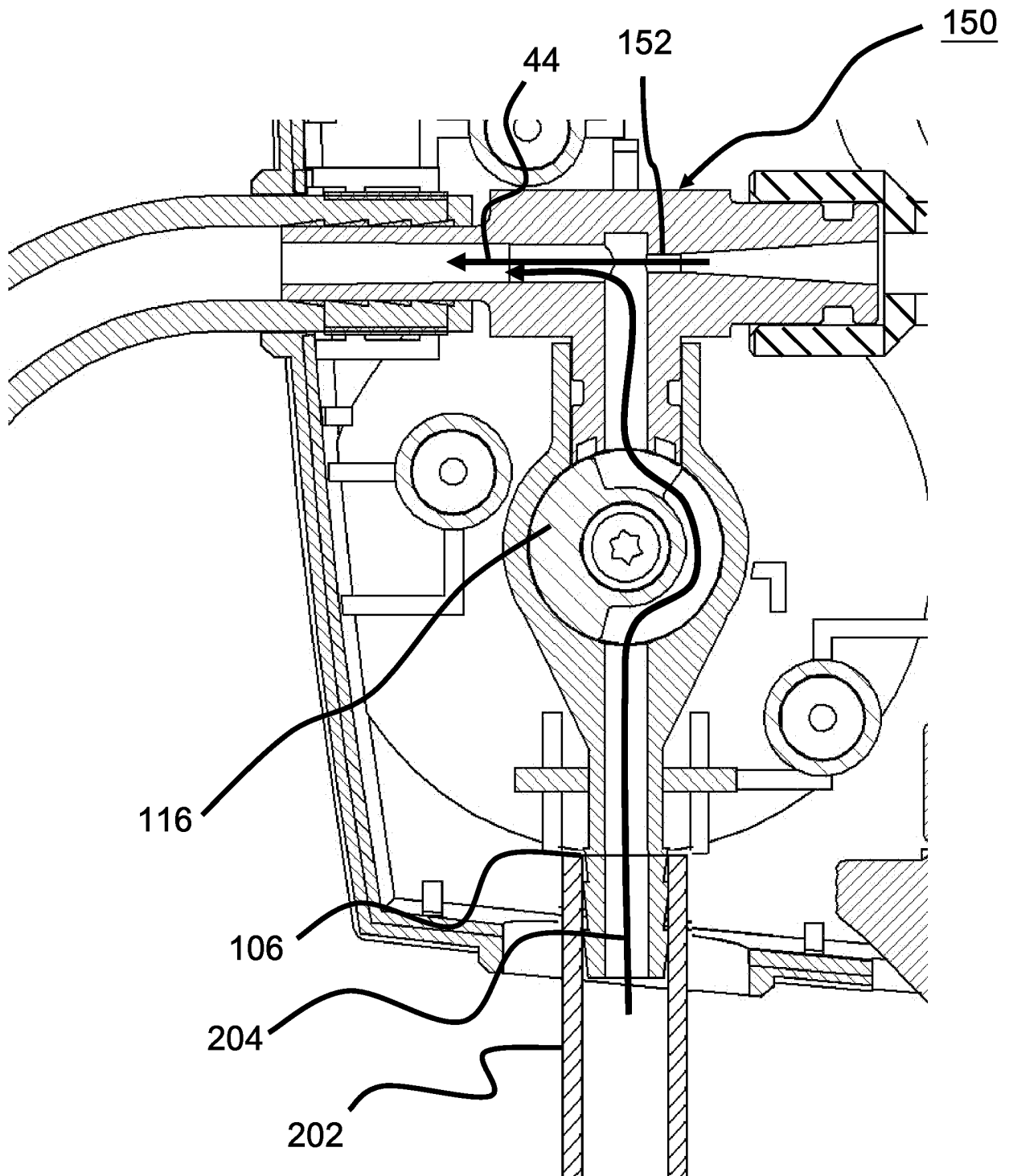


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20030071142 A1 [0003]
- US 6905080 B [0003]
- US 20020190145 A [0003]
- EP 2105550 A [0003]
- DE 20202532 [0003]
- FR 2901718 [0003]
- US 5725322 A [0003]
- US 5669558 A [0006]
- WO 2008086952 A [0006]
- US 3361300 A [0006]
- US 20060234616 A [0006]
- WO 9809739 A [0006]