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(54) **ELECTRICAL INSULATOR WITH THREAD AND METHOD OF ITS CLEANING**

(57) The present invention relates to an electrical insulator (1) of cylindrical shape with a thread-shaped surface (2), a brush (3), a motor (4) and a supporting element (6).

The present invention also relates to a method of cleaning the insulator, as defined in claim 1, wherein the insulator (1), which has a thread-shaped surface (2) driven by the motor (4) rotates around its axis, and the brush (3) attached to the insulator (1) moves along the insulator, causing removal of particles deposited on the insulator (1).

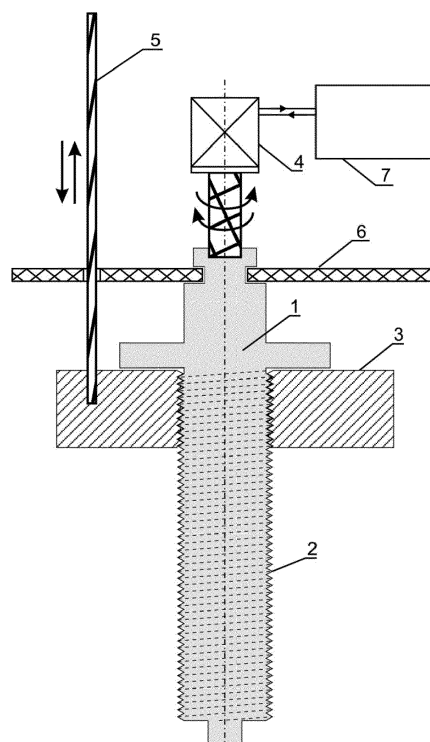


Fig.1

Description

[0001] The present invention relates to an electrical insulator with a thread-shaped surface and a threaded brush for cleaning the insulator surface. The insulator with a thread and its cleaning brush can be used e.g. in dusty places, in particular in devices for dust removal from gases, i.e. electrostatic precipitators.

[0002] The cleaning of the threaded insulator consists of turning the insulator around its axis with the rotation of the brush prevented, as a result the brush moves along the threaded insulator. The same effect can be achieved by turning the brush around the immobilized insulator. The brush moving along the insulator scrapes off the dust from its surface. Reversing the direction of rotation (of insulator or brush) returns the brush to its original position.

[0003] Patent EP0278606A2 discloses an electrical insulator for use in a humid and polluted environment. It was formed into a mandrel from which the protrusions extend symmetrically at an angle of 30 - 90 degrees to the mandrel. This construction allows condensed water to run down the insulator, which causes the surface is cleaned.

[0004] Patent US5421863A discloses a device with an electrically insulating disk for use in an electrostatic precipitator. The insulator is attached to a high voltage rod. The electrostatic precipitator channel is equipped with a device for supplying compressed ventilation air or other gas as an insulator cleaning agent.

[0005] Patent US3257501A discloses a method of obtaining an electrical insulator and its construction. The insulator has the shape of a truncated cone with a spiral cavity, whose task is to drain water from the surface of the insulator.

[0006] Patent US2897386A discloses a self-cleaning insulator used, e.g. in electric machines. The insulator is made of a high voltage insulating element which has an exposed surface subjected to current discharges or cross arcs for cleaning the dirty surface of the insulator.

[0007] Patent US2155848A discloses an electrical insulator, particularly well-suited for use where it is exposed to moisture, such as rain or fog. The water settling on its surface creates a continuous stream with a substantially homogeneous resistance to obtain a uniform voltage drop on the insulator.

[0008] Patent US7387167B2 discloses an electrically insulating drilling tool device for insulating the first conductive element from the second conductive tool element.

[0009] The purpose of the present invention is to provide an electrical insulator with a thread and a brush to separate elements with a significant difference in electrical potential, even in a highly polluted environment. This problem has been solved to a significant extent in the present invention.

[0010] The present invention relates to an electrical insulator of cylindrical shape with a thread-shaped sur-

face, a brush, a motor and a supporting element.

[0011] The electrical insulator where the brush is mounted with a guide and with the motor are attached to the supporting element.

[0012] The electrical insulator where the brush can have at least one a convex scraper fitting to the thread, preferably when the first convex scraper is full and fills the entire thread cavity on the insulator.

[0013] The electrical insulator where the brush fitting to the insulator thread can be equipped with an additional wire brush with wire ends surrounding the insulator thread.

[0014] The electrical insulator is made of dielectric material, preferably ceramic.

[0015] The electrical insulator where the thread is preferably metric or trapezoidal.

[0016] The electrical insulator has the brush made of dielectric material.

[0017] The electrical insulator has the supporting element which can be the housing of the dust removal device.

[0018] The electrical insulator can be a single-sided closed sleeve with a thread on the inner surface.

[0019] A method of cleaning the defined above insulator wherein the insulator, which has a thread-shaped surface, driven by the motor rotates around its axis, and the brush attached to the insulator moves along the insulator, causing removal of particles deposited on the insulator.

[0020] The method where rotation of the insulator causes the brush to move along the insulator, up or down depending on the direction of rotation, to scrape the deposited particles off the insulator.

[0021] The method where the motor work is operated by a controller that provides a voltage to the motor and controls the direction and number of its rotations.

[0022] The method where the brush is attached to the guide and to the supporting element so that the brush moves along the axis of the insulator.

[0023] The method where the insulator can have a hole through the center along its axis, and a metal rod with high voltage applied passes through this hole. The rod mounted in this hole is used to rotate the insulator around its axis. The motor rotation is transmitted to the rod by an additional connector made of dielectric material which rotates in a sleeve made of dielectric material.

[0024] The method where the cleaning brush is mounted inside the insulator, and its rotation around the insulator axis is blocked by non-rotatable attachment of the high-voltage element.

[0025] An advantage of the invention is its construction, which allows to rotate one of the elements, i.e. the insulator or the brush (while blocking the rotation of the other element) for simple removal of collected particles from the surface of the insulator. This makes it easy to keep the insulator surface clean, which is a key factor in ensuring that the electrical insulator works properly.

Description of the figures:**[0026]**

Fig.1 - presents cross-section of an electrical insulator with a brush and other elements used to clean the insulator

Fig.2 - presents cross-section of a variant of electrical insulator with a hole through the center, along its axis

Fig.3 - presents cross-section of a variant of electrical insulator in the form of a sleeve

Fig.4 - presents cross-section of a variant of brush with a convex scraper with teeth

Fig.5 - presents cross-section of a variant of brush with an additional wire brush.

Description of reference numerals:**[0027]**

- 1 - an electrical insulator
- 2 - a surface in the form of a thread
- 3 - a brush
- 4 - a motor
- 5 - a guide
- 6 - a supporting element
- 7 - a motor controller
- 8 - a metal rod
- 9 - a connector
- 10 - a sleeve
- 11 - a non-rotatable attachment of a high-voltage element
- 12 - a convex scraper on the brush
- 13 - a first convex scraper tooth
- 14 - a wire brush

[0028] The present invention is illustrated by the following example construction which is not a limitation of it.

[0029] The subject matter of the invention is shown in the exemplary embodiments in the drawings Fig. 1 - Fig.

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[0030] The electrical insulator (1) of cylindrical shape has a thread-shaped surface (2), is attached to the motor (4) and has the guide mounted (5) brush (3), which allows removing the dust deposited on the surface of the insulator (1). Cleaning of such an insulator (1) is carried out in such a way that it is driven by a motor (4) and can rotate around its axis, but cannot move along this axis, while the brush (3) attached with a guide (5) cannot rotate, but it can move along the axis of the insulator (1). Therefore, rotating the insulator (1) causes the brush (3) to move and remove the dust deposited on the insulator. The work of the motor (4) rotating the insulator is operated by the controller (7), which provides a voltage to the motor and controls the direction and number of its rotations.

[0031] According to the invention the electrical insulator (1) for separating elements with a significant difference in electrical potential, in particular for operation in a highly polluted environment (e.g. in dust removal devices), is made of a dielectric material, e.g. ceramics. The insulator surface is in the form of a thread (2) and it can be metric, trapezoidal or other thread. The brush (3) made of dielectric material fits to this thread. The insulator is attached to the motor (4), which can rotate it in both directions, but it is impossible to move the insulator along the axis of rotation. The brush (3) is attached with a guide (5) that does not allow the brush to rotate, but allows the brush to move along the insulator axis (1). All these elements are attached to the supporting element (6), which can be the housing of the dust removal device. The supporting element (6) can be made of e.g. sheet metal and can be grounded. The element with high electrical potential (e.g. discharge electrode in the ESP, high voltage wire) is mounted on the bottom of the insulator with a rotary joint, so that the rotation of the insulator does not rotate the element (Fig. 1).

[0032] In one of the variants, the insulator (1) can have a hole through the center (along its axis) and a metal rod (8) with high voltage applied passes through this hole. The rod (8) is mounted in this hole and it is used to rotate the insulator around its axis. The motor rotation (4) is transmitted to the rod (8) by an additional connector (9) made of dielectric material, causing rotation in a sleeve (10) which is made of dielectric material (Fig. 2).

[0033] In other variant, the insulator (1) can be a single-sided closed sleeve with a thread on the inner surface (2). In such a variant, the cleaning brush (3) is mounted inside the insulator, and its rotation around the axis of the insulator (1) is blocked by a non-rotatable attachment of the high-voltage element (11) (Fig. 3).

[0034] In one of the variants, the brush (3) can have at least one a convex scraper (12) fitting to the insulator thread, resulting in scraping the dust deposited on the insulator thread. It is beneficial when the first convex scraper tooth (13) is full, i.e. fills the entire thread cavity on the insulator (Fig. 4).

[0035] In one of the variants, the brush (3) fitting to the insulator thread can be equipped with an additional wire

brush (14) with wire ends surrounding the insulator thread, which scrape the dust deposited on the insulator thread (Fig. 5).

[0036] In another variant of the insulator (1) and the brush (3), the cleaning of the insulator can also be done by rotating the brush while preventing the insulator from rotating, causing the same effect, i.e. the brush moving along the insulator.

Claims

1. The electrical insulator **characterized in that** the insulator (1) of cylindrical shape has a thread-shaped surface (2), a brush (3), a motor (4) and a supporting element (6).
2. The electrical insulator according to claim 1, **characterized in that** the brush (3) is mounted with the guide (5) and with the motor (4) are attached to the supporting element (6).
3. The electrical insulator according to claim 1, **characterized in that** the brush (3) can have at least one convex scraper (12) fitting to the insulator thread (2), preferably when the first convex scraper tooth (13) is full, i.e. fills the entire thread cavity on the insulator (1).
4. The electrical insulator according to claim 1, **characterized in that** the brush (3) fitting to the thread (2) of the insulator (1) can be equipped with an additional wire brush (14) with wire ends surrounding the insulator thread (1).
5. The electrical insulator according to claim 1, **characterized in that** the insulator (1) is made of dielectric material, preferably ceramic.
6. The electrical insulator according to claim 1, **characterized in that** the thread (2) is preferably metric or trapezoidal.
7. The electrical insulator according to claim 1, **characterized in that** the brush (3) is made of dielectric material.
8. The electrical insulator according to claim 1, **characterized in that** the supporting element (6) can be a housing of a dust removal device.
9. The electrical insulator according to claim 1, **characterized in that** the insulator (1) can be in the form of a single-sided closed sleeve with a thread on the inner surface (2).
10. The method of cleaning the insulator, as defined in claim 1, **characterized in that** the insulator (1) which

has a thread-shaped surface (2), driven by the motor (4) rotates around its axis, and the brush (3) attached to the insulator (1) moves along the insulator, causing removal of particles deposited on the insulator (1).

11. The method according to claim 10, **characterized in that** the rotation of the insulator (1) causes the brush (3) to move along the insulator (1), up or down depending on the direction of rotation, to scrape the deposited particles off the insulator.
12. The method according to claim 10, **characterized in that** the motor (4) work is operated by a controller (7) that provides a voltage to the motor (4) and controls the direction and number of its rotations.
13. The method according to claim 10, **characterized in that** the brush (3) is attached to the guide (5) and to the supporting element (6) so that the brush (3) moves along the axis of the insulator (1).
14. The method according to claim 10, **characterized in that** the insulator (1) can have a hole through the center along its axis, and a metal rod (8) with high voltage applied passes through this hole and is mounted in this hole and used to rotate the insulator (1) around its axis, where the motor (4) rotation is transmitted to the rod (8) by an additional connector (9) made of dielectric material which rotates in a sleeve (10) made of dielectric material.
15. The method according to claim 10, **characterized in that** the cleaning brush (4) is mounted inside the insulator (1) and its rotation around the insulator axis is blocked by non-rotatable attachment of the high-voltage element (11).

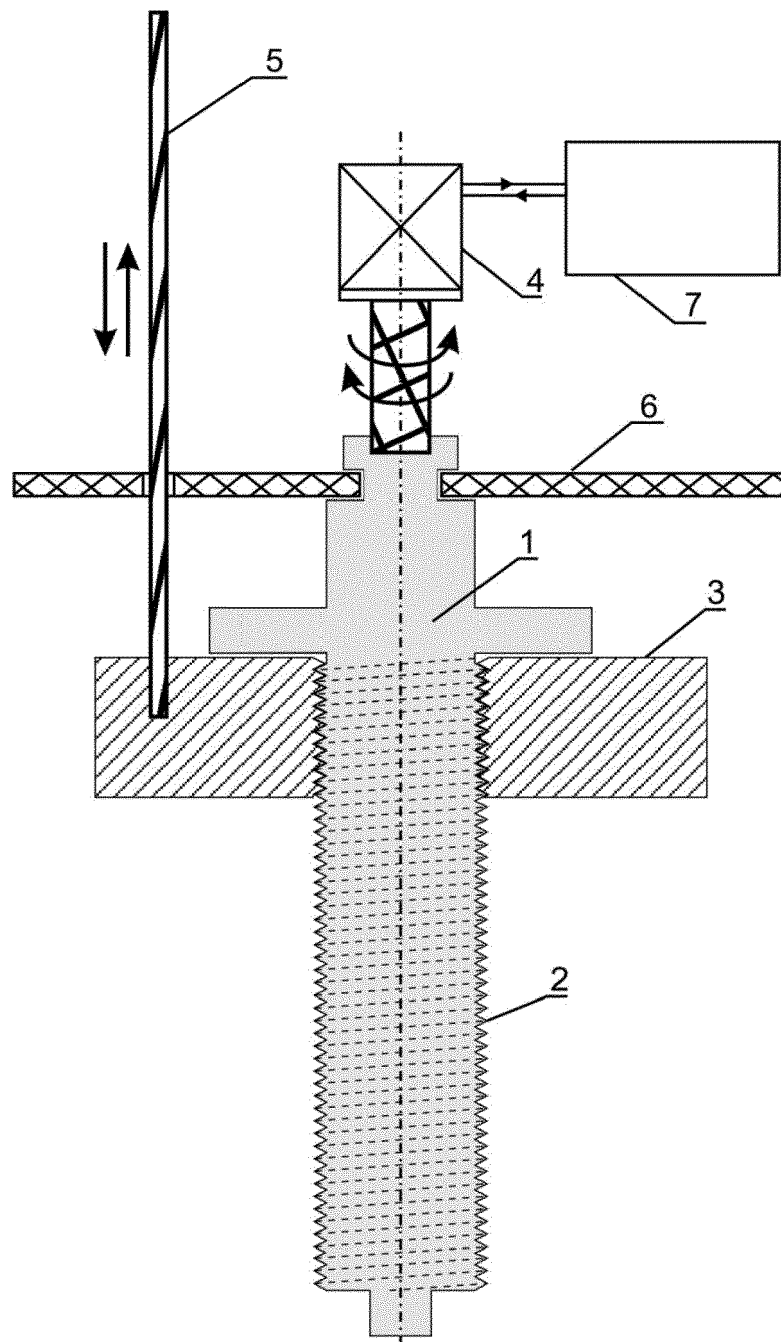


Fig.1

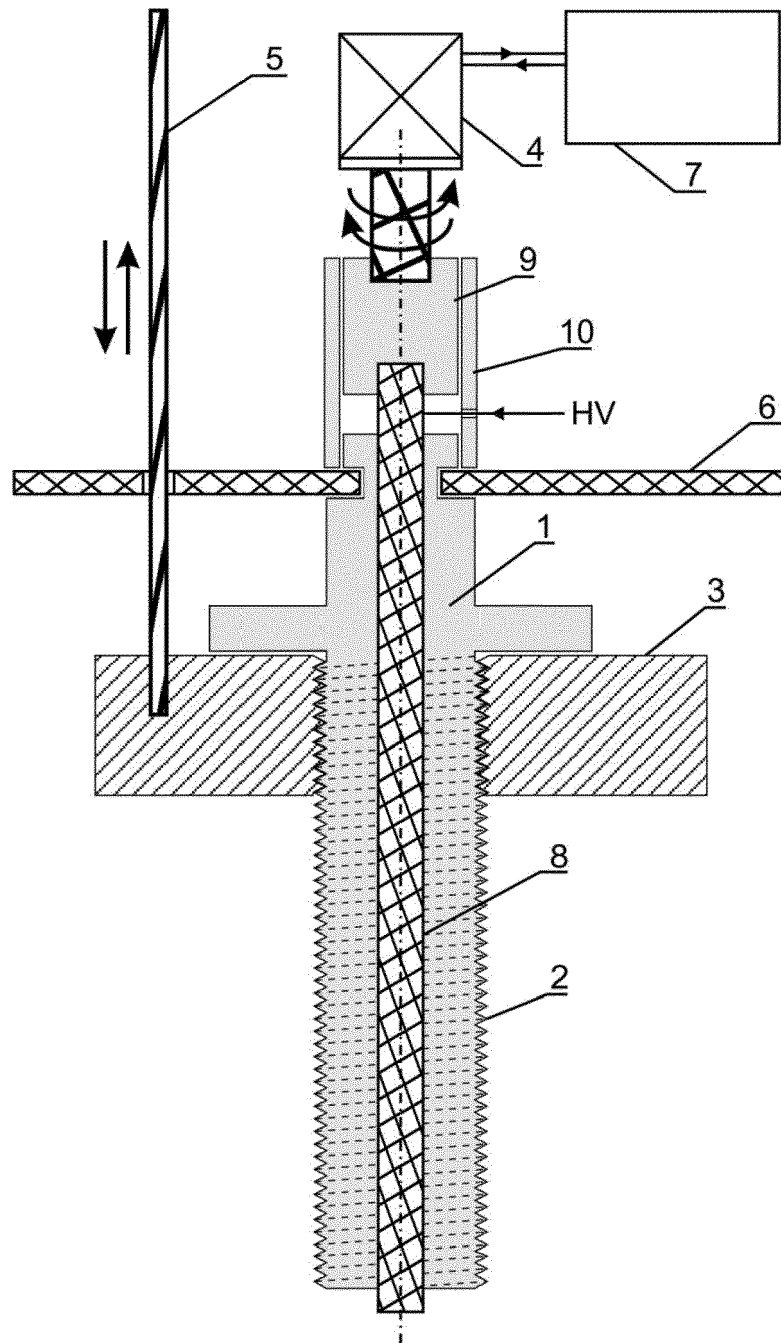


Fig.2

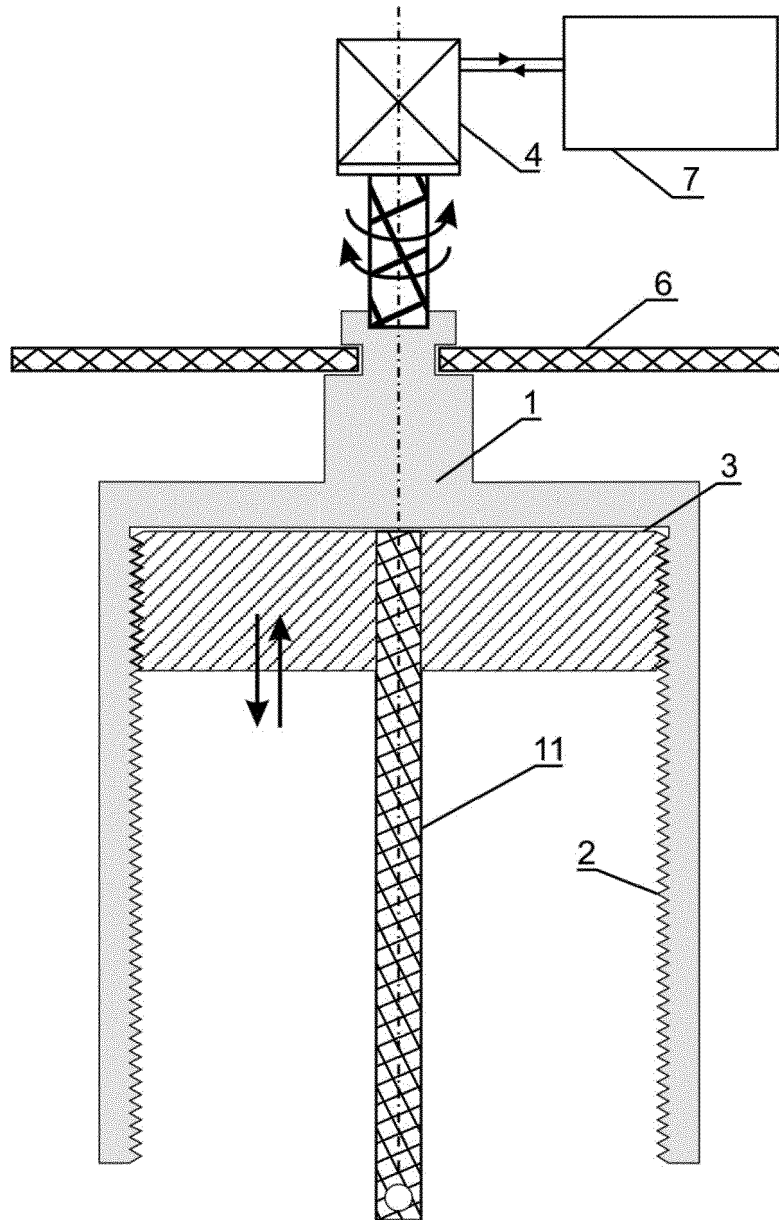


Fig.3

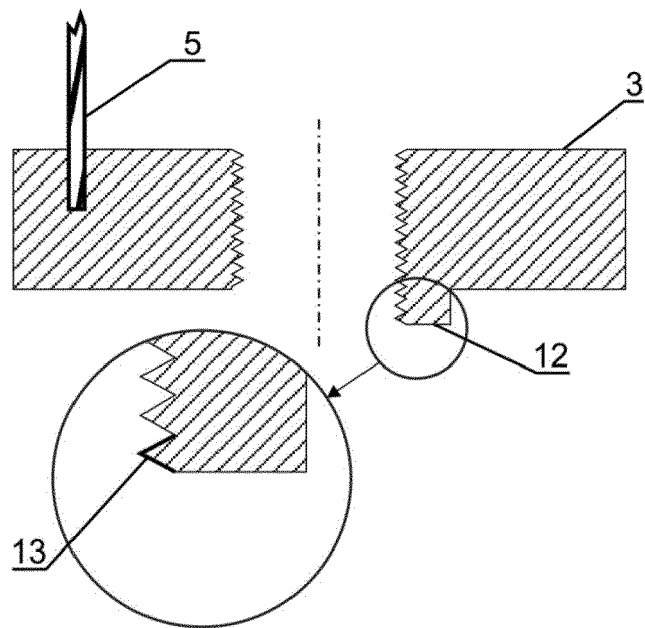


Fig.4

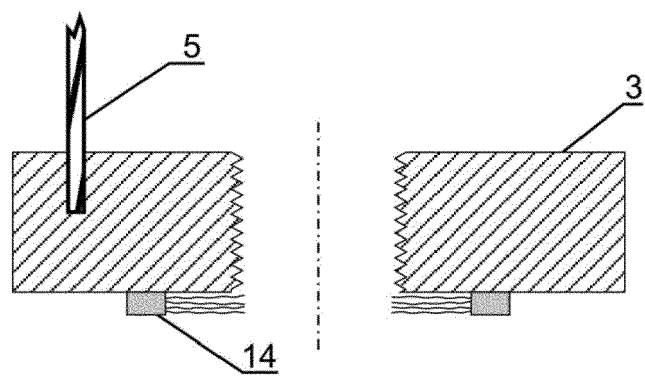


Fig.5



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Application Number
EP 20 02 0309

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 September 2020	Examiner Alberti, Michele
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	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 20 02 0309

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