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RADIATION PROTECTIVE GIRDLE

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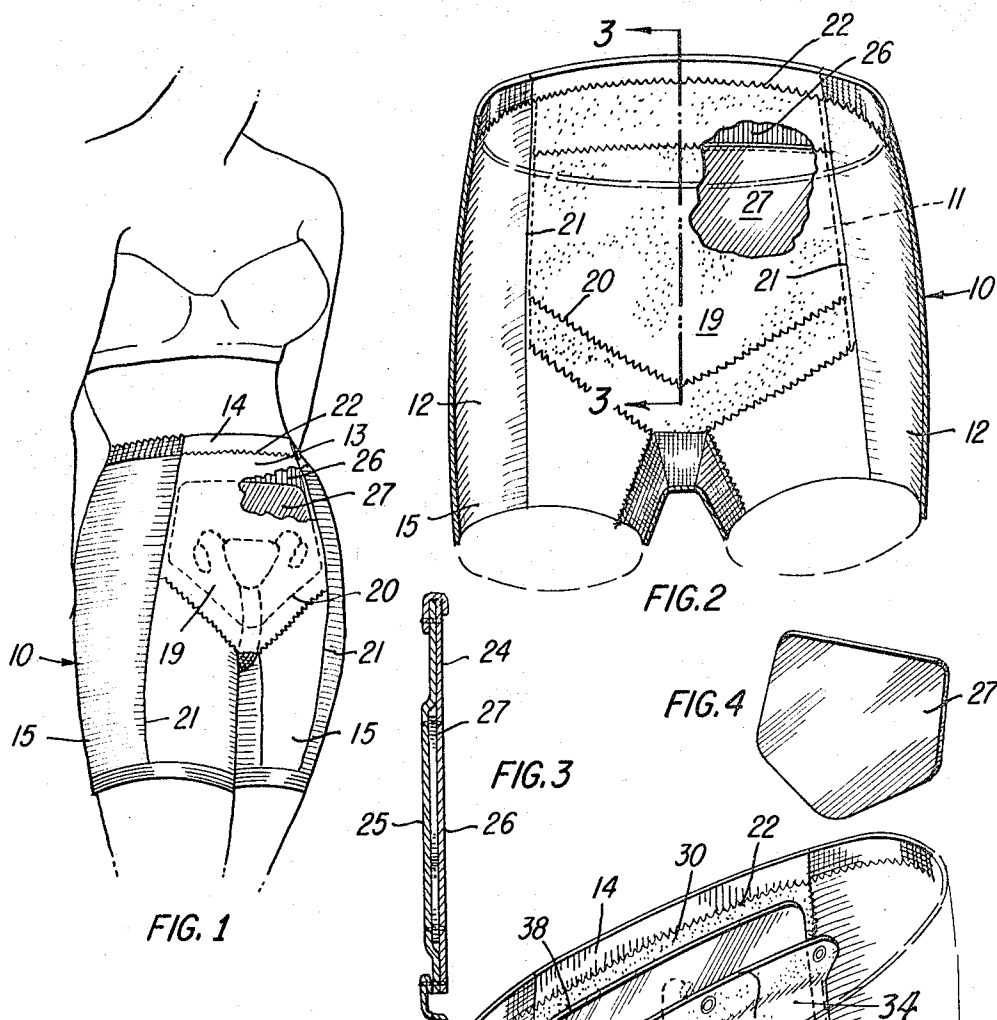


FIG. 1

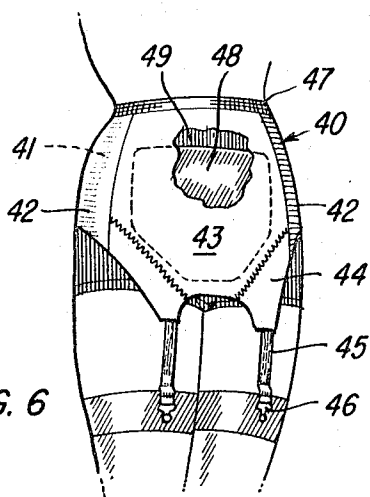


FIG. 6

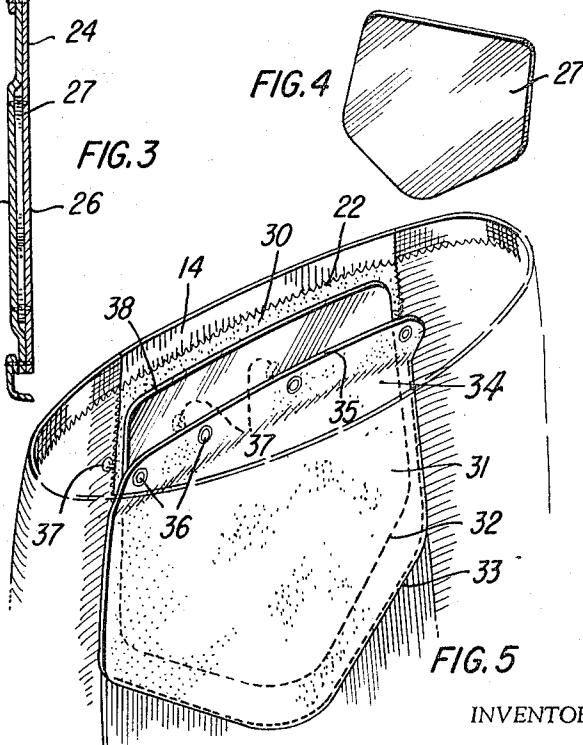


FIG. 5

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RADIATION PROTECTIVE GIRDLE

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This invention relates to undergarments having X-radiation protection, and relates more particularly to undergarments having foundation or support characteristics and other undergarments having gamma radiation protection in specific selected areas.

It is recommended practice in hospitals, operating rooms, clinics and physicians' offices in which X-ray apparatus is employed to require X-ray technicians to use protective aprons, coats and other shielding garments over uniforms in order to protect the individual from the injurious, deleterious and harmful effects caused by prolonged exposure to X-radiation or gamma radiation propagated by X-ray equipment or apparatus. Such conventional garments as are presently being used to shield an individual against gamma radiation from X-ray equipment are usually extremely heavy since they are provided with lead sheets or lead impregnated material causing them to be cumbersome and uncomfortable. Frequently, technicians are unable to equip themselves with proper garments during emergency surgery when X-ray photographs must be made of a patient during surgery within a minimum period of time during which the technician will be exposed to the injurious effects of direct gamma radiation which may result in sterility and genetic hazards.

Therefore, it is an objective of this invention to provide an undergarment for X-ray technicians that may be worn throughout the day with a minimum of discomfort while providing a degree of gamma radiation protection to the abdominal and gonadal region and to other vital internal organs.

Another objective of this invention is to provide a foundation garment providing support properties and characteristics in combination with a radiant energy protective shield that will cover the abdominal and gonadal areas of the wearer.

Still another objective of this invention is to provide a girdle or hose supporter in which a radiation protective shield is supported in enveloping relation within the garment and may be worn by a technician to afford some degree of protection for vital organs from limited exposure to gamma radiation without the necessity of wearing burdensome and heavy lead aprons or laboratory coats provided with lead sheets for short periods of gamma radiation protection.

Yet a further objective of this invention is to provide an undergarment provided with a removable gamma radiation shield that will afford some limited protection for the abdominal and gonadal regions of the wearer protecting against some of the injurious effects caused by gamma radiation without unduly restricting the wearer's activity.

Still another objective of this invention is to provide an undergarment in which a gamma radiation shield is incorporated into the garment and may be removably positioned, and one that is sufficiently flexible so as not to be uncomfortable to the wearer.

Other objects and many of the attendant advantages of this novel undergarment will become more readily apparent to those in the medical art from the following detailed description taken in conjunction with the accompanying drawing in which like characters of reference designate corresponding parts throughout the several views from one mode of presentation of this invention, and wherein:

FIG. 1 is a front perspective view of a panty-girdle, with a portion removed from the front panel, incorporating a radiant energy opaque shield for the protection of the abdominal and gonadal regions of a wearer;

FIG. 2 is a slightly enlarged front elevational view of the girdle of FIG. 1 with a fragmentary portion removed to expose a portion of the protective shield in the front panel;

FIG. 3 is a partial transverse sectional view taken substantially along the plane of section line 3—3 of FIG. 2;

FIG. 4 is a front perspective view illustrating one configuration for a radiant energy opaque shield which may be utilized in the girdle undergarment of FIGS. 1 through 3;

FIG. 5 is a partial rear perspective view of a modified embodiment of the present invention illustrating the rear portion of the front panel of a foundation garment having means for releasably retaining a radiation protection shield therein; and

FIG. 6 is a front perspective view of a hose-supporter employing a radiation protection shield with a portion of the front panel removed therefrom.

Referring to the drawing and more particularly to FIGS. 1 and 2, there is illustrated one embodiment of the present invention incorporated in a panty-type girdle 10 in which there are rear, side and front sections 11, 12 and 13, respectively, a waist-encircling elastic band 14 secured to the upper portions of the rear, side and front sections 11, 12 and 13, with the lower extremities of the garment 10 being provided with short leg-receiving portions 15, and an intermediate crotch portion 16. Suitable conventional hose supporters (not shown) may be secured to depend from the inside surfaces of the leg portions 15 of the girdle 10 for retaining the welt or upper portion of a stocking in position on the leg of a wearer. Preferably the girdle side sections 12 may be woven or knit fabric utilizing elastic yarns to provide the requisite foundation supporting properties for the garment with the rear section 11 being formed either from a woven or knit non-elastic or elastic fabric depending upon the styling and desired supporting characteristics of the garment.

The frontal area of the garment 10, which for the purpose of this description may include an area covering the abdominal and gonadal regions, preferably extends to the crotch area and will be formed preferably from an inelastic woven fabric with the upper shielding portion 19 thereof being defined by the V-shaped seam 20 that extends divergently upwardly to the vertical seams 21 joining the side sections 12 to at least the waistband seam 22. This area to be protected shields the reproductive organs 23 and the abdominal cavity which area extends to protect the spleen and other internal organs. It is within this region that the most serious injury is at-

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tributable from exposure to X-radiation and gamma radiation as produced by rays emanating from X-ray apparatus which may be propagated into the abdominal region, the gonadal region and into other vital organs that may ultimately affect the spleen. The frontal area 19 to be shielded is provided with an outer fabric layer 24 and an inner layer fabric 25 with the inner fabric layer having a skin-engaging portion that is preferably made from cotton yarns having a soft flannel or napped surface to provide for maximum moisture absorption. However, it is contemplated that other yarns or yarn blends including synthetic fibers may be utilized depending upon the garment construction. The inner and outer fabric layers 24 and 25 provide therebetween a shield-receiving pocket or compartment 26 for cooperatively receiving therein a radiant energy opaque shield that is preferably flexible and sufficiently effective, depending upon the thickness, density and opaqueness of the materials utilized, to protect against certain elevations of gamma radiation experienced in and around X-ray apparatus and equipment normally employed in hospitals, surgical operating rooms, and clinics. The protective shield is intended to reduce injury to internal organs within limited ranges of exposure cycles for only limited periods of time when auxiliary leaded aprons and other protective garments are not worn by the technician. A radiant energy opaque shield 27, one configuration of which is illustrated in FIG. 4, may be of sufficient thickness, density and plane area to inhibit or block the penetration of injurious radiant energy waves by reason of the opaque nature of the material. It has been found desirable to utilize, in some instances, a lead sheet of suitable thickness such as employed in an X-ray technician's apron, however, the utilization of lead impregnated rubber, laminated lead cloth, or cloth having finely divided metallic lead particles impregnated into the reticulated material may be utilized in order to retain desirable flexibility in the undergarment and without having the sheet material cut through the cloth fabric. One protective shield material found to be desirable and affording one level of protection against radiant gamma rays in a garment of the nature disclosed is manufactured by Bar-Ray Company of Brooklyn, N.Y., in which a $\frac{1}{16}$ inch lead vinyl sheet is employed utilizes a rubberized lead composition in which a degree of protection is afforded having the equivalent of 0.25 mm. lead sheet. Where greater gamma radiation exposure is experienced, increased protective shielding may be achieved by utilizing two or more layers of the shielding material retained within the same pocket 26.

The flexible radiant energy opaque shield or plate is inserted preferably into the pocket between the outer and inner fabrics during the fabrication of the garment after which suitable seams or stitching may be inserted in order to secure the protective shield in position without the shield shifting from one location to another within the pocket.

There is illustrated in FIG. 5 a modified form or embodiment of the invention incorporated in an undergarment such as a girdle or for that matter a panty garment in which the front outer panel 30 is fabricated substantially similar to the front outer panel or section of the girdle 10 illustrated in FIGS. 1 and 2. However, the inner ply or fabric 31 is secured to the front or outer panel 30 by means of stitching 32 and 33 forming a perimeter for the shield-receiving pocket 34. The upper edge 35 of the inner fabric ply 31 freely extends or is unsecured to the front fabric and is provided with a plurality of spaced-apart snap fastener members 36 for cooperative alignment and engagement with the mating snap fastener parts 37 that are spaced apart and secured to the rear side of the front fabric ply 30. A radiant energy protective shield 38 of the desired configuration and thickness may be removably inserted into the shield-receiving pocket 34 formed between the outer and inner layers of the fabric 30 and 31. The snap fasteners 36 and 37 may be secured

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covering the upper edge of the shielding material 38 and preventing the shield from contacting the wearer's skin. Removal of the shield 38 may be found desirable when the garment is to be laundered thereby avoiding possible damage to the shield. Additional plies or thickness of the shielding material may be provided without removing the garment so as to afford increased protection against gamma radiation when required. The shielding material may be removed from within the pocket 34 during periods when the technician is not exposed to the injurious effects of gamma radiation and the garment may be worn as a conventional garment.

Although the description thus far has related primarily to a panty-type girdle, this invention is not to be so restricted or limited as it is readily applicable and adaptable to straight-line girdles without the leg portions. Also, it is contemplated that this invention may be applicable to a torso-enveloping continuous garment in which gamma radiation shields may be employed not only in selected areas of the front portion of the garment but also to the rear portion of the garment.

There is illustrated in FIG. 6 a further modification of this invention in the form of a garter-belt or hose supporter 40 in which there are rear, side and front sections 41, 42 and 43, respectively. The front section 43 is substantially identical to the rear section that is not shown with the front section being provided with downwardly extending tabs 44 to which a hose supporter 45 is secured at the end of which hose supporter is a conventional hose fastening member 46. A waist encircling stretchable band 47 is provided at the upper portion of the garter belt.

The front fabric layer of the garment is backed by a rear fabric layer, not shown, that is similar to the construction illustrated in the garment of FIGS. 1 and 2. The gamma radiation shielding material 48 is cooperatively received between the fabric layers within the shield receiving compartment or pocket 49 with the shield being of sufficient area to protect the abdominal and gonadal areas of the wearer.

It will be readily apparent to those acquainted with gamma radiation that various materials that are opaque to radiant energy may be utilized as well as the contour of the material for positioning within the undergarment without departing from the purpose and spirit of this invention and such modifications and alterations are expected within the scope of the appended claims.

What is claimed is:

1. A protective undergarment for laboratory technicians exposed to gamma radiation comprising a panty having a waist-encircling elastic opening and leg openings, said panty having a frontal area extending over at least the abdominal and gonadal regions of the wearer, said frontal area of the panty having an outer fabric ply and an inner fabric ply secured along edges thereof and forming a shield-receiving pocket therebetween, and a radiant energy opaque sheet positioned in said pocket between said fabric plies for in at least the gonadal region forming a protective shield to the wearer's gonadal region.

2. A girdle having X-ray protection means comprising a front panel, a rear panel, and elastic side panels, said panels being seamed together to form a panty having a crotch portion and depending leg portions the front panel disposed between the elastic side panels and extending over the abdominal and gonadal regions when in position on the wearer, said front panel having at least two layers of superposed fabric forming a shield-receiving pocket therebetween, said pocket extending from the waist band to the crotch portion, the lower portion of said pocket defined by upwardly diverging seams, a flexible sheet opaque to gamma radiation and having an area to cover at least the gonadal region positioned in said compartment between said fabric layers.

3. An undergarment having a size, shape and configuration adapted to be disposed on the body of the wearer

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and to enclose at least the pelvic and gonadal regions comprising front, rear and side sections, said front section consisting of an outer and an inner layer of fabric secured along edges thereof and forming a protective shield-receiving pocket therebetween, and a radiant energy opaque shield having a plane area covering at least the gonadal region positioned in the pocket positioned between said fabric layers, and means for releasably separating the fabric layers to remove or insert the radiant energy opaque shield, said shield being positioned in the pocket forming a protective shield for a wearer's gonadal region.

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