



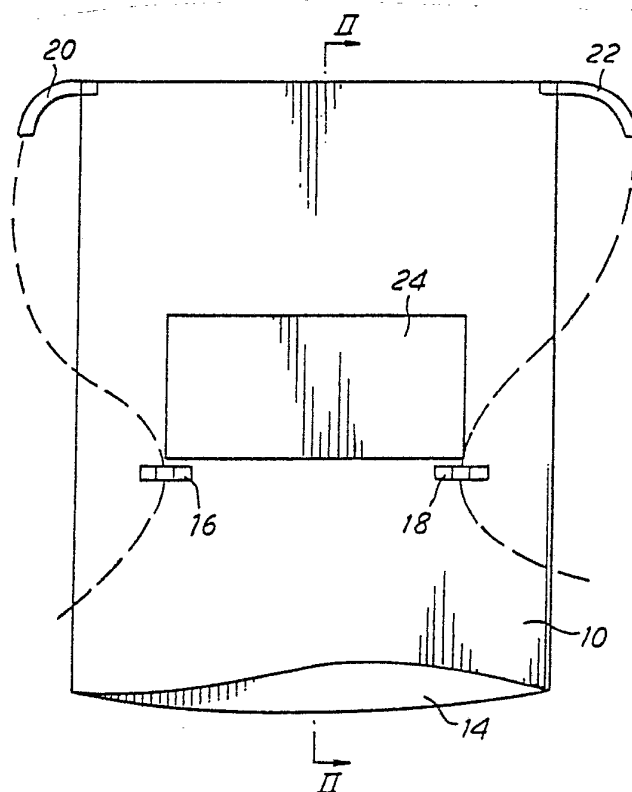
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB82/00021 (22) International Filing Date: 26 January 1982 (26.01.82) (31) Priority Application Numbers: 8103520 8125798 (32) Priority Dates: 5 February 1981 (05.02.81) 24 August 1981 (24.08.81) (33) Priority Country: GB (71)(72) Applicants and Inventors: DE LA PENA, Michael [GB/GB]; The Loose Box, Knowl Hill, near Reading, Berkshire (GB). SMALL, Charles, Wocker [US/CH]; 8 Boulevard James Fazy, CH-1201 Geneva (CH). (74) Agent: COOK, Anthony, John; D. Young & Co., 10, Staple Inn, London WC1V 7RD (GB).</p>		<p>(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent). Published <i>With international search report.</i></p>

(54) Title: HEAT AND SMOKE PROTECTIVE HOOD

(57) Abstract

A hood (10) of non-thermoplastic polyimide material with a pad (24) which is air permeable but prevents the passage of smoke or noxious gases to the interior of the hood.



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1.

HEAT AND SMOKE PROTECTIVE HOODFIELD OF THE INVENTION

This invention relates to a hood for wearing on the head for use in fire protection situations or when a person is to be evacuated from an area or a room where there is a fire or where there is smoke or noxious fumes.

PRIOR ART

There have been many proposals for protective hoods and respiratory devices, often intended to enable the wearer to breathe, when the surrounding atmosphere is noxious or toxic.

British Patent No. 1 569 088 (MORRIS) discloses a welder's hood with an air filter. British Patent No. 1 587 121 discloses head-gear and a respirator for aircrew.

British Patent No. 1 593 360 discloses a hood of plastics material having welded seams in a special arrangement.

British Patent No. 1 395 099 discloses clothing to wear in an operating theatre. British Patent No. 1 352 982 discloses a stretchable hood, and British Patent No. 1 302 670 discloses a stretchable suit. British Patent No. 1 103 380 discloses a filter arrangement for use to improve the ventilation of motor vehicles.

British Patent 1 173 143 discloses a hood or a glove which is oleophobic and has a lining which includes activated charcoal. Other proposals have been made in British Patents Nos. 1 587 121, 1 376 369, 1 088 293, 896 345, 842 766, 482 137, 357 773 and U.K. Published Application No. 2 024 6,1A.

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2.

British Patent No. 1 529 558 shows a respirator hood tightly fitting the head with a filter container rigidly connected to a mouthpiece.

British Patent No. 1 526 134 shows a protective hood for use with an air-exhausting device also worn on the head.

None of the numerous suggestions mentioned above are in any way suitable to be worn by members of the general public seeking to escape from a burning building e.g. a hotel or a burning vehicle, e.g. an aeroplane, train, or bus.

It is an aim of this invention to provide a hood of simple construction which can be folded flat, which is comfortable to wear, and which when worn provides good protection against heat and against breathing smoke and noxious gases such as the products of combustion.

SUMMARY OF THE INVENTION

According to the present invention in its broadest aspect, there is provided a hood of non-thermoplastics polyimide material having an open end wherein the head of the wearer may be inserted and having, located in its front wall, a pad which is air permeable but which prevents the passage to the interior of the hood of smoke and noxious gases.

3.

PREFERRED EMBODIMENTS

In a preferred embodiment of the invention, the hood is made from two superposed substantially rectangular sheets or of one sheet folded down one of its longer sides of KAPTON plastics material, of approximately 1000th of an inch (25 micrometres) in thickness .

In a specially preferred embodiment of the invention a pair of tapes are provided on the hood whereby it may be securely fastened to the head, and according to an advantageous feature of the invention the tapes are located in such a manner as to minimise the dead space within the hood when the tapes are fastened in a prescribed manner. For this purpose the tapes may be fastened one to each upper corner of the rectangular hood, and then each led down to pass through a loop which is secured to the face of the hood, there being one loop at each side inset about 6 or 7 centimetres from the nearer edge of the hood and disposed about 15 - 18 centimetres, preferably 16 - 17 centimetres, from the bottom or open end of the hood.

KAPTON is a Trade Mark of Du Pont de Nemours International S.A., and KAPTON film may be obtained from this company, PP and R Films Division, CH1211 Geneva, Switzerland.

Alternatively, the hood may be constructed including an elastic or rubber strap having two ends each of which is secured to an upper region of the front wall of the hood in such a way that the strap extends substantially horizontal when the hood is worn normally by an erect person, and also including a pair of neck tapes, each of which has two ends one of which is secured to the hood and the other of which is free, these tapes being led around the hood and passed

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through one or more loops attached to the hood, the arrangement being such that the tapes can be pulled in opposite directions to tighten a lower region of the hood snugly around the neck of the wearer.

5 In a particularly preferred arrangement according to the invention, a filter pad is provided over a "window", i.e. an aperture made in one of the superposed sheets of "KAPTON" film. The filter pad may be a 4-layer pad which includes the following layers laminated to one another:-

- 10 1. (Outer) a layer of spark-resistant and flame-resistant charcoal cloth.
2. A layer of microfine fibre for example polycarbonate fibre, as another example a microfine polypropylene fibre layer may be used.
- 15 3. A layer of charcoal cloth in which the charcoal is in activated form and which in addition is impregnated with a copper salt and with organic compounds to render this layer adsorbitive to hydrogen cyanide and to nitrogen oxides.
- 20 4. A porous open cell plastics foam layer which is preferably loaded with a suitable amount for example 60 grammes per square metres of activated charcoal powder.

As an alternative to using "KAPTON" film, one may use any polyimide film having adequate heat radiation resistance and chemical resistance at elevated temperatures and, which preferably is not a thermoplastic material.

5.

SHORT DESCRIPTION OF THE DRAWINGS

The invention will be better understood from the following illustrative description of one non-limiting example thereof, given with reference to the accompanying drawings in which:-

5 Figure 1 is a front view of one example of protective hood according to the invention;

Figure 2 is a vertical cross-section on the line II-II of Figure 1;

10 Figure 3 is a cross section through a four-layer filter pad used in a hood as shown in Figures 1 and 2; and

Figure 4 shows diagrammatically an alternative example of hood according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

15 The illustrated hood includes front and rear walls 10, 12 made of a polyimide film which is flame-resistant, infusible, non-permeable to gases, resistant to heat radiation and not thermoplastic. The front and rear walls are substantially rectangular and are joined around two or three of their edges to form a bag or hood which can be worn on the head. The hood may be made from a single rectangular
20 sheet of film which is folded over and then secured together along two edges so producing a rectangular bag shape with one end constituting an open mouth into which the wearer inserts his head. Alternatively it may be made from two superposed sheets joined along three edges. The open edges indicated at 14 in Figure 1. The
25 front wall 10 has a window cut therein, and over this window is placed a filter pad layer which in the preferred embodiment of the

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invention is as shown in Figure 3 and comprises a four-layer laminate. This filter pad layer is secured to the wall 10 by adhesive, by heat sealing, or by other convenient means.

Also attached to the front wall 10 are two tape loops 16, 18
5 each of these being joined to the wall 10 by their end portions
and having a central portion separated from the wall 10 so that a
tape 20 or 22 as the case may be, can be passed through the resulting
loops so formed. In wearing the hood, these tapes 20 and 22 are then
10 tied by the user around his neck, so in substance closing off the
lower opening 14 and also flattening the hood to conform quite
closely to the head of the wearer in order to reduce the free space
within the hood within which dead air can accumulate. It has been
found that this particular arrangement of tapes and loops is partic-
15 hood very easy to put on and take off.

Referring now to Figure 3, one example of a filter pad 24 is
shown in Figure 3. Alternative filters may be used. The outer
layer 26 (Figure 3) is preferably commercially available _____

charcoal cloth prior to activation of the charcoal. The next layer
28 is a layer of microfine fibres for this purpose polycarbonate or
polypropylene fibres may be used. A particularly suitable layer is a
randomized polycarbonate fibre sold by the company Carl Freudenberg of
5 West Germany. This layer forms a good filter for particulate material
in smoke. The third layer is preferably a charcoal cloth which has
been subjected to a double impregnation in order to render it such that
it will absorb hydrogen cyanide gas and nitrogen oxides. The fourth
10 layer is a porous open cell plastics foam which is loaded with a suitable
amount of activated charcoal powder. Polyurethane foam having sub-
stantially 60 grammes per square metre of such powder may for example
be used.

Filter including these layers in combination is believed
to give good protection against the products of combustion and so will
provide good protection to a person who wears such a hood during, for
15 example, escape from a burning building.

Figure 4 illustrates in front view an alternative design of
hood according to the invention, which is similar to that shown in
Figures 1-3, except as regards the arrangement of tapes.

The hood 30 illustrated in Figure 4 has an elastic or rubber
20 strap 31 extending across the top of its front surface, secured to the
hood at each end. When the hood is worn, this strap 31 is pulled down
(indicated dotted at 31a) and hooked below the chin of the wearer (or
in a retainer as described later) so diminishing the internal volume of
the hood. Alternatively, the strap 31 may be held down by a retainer
25 34 fixed to the front surface of the hood. The retainer 34 may be
such that the strap 31 must be stretched to reduce its diameter in order
that it can be hooked or clipped or otherwise retained in a suitable
recess or formation (not shown) in the retainer 34. The hood also
includes a neck tape encircling the lower part of the hood and held
by retaining loops 32, 33 and 38. The two ends 36 and 37 of the tape
are free and when the hood is donned, are pulled one by each hand of
the wearer in order to fit the lower part of the hood snugly around
the neck of the wearer.

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It will be seen that there has been particularly described and illustrated a protective hood, particularly intended for use by members of the general public unexpectedly involved in an emergency, which can easily be manufactured, which can be folded flat, and therefore easily transported, which is easy to apply and comfortable to wear, which is easy to remove, and which will provide good protection in an emergency situation.

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CLAIMS

1. A protective hood of polyimide plastics material having an open end wherein the head of the wearer may be inserted and having, located in its front wall, a pad which is air permeable but which prevents the passage to the interior of the hood of smoke and noxious gases.
2. A hood according to claim 1 wherein the hood is made from two superposed substantially rectangular sheets of polyimide plastics material, each of approximately 1000th of an inch (25 micrometres) in thickness, said sheets being secured together around three of their four edges.
3. A hood according to claim 1 and made from one substantially rectangular sheet folded over to provide two superposed sheets which are then secured together along two of their edges, the rectangular sheet being substantially 1000th of an inch (25 micrometres) in thickness.
4. A hood according to claim 1 including a pair of tapes, each of which is fastened at one end to a respective upper corner of the hood and is then led down to pass through a respective loop, said loops being fastened approximately $2/3$ down the height of the hood when the hood is flat and each being spaced from the adjacent vertical edge of the hood by a distance of substantially 18 to 20 percent of the width of the hood when flat.

10.

5. A hood according to claim 1 including an elastic or rubber strap having two ends each of which is secured to an upper region of the front wall of the hood in such a way that the strap extends substantially horizontal when the hood is worn normally by an erect person, and also including a pair of neck tapes, each of which has two ends one of which is secured to the hood and the other of which is free, these tapes being led around the hood and passed through one or more loops attached to the hood, the arrangement being such that the tapes can be pulled in opposite directions to tighten a lower region of the hood snugly around the neck of the wearer.

6. A hood according to claim 1 wherein the pad is a laminated pad having at least the following 4 layers laminated together:

- (i) as an outer layer a layer of spark-resistant and flame-resistant charcoal cloth;
- (ii) a layer of microfine fibre;
- (iii) a layer of charcoal cloth the charcoal being in activated form the cloth being impregnated with a copper salt and organic compounds whereby this layer is absorptive to hydrogen cyanide and nitrogen oxides; and
- (iv) a porous open cell synthetic plastics foam layer.

11.

7. A protective hood comprising an open-ended envelope of polyimide material which is flame-resistant, infusible, non-permeable to gases, resistant to heat radiation and non-thermoplastic, the envelope being made up of front and rear walls of said material and the open end being of dimensions such that a wearer can insert his head therein, one of the walls having a window aperture therein covered by an air-permeable laminate capable of filtering out the gases hydrogen cyanide and nitrogen oxides thereby preventing ingress of such gases to the hood while allowing the wearer to breathe, the hood also having neck tapes so arranged that upon tightening the tapes minimise the volume of dead air within the hood and cause the lower region of the hood to fit snugly around the neck of the wearer.



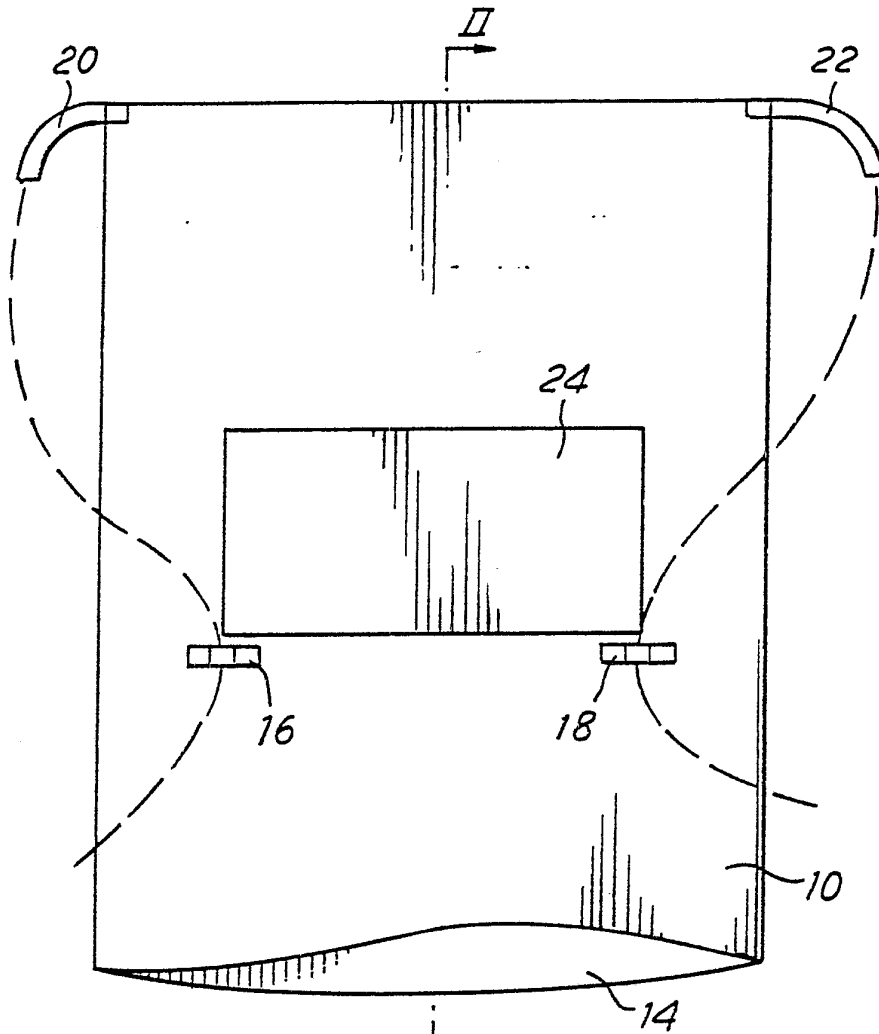


FIG. 1

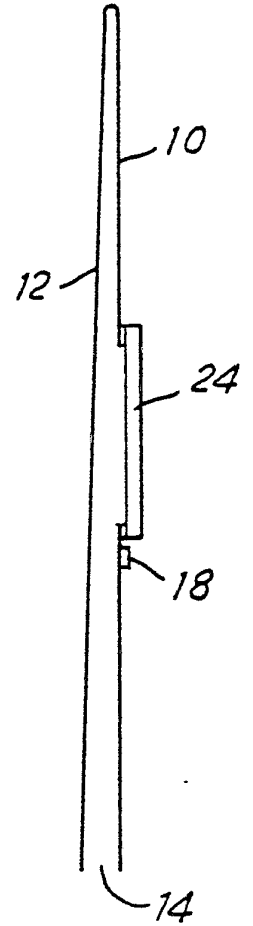


FIG. 2

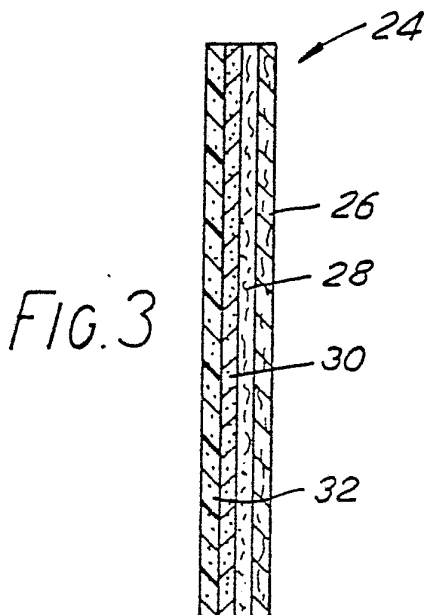


FIG. 3

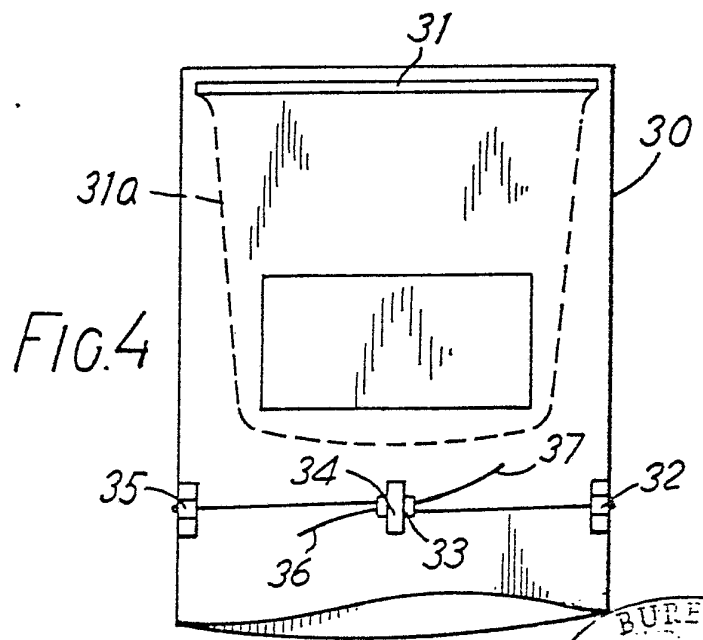


FIG. 4



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 82/00021

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ³ : A 62 B 17/04; A 42 B 1/04		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
IPC ³	A 62 B; A-42 B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	US, A, 4032991 (VANDEWEGHE) 5 July 1977 see columns 2 and 3; figures 3 and 6 --	1-6
Y	US, A, 4231118 (NAKAGAWA) 4 November 1980 see column 2, line 40 - column 4, line 15; figures 1 and 2 --	1-6
Y	US, A, 3521629 (REYNOLDS) 28 July 1970 see column 2, line 63 - column 4, line 11; figures 1 and 4 --	1-6
A	US, A, 4231359 (MARTIN) 4 November 1980 see column 2, line 56 - column 4, line 14; figure 1 -----	
<p>* Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ²
19th April 1982		28th April 1982
International Searching Authority ¹		Signature of Authorized Officer ²⁰
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