

[54] **DISPOSABLE HALF-MASK RESPIRATOR**
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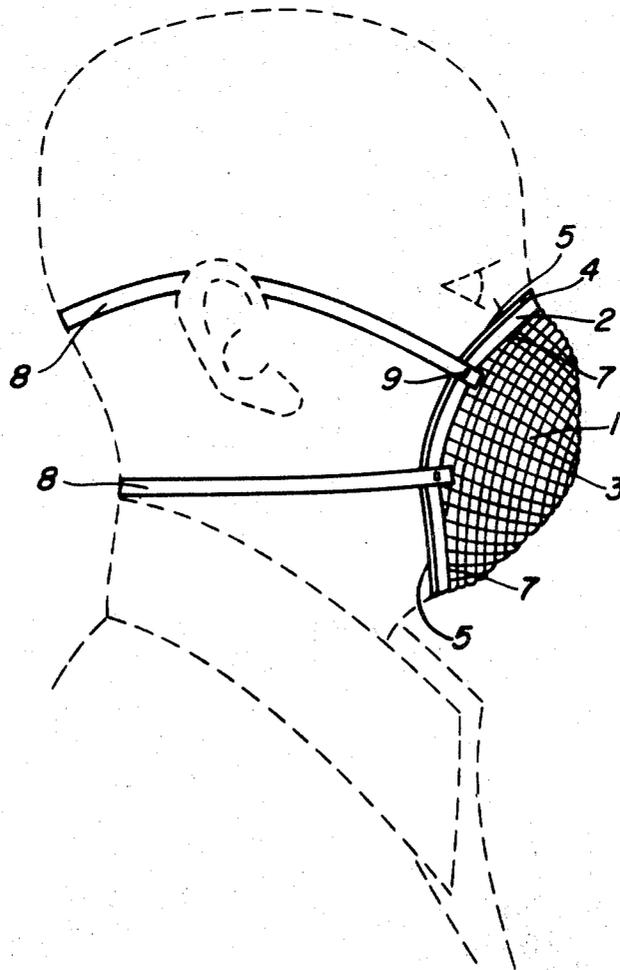
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 128/146.7, 146, 140, 141, 205, 212, 146.3,
 142.4, 142.6, 139, 595, 586, 146.4, 146.5

[57] **ABSTRACT**

A half-mask respirator comprising a high efficiency media filter and having a molded plastic edging or collar attached to the said media, said edging or collar composed of a thermal or catalytic setting plastic which is self-bonding to the filter media, and which is also molded in several individually different shapes to closely approximate an individual wearer's face shape and to which is applied a thin layer of uncured, non-toxic, catalytic, low temperature or thermo-setting plastic which is then positioned on the wearer's face and thus will provide a very high efficiency seal between the filter media and the wearer's face.

[56] **References Cited**
UNITED STATES PATENTS
 2,845,926 8/1958 Hill 128/146.6
 3,688,768 9/1972 Reimschuessel et al. 128/146.2
 2,578,007 11/1951 Hill 128/146.6

3 Claims, 4 Drawing Figures



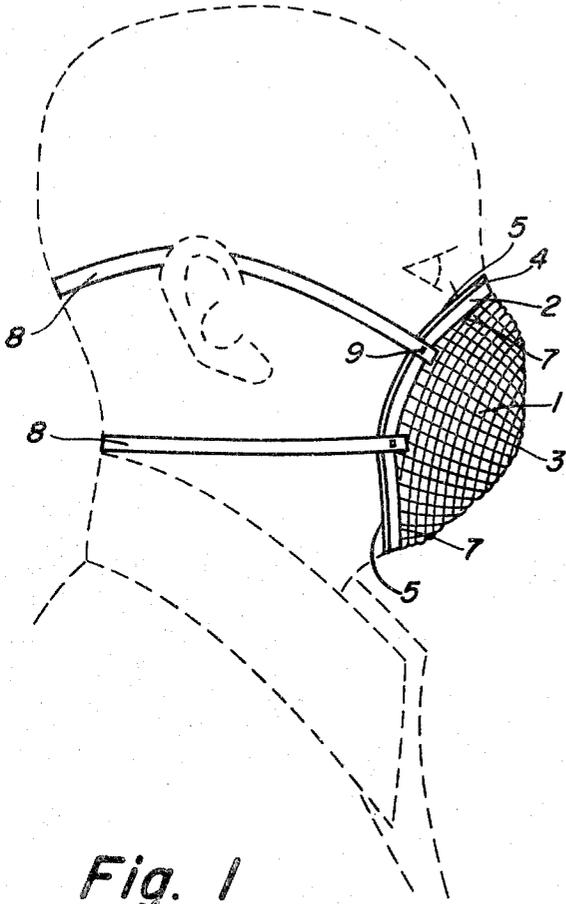


Fig. 1

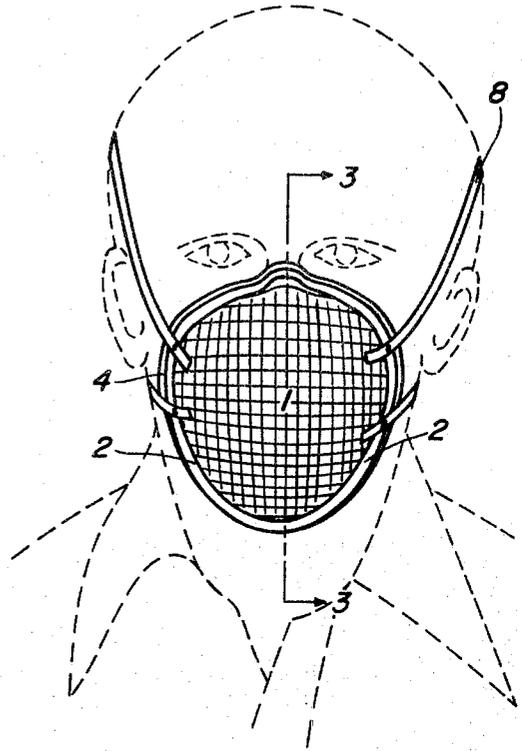


Fig. 2

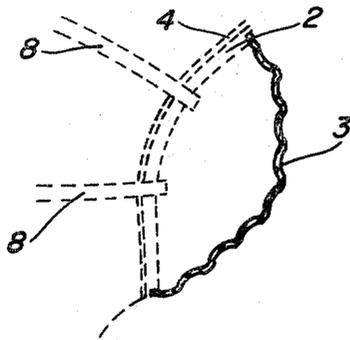


Fig. 3

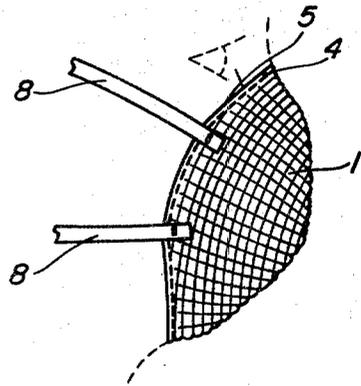


Fig. 4

DISPOSABLE HALF-MASK RESPIRATOR**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention is an improvement in anatomically fitted masks and relates more particularly to facial masks through which a high efficiency separation of harmful contaminants from the wearer's air supply is attained. The improvement of my invention is that a soft, pre-formed, peripheral edging or collar is molded directly to the filter media. The edging or collar will be molded in a variety of facial sizes and shapes to more closely approximate the wearer's facial contour. A thin layered application of a non-toxic, catalytic or low temperature thermo-setting plastic will be applied to facial contact portion of the collar immediately prior to positioning the respirator unit on the user's face. Catalytic curing of the contact plastic layer will occur in a very short time period on the user's face and thereby provide a nearly perfect face-seal between the filter media and the wearer. The tension in the support straps will be very low since only position maintenance will be required.

2. Description of the Prior Art

The inventor knows of no prior art which discloses the use of a one or two layered plastic edging or collar which is bonded to the filter media for a respirator mask so as to obtain a perfect airtight face seal or fit on every wearer. The inventor is aware of Galleher, U. S. Pat. 2,877,764, in which a peripheral cell or cuff is contoured to the wearer's face. The cell or cuff is inflated with air which when positioned on the wearer's face provides a contoured seal through the exertion of pressure against the wearer's face by the support straps. In particular, the Galleher patent claims a mask in which a peripheral selectively contoured retaining cushion is in contact with the facial contour of the wearer, said cushion having a relatively thin-walled cell, a filter for the cell comprising particles of foamed latex, said cell being capable of holding and releasing a fluid or gas along with the appropriate valve means for accomplishing this task.

In general, the prior art has been limited to masks that were made of latex or rubber and achieved their limited degree of face-seal fit by the application of pressure between the contact surface of the respirator body and the wearer's face through tension in the supporting straps of the mask. It is well known that respirators used today fit only 60 to 75 percent of their wearers. This is the result of the production of a single size being worn by wearers of a wide range in facial size and shape. Further, the attainment of fit requires a high support strap tension to both support the weight of the respirator and hold it in intimate contact with the wearer's facial contour. This pressure against the wearer's face results in a low use-time due to pain located principally at pressure points of the bridge of the nose and cheek bones. The use-time limitation, due to pressure point pain, is from minutes to a few hours but in no way allows use for an 8 hour shift. This half-mask respirator of this invention solves both the face-seal efficiency and pressure point comfort problems, in that by molding the edging or collar of the mask to the exact contours of the wearer's face the result is a high efficiency face-seal and because of the exact contour fit and the light weight of the unit only very low support strap tension is required thereby providing comfort. The mask

is intended to be discarded after each use since it is a low cost, maintenance free item.

SUMMARY OF THE INVENTION

This invention is concerned with a respirator which has a single or two-layered plastic collar means attached to a high efficiency filter media. This collar means is contoured to the exact shape of the wearer's facial features throughout the contact area between the collar and the wearer's face. The critical inventive feature of this respirator is a soft, flexible, plastic collar to be bonded onto the filter media and molded in a variety of facial sizes and shapes suited to use by the individual user based on his facial size and shape. A second novel feature of this invention is that immediately prior to wearing the mask a thin layer of liquid catalytically or low-temperature cured plastic is applied to the facial contact area or directly on the interior periphery of the filter media. The mask is properly positioned on the wearer's face with the support straps. The liquid layer would self bond to the collar or the filter media and completes an exact face-seal fit. The straps which support the mask can be attached to the collar by either bonding or otherwise attaching them by any other well known means. Likewise the filter media can be any well known high efficiency type which is also known in the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the half-mask respirator in the preferred embodiment of this invention.

FIG. 2 is a frontal perspective view of the half-mask respirator of FIG. 1.

FIG. 3 is a vertical sectional view of FIG. 2 along the lines 3-3.

FIG. 4 is a side view of another embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a half-mask respirator having a high-efficiency filter media 1 that is shaped so as to have flexibility in both the vertical and horizontal directions by use of crenulated or minutely rounded scallops or contours 3. Attached to filter media 1 is a catalytic or thermo-setting plastic collar 2 that is bonded along the outer periphery and shown schematically at points 7, said edging or collar being molded in a variety of shapes and sizes one of which closely approximates the pertinent facial contours of the wearer 5. A second layer or collar 4 approximately 1/16th of an inch wide of non-toxic catalytic or low temperature curing plastic which self bonds to the first collar 2 is applied and while still in a liquid or uncured state is positioned on the wearer's face 5 and completes a perfect airtight fit between the collar 2 and the wearer's face 5. The support straps 8 are attached to the collar 2 by any well known means 9.

FIG. 2 shows a perspective view of the half-mask respirator with a molded plastic edging 2 bonded to filter media 1, catalytic or low-temperature cured plastic layer 4 and support straps 8.

FIG. 3 shows a crenulation of the filter media and is a sectional view along line 3-3 of FIG. 2. This allows the wearer to flex or move his jaw without disturbing the airtight fit of the collars 2 and 4 without applying undue pressure by means of straps 8.

The collar 2 which is attached to the filter media 1 can be any catalytic or thermo-setting plastic to be molded in a variety of facial sizes and shapes which is applied immediately prior to use, a second self-bonding catalytic curing plastic collar 4 which bonds only to the collar 2 for completion of perfect face-seal. Any one of the several presently known oxygen-complexed dimethyl silicon plastics or polyurethane resins plastimers would be suitable materials for these collars or a non-toxic self-bonding member of the same plastic family. Any other material that is non-toxic, does not adhere to the wearer's skin, and bonds to the first collar 2 would be suitable material for the second collar. Specifically, this embodiment visualizes a plastic collar 2 molded and bonded to the inner or outer peripheral edge of a high-efficiency filter media 1 and having a facial contact portion of approximately three-eighths to one-half inch in width to which is applied a layer of a non-toxic uncured plastic about one-sixteenth of an inch wide or other compatible material that would self-bond to the collar 2 and not to the wearer's facial skin and that would cure by contained catalytic action during the first few minutes of wear to a soft, flexible, elastic material that would result in a perfect self molded face-seal between the filter media and the wearer's face.

SECOND EMBODIMENT OF THIS INVENTION

FIG. 4 shows the sealing layer being the sole collar 4. The uncured, liquid plastic is applied to the inner periphery of the filter media 1 and then, while still uncured, positioned on the wearer's face 5 by straps 8 and allowed to cure in place and thereby provide the face-seal as described above.

The width of the single collar 4 is about one-quarter of an inch. The main problem with directly applying the liquid, uncured plastic to the filter media 1 is the long setting time required to form the collar 4. An excess of plastic is required over that used in the preferred embodiment to provide a perfect anatomical fit. The advantages of collar 2 as shown in FIGS. 1-3 is to provide: a) structural support to the periphery of the filter media 1, b) a back-up seal in the event the second collar 4 should fail, c) a base on which the uncured plastic is bonded to quickly, and d) it may be premolded so as

to give an approximate facial fit. The same materials as described in the preferred embodiment would be suitable for forming this collar.

The filter media can be any well known filter means and specifically it will be a molded or otherwise formed material that in the application to dust filtration might be a paper having a 0.8 micron nominal pore size similar to that of the Mine Safety Appliances Company's Type S. The contours or crinulations molded onto the filter media as shown in the drawings are old in the art of respirator filter media and are not a part of this invention. The support straps can be made of the same material as the collar or any other elastic type material.

From the above it will be seen that by my invention I have provided a selective contoured airtight half-mask respirator which is simple in construction, extremely comfortable and effective in use, and of low cost. The improved method of obtaining and retaining a selective contour in a mask of this kind to fit any wearer and with the highest degree of comfort to this wearer makes this mask a decided improvement over the prior art. The use of this method for obtaining a perfect anatomical fit has application in other than the respirator field such as scuba type face masks, plastic gloves and footwear for use in handling hazardous chemicals, or any other application where perfect anatomical fit is required.

What I claim is:

1. A disposable half-mask respirator having crenulated filter media, supporting straps, and a molded, soft, plastic collar means connected to said straps for providing a perfect anatomical fit with one edge of said means being bonded to the said media, said collar means being composed of a catalytic or low temperature cured thermo-setting plastic selected from the class consisting of oxygen-complexed dimethyl silicon and polyurethane resin plastimers.

2. The respirator of claim 1 in which said collar means is composed of oxygen complexed dimethyl silicon plastics.

3. The respirator of claim 1 in which said collar means is composed of polyurethane resin plastimer plastics.

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