



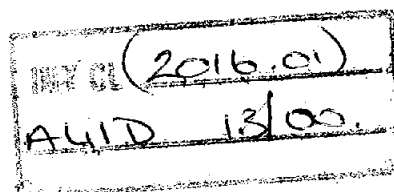
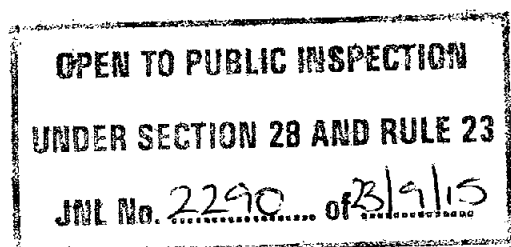
Oifig
Na
bPaitinní

The
Patents
Office

IE S2014/0054

ABSTRACT

A set of garments, namely a coverall with integrated, self-adjusting hood (1) and face mask (2) and a set of boots plus a method of presenting same for gowning and a method of gowning that facilitates easy donning without contaminating the legs of the garment. <Figure 1>



**TRUE COPY
AS
LODGED**

1

S 140054

Title

Anti-Contamination Suit for Cleanroom Environments

Description

5

Many industries require their operations to be carried out in clean environments. These include the Pharmaceutical, Biotechnology, Semiconductor and Microelectronic industries and also areas such as healthcare, aerospace, research and medical device manufacture.

10 These clean environments are achieved through the use of cleanrooms. A cleanroom is defined as an area where airborne contamination is controlled to within specific limits. These limits are set out in the standard ISO 14644. Contamination can be described as anything other than the product being manufactured or process being performed. Common contaminants include dust, skin and hair cells, bacteria, viruses, fungi and other types including aerosol particles. Contamination from outside the cleanroom is generally prevented from entering through the use of filters on the air handling system,
15 positive air pressure and material handling protocols.

The largest source of contamination within a cleanroom environment is the human operator. As a living organism humans continually release particles of skin and hair, aerosol particles in our breath and also fabric particles from the clothes we wear. A single particle can carry numerous potential bacterial contaminants. To prevent these particles from contaminating a cleanroom the users must don particular
20 garments manufactured using particular fabrics that have a high filtration effect and serve to contain any particles released within the garment. Typically, these garments comprise a coverall that covers the torso, arms and legs; a separate hood to cover the head and neck and contain the hair; a face mask to filter particles from breath; and a pair of boots that extend to just below the knee.

25 It is regarded as best practice for these garments to be donned in a manner that does not contaminate the exterior of the garment. These garments are donned in an airlock or ante-room prior to entry into the cleanroom environment.

The donning of these garments presents the problem to be solved. Of particular concern is the tendency for the legs of the coverall to drag along the floor during the gowning process. This contaminates the garment and increases the risk of the user carrying potentially damaging particles, both non-viable and
30 viable, into the cleanroom environment. The invention disclosed includes a coverall with shortened leg sections and single zip closure plus a corresponding set of boots which attach to the shortened leg sections.

The invention discussed comprises a set of garments, namely a coverall (fig.1) with integrated, self adjusting hood (1) and face mask (3) and a set of boots (fig 2) plus a method of presenting same for
35 gowning and a method of gowning that facilitates easy donning without contaminating the legs of the garment.

In a preferred embodiment, the coverall consists of an inner and outer surface, a front torso section (18) including a face mask portion (3), a rear torso section including a hood section (1), a left (16) and right

(5) sleeve and a left (9) and right (12) leg. The coverall carries a number of stud fasteners, or similar attachments, at locations on the sleeves (6) and (15), waist (8) and (13), hood (2), shoulder (4) and thigh area (8) and (13) which are utilized during the folding and preparation of the garment. Advantageously, on the inner face of the waist section the coverall carries a band of fabric (28) which is a different colour to the main fabric of the coverall and is used during the gown process to denote to the user the inside and rear of the garment. Attached to this inner waist section is a flap of fabric (27) which can be used to carry a label or other identifying means. The front torso section (18), when donned, is connected to the rear torso section (20) by means of a zipper on one side of the body (17) that travels from the bottom of the left leg section up into the hood section (1), securing the face mask portion (3) in place. The ends of both legs carry a zip portion (10) and (11) that is used to attach the boots. The waist section has a band of elastic (21) to adjust the fit. The rear of the hood has bands of elastic (19) that automatically adjust the fit of the hood to the users head.

The boots (fig 2) consist of a sole (24) and a leg portion (23). There is a buckle (25) or similar adjustment feature to adjust fit at the instep. The top of the leg section (22) carries a zip that is used to attach the boot to the coverall legs.

The garments must be supplied in a clean condition for use. This requires them to be packaged in a sealed bag to maintain cleanliness until use. This operation is typically carried out by a manufacturer or, in the case of reusable garments, by a cleanroom laundry provider. The invention also relates to a method of presenting the garments for use in the following manner for the coverall;

- unzipping the zip to the end of the left leg
- attaching the stud at the left wrist (15) to the point at the left hip (13)
- attaching the stud at the right wrist (6) to the point at the right hip (8)
- attaching the stud at the hood (2) to the point on the shoulder (4)
- fold the front section laterally onto itself, exposing the interior fabric and coloured waist section (28)
- turning the coverall over so that the rear of the garment faces upward
- rolling the coverall down, starting at the hood and rolling to the waist
- folding the left side in followed by folding the right side in
- folding the garment upwards one or more times to fit the proposed packet or bag
- placing the fabric flap (27) at the waist on the outside of the folded garment
- placing the folded garment into the packet or bag with the coloured waist section (28) visible and sealing.

The invention also describes a method of presenting the boots for use, comprising the following steps;

- folding the leg section (23)
- placing the boots into a packet or bag for sealing.

Advantageously, the invention also describes a method of donning the garments that minimizes the risk of the user contaminating the garments during the donning process.

Donning the coverall comprises the following steps;

- open the bag containing the coverall
- 5 -grasp the coloured fabric band (28) and remove the garment from the bag
- using the coloured fabric band (28) that denotes the rear of the garment, orient the garment correctly and grip both hands on the exposed inner surface
- insert right leg into right leg section (9)
- insert right arm into right arm section (5)
- 10 -inset left arm into left arm section (16)
- shrug coverall up onto shoulders, releasing sleeve studs (8) and (13) in the process
- slide hands into the inner surface of the hood (1) and pull onto head
- connect the zip (17) at the end of the left leg
- pull zip (17) upwards, continuing until it reaches the end, securing the face mask (3) into place
- 15 -Then the user completes the donning process by donning the boots using the following procedure;
- open the bag containing the boots, and one at a time;
- step into the boot
- pull the leg section vertically (23) and connect the zip (22) to the corresponding zip (10) or (11) on the
- 20 end of the coverall leg
- zip the boot into place
- repeat for the other boot

In an optional embodiment, the hood may have alternate adjustment methods such as the use of stud fasteners, fabric tie tapes or straps and buckles.

- 25 In a further optional embodiment, the sleeves ends may have optional adjustment methods including a combination of knitted cuffs (7) and (14), stud closures, elastic, Velcro or similar.

In a further embodiment the face mask section of the front torso portion may be replaced with a further section of similar fabric to the main body of the coverall.

- 30 In a further embodiment the coverall may be supplied with a hood but no face mask or alternatively without the hood or face mask section.

In a further embodiment the coverall and boots may be connected to each other with optional methods including, but not limited to, studs, Velcro or buckles.

5 The present invention has been described in general and in detail by way of examples. Persons of skill in the art understand that the invention is not limited to the specific embodiments disclosed. Modification and variations of the general concept may be made without departing from the scope of the invention as defined by the following claims.

Claims

1. A set of garments, namely a coverall with integrated, self adjusting hood (1) and face mask (2) and a set of boots plus a method of presenting same for gowning and a method of gowning that facilitates easy donning without contaminating the legs of the garment.
2. A coverall, according to claim 1, comprising an inner and outer face, rear torso section (20) with hood portion (1), front torso section (18) with face mask portion (3) , left (16) and right (5) sleeve, left (12) and right (9) leg, whose rear and front torso portions are connected together a zipper (17); with studs or similar attachment methods at points on the garment (2) (6) (15) to facilitate attaching the sleeve and hood portions to the garment (4) (8) (13); with elastic portions (19) in the hood section to facilitate self adjustment when donned; with a section of fabric (28) at the rear of the inside of the waist that is a different colour to the rest of the garment to designate the rear of the garment and facilitate correct orientation of the garment for donning; with a closure at each sleeve end such as elastic, knitted cuffs (7) and (14), stud closure or the like; with at each leg end an attachment method such as zip (10) and (11), stud closure, Velcro, buckles or the like.
3. A pair of boots, according to claim 1, comprising a sole (24) and leg (23)section, with a zip at the top hem (22), and adjustment method (25) such as buckles, studs or similar at the instep(30).
4. A method of presenting the coverall, according to claims 1 to 3, for the user, comprising the steps of:
 - unzipping the zip to the end of the left leg
 - attaching the stud at the left wrist (15) to the point at the left hip (13)
 - attaching the stud at the right wrist (6) to the point at the right hip (8)
 - attaching the stud at the hood (2) to the point on the shoulder (4)
 - fold the front section laterally onto itself, exposing the interior fabric and coloured waist section(28)
 - turning the coverall over so that the rear of the garment faces upward
 - rolling the coverall down, starting at the hood and rolling to the waist
 - folding the left side in followed by folding the right side in
 - folding the garment upwards one or more times to fit the proposed packet or bag
 - placing the fabric flap (27) at the waist on the outside of the folded garment
 - placing the folded garment into the packet or bag with the coloured waist section (28) visible and sealing.
5. A method of donning the garments, according to claims 1 to 4, comprising the steps of:
 - open the bag containing the coverall

- grasp the coloured fabric band (28) and remove the garment from the bag
- using the coloured fabric band (28) that denotes the rear of the garment, orient the garment correctly and grip both hands on the exposed inner surface
- insert right leg into right leg section (9)
- 5 -insert right arm into right arm section (5)
- inset left arm into left arm section (16)
- shrug coverall up onto shoulders, releasing sleeve studs (8) and (13) in the process
- slide hands into the inner surface of the hood (1) and pull onto head
- connect the zip (17) at the end of the left leg
- 10 -pull zip (17) upwards, continuing until it reaches the end, securing the face mask (3) into place
- then open the bag containing the boots, and one at a time;
- step into the boot
- pull the leg section vertically (23) and connect the zip (22) to the corresponding zip (10) or (11) on the end of the coverall leg
- 15 - zip the boot into place
- repeat for the other boot.

Drawings

Fig. 1.

Coverall

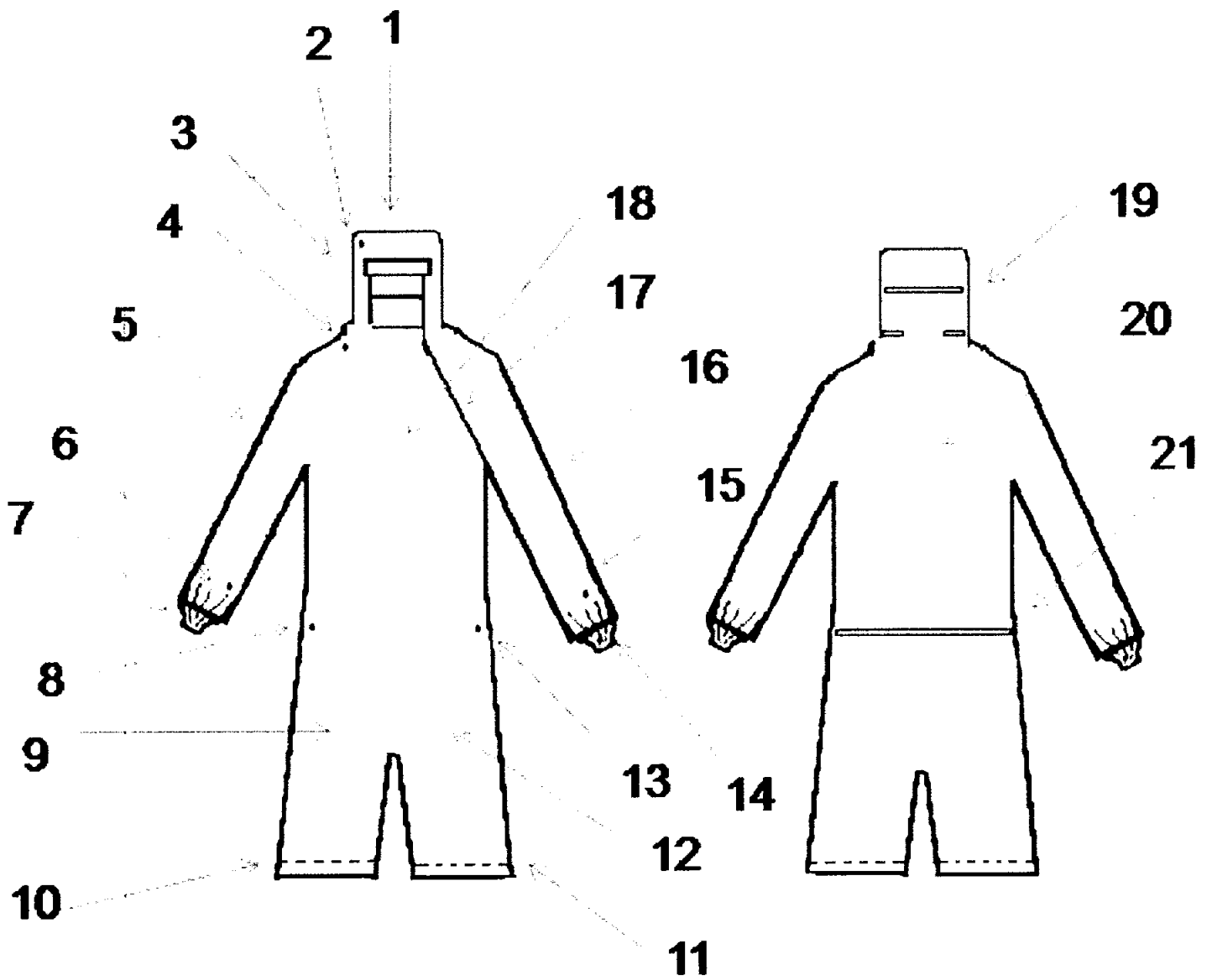


Fig. 2.

Boot

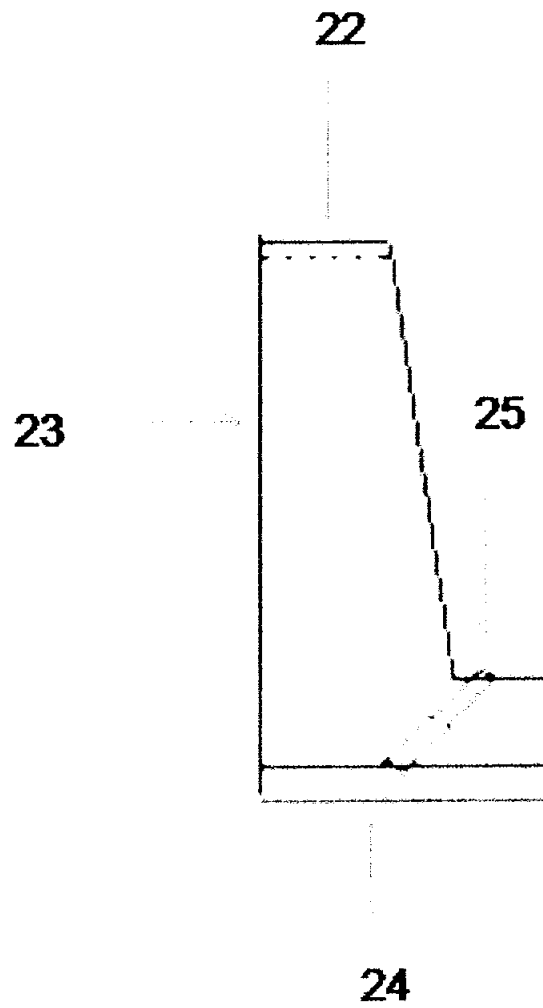


Fig. 3.

Coverall with front section folded to show interior

