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(71) Applicant: **Banchini, Filippo**
43123 Parma (PR) (IT)

(72) Inventor: **Banchini, Filippo**
43123 Parma (PR) (IT)

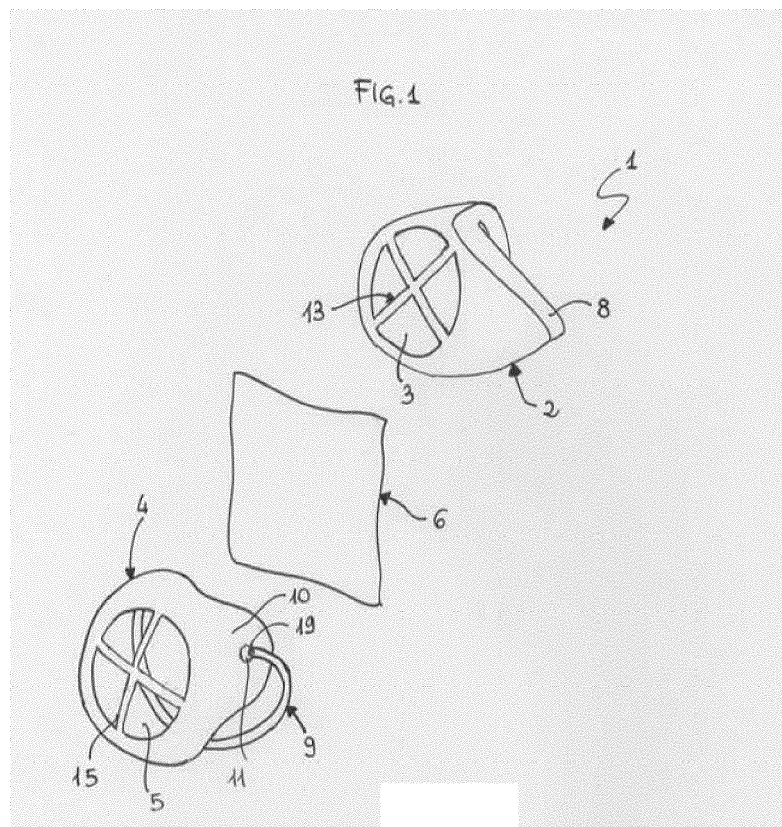
(74) Representative: **Dondi, Silvia**
Bugnion S.p.A.
Largo Michele Novaro, 1/A
43121 Parma (IT)

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(54) **MASK FOR THE PROTECTION OF THE RESPIRATORY TRACT AND METHOD FOR ASSEMBLING THEREOF**

(57) A face mask (1) for the protection of the respiratory tract, comprising:
a first portion (2), substantially concave, applicable to a user's face and having a first through opening (3);
a second portion (4), substantially concave, having a second through opening (5), the second portion (4) being

superposable externally to the first portion (2);
at least one filtering element (6) interposed between the first portion (2) and the second portion (4) to cover the extension of the first through opening (3) and of the second through opening (5).



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Description

[0001] The present invention relates to a mask for the protection of the respiratory tract and a method for assembling thereof. For example, the mask proposed herein can be used in the health care environment for preventing the aspiration and/or spread of infectious agents which can be transmitted by air, or in an industrial and domestic environment for protecting against volatile substances that are harmful to health.

[0002] Various disposable containment masks for protecting the respiratory tract are available on the market, each of which is suitable for protecting the user from specific situations.

[0003] For example, among the masks known for use in the healthcare environment the following are known:

- surgical masks, for protecting the patient from the contamination that can come from speaking and, in general, from the emission of drops of saliva emitted by the operator wearing them,
- filtering face masks, for protecting the respiratory tract of the wearer against external agents (aerosol), with classification based on the filtering power (FFP1, FFP2, FFP3), possibly provided with an exhalation valve.

[0004] Therefore, every requirement corresponds to a specific type of mask, which must also be disposed of after use as the filtering efficacy deteriorates over time (after a few hours).

[0005] Then there are containment masks for industrial or domestic use, for example anti-dust, anti-smog or anti-gas. In some models the exhausted filter can be replaced with an equivalent one, therefore the mask is reusable. However, also in this case each mask is only suitable for one specific use and for one specific shape of filter.

[0006] Local or global health emergency situations require the immediate availability of huge quantities of masks for the population and for the healthcare personnel exposed.

[0007] The production processes of the masks mentioned above are generally long and not able to respond to requirements.

[0008] In this context, the technical task underpinning the present invention is to provide a mask for the protection of the respiratory tract and a method for assembling thereof, which obviates the drawbacks of the prior art as cited above.

[0009] In particular, the aim of the present invention is to provide a mask for the protection of the respiratory tract which is reusable and versatile, i.e. personalisable for the different applications that the user could make thereof over time.

[0010] Another aim of the present invention is to make available a mask for the protection of the respiratory tract which can be easily sanitised.

[0011] Another aim of the present invention is to pro-

pose a mask for the protection of the respiratory tract which is easy and quick to produce.

[0012] Another aim of the present invention is to make available a mask for the protection of the respiratory tract which is easy and quick to assemble by anyone, not necessarily by specialist personnel.

[0013] The stated technical task and specified objects are substantially achieved by a mask for the protection of the respiratory tract, comprising:

- a first portion substantially concave and shaped in such a way as to be pulled near the face of a user to cover nose and mouth, the first portion having a first through opening;
- a second portion substantially concave and sized for being applied externally to the first portion with respect to the face of the user, the second portion having a second through opening;
- at least one filtering element interposed between the first portion and the second portion, the filtering element being sized in such a way as to cover the extension of the first through opening and of the second through opening.

[0014] According to one aspect of the invention, the mask comprises a first grill arranged at the first through opening and a second grill arranged at the second through opening.

[0015] The filtering element is interposed between the first grill and the second grill.

[0016] According to one aspect of the invention, the second portion is press fitted externally to the first portion. The filtering element is maintained between the first portion and the second portion thanks to such press fitting.

[0017] Preferably, the first portion has a perimetral edge shaped in such a way to adhere to the face.

[0018] According to one embodiment, a gasket is applied to the perimetral edge, the gasket being made of a softer material than the material constituting the first portion.

[0019] According to another embodiment, the filtering element has an extension such as to cover the perimetral edge of the first portion and to bend internally to the first portion.

[0020] The first portion and the second portion are made of one of the following materials: plastic, silicone, wood, metal.

[0021] The filtering element is made of one of the following materials: non-woven fabric made of one or more layers, two fabrics with hydrophilic cotton interposed, spongy fabric.

[0022] According to one embodiment, the mask comprises at least one elastic lace having the ends fixed to opposite sides of the second portion in such a way that the elastic lace can be wound around the head of the user.

[0023] The stated technical task and specified objects are substantially achieved by a method for assembling the mask, comprising the steps of:

- arranging the filtering element externally to the first portion so as to cover the first through opening;
- bringing the second portion close to the filtering element already arranged in such a way that the second through opening is filled by such filtering element;
- pressing the second portion in such a way as to press or joint fit it to the first portion, so blocking the filtering element arranged therethrough.

[0024] Further characteristics and advantages of the present invention will more fully emerge from the non-limiting description of a preferred but not exclusive embodiment of a mask for the protection of the respiratory tract and a method for assembling thereof, as illustrated in the accompanying drawings, in which:

- figure 1 is an exploded perspective view of a mask for the protection of the respiratory tract, according to the present invention;
- figure 2 illustrates one of the components (first portion) of the mask of figure 1, in a perspective view.

[0025] With reference to the figures, number 1 indicates a mask for the protection of the respiratory tract.

[0026] The mask 1 comprises a first portion 2 and a second portion 4, substantially concave, and at least one filtering element 6.

[0027] The first portion 2 is shaped in such a way as to be pulled near the face of a user to cover nose and mouth.

[0028] The second portion 4 is sized for being applied externally to the first portion 2 with respect to the face of the user.

[0029] The first portion 2 has a first through opening 3 formed in a central zone thereof. In the embodiment described and illustrated herein, the first through opening 3 houses a first grill 13, i.e. a grid-like structure.

[0030] The second portion 4 has a second through opening 5 formed in a central zone thereof. In the embodiment described and illustrated herein, the second through opening 5 houses a second grill 15, i.e. a grid-like structure.

[0031] The filtering element 6 is interposed between the first portion 2 and the second portion 4 and is sized in such a way as to cover the extension of the first through opening 3 and of the second through opening 5.

[0032] In particular, the filtering element 6 covers and extends beyond the extension of the through openings 3, 5.

[0033] In the embodiment described and illustrated herein, the filtering element 6 is interposed between the first grill 13 and the second grill 15, which act as a support.

[0034] When the mask 1 is assembled, the first through opening 3 and the second through opening 5 (therefore the respective grills 13, 15) are partially aligned and the filtering element 6 covers the grid-like area delimited by the grills 13, 15.

[0035] The first grill 13 and the second grill 15 can have the same pitch and orientation as the linear bars that constitute them, or have a different pitch and/or orientation. For example, in the embodiment illustrated in figure 1, the second grill 15 has the linear bars rotated through about 45° with respect to the first grill 13.

[0036] According to one embodiment, the two through openings 3, 5 are circle shaped.

[0037] According to another embodiment, the two through openings 3, 5 are rectangle or square shaped.

[0038] In all cases, the filtering element 6 (which can be circle or rectangle or square shaped or have a non-geometric shape) has an extension preferably greater than both of the through openings 3, 5.

[0039] According to an aspect of the invention, the first through opening 3 and the second through opening 5 have a dimension such as to include at least the mouth of the user.

[0040] According to an aspect of the invention, the first through opening 3 and the second through opening 5 have the same dimension.

[0041] Alternatively, the first through opening 3 and the second through opening 5 have a different extension.

[0042] The first portion 2 and the second portion 4 are made of one of the following materials: plastic, silicone, wood, metal.

[0043] The filtering element 6 is made of one of the following materials: soft non-woven fabric, possibly made of various layers (e.g. polyester or polypropylene fibres), two fabrics with hydrophilic cotton interposed, soft spongy fabric with a thickness such as to enable the passage of air, specific filtering fabrics already used in other masks (e.g. FFP2 or FFP3).

[0044] In general, the filtering element 6 may be made of any fabric. The important point is that the material selected for the filtering element 6 is deformable to enable the adhesion of the two superposed portions 2, 4 of the mask 1 thus creating a sealing mechanism.

[0045] In one embodiment, there may be various superposed filtering elements 6, the same or different.

[0046] As can be seen from figure 2, the first portion 2 has a perimetral edge 7 shaped in such a way to adhere to the face.

[0047] According to an aspect of the invention, the perimetral edge 7 has a rounded profile so as to adhere to the face without creating skin lesions.

[0048] According to an aspect of the invention, a gasket 8 is applied to the perimetral edge 7, the gasket preferably being made by a softer material than the material constituting the first portion 2, which makes the adhesion to the face more comfortable.

[0049] For example, the gasket 8 is made of sponge or silicone or neoprene.

[0050] The gasket 8 further enables greater adhesion of the first portion 2 to the user's face, reducing the passage of air around the edge and thus creating a substantially total filtering effect through the filtering element 6 interposed between the two portions 2, 4.

[0051] According to one embodiment of the invention, the second portion 4 is press fitted externally to the first portion 2. In this case, the filtering element 6 is maintained between the first portion 2 and the second portion 4 due to simple superposition, precisely thanks to such press fitting.

[0052] According to a further embodiment, in the place of the gasket 8 it is contemplated that the filtering element 6 has an extension such as to be able to cover the perimetral edge 7 of the first portion 2 and to be folded inside the first portion 2 thus being in contact with the user's face.

[0053] According to another embodiment of the invention, the second portion 4 is mounted outside the first portion 2 by mutual joining means, e.g. through hook supports situated on the two portions 2, 4 which guarantee the persistent compression of the two portions 2, 4.

[0054] According to the embodiment illustrated in figure 1, the mask 1 is provided with at least one elastic lace 9 having the ends 19 fixed to opposite sides of the second portion 4 in such a way that the elastic lace 9 can be wound around the head of the user.

[0055] For example, the second portion 4 comprises two appendages 10 which extend in the diametrically opposite position.

[0056] Each appendage 10 has a hole 11 to which an end 19 of the elastic lace 9 is fixed.

[0057] In the embodiment described and illustrated herein, the second portion 4 adheres by pressure to the first portion 2, blocking the intermediate filtering element 6 and, thanks to the elastic lace 9, enables all the components of the mask 1 to be held firmly to the user's face.

[0058] According to an embodiment (not illustrated), the fixing of the mask 1 takes place by means of two elastic laces, each fixed to opposite sides of the second portion 5 so as to form an eyelet into which an ear of the user can be inserted.

[0059] According to a further embodiment (not illustrated), the mask 1 is provided with two ribbons, each having an end fixed to a side of the second portion 4 and another free end. The free ends of the ribbons can be knotted behind the user's head.

[0060] The fixing of the mask 1 can also take place by a means fixed to the first portion 2 rather than to the second portion 4, e.g. analogous to that just described.

[0061] The mask 1 can be easily assembled through an assembly method comprising the following steps:

- arranging the filtering element 6 externally to the first portion 2 so as to cover the first through opening 3;
- bringing the second portion 4 close to the filtering element 6 already arranged in such a way that the second through opening 5 is filled by such filtering element 6;
- pressing the second portion 4 in such a way as to apply it (by press or joint fitting) to the first portion 2, so blocking the filtering element 6 arranged there-through.

[0062] In practice, the second portion 4 and the first portion 2 are superposed with the filtering element 6 in between, supported by the first grill 13 and by the second grill 15 which are located in the two through openings 3, 5.

[0063] The characteristics of a mask for the protection of the respiratory tract and a method for assembling thereof, according to the present invention, are clear from the description provided, as are the advantages.

[0064] In particular, the mask proposed can be reused as it is sufficient to replace the exhausted filtering element and sanitise the two concave portions.

[0065] Furthermore, by replacing the filtering element whenever the specific situation requires it, the mask can be easily and quickly adaptable to different uses, in the healthcare, industrial and domestic environments.

[0066] Furthermore, the mask can be easily assembled directly by the user, or however by non-specialist personnel. In fact, it simply requires the insertion of the filtering element between the two portions, pressed or fitted onto each other.

[0067] The mask can be produced quickly and easily in an industrial context, by making dedicated moulds for the two concave portions, but it could also be made with recycled materials. By way of example, the two concave portions could be made from bottoms of PET containers, appropriately perforated.

[0068] The use of any fabric for making the filtering element can also enable masks to be provided quickly in the event of an emergency, solving or at least reducing the problem of obtaining masks.

[0069] Furthermore, with respect to known solutions, the filtering element is not required to have a specific shape in order to be interposed between the two concave portions. On the contrary, the filtering element can have any shape, which contributes to making the construction of the mask possible for everybody, also possibly using recycled material or material available at home.

[0070] By releasing the filtering element from a specific shape, the quantity of filtering fabric used for making the mask can also be reduced. It is to be noted that with a filter of the current FFP2 or FFP3 masks, various filtering elements for the mask proposed herein could even be made.

Claims

1. Mask (1) for the protection of the respiratory tract, comprising:

- a first portion (2) substantially concave and shaped in such a way as to be pulled near the face of a user to cover nose and mouth, said first portion (2) having a first through opening (3);
- a second portion (4) substantially concave and sized for being applied externally to said first portion (2) with respect to the face of the user, said second portion (4) having a second through

- opening (5);
 - at least a filtering element (6) interposed between the first portion (2) and the second portion (4), said filtering element (6) being sized in such a way as to cover the extension of the first through opening (3) and of the second through opening (5). 5
2. Mask (1) according to claim 1, further comprising a first grill (13) arranged at the first through opening (3) and a second grill (15) arranged at the second opening (5), said filtering element (6) being interposed between the first grill (13) and the second grill (15). 10 15
3. Mask (1) according to claim 1 or 2, wherein said second portion (4) is press fitted externally to the first portion (2), said filtering element (6) being maintained between the first portion (2) and the second portion (4) thanks to the press fitting. 20
4. Mask (1) according to any of the preceding claims, wherein said first portion (2) has a perimetral edge (7) shaped in such a way to adhere to the face. 25
5. Mask (1) according to claim 4, further comprising a gasket (4) applicable to said perimetral edge (7), said gasket (8) being made by a softer material than the material constituting the first portion (2). 30
6. Mask (1) according to claim 4, wherein said filtering element (6) has such an extension to cover the perimetral edge (7) of the first portion (2) and to bend internally to the first portion (2). 35
7. Mask (1) according to any of the preceding claims, wherein the first portion (2) and the second portion (4) are made in one of the following materials: plastic, silicone, wood, metal. 40
8. Mask (1) according to any of the preceding claims, wherein said filtering element (6) is made in one of the following materials: non-woven fabric made of one or more layers, two fabrics with hydrophilic cotton, spongy fabric. 45
9. Mask (1) according to any of the preceding claims, further comprising at least one elastic lace (9) having the ends (19) fixed to opposite sides of said second portion (4) in such a way that said elastic lace (9) can be wound around the head of the user. 50
10. Method for assembling a mask (1) according to any of the preceding claims, comprising the steps of: 55
- arranging the filtering element (6) externally to the first portion (2) so as to cover the first through opening (3);

- bringing the second portion (4) close to the filtering element (6) already arranged in such a way that the second through opening (5) is filled by said filtering element (6);
 - pressing the second portion (4) in such a way as to press or joint fitting it to the first portion (2), so blocking the filtering element (6) arranged therethrough.

FIG. 1

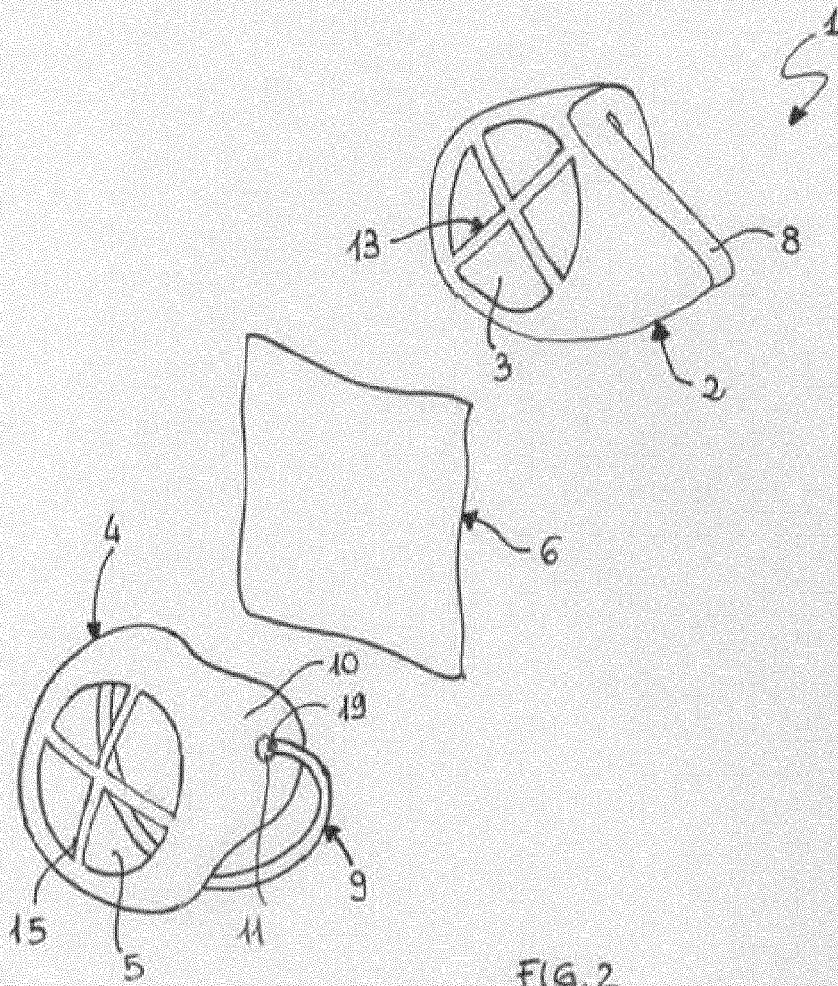
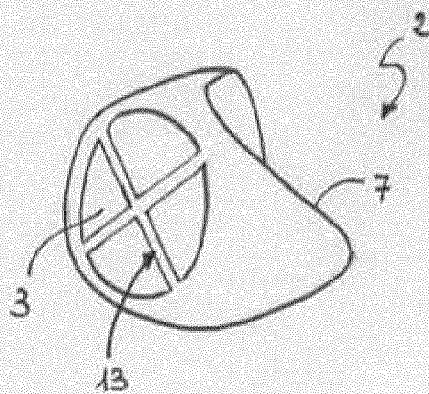


FIG. 2





EUROPEAN SEARCH REPORT

Application Number
EP 21 16 8454

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2018/008848 A1 (MOULTON THOMAS M [US] ET AL) 11 January 2018 (2018-01-11) * paragraph [0001]; figures 1B, 2B, 3B, 4A, 4B, 5A * * paragraphs [0016], [0017], [0021], [0022] * * paragraphs [0034], [0036], [0038], [0039], [0041], [0043] * * paragraphs [0048], [0049] * * paragraph [0060] * -----	1-5, 7-10	INV. A41D13/11
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 August 2021	Examiner Hauck, Gunther
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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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
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