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(54) **NEGATIVE PRESSURE ISOLATION HOOD**

(57) The present invention discloses a negative pressure isolation hood, and relates to the infectious disease treatment and transfer field. The negative pressure isolation hood includes a hood, a half-length outerwear, an exhaust hose, and an air-exhaust filtration system, where the hood is disposed above the half-length outerwear and is in air tight connection with the half-length outerwear, the hood is connected to the air-exhaust filtration system through the exhaust hose, and a one-way air inlet valve is disposed at the top of the hood. The negative pressure isolation hood in the present invention is used by an infectious disease patient without impeding free movement of the infectious disease patient, ensuring normal and unrestricted movement of the wearer's head and neck, and the exhaust air filtration system is small in size and is easy to carry.

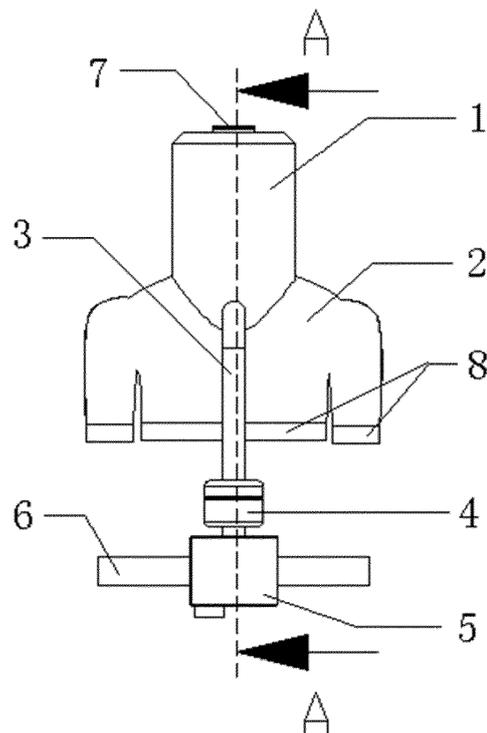


FIG. 1

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Description**TECHNICAL FIELD**

5 **[0001]** The present invention relates to the infectious disease treatment and transfer field, and in particular, to a negative pressure isolation hood.

BACKGROUND

10 **[0002]** The outbreak of SARS, Ebola, and other severe infectious diseases has brought great risks to front-line medical workers. At present, positive pressure biological protective clothing and positive pressure biological protective hoods have been developed to protect rescue personnel, medical workers, and researchers who are in contact with patients infected with severe infectious diseases. However, how to prevent people infected with severe infectious diseases from releasing pathogens into the environment is one of problems to be resolved urgently. A negative pressure isolation hood can maintain a stable negative pressure environment in the hood. When a patient with an infectious disease wears a negative pressure isolation hood, aerosols carrying severe pathogens and generated by the patient can effectively be prevented from being spread. This is very important for safe transfer of patients with infectious diseases.

15 **[0003]** The patent ZL201110082388.0 has disclosed a negative-pressure isolation type inflatable stretcher for patients with infectious diseases, and described an airtight compartment that is provided with an arched airbag compartment cover and an airbag compartment bottom and that is formed through a waterproof zipper. The negative-pressure inflatable stretcher integrates negative pressure and a ventilation function based on a function of a stretcher, and is mostly used for transfer or transport of patients with infectious diseases who cannot walk. When a patient lies on a negative-pressure inflatable stretcher, healthy personnel needs to carry the patient, but a negative pressure hood is more applicable to a healthy infectious disease patient who can look after oneself.

SUMMARY

25 **[0004]** To resolve the foregoing technical problem, the present invention provides a negative pressure isolation hood, which can be used by an infectious disease patient without impeding free movement of the infectious disease patient, ensuring that normal and unrestricted movement of the wearer's head and neck, and an exhaust air filtration system is small in size and is easy to carry.

30 **[0005]** To achieve the above purpose, the present invention provides the following technical solution.

35 **[0006]** A negative pressure isolation hood includes a hood, a half-length outerwear, an exhaust hose, and an air-exhaust filtration system, where the hood is disposed above the half-length outerwear and is in air tight connection with the half-length outerwear, the hood is connected to the air-exhaust filtration system through the exhaust hose, and a one-way air inlet valve is disposed at the top of the hood.

[0007] Preferably, a zipper is disposed at a front part of the half-length outerwear, laces are disposed at an arm and a waist of the half-length outerwear; and the lace is configured to tighten the arm and the waist.

40 **[0008]** Preferably, the hood is a TPU transparent film hood or a PVC transparent film hood, a front part of the hood is a transparent view window, and inflatable support strips for supporting the hood are disposed at a rear part and a side part of the hood.

[0009] Preferably, the hood is a hard transparent film hood.

[0010] Preferably, the air-exhaust filtration system comprises a power air-exhaust device and an air filter, the power air-exhaust device is connected to the air filter, and the air filter is connected to the exhaust hose.

45 **[0011]** Preferably, the power air-exhaust device is connected to the air filter through a source nipple, and a seal washer is disposed at the source nipple.

[0012] Preferably, a control system, a battery, and a draught fan are fixed inside the power air-exhaust device, the battery is electrically connected to the control system, and the control system is electrically connected to the draught fan.

50 **[0013]** Preferably, an operation panel and a power charging interface are disposed outside the power air-exhaust device, the battery is electrically connected to the power charging interface, and a water-proof switch, an air-volume regulation button, a battery power display LED indicator, a low-battery buzzer alarm, and a low-air-volume buzzer alarm are disposed on the operation panel and are all connected to the control system.

[0014] Preferably, the power air-exhaust device is connected to a belt.

[0015] Preferably, the belt is a waterproof belt.

55 **[0016]** The present invention achieves the following technical effects compared with the prior art:

(1) In the present invention, a hood is disposed above a half-length outerwear and is in airtight connection with the half-length outerwear, the hood is connected to an air-exhaust filtration system through an exhaust hose, and the

air-exhaust filtration system filters polluted air in the negative pressure hood and discharges filtered air to the atmosphere, so as to avoid the spread of pathogens. The negative pressure isolation hood is used by an infectious disease patient without impeding free movement of the infectious disease patient, ensuring normal and unrestricted movement of the wearer's head and neck.

(2) In the present invention, the hood part is made of a soft TPU transparent film, a PVC transparent film, or a hard transparent film. When the hood is made of a soft TPU transparent film or a PVC transparent film, air tightness is ensured through high-frequency heat sealing processing, and a structure of an inflatable support strip is used as a support, so as to ensure wearing comfort and safety of a user. When the hood is made of a hard transparent film, an inflatable support structure can be omitted and the structure of the hood can be simplified.

(3) In the present invention, a form of half-length outerwear is used, the half-length outerwear is made of a soft waterproof material, an upper part of the half-length outerwear is connected to a neck of the hood, a lower part of the half-length outerwear is tightened at a waist and an arm through a belt. This not only ensures normal and unrestricted movement of a wearer's head and neck but also ensures that there is semi-closed space.

(4) In the present invention, a control system, a power source, a draught fan, and an air filter are integrated in the air-exhaust filtration system. A power air-exhaust device has a simple structure and is easy to carry. Through use of the high-performance power source and draught fan with small sizes, a smart design of an integrated circuit, and appropriate configuration of an internal structure, the air-exhaust filtration system outputs stable negative pressure with noise no higher than 80 dB(A).

(5) In the present invention, the air-exhaust filtration system is an independent device, can be used in cooperation with the negative pressure isolation hood, and can also be used in cooperation with a negative pressure mask. When the air-exhaust filtration system is used in cooperation with the hood, the air-exhaust filtration system is fixed to a belt or a backpack. When an infectious patient uses the hood, the infectious patient can tie the belt to his/her waist, and in this case, the infectious patient can move freely when wearing the negative pressure isolation hood.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] To describe the technical solutions in the embodiments of the present invention or in the prior art more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a schematic structural diagram of a negative pressure isolation hood according to the present invention;
 FIG. 2 is an A-A sectional view of FIG. 1;
 FIG. 3 is a left view of FIG. 1;
 FIG. 4 is a top view of FIG. 1;
 FIG. 5 is a schematic appearance diagram of an air-exhaust filtration system; and
 FIG. 6 is a schematic diagram of a control system of an air-exhaust filtration system.

[0018] Reference signs: 1. hood; 2. half-length outerwear; 3. exhaust hose; 4. air filter; 5. power air-exhaust device; 6. belt; 7. one-way air inlet valve; 8. lace; 9. inflatable support strip; 10. operation panel; 11. power charging interface.

DETAILED DESCRIPTION

[0019] The following clearly and completely describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely a part rather than all of the embodiments of the present invention. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present invention.

[0020] To make objectives, features, and advantages of the present invention more comprehensible, the following describes the present invention in more detail with reference to accompanying drawings and specific implementations.

[0021] As shown in FIG. 1 to FIG. 4, an embodiment provides a negative pressure isolation hood, including a hood 1, a half-length outerwear 2, an exhaust hose 3, and an air-exhaust filtration system, where the hood 1 is disposed above the half-length outerwear 2 and is in air tight connection with the half-length outerwear 2, the hood 1 is connected to the air-exhaust filtration system through the exhaust hose 3, and a one-way air inlet valve 7 is disposed at the top of the

hood 1. The air-exhaust filtration system includes a power air-exhaust device 5 and an air filter 4, and the power air-exhaust device 5 is connected to the air filter 4. A rear part of a neck of the hood 1 is connected to the exhaust hose 3 through threading, one end of the exhaust hose 3 is connected to the hood 1, and the other end thereof is connected to the air filter 4.

5 [0022] The hood 1 is a TPU transparent film hood or a PVC transparent film hood, a front part of the hood 1 is a transparent view window, inflatable support strips 9 for supporting the hood 1 are disposed at a rear part and a side part of the hood 1, and the inflatable support strip 9 is formed by high-frequency heat sealing of a TPU transparent film inflatable strip. When there is negative pressure in the hood 1, the inflatable support strips 9 play a support role, so as to ensure that the hood 1 is not deformed. When the hood 1 is made of a soft TPU transparent film or a PVC transparent film, air tightness is ensured through high-frequency heat sealing processing, and a structure of the inflatable support strip 9 is used as a support, so as to ensure wearing comfort and safety of a user. In another embodiment, the hood 1 is made of a hard transparent film. In this way, an inflatable support structure can be omitted and the structure of the hood 1 can be simplified.

10 [0023] The half-length outerwear 2 is made through high-frequency heat sealing of a soft and comfortable waterproof material, and is connected to the neck of the hood 1 through high-frequency heat sealing. A zipper is disposed at a front part of the half-length outerwear 2, laces 8 are disposed at an arm and a waist of the half-length outerwear 2; and the lace 8 is configured to tighten the arm and the waist. This not only ensures normal and unrestricted movement of a wearer's head and neck but also ensures that there is semi-closed space.

[0024] The one-way inlet valve 7 at the top of the hood 1 is fixed through high-frequency heat sealing.

20 [0025] When negative pressure inside the negative pressure isolation hood is excessively high, the one-way inlet valve 7 is opened to make air automatically inflow to adjust the negative pressure inside the negative pressure isolation hood.

[0026] The power air-exhaust device 5 is connected to a belt 6, and the belt 6 is a belt made of a waterproof material. The power air-exhaust device 5 can be fixed on a wearer's back or back waist through a backpack or the belt 6. When a backpack is used for fixing the power air-exhaust device 5, a double-shoulder backpack is preferably used. It can be learned that, in this embodiment, the air-exhaust filtration system is an independent device, can be used in cooperation with the negative pressure isolation hood, and can also be used in cooperation with a negative pressure mask. When the air-exhaust filtration system is used in cooperation with the hood, an infectious patient ties the belt 6 to his/her waist to further fix the air-exhaust filtration system, and in this case, the infectious patient can move freely when wearing the negative pressure isolation hood.

25 [0027] An outer part of the power air-exhaust device 5 is a hard shell, an upper part of the power air-exhaust device 5 is connected to the air filter 4 through a source nipple, a seal washer is disposed at the source nipple, and joint parts of the whole shell are all sealed.

[0028] A control system, a battery, and a draught fan are fixed inside the power air-exhaust device 5, the battery is electrically connected to the control system, and the control system is electrically connected to the draught fan. The battery may be a rechargeable lithium battery. As shown in FIG. 5, an operation panel 10 and a power charging interface 11 are disposed outside the power air-exhaust device 5, the battery is connected to the power charging interface 11, and the power charging interface 11 is configured to charge the battery and may also be used as an interface of an external power source.

30 As shown in FIG. 6, the control system is composed of an integrated circuit board with a single-chip microcomputer P89LPC935 as a core. The battery is electrically connected to the draught fan through a circuit of an adjustable voltage regulator. The battery is electrically connected to the integrated circuit board by expanding a battery capacity monitoring circuit, and the draught fan is electrically connected to the integrated circuit board by expanding an air-volume monitoring circuit. A water-proof switch, an air-volume regulation button, a battery power display LED indicator, a low-battery buzzer alarm, and a low-air-volume buzzer alarm are disposed on the operation panel 10 and are all electrically connected to the integrated circuit board.

35 [0029] In this embodiment, the control system, a power source, the draught fan, and the air filter 4 are integrated in the air-exhaust filtration system. The power air-exhaust device 5 has a simple structure and is easy to carry. Through use of the high-performance power source and draught fan with small sizes, a smart design of the integrated circuit, and appropriate configuration of an internal structure, the air-exhaust filtration system outputs stable negative pressure with noise no higher than 80 dB(A).

40 [0030] A specific working process is as follows: When there is a need to run the air-exhaust filtration system, the waterproof switch on the operation panel 10 is turned on, the draught fan is started when the control system controls the battery, and the draught fan filters polluted air in the negative pressure isolation hood through the air filter 4. In this way, harmful substances (particulate matters and pathogenic microorganisms) are blocked, and filtered clean air is discharged into the atmosphere through the power air-exhaust device 5.

45 [0031] Specific performance of the negative pressure isolation hood in this embodiment is shown in Table 1 below.

Table 1 Performance parameters of the negative pressure isolation hood in this embodiment

Evaluation items	Air volume level		
	Low	Intermediate	High
Static pressure (Pa) in the negative	-40	-55	-70
Actual air output (LPM)	150	178	199
Noise in the hood (dB(A))	68	70	72
Working time (h)	11	9.5	8
Low-air-volume alarm	Normal	Normal	Normal
Low-battery alarm	Normal	Normal	Normal

[0032] It can be seen from measurement results that specific negative pressure can be kept in the negative pressure isolation hood through the air-exhaust filtration system, the noise is lower than 80 dB(A), average working time is greater than six hours, and all the indicators and alarm functions operate normally.

[0033] Several examples are used for illustration of the principles and implementation methods of the present invention. The description of the embodiments is used to help illustrate the method and its core principles of the present invention. In addition, those skilled in the art can make various modifications in terms of specific embodiments and scope of application in accordance with the teachings of the present invention. In conclusion, the content of this specification shall not be construed as a limitation to the invention.

Claims

1. A negative pressure isolation hood, comprising a hood, a half-length outerwear, an exhaust hose, and an air-exhaust filtration system, wherein the hood is disposed above the half-length outerwear and is in air tight connection with the half-length outerwear, the hood is connected to the air-exhaust filtration system through the exhaust hose, and a one-way air inlet valve is disposed at the top of the hood.
2. The negative pressure isolation hood according to claim 1, a zipper is disposed at a front part of the half-length outerwear, laces are disposed at an arm and a waist of the half-length outerwear; and the lace is configured to tighten the arm and the waist.
3. The negative pressure isolation hood according to claim 1, wherein the hood is a TPU transparent film hood or a PVC transparent film hood, a front part of the hood is a transparent view window, and inflatable support strips for supporting the hood are disposed at a rear part and a side part of the hood.
4. The negative pressure isolation hood according to claim 1, wherein the hood is a hard transparent film hood.
5. The negative pressure isolation hood according to claim 1, wherein the air-exhaust filtration system comprises a power air-exhaust device and an air filter, the power air-exhaust device is connected to the air filter, and the air filter is connected to the exhaust hose.
6. The negative pressure isolation hood according to claim 5, wherein the power air-exhaust device is connected to the air filter through a source nipple, and a seal washer is disposed at the source nipple.
7. The negative pressure isolation hood according to claim 6, wherein a control system, a battery, and a draught fan are fixed inside the power air-exhaust device, the battery is electrically connected to the control system, and the control system is electrically connected to the draught fan.
8. The negative pressure isolation hood according to claim 7, wherein an operation panel and a power charging interface are disposed outside the power air-exhaust device, the battery is electrically connected to the power charging interface, and a water-proof switch, an air-volume regulation button, a battery power display LED indicator, a low-battery buzzer alarm, and a low-air-volume buzzer alarm are disposed on the operation panel and are all connected to the control system.

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9. The negative pressure isolation hood according to claim 5, wherein the power air-exhaust device is connected to a belt.
10. The negative pressure isolation hood according to claim 9, wherein the belt is a waterproof belt.

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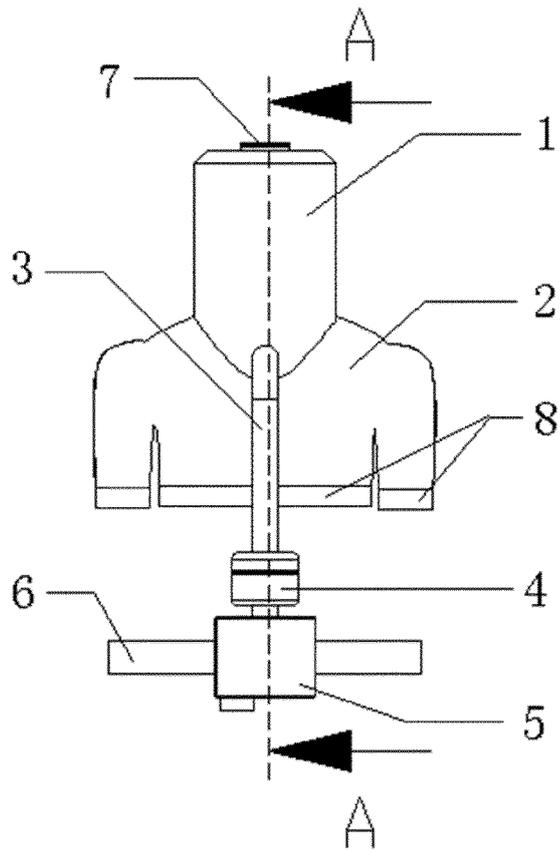


FIG. 1

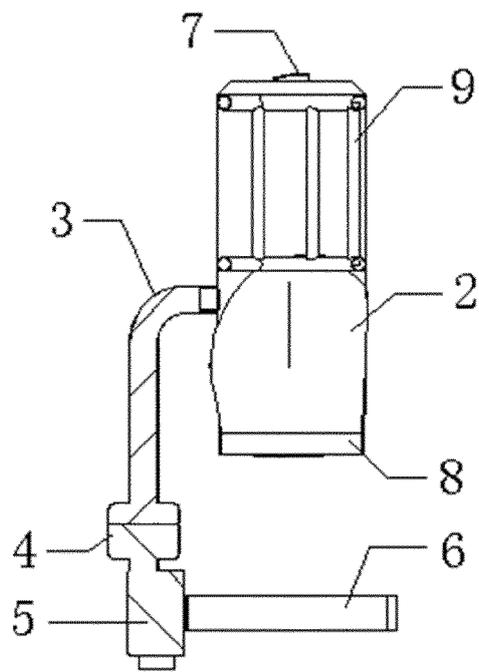
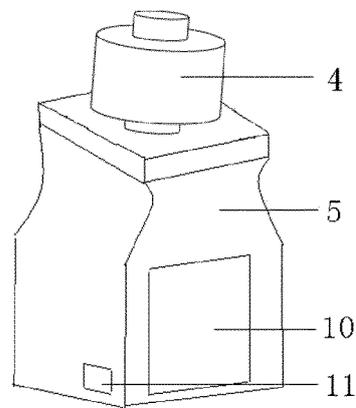
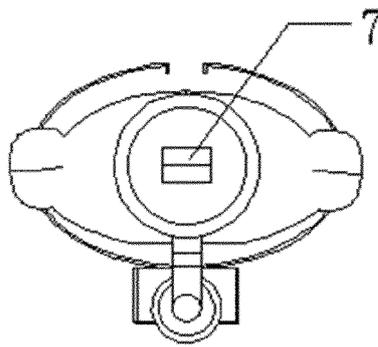
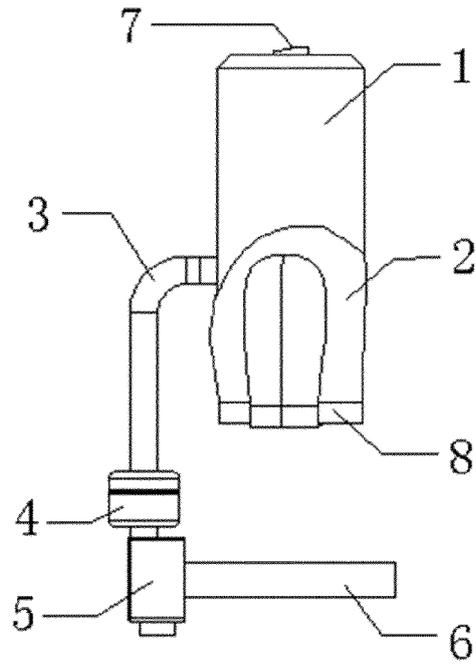


FIG. 2



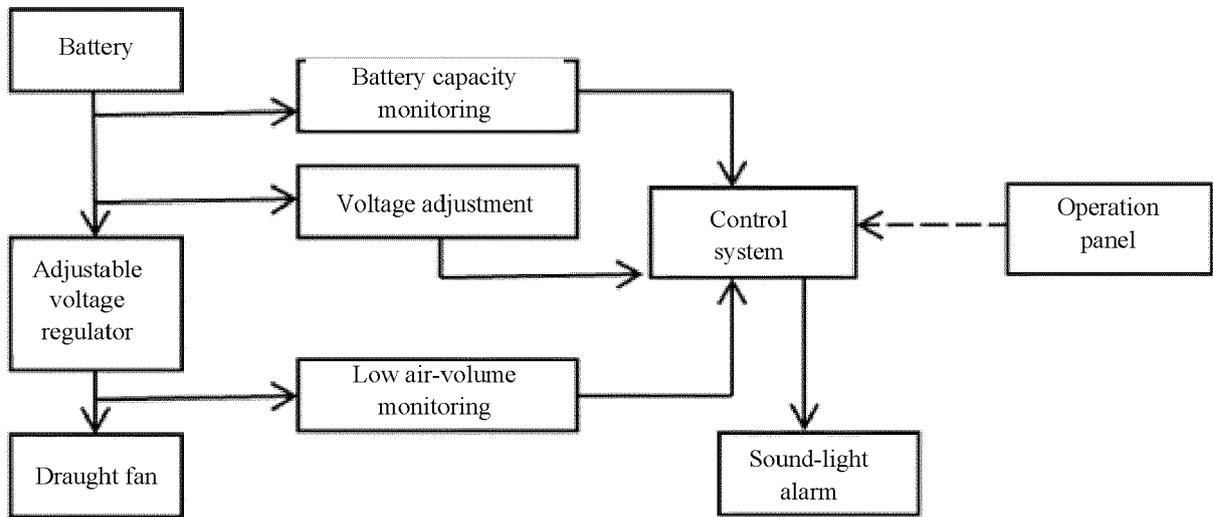


FIG. 6



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Place of search The Hague		Date of completion of the search 1 August 2019	Examiner Edlauer, Martin
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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ANNEX TO THE EUROPEAN SEARCH REPORT
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