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(54) **LANCE OF A CLEANING KIT FOR MEDIUM-VOLTAGE POWER DEVICES**

(57) **Summary of the invention**

The invention solves the problem of the construction of a lance of a cleaning kit for medium-voltage power devices.

The lance is equipped with an external assembly (A) and an internal assembly (B) placed therein, wherein the

external assembly (A) constitutes a head (1) with clamps (2) and (3) of connections, mounted in it from the front, and connected to a body (4). The body (4) is detachably connected to an extension (5), which at the opposite end is detachably connected to a dispensing nozzle (6).

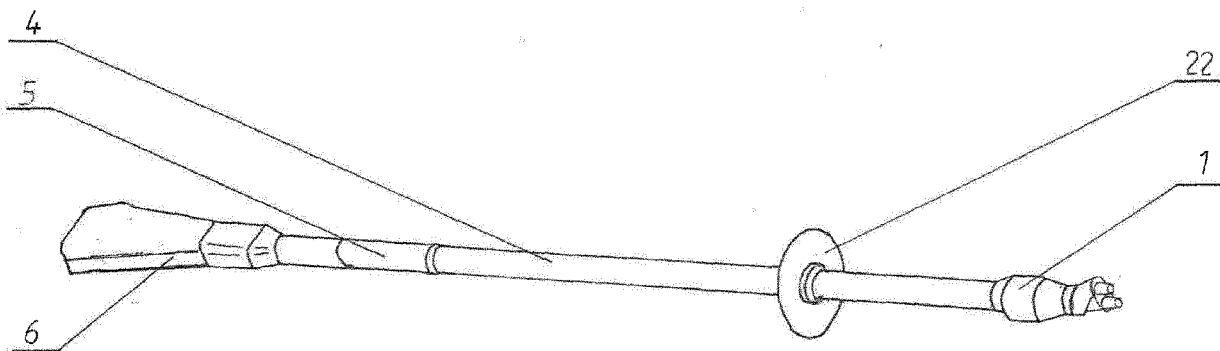


Fig.1

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Description

[0001] The subject of the invention is a lance of a cleaning kit for medium-voltage power devices during cleaning process.

[0002] The solution enables cleaning, mainly of power devices. It can also be used to clean other types of installations.

[0003] From the description of the Polish invention, protected by patent No. PL238 851, there is known a method and device for cleaning transmission channels and cooling channels of all types of devices, machines, tools, especially punches and forming dies, in which the channels are cleaned by dynamic, two-directional pulsation of the cleaning fluid in the channel being cleaned, using a cleaning arrangement with a modified double-membrane pump, connected to the cleaning arrangement in such a way that one section - the pump membrane is plugged in the arrangement on the supply side. The second membrane on the return side, which, after connecting the pump to a source of compressed air and cutting off the cleaned arrangement with a shut-off valve from the fluid tank and the supply pump, through alternating, pulsating vibrations of the membranes, introduces the cleaning fluid in the channel into a state of two-directional, dynamic pulsation and gives it a turbulent movement, thereby dynamizing the cleaning process.

[0004] The presented invention makes it possible to solve a similar technical problem, but due to the fact that it is carried out with the use of fluids, it is not suitable for use in electrical power installations operating under voltage.

[0005] The purpose of the solution, according to the invention, is to eliminate the existing disadvantages by developing the construction of a device enabling the cleaning process of industrial devices, mainly power installations, without the need to disconnect and immobilize them for the time of carrying out cleaning works.

[0006] The implementation of the invention is about developing a solution enabling the achievement of the objective goals, which is the removal of impurities from devices operating under medium voltage.

[0007] The essence of the invention is the construction of a lance, which is an essential component of a cleaning kit for energized power devices. The lance, thanks to the technical means used and the use of suitable raw materials with dielectric properties, allows to carry out the cleaning process of the installation without the necessary to shut it down for the duration of the work. As a result, electrical power devices, despite the work being carried out, can work without interference and perform their functions properly.

[0008] According to the invention, the lance of the cleaning kit for medium-voltage power devices is equipped with an external assembly and an internal assembly located therein.

[0009] The external lance assembly of the cleaning kit, according to the solution, is a head with clamps of technical

gas connections mounted in it from the front, connected to a body, detachably connected to an extension, which at the opposite end is connected to a dispensing nozzle.

[0010] A flow channel for an anti-frosting gas is formed within the external assembly and is connected to the anti-frosting gas connection clamp.

[0011] The internal assembly is a sleeve mounted axially in the body. It is a channel for the flow of the cleaning gas. The sleeve is connected to the cleaning gas connection clamp.

[0012] The head has the form of a solid of revolution which central part forms a cylinder with diagonally cut walls, adhering on both sides, the wall from the side of the connection clamp is stepped, converging towards the surface on which they are installed.

[0013] The head is connected to the body formed by a tube with an internal assembly sleeve axially mounted therein and connected to the cleaning gas connection clamp. The sleeve of the internal assembly in the cylindrical part of the head is shaped in the form of a bulb, inside which an openwork baffle is fixed transversely. This baffle acts as a mechanical filter to retain impurities from the gas flowing from the cleaning gas connection.

[0014] The sleeve of the external assembly, at the end, from the connection side of the extension, has a threading on the inside, matching the threading on the outer surface of the tip of the extension. These threadings cooperating with each other create a tight coupling between the extension and the body, secured from the outside with a "press-fit" fastening of the outer wall of the extension on the body, wherein the tube of the body is recessed at the place of attachment.

[0015] Above this recess, there is a ring covered with a flange. The same solution of the connection is placed on the opposite side, creating couplings between the extension and the dispensing nozzle.

[0016] The dispensing nozzle, depending on the needs, capacities and operational requirements, is connected to the extension.

[0017] The dispensing nozzle, in its initial section, near the extension, has the form of a sleeve, which at a certain distance from the place of connection with the extension turns into a flattened solid with side walls diagonally diverging to the sides, open at the end.

[0018] Inside the dispensing nozzle there is a sleeve which constitutes a continuation of the cleaning gas flow channel, converging to the narrowing towards point C, and then widening to the sides, so that its side walls are located parallel to the flared side walls of the dispensing nozzle. The walls of the dispensing nozzle and the axially located cleaning gas channel therein, wherein the walls extend perpendicularly to the flared side walls, form, in cross-section, closed circuits of the cleaning gas channel in the center, surrounded by the anti-frost gas flow channel. Keeping the walls of these channels at a constant distance from each other is ensured by fastening ribs mounted between them.

[0019] An element of the lance equipment is a protective cover, preferably transparent, mounted on the tube of the body, pressed against the flange and fixed with a nut.

[0020] The lance, according to the solution, is light and comfortable to use. Thanks to the appropriate shape and use of the extension, its length can be freely adjusted, adapting to the existing conditions. This makes it possible to clean places and surfaces previously inaccessible. The use of forced gas flow reduces the formation of thermal bridges and, as a result, eliminates frosting.

[0021] The subject of the invention has been illustrated in the attached drawing, in which fig. 1 shows a general view of the lance, **example 1**; fig. 2 shows a general view of the lance, **example 2**; fig. 3 shows a top view of the lance with the cleaning gas and anti-frosting flow clamps shown along with details presenting the views from the side of the clamps and the side of the dispensing nozzle, **example 1**; fig. 4 shows the lance in A-A section along with the coupling to the cleaning gas clamp, **example 1**; fig. 5 shows the lance in B-B section along with the gas clamps, **example 1**; fig. 6 shows a side view of the lance, **example 2**; fig. 7 shows the lance in C-C section, **example 2**; fig. 8 shows the lance in D-D section, **example 2**; fig. 9 illustrates the extension in cross section; fig. 10 shows the body in cross-section.

[0022] The lance of the cleaning kit for medium-voltage power devices is an essential element of the kit equipment.

[0023] The lance, **example 1**, made of a dielectric material, is provided with an external assembly A and an internal assembly B placed therein.

[0024] The external lance assembly A of the cleaning kit for medium-voltage power devices, according to the solution, is a head 1 with clamps 2 and 3 of gas connections mounted in it from the front, connected to a body 4, which is detachably connected to an extension 5, which at the opposite end is detachably connected to a dispensing nozzle 6.

[0025] The clamp 2 is connected to the anti-frosting gas connection, while clamp 3 is connected to the cleaning gas connection.

[0026] A flow channel for an anti-frosting gas A' is formed within the external assembly A, and is connected to the anti-frosting gas connection clamp 2, while a sleeve 7, located axially in the body 4, is a cleaning gas flow channel B' and is connected to the cleaning gas clamp 3.

[0027] The head 1 has the form of a solid of revolutions, which central part forms a cylinder 8 with diagonally cut walls 9 and 10, adhering to it at both ends, and the wall 9, from the side of the clamps 2 and 3, is stepped, converging towards the surface on which the clamps 2 and 3 of the connections are installed.

[0028] The head 1 is connected to the body 4, which is in the form of a tube, with the sleeve 7 of the internal assembly B axially mounted therein, connected to the clamp 2 of the cleaning gas connection. The sleeve 7 in the cylindrical part of the head 1 is shaped in the form of

a bulb, inside which an openwork baffle 11 is installed transversely, acting as a mechanical filter, arresting impurities from the cleaning gas, which is directed from the connection with the clamp 2.

[0029] The sleeve of the body 4 of the external assembly A, from the connection side of the extension 5, has a threading 12 on the inner surface, matching the threading 13 made on the outer surface of the extension 5. Cooperation between these threadings allows to obtain a tight coupling of the extension 5 with the body 4, secured from the outside with a "press-fit" of the outer wall 5' of the extension 5 on the part 14 of the wall of the tube of the body 4 recessed from the outside.

[0030] Above the recess 14, the tube of the body 4 has a ring 15 secured with a flange 16. The same solution, representing the coupling of the body 4 with the extension 5 is located on the opposite side of the extension 5, connecting it with the dispensing nozzle 6.

[0031] The dispensing nozzle 6, connected to the extension 5, has in its initial section the form of a tube which constitutes a continuation of the anti-frosting gas flow channel A' with the sleeve 7 of the cleaning gas flow channel B' located inside. The dispensing nozzle widens at a certain distance from the connection point with the extension 5, turning into a flattened solid with diagonally diverging side walls 17, open at the end. The flattened surface of the dispensing nozzle 6, **example 1**, is horizontal to the ground.

[0032] Located in the dispensing nozzle 6, the sleeve 7 of the cleaning gas flow channel B' narrows towards point C, and then widens. Walls 18 of the cleaning gas channel B', tilted to the sides, are placed parallel to the walls 17 of the anti-frosting gas flow channel A'.

[0033] Located perpendicularly to the flared side walls 17 and 18, walls 19 and 20 form, in cross-section, closed circuits of the cleaning gas channel B' surrounded by the area of the anti-frosting gas flow channel A'. Keeping the walls of the channels A' and B' at a constant distance is ensured by fastening ribs 21 mounted between the walls 17 and 18.

[0034] An element of the lance equipment, according to the solution, **example 1**, is a protective, transparent cover 22, mounted on the body 4, and pressed against the flange 16 with a nut 23.

[0035] According to the invention, the lance, **example 2**, is made of a dielectric material and provided with an external assembly A and an internal assembly B placed therein.

[0036] The external assembly A of the lance of the cleaning kit for medium-voltage power devices, according to the solution, is a head 1 with clamps 2 and 3 of gas connections mounted in it from the front, connected to a body 4 detachably connected to an extension 5, which at the opposite end is detachably connected to a dispensing nozzle 6.

[0037] The clamp 2 is connected to the anti-frosting gas connection, while the clamp 3 is connected to cleaning gas connection.

[0038] Inside the external assembly A, an anti-frosting gas flow channel A' is formed, which is connected to the anti-frosting gas connection clamp 2, while a sleeve 7, located axially in the body 4, is a cleaning gas flow channel B' and is connected to the cleaning gas clamp 3.

[0039] The head 1 has the form of a solid of revolutions, wherein the central part of the head forms a cylinder 8 with diagonally cut walls 9 and 10 adhering to it at both ends, and the wall 9, from the side of the clamps 2 and 3, is stepped, converging towards the surface on which the clamps 2 and 3 of the connections are installed.

[0040] The head 1 is connected to the body 4, which is in the form of a tube, with the sleeve 7 of the internal assembly B axially mounted therein, connected to the clamp 2 of the cleaning gas connection. The sleeve 7 in the cylindrical part of the head 1 is shaped in the form of a bulb, inside which an openwork baffle 11 is installed transversely, acting as a mechanical filter arresting impurities from the cleaning gas, which is directed from the connection with the clamp 2.

[0041] The sleeve of the body 4 of the external assembly A, from the connection side of the extension 5, has a threading 12 on the inner surface matching the threading 13 made on the outer surface of the extension 5. Cooperation between these threadings allows to obtain a tight coupling of the extension 5 with the body 4, secured from the outside with a "press-fit" of the outer wall 5' of the extension 5 on the part 14 of the wall of the tube of the body 4 recessed from the outside.

[0042] Above the recess 14, the tube of the body 4 has a ring 15 secured with a flange 16. The same solution, representing the coupling of the body 4 with the extension 5, is on the opposite side, connecting the extension 5 with the dispensing nozzle 6.

[0043] The dispensing nozzle 6, connected with the extension 5, has in its initial section the form of a sleeve which constitutes a continuation of the anti-frosting gas flow channel A' with the sleeve 7 of the cleaning gas flow channel B' located inside, expanding at a certain distance from the connection point with the extension 5. It turns into a flattened solid with diagonally extending side walls 17, open at the end.

[0044] The flattened surface of the dispensing nozzle 6, **example 2**, is angularly bent.

[0045] Placed in the dispensing nozzle 6, the sleeve 7 of the cleaning gas flow channel B' narrows towards point C, and then widens. Walls 18 of the cleaning gas channel B', tilted to the sides, are placed parallel to the walls 17 of the anti-frosting gas flow channel A'.

[0046] Located perpendicularly to the flared side walls 17 and 18, walls 19 and 20 form, in cross-section, closed circuits of the cleaning gas channel B' surrounded by the area of the anti-frosting gas flow channel A'. Keeping the walls of the channels A' and B' at a constant distance is ensured by fastening ribs 21 mounted between the walls 17 and 18.

[0047] An element of the lance equipment, according to the solution, **example 2**, is a protective, transparent

cover 22, mounted on the body 4, and pressed against the flange 16 of a nut 23.

5 Claims

1. A lance of a cleaning kit for medium-voltage power devices, **characterized in that** it is equipped with an external assembly (A) and an internal assembly (B) placed therein, wherein the external assembly (A) is a head (1) with clamps (2) and (3) of connections, mounted in it from the front, connected to the body (4) detachably connecting to an extension (5), which at the opposite end is detachably connected to a dispensing nozzle (6); moreover, inside the external assembly (A) there is an anti-frosting gas flow channel (A'), connected to the clamp (2) of the anti-frosting gas connection, while the sleeve (7) constituting the internal assembly (B) located axially in the body (4) creates a cleaning gas flow channel (B') and is connected to the cleaning gas clamp (3); moreover, the head (1) has the form of a solid of revolutions, and in its cylindrical part, the sleeve (7) is shaped in the form of a bulb, inside which an openwork baffle (11) is installed transversely, while from the side of the connection with the extension (5), on the inner surface of the sleeve of the body (4), there is a threading (12) matching the threading on the outer surface of the tip of the extension (5), creating a tight coupling of the extension (5) with the body (4), secured from the outside with a "press-fit" mounted outer wall (5') of the extension; moreover, the body (4), at the end from the outside, has a recess (14) over which a ring (15) is mounted, secured with a flange (16), while the same recess (14) is located on the outer wall of the dispensing nozzle (6), in the initial section, in the form of a sleeve, and then widening to the sides into the form of a flattened solid with diagonally diverging side walls (17), open at the end, wherein the sleeve of the dispensing nozzle (6) being a section of the gas cleaning channel (B'), narrows and then widens towards point (C), and its flared walls (18) run parallel to the walls (17) of the anti-frosting agent flow channel (A') and together with angularly bent walls (19) and (20) form a closed circuit of the cleaning gas channel (B') surrounded by the area of the anti-frosting agent flow channel (A').
2. The lance according to claim 1, **characterized in that** an element of its equipment is a protective cover (22) mounted on the body (4), and pressed against the flange (16) with a nut (23).
3. The lance according to claim 1, **characterized in that** the clamp (2) is connected to the anti-frosting gas connection, and the clamp (3) is connected to the cleaning gas connection.

4. The lance according to claim 1, **characterized in that** the central part of the head (1) is formed by a cylinder (8) with diagonally cut walls (9) and (10) adhering to it at both ends, wherein the wall (9), from the side of the clamps (2) and (3) is stepped, converging towards the surface with the anti-frosting gas connection clamp (2) and the cleaning gas clamp (3) installed thereon. 5
5. The lance according to claim 1, **characterized in that** an openwork baffle (11) is a mechanical filter of impurities in the cleaning gas. 10
6. The lance according to claim 1, **characterized in that** it is made of a dielectric material. 15
7. The lance according to claim 1, **characterized in that** the dispensing nozzle (6) at the end is parallel to the ground or angularly bent. 20

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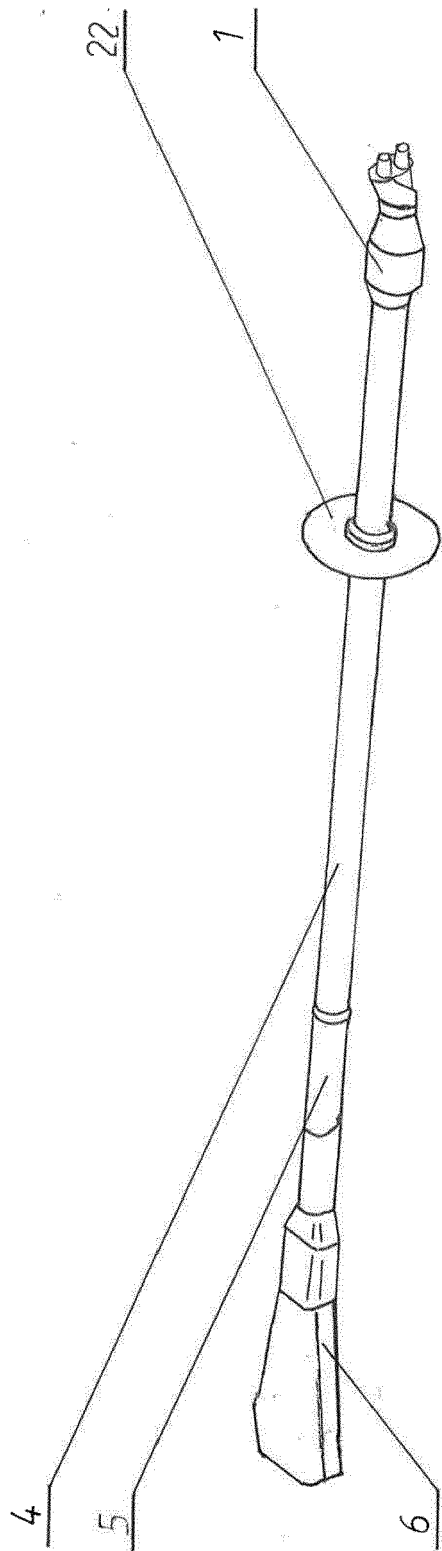


Fig.1

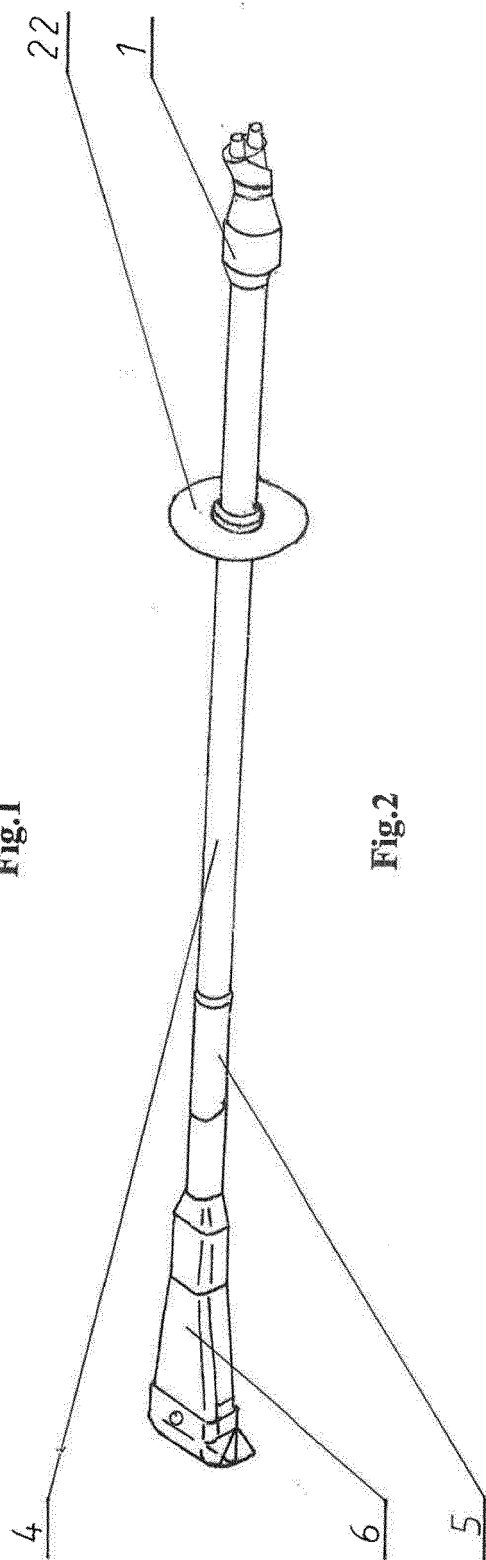


Fig.2

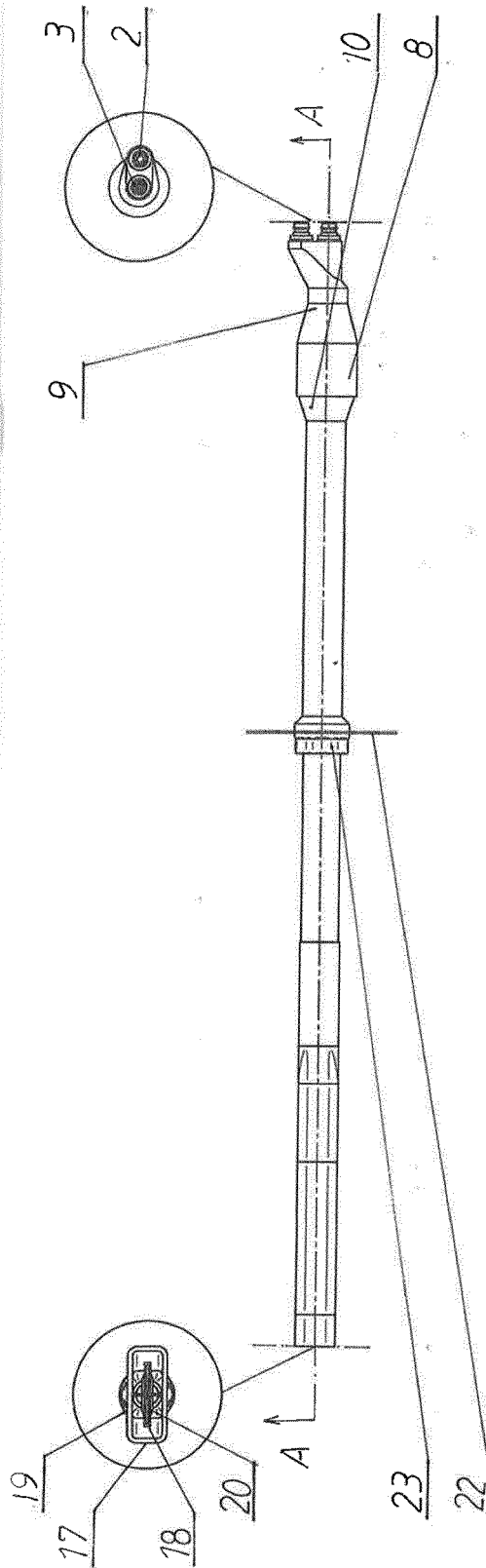


Fig.3

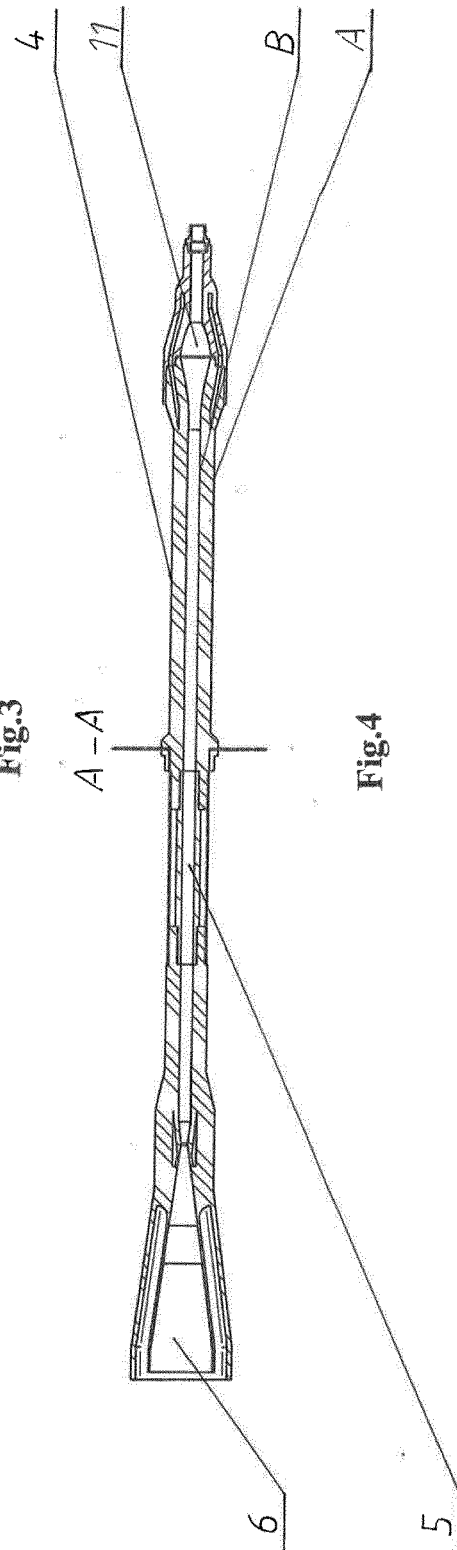


Fig.4

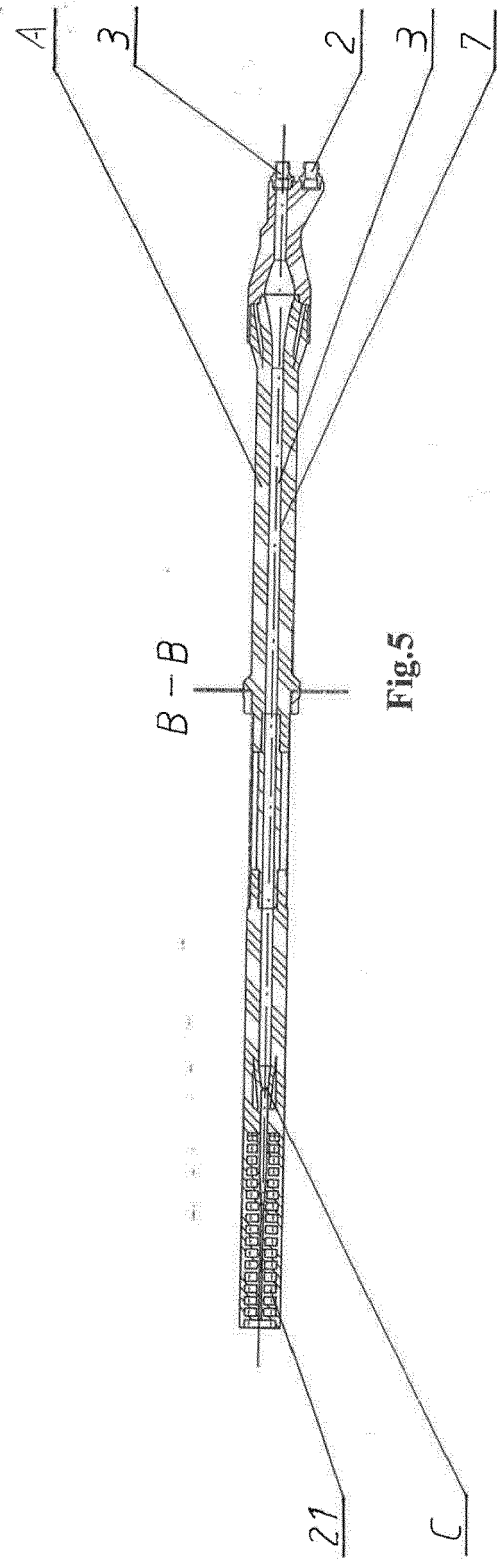


Fig.5

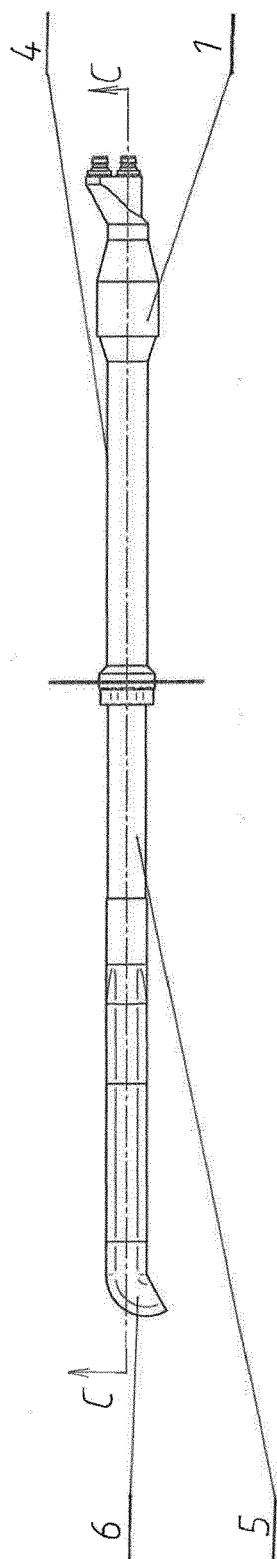
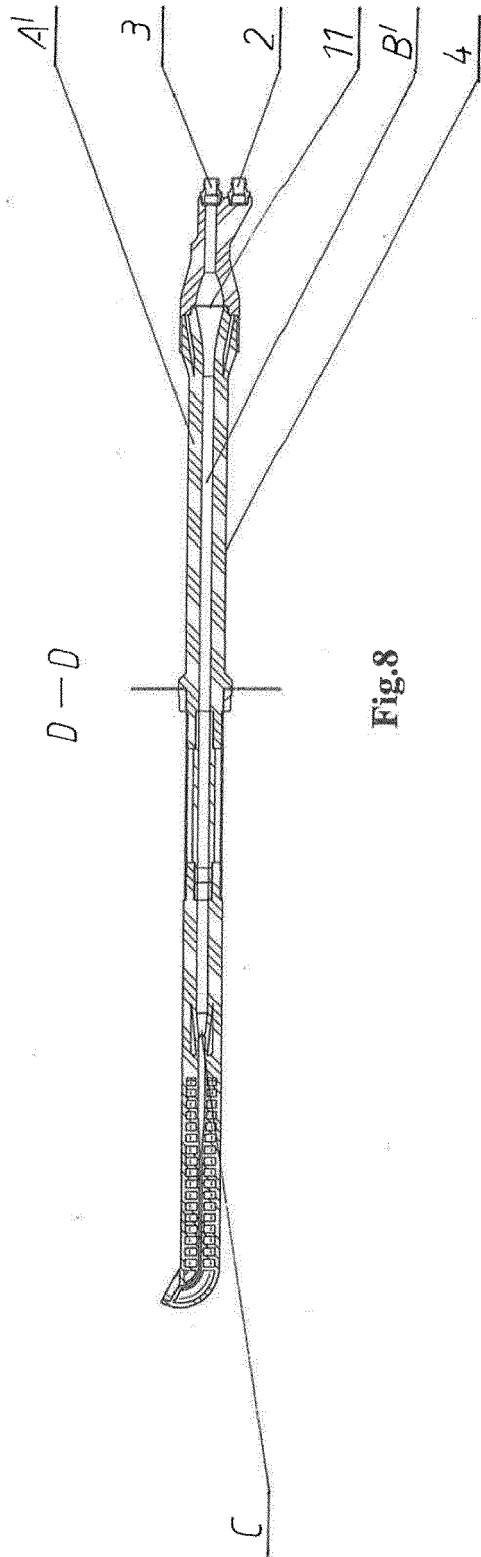
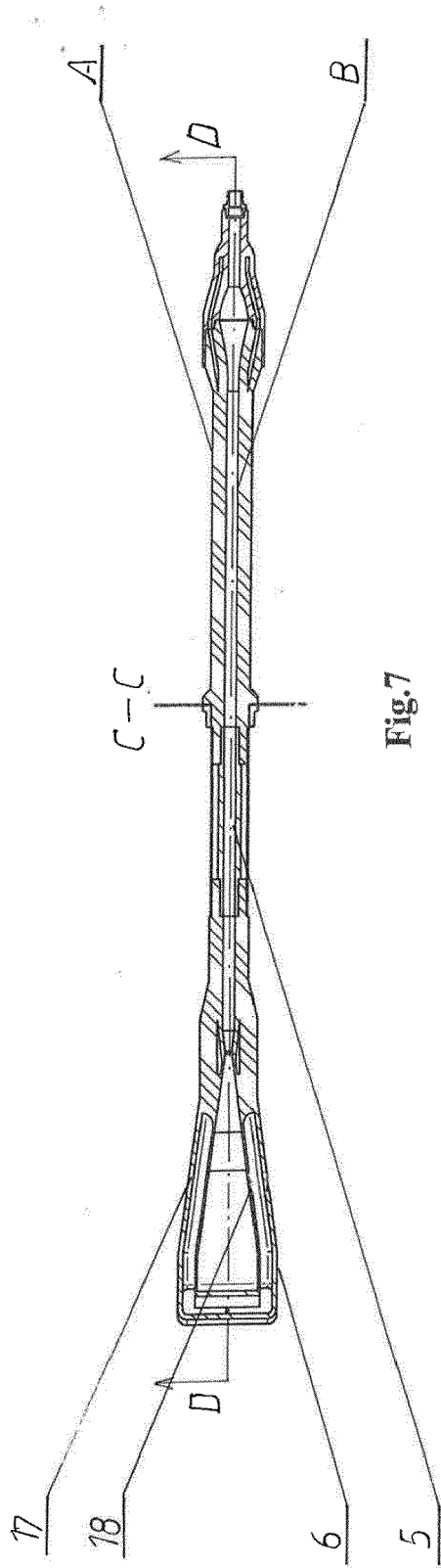
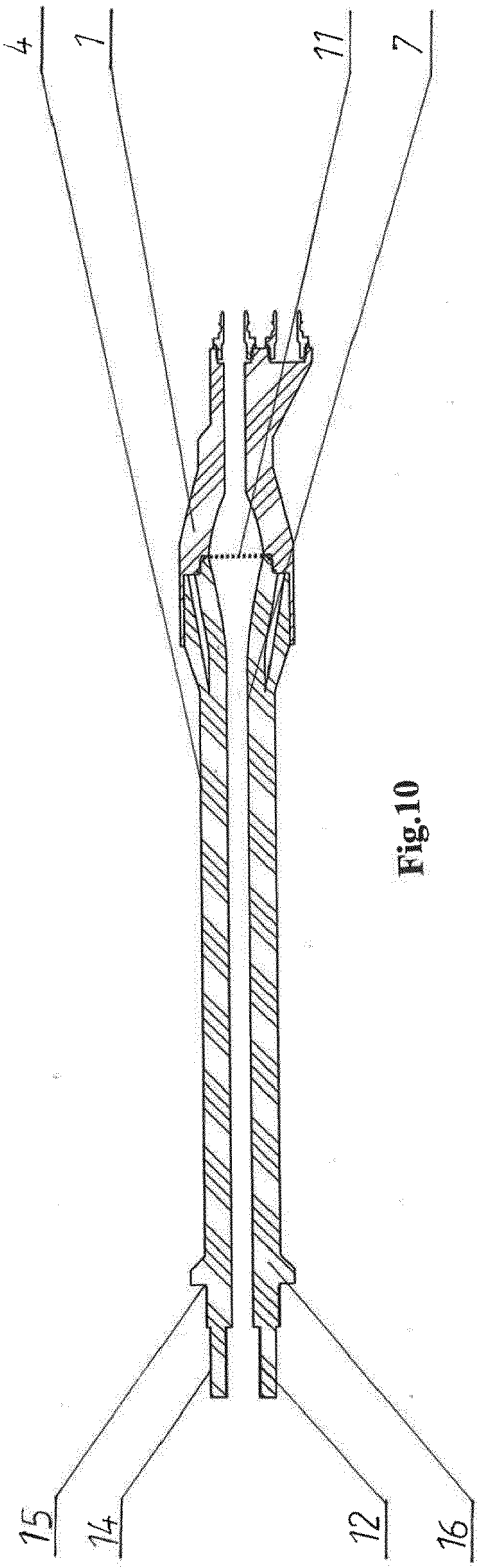
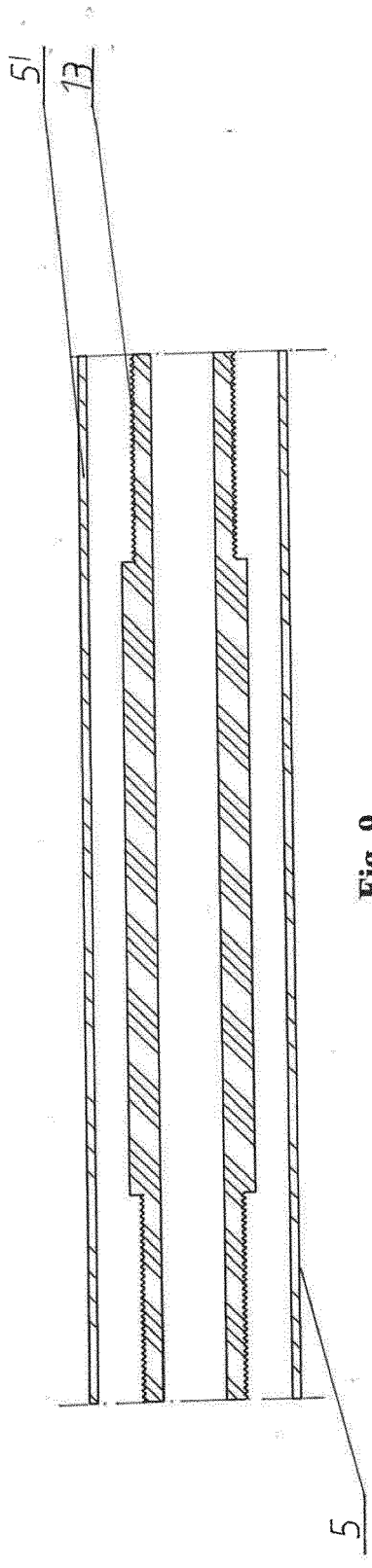


Fig.6







PARTIAL EUROPEAN SEARCH REPORT

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2016/332175 A1 (FU DEN-NAN [TW] ET AL) 17 November 2016 (2016-11-17) * abstract; figures * * paragraph [0020] - paragraph [0027] * -----	1-7	INV. B08B5/02 B05B15/65 B05B12/14
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			TECHNICAL FIELDS SEARCHED (IPC)
			B08B

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

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Place of search	Date of completion of the search	Examiner
The Hague	3 July 2024	Plontz, Nicolas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

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INCOMPLETE SEARCH SHEET C

Application Number

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Claim(s) searched incompletely:

1-7

Reason for the limitation of the search:

Following the invitation pursuant to Rule 63(1) , the applicant has filed a statement in the letter dated 30-04-2024 indicating the subject-matter to be searched, the search will be conducted on the subject-matter indicated in said letter of reply.

1 The subject-matter indicated in the letter dated 30-04-2024 reads:

1.1 A lance of a cleaning kit for medium-voltage power devices, characterized in that it is equipped with an external assembly (A) and an internal assembly (B) placed therein, wherein the external assembly (A) comprises a head (1) with clamps (2) and (3) of gas connections, a first clamp (2) for connection to an anti-frosting gas, and a second clamp (3) for connection to a cleaning gas, mounted in it from the front, and a body, wherein the head is connected to the body (4), said body being detachably connected to an extension (5), which said connection extension being at the its opposite end is detachably connected to a dispensing nozzle (6);

1.2 moreover, inside the external assembly (A) there is a an anti-frosting gas flow channel (A'), connected to the first clamp (2) of the anti-frosting gas connection, while wherein the internal assembly (B) the comprises a first sleeve (7) constituting the internal assembly (B) located axially in the body (4) 1.3 which creates a cleaning gas flow channel (B') and is connected to the cleaning gas clamp (3);

1.4 moreover, the head (1) has the form of a solid of revolutions, and in its cylindrical part, the sleeve (7) is shaped in the form of a bulb, inside which an openwork baffle (11) is installed transversely,

1.5 while from the side of the connection with the extension (5), on the inner surface of the sleeve of the body (4), there is a threading (12) matching the a threading on the outer surface of the tip of the extension (5), creating a tight coupling of the extension (5) with the body (4), secured from the outside with a "press-fit" fastening of the mounted outer wall (5') of the extension;

1.6 moreover, the body (4), at the end from the outside, the place of attachment has a recess (14) over which a ring (15) is mounted, secured covered with a flange (16), while the same recess (14) is located on the outer wall of the dispensing nozzle (6), wherein said dispensing nozzle in the its initial section, near the extension, has the form of a 1.7 second sleeve, which at a certain distance from the place of connection with the extension turns into a flattened solid with side walls (17) diagonally diverging to the sides, and is open at the end,

1.8 wherein inside the dispensing nozzle (6) there is a third sleeve which constitutes a continuation of the cleaning gas flow channel (B') , the sleeve of the dispensing nozzle (6) being a section of the gas cleaning channel (B'), which second sleeve narrows and then widens towards a point (C) and then widens, and its flared wherein said widening walls (18) of the third sleeve run parallel to the diverging walls (17) of the anti-frosting agent flow channel (A') 1.9 second sleeve and

1.10 wherein together with the flattened surface of the dispensing

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SHEET C

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nozzle (6) is angularly bent walls (19,) and (20) form,
and wherein the further walls of the sleeves (19) and (20), respectively
perpendicular to the walls of the diverging walls (17) of the second
sleeve and to widening walls (18) of the third sleeve form, in
cross-section, a closed circuit1.11 s of the cleaning gas channel
(B') surrounded by the area of the anti-frosting agent flow channel (A').

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-07-2024

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- PL 238851 [0003]