Feb. 3, 1953 H. A. FROMMELT ET AL 2,627,072

HEAT-RESISTANT GARMENT

Filed May 29, 1951

Fig. 1

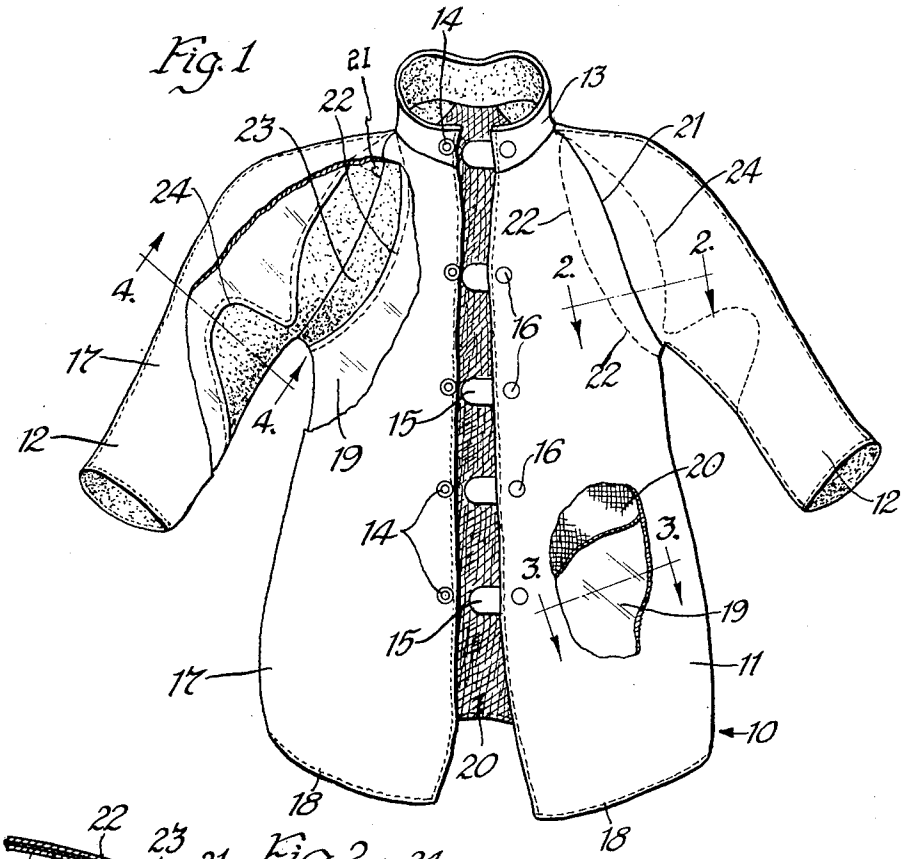


Fig. 2

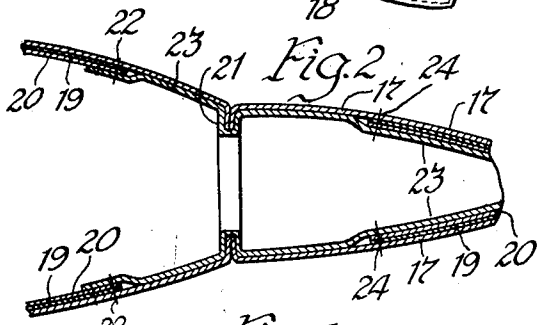


Fig. 3

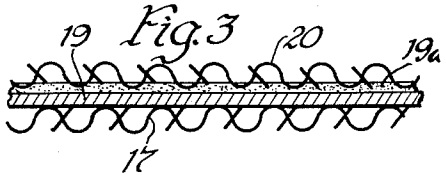
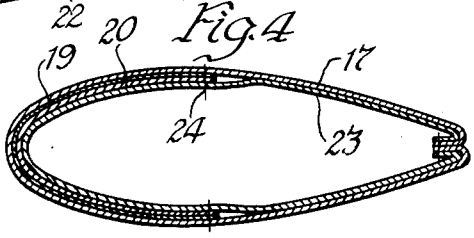


Fig. 4



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Patented Feb. 3, 1953

2,627,072

UNITED STATES PATENT OFFICE

2,627,072

HEAT-RESISTANT GARMENT

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Application May 29, 1951, Serial No. 228,907

1 Claim. (Cl. 2—2)

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This invention relates to the art of heat protective clothing and more particularly to novel composite garments which are especially adapted for use adjacent radiant heat sources developing temperatures as high as 300° F. and even in excess of 3000° F. The invention also relates to a method of protecting humans from intense radiant heat.

Prior to our invention numerous industries, including steel, glass and ceramic, have been concerned with the problem of protecting employees who must come into proximity with heat sources developing relatively high temperatures. As a result of the inability of the employees to tolerate high temperatures in which the work had to be carried on, even for the shortest times, numerous protective devices and protective garments, such as coats, shields, aprons, shoe inserts, gloves and hoods, have heretofore been attempted and thoroughly tried and used without solving the problem. No satisfactory protective garment has heretofore been found which will protect a human from heat radiations for substantial periods of time.

It is an object of our invention to provide a protective garment which will enable the user to work for substantial periods of time proximate to radiant heat sources of from 300° F. to 5000° F.

It is a further object of our invention to provide a protective device for use as insulation against high radiated heat energies from 300° F. to 5000° F.

It is a further object of our invention to provide a heat repellant garment which includes a heat energy reflector and a non-heat-conductive flexible fabric secured thereto.

Still another object of the invention is to provide a method for protecting a person from excessive radiant heat in a manner which does not too seriously retard the mobility of the person.

Other and further objects of our invention will become apparent from the following description and appended claims, reference being had to the accompanying drawings and numerals of reference thereon wherein:

Fig. 1 is a front elevational view of our novel composite protective garment with parts broken away to show the internal structure thereof;

Fig. 2 is a fragmentary cross sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged cross section taken on a segment of the composite wall and illustrating the manner in which the metallic foil is bonded and mounted with respect to the outer and inner layers of material; and

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Fig. 4 is an enlarged cross section of one of the sleeves, as taken on a plane indicated by line 4—4 of Fig. 1.

It is an unusual feature of this invention that foils of metals which are normally good heat conductors have now been found to be good heat reflectors. The garments of the invention may be worn in close proximity to radiant heats from 300° F. to 5000° F. and the inner protected fabric layer will not become scorched. Neither will the wearer feel any great discomfort from heat because the rays of radiant heat are being reflected away from his body by the normally heat-conducting metallic foil. For example radiant heat at about 2000° F. may be brought into close proximity with the foil surface of our garment, and even though this is above the kindling temperature of the sheet of fabric backing on the foil, the fabric will remain cool and unscorched.

Referring now to the drawings in which one embodiment of our invention is illustrated, numeral 10 designates a heat resistant coat which has a body portion 11, sleeves 12 and an upwardly extending collar 13 which is designed to protect the neck. Adjacent the edge of the coat and collar opening are a plurality of fastening elements 14 and cooperating fastening tabs or bends 15 which are secured at one end thereof to the opposite edge of the coat by securing elements designated as 16. It will be appreciated that any suitable fastening means for securing the edges of the coat about the body of the user may be used.

The garment illustrated in the drawings comprises a plurality of layers which are arranged to provide maximum heat repellancy and yet permit maximum freedom of movement, as will hereinafter become apparent.

The outermost layer, which is designated by the numeral 17, of the entire garment comprises a suitable non-heat-conductive material such as woven asbestos or the like. Such outer layer 17 provides the first barrier to the heat. Extended along the major portion of the body 11 of garment 10 and suitably secured to the outer layer or fabric 17 by lines of stitching 18 is a radiant heat reflecting layer 19 which faces outwardly and which is preferably not secured to the outer non-conductive layer 17 except along the lines of stitching 18. A fabric backing 20 of a material such as canvas, rayon, wool, nylon and other natural or artificial fabric is secured along its entire outer surface to the entire inner surface of the radiant heat-reflecting layer 19. Such securance may be achieved by a suitable adhesive

19a (Fig. 3). The heat-reflecting layer 19 may be a metal foil and is preferably a foil of a good heat-conducting metal such as aluminum, copper, gold and silver.

As illustrated in Figs. 1 and 2, the sleeves 12 are secured to the body 11 by lines of stitching which are designated as 21. In the broken away portion of Fig. 1 and in Fig. 2 the foil and canvas layers 19 and 20 respectively terminate short of the seam 21 and terminate in the body portion 11 along a path spaced from the seam 21. Lines of stitching 22 secure the edges of the foil and of the canvas to the outer asbestos layer 17 adjacent to though spaced from the sleeve section. By terminating short of the arm seam 21 freedom of movement of the arm is provided without danger of cracking the heat reflecting foil layer 19. In Figs. 1 and 2, a sleeve lining 23 is provided and is secured by suitable stitching in the areas of the body portions beyond the edges of the foil layer 19 and the canvas 20, and such sleeve lining 23 extends to the irregular curved edge portions of the sleeves.

In Figs. 1, 2 and 4, the sleeves comprise an outer non-heat-conducting layer 17. The layer of foil 19 and the layer of canvas 20 which are secured along the inner edges of the foil terminate short of the arm seam 21 and are secured to the outer asbestos layer by lines of stitching 24 which lines of stitching also connect the asbestos outer layer 17 and foil and canvas layers 19 and 20 to the sleeve lining 23. Such construction permits adequate freedom of movement at the elbow and at the shoulder without danger of cracking or breakage of the foil.

To provide comfort to the wearer the sleeves are lined with an inner absorbent liner or layer 23 made of a felt fabric or the like and such felt fabric layer 23 extends out of the sleeve into the body portion where the liner 23 is secured along its innermost edge by the lines of stitching designated as 22.

It is found that good heat protection is obtained by mounting the outer face of the foil adjacent the outer fabric layer 17 preferably leaving an open space between the foil layer 19 and the outer fabric layer 17.

The garment may be made less elaborately than hereinabove described and still provide unusual protection against excessive radiant heat. In one embodiment of the invention a laminated composite sheet of protective material is prepared by bonding together a layer of metallic foil and a piece of woven fabric. The sheet may be made up into a protective garment with the foil side facing outward or it may be tacked to a jacket to form an outer protective portion thereof. In any event the fabric backing will remain cool and unscorched even when the foil surface is brought close to a source of radiant heat far above the kindling temperature of the fabric. The normally heat-conductive metallic foil will be found to have reflected heat instead of conducting it.

As many changes could be made in the above construction, and as many apparently widely different embodiments of our invention within the scope of the claim could be constructed without departing from the spirit and scope thereof, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative and not in a limiting sense.

The invention is hereby claimed as follows:

In a protective garment for reflecting high temperature heat, an openable main body portion of fire-resistant fabric material having shoulder portions and sleeve openings; a pair of sleeves attached about said sleeve openings to said body portion and providing stitched seams; a flexible fabric lining sewn to said garment body portion and to said sleeves along the edges thereof and disposed along the inner face of said body portion and said sleeve faces; a heat-reflecting metallic foil bonded to said lining along the greater portion thereof, said metallic foil terminating short of said seams and terminating short of the elbow portions of said sleeves to provide for greater flexibility in the areas of said seams and in the areas of said elbow portions; and lines of stitching securing the edges of said metallic foil to said lining.

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