【DESCRIPTION】

【Title of the Invention】

DUST MASK

【Cross-Reference to Related Application】

This application claims the benefit of Korean Patent Application No.10-2011-0091410, filed on September 8, 2011 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

【Technical Field】

[01] The present disclosure in one or more embodiments relates to a dust-proof mask. More particularly, the present disclosure relates to a so-called 'filtering face-piece' respirator or dust-proof mask configured to have a perimeter for sealing around the nose and mouth of a wearer.

[02]

【Background】

[03] In general, industrial sites harbor dusts, dust particles, fumes, odors or other airborne elements harmful to the operators. As a protection, the operators would use dust-proof masks which are classified into semi-permanent masks with replaceable filter cartridges and short-term multi-use (several times) disposable respirators called "filtering face-piece" respirators to which the present disclosure pertains.

[04]

[05] In FIGs. 1a and 1b, Korean Patent No. 100807505 is shown to provide a mask 1 with a frame 5 inserted therein. The suggested mask 1 has a mask main body 2 formed to enclose a user's nose and mouth and a ring-shaped face seal 3 having an outer periphery part joined circumferentially by the main body 2 which is internally provided with the frame 5 formed of a stereographical grid rib.

[06]

[07] The mask 1 has its advantage of facial fitting with the face seal 3 and maintaining form with the frame 5. However, the mask main body 2 is made to be directly contacted by the moisture that occurs during breathing of the wearer, which causes an abruptly dropped efficiency of filtering and shortens the life of the mask 1.

[08]

[09] FIGs. 2a and 2b show Korean Patent No. 100999860 to the present applicant, which has a dust-proof mask 6 and an inserted support 7. The dust-proof mask 6 disclosed therein also include a main filter body 2a and a face contact portion 3a with the thin filmlike support 7 provided internally of the main filter body 2a. Guides are protruded at 7a from the support 7 for keeping the inside surface of the main filter body 2a from making areal contact with the support 7.

[10]

[11] Such featured support 7 allows the dust-proof mask 6 to keep moist breath from the user contacting the main filter body 2a, thereby resolving the deficiencies of the aforementioned mask 1 to some extent.

[12]

[13] However, as shown in FIG. 2b, the support 7 is circumferentially formed with a contact band 8 of a width W by which the main filter body 2a is deprived of the filtering and respiratory functionalities. This is also true with the frame 5 of FIG. 1b and with a mask disclosed by Korean Patent No. 100133840 which is not depicted herein.

[14]

[15] To sum up, the conventional dust-proof masks 1 and 6 are advantageously well supported by the frame 5 and the support 7 respectively, but are circumferentially incapacitated by the widthwise contact areas of w, W between the frame/support 5, 7 and the main bodies 2, 2a.

[16]

【Disclosure】

【Technical Problem】

[17] The present disclosure has been proposed to improve the above-described conventional dusk masks. The present disclosure is intended to provide a dust-proof mask comprising a support that is designed not to make an areal contact with the main body for preventing the loss of function of the mask main body.

[18]

【Summary】

[19] A dust-proof mask of the present disclosure comprises a filter main body conforming to a facial profile and configured to surround a wearer's nose and mouth; an annular facial seat circumferentially joined at a seam with a perimeter of the main body; and a support configured to be attachable/detachable to and from the main body at an inner surface thereof.

[20-25] The support is made of a water-impermeable thin film having at least one intake aperture and at least one exhaust port. The support includes a perimeter, a plurality of guides and a plurality of non-contact flow passages. The perimeter is rounded outward, having a distal end joined with the seam between the main body and the facial seat. The guides are formed as radial protrusions from a front face of the support. And the non-contact flow passages are defined by the guides and the perimeter rounded outward, so as to extend from the distal end of the perimeter to the intake aperture.

[26] The perimeter of the support is rounded outward for providing a smooth facial contact of the dust-proof mask. In addition, each of the guides is formed up to an inner surface of the distal end of the perimeter of the support. Further, the guides are linear extensions with regularly or irregularly spaced clearances incorporated midway to more diversely distribute the flow passages.

[27]

[28] In addition, the intake aperture and the exhaust port are respectively provided with check-valves for preventing unnecessarily directed flows of air.

[29]

【Advantageous Effects】

[30] According to the present dust-proof mask, the support only has its perimeter join with the seam between the main body and the facial seat In other

words, the main body and the facial seat do not make any areal contacts. Therefore, the present dust-proof mask is free from the loss of filtration due to areal contacts between components, which substantially improves efficiency of dust blocking over conventional dust masks.

[31]

【Description of Drawings】

[32] FIGs. 1a and 1b are diagrams respectively showing a conventional dust mask and an insertion frame.

[33] FIGs. 2a and 2b are views respectively showing another conventional dust mask and an insertion support.

[34] FIG. 3 is a perspective view of a dust-proof mask according to at least one embodiment of the present disclosure.

[35] FIG. 4 is an exploded view of FIG. 3.

[36] FIG. 5 is a cross-sectional view of FIG. 3 along line A-A.

[37] FIG. 6 is a plan view of a support applied in FIG. 3.

[38] FIGs. 7a, 7b and 7c are views respectively showing variations of the support of FIG. 6.

[39] REFERENCE NUMERALS

[40] 10: Dust-proof Mask	11: Main Body
[41] 12: Facial Seat	13: Seam
[42] 14: Band	20: Support
[43] 21: Intake Aperture	22. Exhaust Port
[44] 23: Guide	24: Flow Passage
[45] 25: Clearance	26, 27: Valve
[46] 28a, 28b: Base	29. Check Plate

[47] 30. Cap

[48]

【Detailed Description】

[49] Listed or not in the above, features and advantages of the present disclosure will become more apparent through the following description of at

least one embodiment of a dust-proof mask with reference to the accompanying drawings.

[50]

[51] Referring to FIG. 3, the dust-proof mask according to the present disclosure is shown at 10. The dust-proof mask 10 generally conforms to a user's face region over the nose and mouth and is disposed in a proper position of the face by using one or more fixing bands 14 on both sides of the mask 10. The mask 10 of the present disclosure includes a main body 11 forming a space for the face, a ring-shaped facial seat 12 having the outer peripheral portion bonded to the perimeter of the main body 11, and a support 20 disposed internally of the main body 11.

[52]

[53] On both lateral sides the main body 11, the fixing band 14 is connected, and the mask 10 is set in place on the face with the main body 11 and the facial seat 12 enclosing nose and mouth by tightening the band 14 around the user's head 14.

[54]

[55] Specifically, the main body 11 can use commonly available filter materials such as PP (polypropylene) or nonwoven PE (polyethylene) capable of filtering harmful external air and it is designed to conform to the normal facial space as hemispherical, diamond, or other variety of shapes. The body 11 can have a structure in which a number of layers of the filter materials are laminated.

[56]

[57] The facial seat 12 is made of a sheet material obtained by laminating the soft resin such as polyurethane on one side of a soft fiber such as cotton or synthetic fibers such as polyester fibers and nylon fibers. Other embodiments may utilize rubber and a synthetic rubber material including silicone and urethane, although the sheet material described above is considered as advantageous, in view of the face-contacting feeling, water absorption and flexibility.

[58]

[59] In particular, the facial seat 12 is fabricated into a deformed ring in consideration of the profiles of the nose, and thereby it can conform flexibly to the users' face forms with some differences, providing an excellent adhesion to the users.

[60]

[61] In the present disclosure, the outer peripheral portion of the facial seat 12 and perimeter or periphery of the main body 11 are joined together. As a method for bonding, adhesives, sewing, welding or the like is used. When the main body 11 is a laminate structure, the filter layers are joined at the same time. A seam 13 is depicted in the drawings by a dashed line as it is created by turning the bonded seat 12 and main body 11 inside out.

[62]

[63] In the above, the detailed description has been provided for the structures of the main body 11 and the facial seat 12, and these structures are not special only to the present disclosure. However, the dust-proof mask 10 of the present disclosure comprises a support 20 uniquely designed to be attachable/detachable to and from the inner surface of the body 11.

[64]

[65] With reference to FIG. 4, the support 20 is made of a water-impermeable thin film having at least one intake aperture 21 and at least one exhaust port 22 and the support 20 is detachably placed on the inner surface of the main body 11. In addition, the support 20 incorporates a plurality of radially projecting guides 23 on its surface which form non-contact or suspension flow passages 24 of air between the inner support 20 and the outer main body 11.

[66]

[67] To make the support 20, a water-impermeable thin film is sufficient for use as the material which includes plastic resin selected from the group of cellulose esters, polyethylene and the like or rubber resin selected from the group of rubber, silicon and the like. The thickness of the film may range between, but not limited to, 0.3 ~ 0.6mm, and the present disclosure is not limited to some suggested materials and thicknesses of the support 20.

[68]

[69] Though the guide 23 may be composed of a plurality of projections, it is illustrated as a linear extension wherein regularly or irregularly spaced clearances 25 may be incorporated midway to more diversely distribute the flow passages 24.

[70]

[71] With reference to FIG.s 4 and 5, the support 20 is attached to the inner surface of the main body 11 by having a perimeter 28 distally joined with the seam 13 between the main body 11 and the facial seat 12. Therefore, the guides 23 establish non-contact flow passages 24 over the front face of the support 20, extending from the distal end of the perimeter 28 to the intake aperture 21.

[72]

[73] Preferably, as shown, the perimeter 28 of the support 20 is rounded outward at 'R'. The round portion 'R' provides the following advantages:

[74] First, with the round portion 'R' contacting the wear's face, the dust-proof mask 10 provides better tactility and osculation; and

[75] Second, without an areal contact or overlapping between the main body 11 and support 20, the perimeter 28 of the support 20 positively makes contact with the seam 13.

[76]

[77] The rounding at 'R' prevents the perimeter 28 from directly depressing the user face with discomfort and resolves inadequate contacts with the face. Further, the main body 11 and the support 20 possibly make a slight areal contact at the perimeter 28. From this point of view, the round portion 'R' of this embodiment is advantageous.

[78]

[79] In order to eliminate the possibility of surface contacts occurring between the support 20 and the main body 11, the guides 23 preferably have distal ends 31 merging into the perimeter 28 of the support 20. In other words, the guides 23 are formed up to the inner surface of the distal end of a perimeter 28 of the

support 20. However, not all of the guides 23 are necessarily formed so, as profiled at 31a.

[80]

[81] On the other hand, the intake aperture 21 and the exhaust port 22 are respectively provided with valve means for preventing unnecessarily directed flows of air. The valve means includes an intake valve 26 mounted through the support 20 and covered externally by the main body 11 and an exhaust valve 27 mounted through the exhaust port 22 of the support 20 and a corresponding opening of the main body 11. The valves 26 and 27 are so-called check valves for allowing a one-way communication, and thus they are dedicated as the intake and exhaust valves, respectively.

[82]

[83] The respective valves 26 and 27 includes bases 28a, 28b fixed respectively to the intake aperture 21 and the exhaust port 22 and flexible check plates 29 mounted onto the bases 28a, 28b. For the purpose of filtering all the inhaled air, the intake valve 26 is covered by the main body 11 while the exhaled breath, which needs no filtering, exits the main body 11 penetrating thereof. In FIGs. 4 and 5, reference numeral 30 denotes an external cap of the exhaust 27.

[84]

[85] As described above, with the main body 11 and facial seat 12 covering the wearer's mouth and nose, the mask 10 of the present disclosure is secured in place by strapping it over the wear's head by the band 14 once or twice if double strapped. At this time, the rounded finish 'R' provides the user of the mask 10 with fair tactility and well osculation with the face.

[86]

[87] Then, the wearer can breathe safely through the valves, of which the intake valve 26 is open upon inhalation and the exhaust valve 27 is open at exhalation. Prior to this, the external air at the inhalation is filtered through the entire filtration material of the main body 11 and channeled along the flow passages

24 before passing the open intake valve 26 under the pressure of inhalation and entering the respiratory system of the wearer.

[88]

[89] Then, exhaled air is blocked by the support 20 from contacting the main body 11 except that it is discharged through the exhaust valve 27 to the atmosphere. Therefore, the concern for wetting the main body 11 by breathing is resolved, and moist breath from the wearer will neither harm the main body 11.

[90]

[91] The present disclosure considers the loss of unresisted breathing and filtration in proportion to possible areal contact of the support 20 with the main body 11. Such areal contacts are successfully removed by the present disclosure before they interfere with providing enough amount of air for safe breathing and disables to make efficient use of the whole working area of the main body 11.

[92]

[93] In the present disclosure, the support 20 is not possible to make an areal contact with the main body by joining the perimeter 28 with the seam 13 between the main body 11 and the facial seat 12, when a plurality of the guides 23 formed as integral projections from the support 20 establish non-contact flow passages 24 over the front face of the support 20, extending from the distal end of the perimeter 28 to the intake aperture 21, whereby resolving the effect of the areal contact.

[94]

[95] Referring to FIG. 6, in this embodiment, the support 20 has a single central intake aperture 21 and one lateral exhaust port 22. However, the present disclosure is not intended to be limited to the illustrated arrangement and the number of the intake aperture 21 and exhaust port 22.

[96]

[97] For example, FIG. 7a illustrates a central intake aperture with two lateral exhaust ports, FIG. 7b two lateral intake apertures with a lower centered

exhaust port, and FIG. 7c three intake apertures with an exhaust port, which can be selectively applied to the present disclosure.

【CLAIMS】

1. A dust-proof mask, comprising:

a filter main body (11) conforming to a facial profile and configured to surround a wearer's nose and mouth;

an annular facial seat (12) circumferentially joined at a seam with a perimeter of the main body; and

a support (20) configured to be attachable/detachable to and from the main body at an inner surface thereof,

wherein the support is made of a water-impermeable thin film having at least one intake aperture (21) and at least one exhaust port (22), the support including:

a perimeter (28) rounded outward for providing a smooth facial contact of the dust-proof mask with the perimeter (28) having a distal end joined with the seam between the main body (11) and the facial seat (12),

a plurality of guides (23) formed as radial protrusions from a front face of the support, and

a plurality of non-contact flow passages (24) defined by the guides (23) and the perimeter (28) rounded outward(R), so as to extend from the distal end of the perimeter (28) to the intake aperture (21).

2. The dust-proof mask of claim 1, wherein each of the guides (23) is formed up to an inner surface of the distal end of the perimeter (28) of the support (20).

3. The dust-proof mask of claim 1, wherein the guides (23) are linear extensions with regularly or irregularly spaced clearances incorporated midway to more diversely distribute the flow passages (24).

4. The dust-proof mask of claim 1, wherein the intake aperture (21) and the exhaust port (22) are respectively provided with check-valves for preventing unnecessarily directed flows of air.