United States Patent [19]

Misaqi

[11] 3,736,927

[45] June 5, 1973

[54] **SELF-CONTAINED AIR PURIFIER AND CONDITIONER UNIT**

[76] Inventor: **Fazlollah Leo Misaqi,** 1407 Meadowlark Drive, Pittsburgh, Pa. 15243

[22] Filed: **May 17, 1971**

[21] Appl. No.: **144,080**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 841,432, July 14, 1969, abandoned.

[52] **U.S. Cl.** **128/145.6**

[51] **Int. Cl.** **A62b 7/00**

[58] **Field of Search** ..... 128/145.6, 142.7, 128/142.3, 142 R, 146, 141, 145.7, 145.8, 142.6; 2/7–9

[56] **References Cited**

UNITED STATES PATENTS

2,688,962	9/1954	Summers	128/142
2,381,455	8/1945	Jacob	128/142.6
2,402,820	6/1946	Kitchen	128/142
3,413,972	12/1968	Depping	128/142.7

FOREIGN PATENTS OR APPLICATIONS

782,137	3/1935	France	128/141
484,638	5/1938	Great Britain	128/142.3

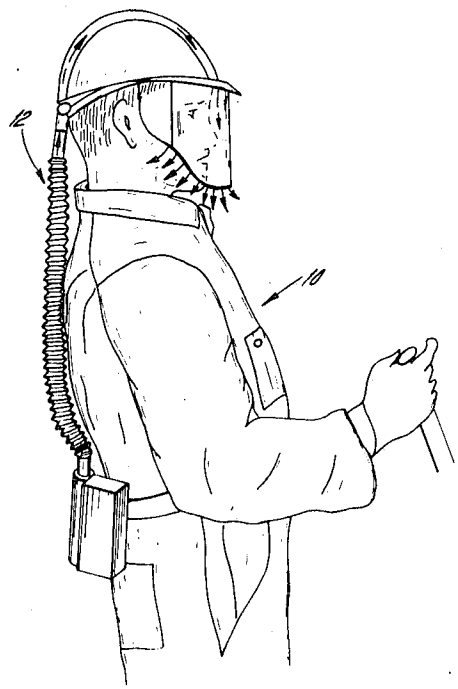
Primary Examiner—Lawrence W. Trapp

Attorney—J. Gibson Semmes

[57] **ABSTRACT**

An integrated composite component, self-contained air purifier and conditioner unit for portable use by individuals. A compact battery driven air blower and protective head covering adapted for delivery of and electrically purifying and/or conditioning air to the face of a user are incorporated in the unit.

2 Claims, 8 Drawing Figures



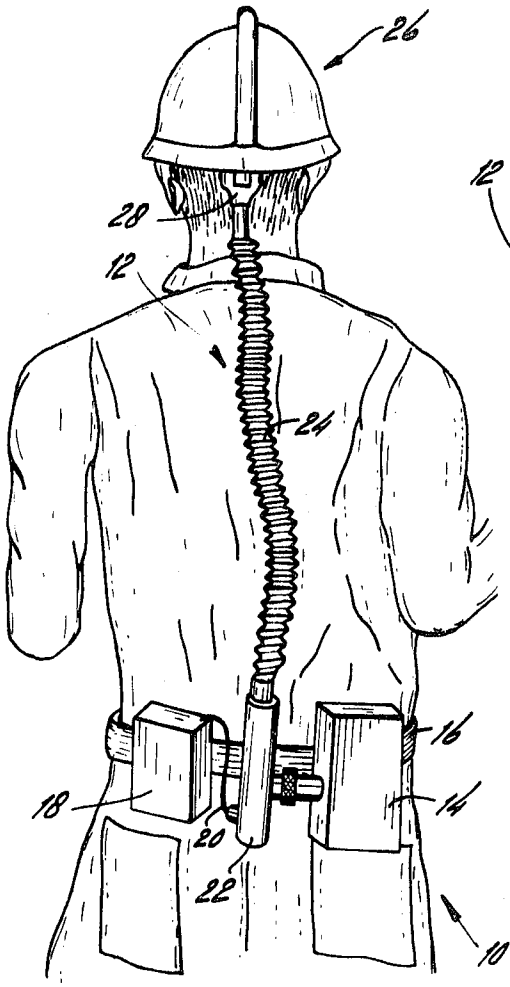


FIG. 1

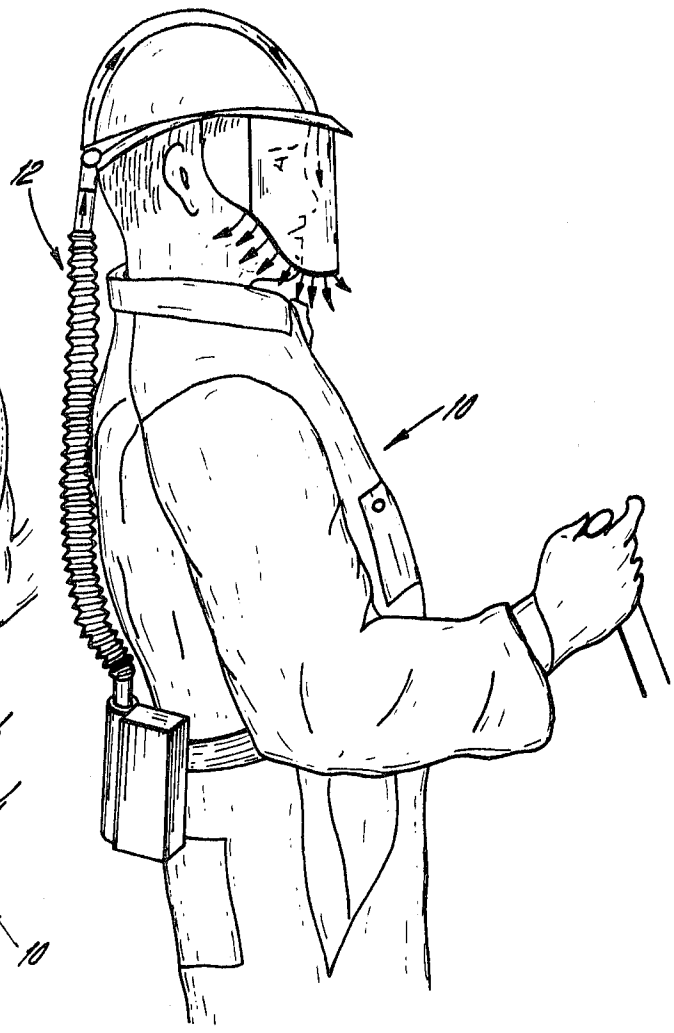


FIG. 2

INVENTOR
FAZLOLLAH L. MISAQI

BY John Gibson Semmes
ATTORNEY

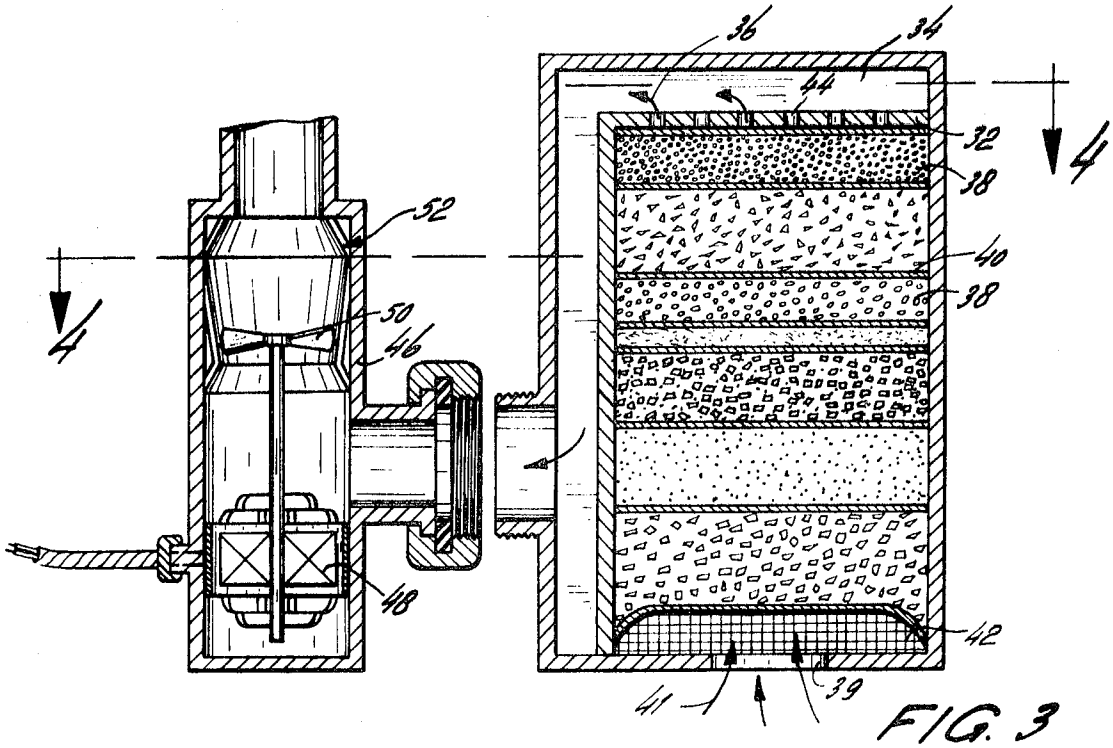


FIG. 3

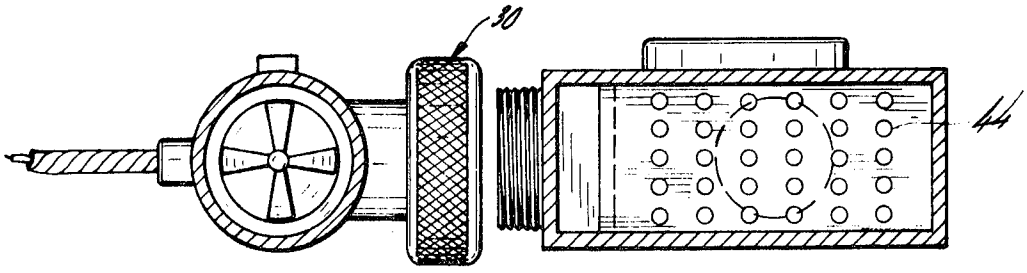


FIG. 4

INVENTOR
FAZLOLLAH L. MISAQI

BY John Gibson Semmes
ATTORNEY

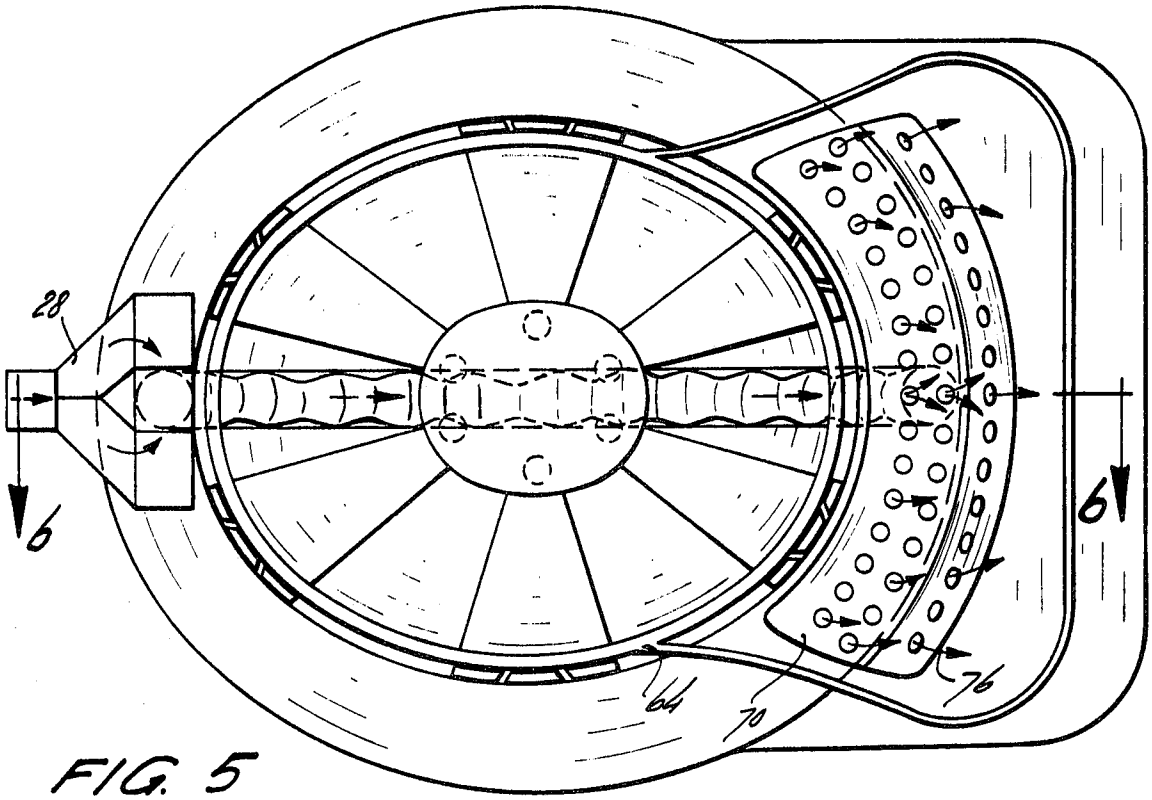


FIG. 5

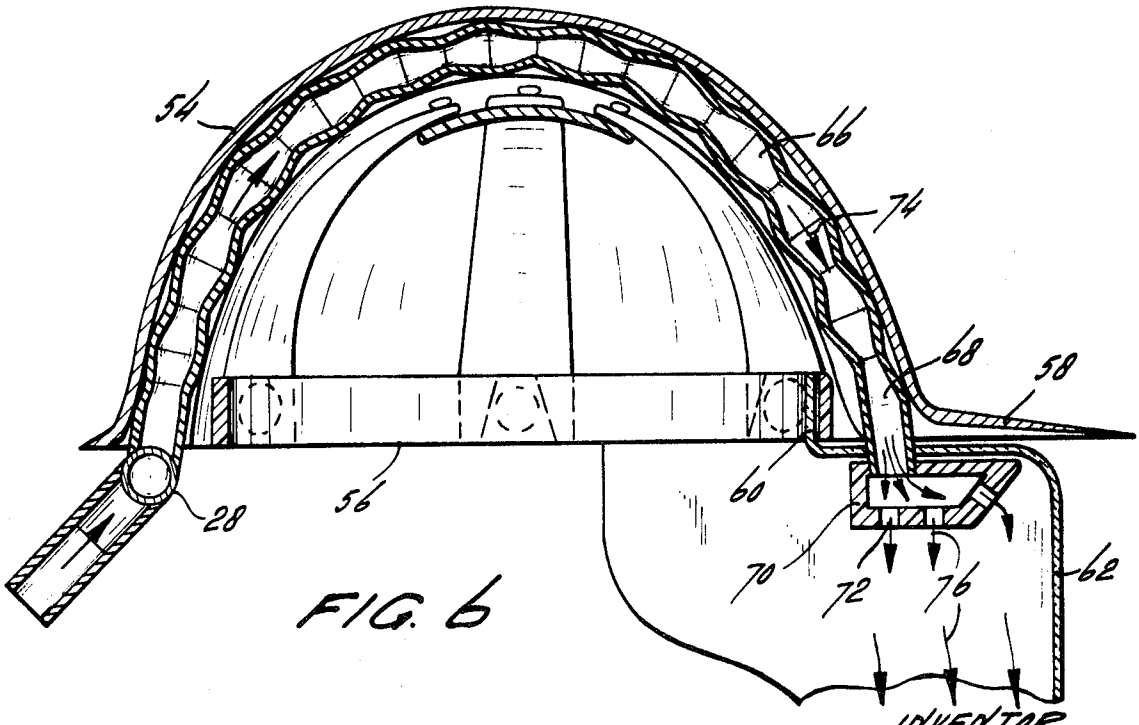


FIG. 6

INVENTOR
FAZLOLLAH L. MISAQI
BY John Gibson Semmes
ATTORNEY

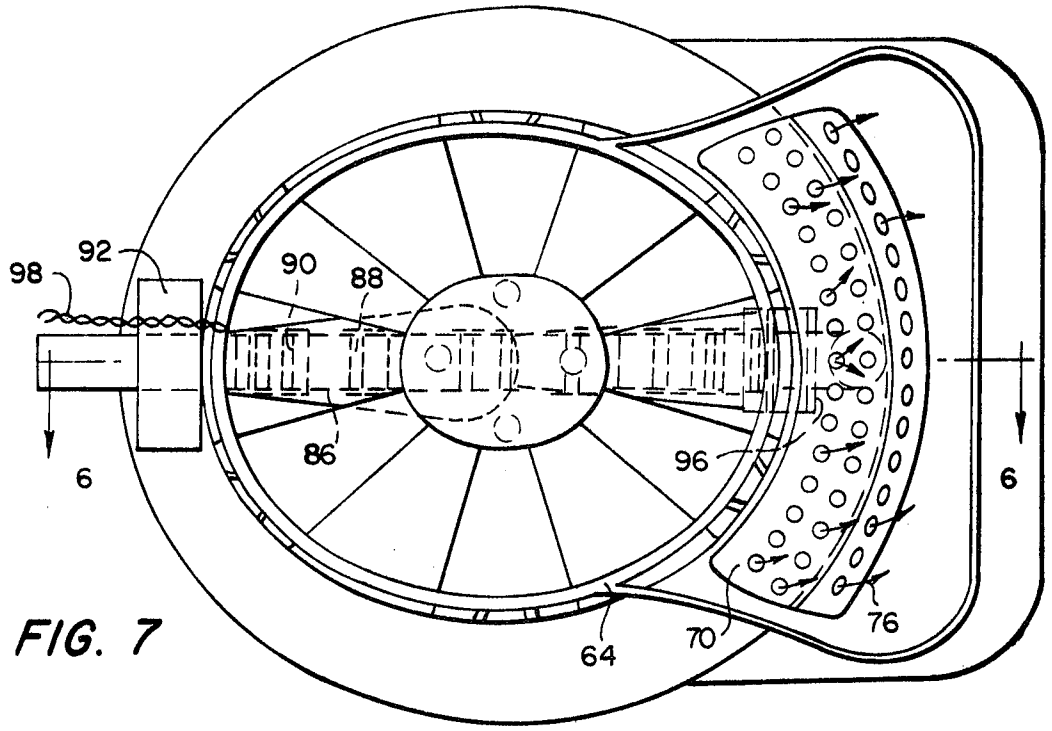


FIG. 7

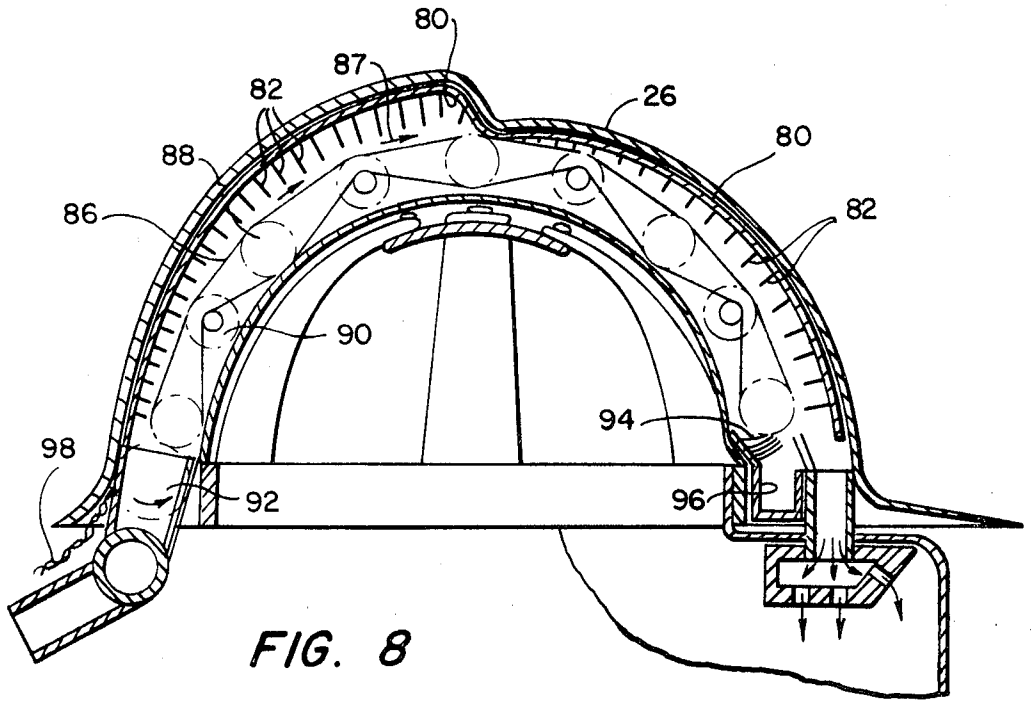


FIG. 8

INVENTOR: FAZLOLLAH LEO MESAQI

ATTORNEY: J. Gibson Semmes
1200 Seventeenth St., N.W.
Washington, D. C. 20036

SELF-CONTAINED AIR PURIFIER AND CONDITIONER UNIT

BACKGROUND OF THE INVENTION

This application is a Continuation-In-Part of my abandoned co-pending application, Ser. No. 841,432, filed July 14, 1969.

Heretofore different types and constructions have been incorporated in air purifier and conditioning units and systems having as their function the protection of users in polluted, toxic, and/or oxygen deficient air environments, and in uranium mines with unsafe concentrations of radon and radon doughters and the like. Such heretofore known apparatus have lacked the feature of a self-contained air purifying device and which is portable or independent of a person's work and work environment. Prior known devices have additionally been costly and bulky in manufacture and use.

SUMMARY OF THE INVENTION

The present invention has, as its principal feature, improvements in apparatus and system to provide, selectively, a constantly flowing supply of purified and/or conditioned air for an automatic individual breathing protection of persons in a work environment of possibly polluted, toxic, or oxygen deficient atmospheres and for various other contaminated environmental conditions. The present invention is for an integrated composite component, self-contained air purifier and conditioner unit for portable use by individuals which is independent of a person's type of work, tools, machinery or work environment. The present invention is distinctive in inclusion of a compact, battery-driven air blower into the air purifier and conditioner which, in combination with a specially adapted protective head covering, provides a unique respiratory device not heretofore available.

Other and additional objects and advantages of the invention will be more readily apparent from the following descriptions of and illustrative embodiment thereof when taken with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear elevational view depicting apparatus of the invention as carried by an individual;

FIG. 2 is a side elevational view of the showing in FIG. 1;

FIG. 3 is a cross-sectional view through a blower and air purifier in side elevation;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a bottom plan view of the inside of adapted head covering; and

FIG. 6 is a side view in section of the adapted head covering.

FIG. 7 and FIG. 8 are a plan and sectional side views of the head covering embodying the electrical purifier.

As will more clearly appear hereinafter, the apparatus constitutes an individual open-face automatic air purifier and conditioner designed for protection of persons and two components, namely the air purifier and an adapted protective head covering are connected by a hose. The apparatus includes an electric self-contained blower which is constituted substantially as a single piece of equipment so connected with the other components that it is a completely self-contained unit wholly portable in nature and in no way dependent upon external sources or increments for operation. Restrictive devices such as extended hoses or face masks and the like are eliminated and a person's face is free and vision unhampered. Working movements are therefore more advantageous.

A major advantage of the invention resides in the function of the self-contained electric blower which in combination with the adapted protective head covering automatically delivers respirable air to a user's nose and mouth without requirement added effect by a user, such as when breathing through a cannister, filter or breathing bag and the like. The transparent shield directs a flow of purified and conditioned air to the required area, while at the same time leaving the face substantially unobstructed. In effect forced clean air forms a protective invisible air cushion in front of a user's face and facilitates shielding of respiratory organs from a polluted environment.

Application of the principal of forced purified and conditioned air in conjunction with elimination of gas masks, mouthpieces and the like make it possible to replace known types of self-contained, closed circuit oxygen apparatus, by a self-contained, open circuit, open-face oxygen apparatus. Carbon dioxide expelled by a user is exhausted into the surrounding atmosphere, and all toxic or contaminated gases in a surrounding environment are chemically eliminated within the air purifier and the so-conditioned air can be enriched with oxygen before being forced to a use area.

Referring now in more detail to the drawings, a user or wearer is generally shown at **10** with the self-contained, integrated composite component air purifier and conditioner unit generally designated **12** removably supported on the body of the user. An air purifier and conditioner unit is shown at **14** which is in the nature of an all-purpose cannister, filter, oxygen-supplying device, air conditioner, etc. and which can include such chemicals and other materials which are effectively operable to substantially completely purify and condition air. The exact nature of such contained materials will be apparent to those skilled in the art to obtain the desired end result and will not be dealt with in detail herein. This unit **14** is mounted on a support belt **16** adapted for encircling engagement with the waist of a user in a usual manner. A battery container **18** is also attached to the belt as shown in FIG. **1**, and is adapted to carry a known type of portable battery connected by lead **20** to a blower assembly generally indicated at **22** for operating the blower unit. A flexible hose **24** interconnects the blower with an adapted head covering **26** through the interposition of a connecting joint **28.**

The purifier and conditioner unit **14** is connected to the blower assembly by an air sealing union **30** (FIGS. **3** and **4**) of such a nature as to permit coupling and uncoupling of the units. The unit **14** has therein a chemical or other material compartment or container **32** spaced in part from the interior of the unit housing to provide an air flow space **34** with the direction of purified and conditioned air being indicated by arrows **36.** The chemicals or other purifying and conditioning materials are shown as a plurality of layers at **38** separated and supported by perforate shelves **40** and the like to permit air flow through the various layers of material. A polluted air inlet opening **39** is provided in the base

of the unit housing with the flow being indicated by arrows 41. A wire mesh cage or the like 42 is positioned over opening 39 and serves as a containing support for the lowermost material layer while permitting air flow therethrough. A plurality of holes or apertures 44 are provided in the top of compartment container 32 for decontaminated air flow therethrough into air flow space 34.

The blower assembly 22 includes a housing 46 into which the air flow indicated at 36 passes. A small D. C. electric motor 48 is secured within the housing and serves to actuate a blower fan 50 constituting a component of an axial air blower generally designated 52. In operation, this blower assembly draws ambient surrounding or environment air into and through the purifier and conditioner and forces it through the flexible hose to the adapted head covering.

The adapted head covering 26 can consist of a usual and well known protective helmet 54 having on the interior thereof an adjustable web support 56. The helmet is provided, if desired, with a protective peak or visor 58 and secured to the bottom of the helmet such as at 60 is a transparent material shield 62 partially retracted below visor 58 for additional security. This shield 62 is of such a design as to cover the eyes, nose and mouth of a user with the temple areas being constricted to conform at 64 to the sides of a user's head. A pure air conducting hose 66 is mounted in the interior of helmet 54, interconnected at the rear of the helmet with connecting joint 28 for the air hose 24. The front end 68 of hose 66 is connected into an air distributor header 70, mounted and positioned within the upper forward confined area of shield 62. The header has a plurality of apertures 72 therein to permit outward flow of purified and conditioned air. The flow of the so purified and conditioned air is indicated by arrows 74 and the exhausted air by arrows 76 which forms an air stream between the face of a user and the inner surface of the shield 62. This air shield or film not only prevents contaminated air from reaching the respiratory system of the user, but additionally serves to cool a user's face, prevent glass fogging, and conveys to the user purified, conditioned and, if desired, oxygen or other enriching gases.

The pure air conducting hose 66 can be so constructed, if so desired, having therein a flexible metallic or other electrically conductive material band 86 which is moveably positioned over rollers 88 and sprocket wheels 90. A driving wheel 92 or other driving mechanism is provided in order to maintain the flexible metallic or other electrically conductive material band 86 in constant motion in the direction of the arrows 87. The driving mechanism may be mechanical or electromechanical of any of the various kinds presently available and well known to those skilled in the art and thus is not described herein in detail. The interior of the pure air conducting hose 66 has, in this embodiment, next to its uppermost side or ceiling an electrically conductive plate 80 having electrically conductive needles or bands 82 protruding downwardly therefrom. The interior of the pure air conducting hose is constructed so as to form an irregular chamber, as shown in FIG. 8. Thus, the chamber becomes larger at the uppermost and at the foremost parts of the helmet. The flexible conductive band 86 and the conductive plate 80 and needles or bands 82 are electrically charged to opposite potentials by voltage supplied by battery pack 18 and connected to the helmet by high voltage lead 98. So, for example, plate 80 and needles or bands 82 could be negatively charged and the flexible band 86 could be positively charged. The oppositely charged flexible band and the conductive plate 80 and needles or bands 82 create an electrostatic field within the pure air conducting hose 66 within the helmet. This electrostatic field will eliminate the finest respirable dust particles and free atoms and ions of radio active doughters of the noble gases, thus providing a highly efficient air purifier. The electrically charged particles thus collected on the band 86 are conveyed by an on-the-band 86 until they are scraped off the band 86 by brushes 94 positioned at the foremost end of the band. The electrically charged particles are then collected by the container 96 positioned below the brushes 94.

The overall structure of the adapted head covering keeps a user's face free from obstructions and the nose and mouth are free for performing their natural functions without additional effort or removal of the head covering.

It will be seen from the foregoing that the present invention provides apparatus which is self-contained and of such a nature as to be readily and easily supported by a user without resort to external apparatus and negates the necessity for known types of face masks and respirators.

An additional advantage resides in the use of a positive pressure so that possible leaks are not harmful and leaks cannot result in a pollution of the respirable air. Special medicines can be used as additives in the chemicals or materials. Once the protective head covering is adjusted to an individual, no further fitting is needed. The basic components including the blower, battery, hose and adapted head covering are interchangeable or replaceable by others more suited to environmental use.

Manifestly, changes in details of construction can be effected without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

I claim:

1. An integrated, composite component, self-contained air purifier and conditioner for portable individual use comprising:

A. an air purifier and conditioner decontaminant unit;

B. blower means interconnected with the decontaminant air unit for drawing air through said unit;

C. portable self-contained power means connected to the said blower means for actuating said blower;

D. a protective head covering;

E. air hose means interconnecting said head covering with the exhaust end of said blower means for delivering purified and conditioned air to said head covering;

F. a protective face shield suspended from said head covering member;

G. means attached to said head member and connected to said air hose for electrically purifying the air, said means comprising an irregularly shaped conduit attached to said air hose, a portion of said conduit being electrically charged along the conduit, an oppositely charged movable band located near said charged portion and means for moving said band, whereby minute particles and impurities

are electrostatically removed from the air in said conduit; and

H. means connected to said irregularly shaped conduit for dispensing purified and conditioned air into the space between a user's face and said protective shield.

2. Apparatus as claimed in claim **1** having brushes in contact with the moving electrically charged band and a container for collecting the electrically charged particles.

* * * * *