

April 14, 1964

S. LASH

3,128,476

FLUID-IMPERMEABLE CLOSURE

Filed July 24, 1961

3 Sheets-Sheet 1

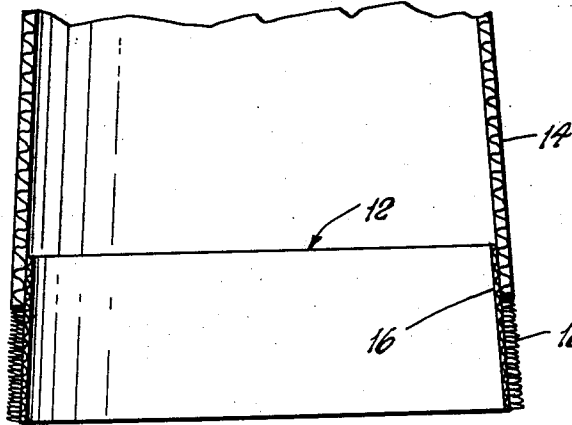


Fig. 1

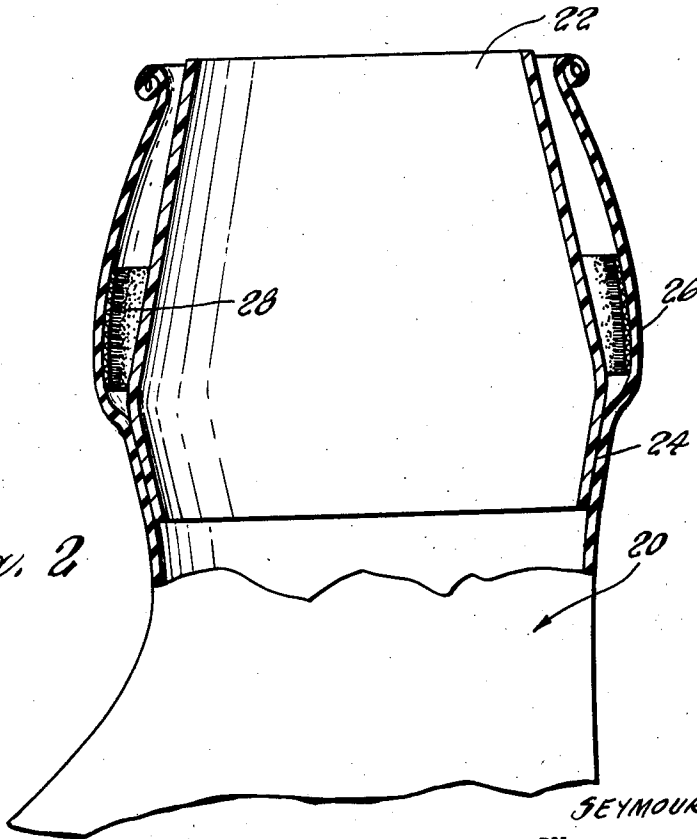


Fig. 2

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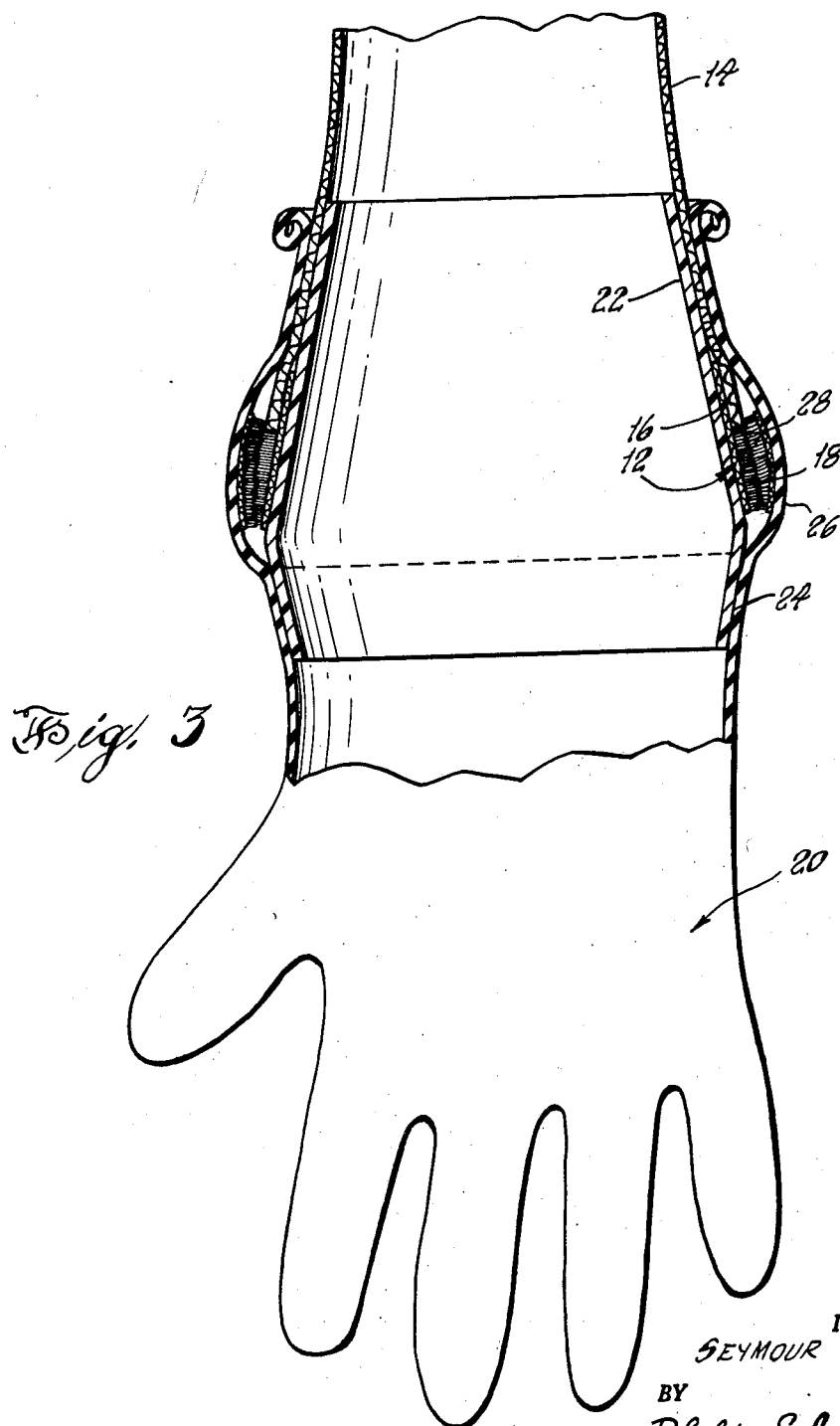
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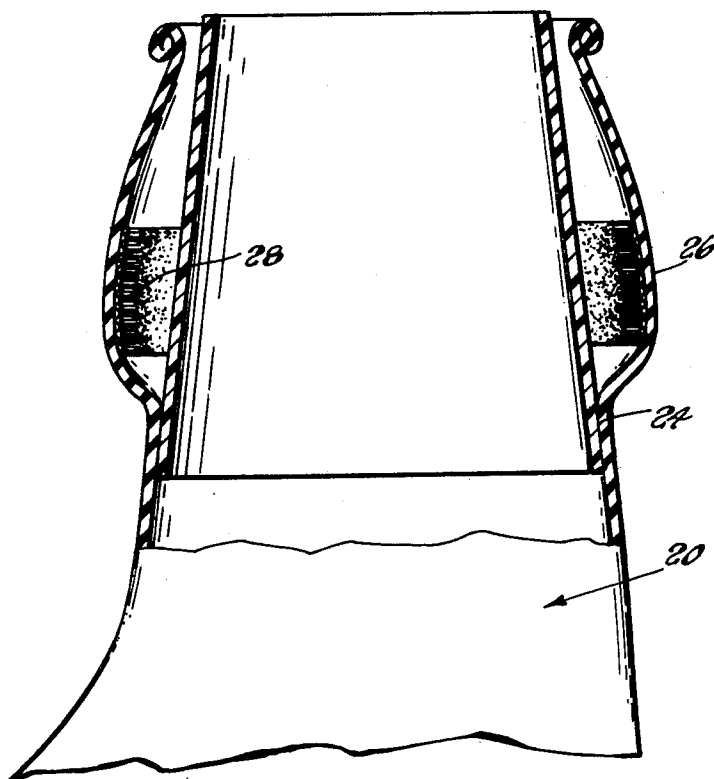


Fig. 4

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3,128,476

FLUID-IMPERMEABLE CLOSURE

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10 Claims. (Cl. 2-270)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The invention relates to an improved fluid-impermeable closure and especially to a fluid-impermeable closure between an appendage to a garment and the garment itself wherein the appendage is easily detachable.

Hereinafter, the specification will refer only to the term "gloves" for simplicity and ease of description, but it will be understood that the description covers garment appendages in general which are intended to include gloves, helmets, boots and any other items of a like nature which it may be desired to join to a garment by a fluid-impermeable junction.

In the past, permanent fluid-impermeable junctions have been effected by cementing or by attaching the gloves to the garment by a variety of mechanical interlocking devices and then covering the junction with a rubber cuff to make it fluid-impermeable. The disadvantage of this method is that the gloves cannot be removed without removing the garment.

If detachability was desired, the method most often employed was to attach one tapered cylinder at the top of the glove and another at the end of the sleeve of the garment. The two cylinders were joined by sliding one inside of the other until the taper impeded further sliding. A rubber wristlet was then rolled up over the cylinders. The disadvantages of this method are numerous: The cylinders, if bent or disturbed during storage or use, cannot be properly interlocked to form a tight juncture. If a cylinder is bent so that a tight juncture cannot be formed, the whole garment is useless. The closure depends upon the internal friction of the cylinders for its holding force, and this is not reliable in the case of a boot. During stand-by conditions, when handwear or footwear does not have to be worn, the rigid cylinders at the garment ends are very uncomfortable. Packaging of garments with rigid cylinders in them often presents a serious space problem. Finally, pattern measurements for constructing garments which in corporate cylinders are very critical and this usually results in higher cost per garment.

The foregoing disadvantages are overcome and the objects and advantages of the present invention are accomplished by affixing a single rigid cylinder to the glove only and effecting positive attachment between the glove and the sleeve of the garment by means of a "Velcro"-type fastener, of the type shown in U.S. Patent No. 2,717,437, issued September 13, 1955.

In a typical embodiment of the invention, a tapered rigid cylinder is cemented on the inside of the open end of a rubber glove, the cemented portion extending around the inner end of the cylinder. The uncemented portion of the glove-end may be rolled up to cover the cylinder or rolled down to expose the cylinder. A "Velcro" tape is cemented at the outer end of the garment sleeve so that the functional area extends outside the sleeve. The complementary portion of the "Velcro" fastener is cemented to the inner side of the glove on the free portion which rolls up over the cylinder so that, when the sleeve is slid down over the cylinder as far as it will go and the rubber glove-end is rolled up over the sleeve, the complementary sections of the "Velcro" fas-

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tener engage and hold each other, the rubber glove-end forming a fluid-impermeable covering for the juncture.

An object of this invention is to provide a fluid-impermeable closure between a garment and detachable appendages which are worn therewith.

Another object is to provide such a closure without attaching rigid cylinders to the garment itself.

A further object is to provide such a closure which is not unduly complex, awkward to wear or expensive.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a diagrammatic illustration of the sleeve portion of an embodiment of the invention;

FIG. 2 is a diagrammatic illustration of the glove portion of an embodiment of the invention;

FIG. 3 is a diagrammatic illustration showing how the sleeve and glove portions fit together; and

FIG. 4 is a diagrammatic illustration of the glove portion of another embodiment of the invention, having a single-tapered cuff.

In FIG. 1, a strip of "Velcro" tape 12 is shown affixed to the outer end of a sleeve 14, which may be designated as the receiving section of an impermeable garment. The "Velcro" tape 12 comprises a backing 16 along the lower half of which "Velcro" pile 18 extends, the upper half being the bare backing material to which the sleeve 14 is affixed by cementing or other suitable means. In the preferred embodiment, the "Velcro" tape extends completely around the sleeve. If the garment is intended to be impermeable, the sleeve may be made from a fabric such as rubberized nylon.

FIG. 2 shows the glove portion of the invention. The glove 20, which is also fabricated from a fluid-impermeable material such as rubber, is cemented or otherwise affixed to the innermost end of a tapered, rigid cylindrical cuff 22. The cemented portion is indicated by the numeral 24. The cuff 22 may be fabricated from a rigid plastic material like polystyrene or from a metal like aluminum. The free, or outer, end 26 of the glove can be rolled up and down along the cuff 22. For illustrative clarity, the outer end 26 of the glove is shown spaced from the cuff 22, but in actual practice, the glove-end hugs the cuff tightly. A second strip of "Velcro" pile 28 extends around the inside of the free portion of the glove 20 at a location which allows it to mate with the strip of "Velcro" pile 18 on the sleeve 14 when the sleeve 14 is slid down as far as it will go along the tapered cuff 22.

The manner in which the sleeve fits over the cuff, the two sections of "Velcro" pile fit together and the outer, or free, end of the rubber glove is rolled up over the "Velcro" pile juncture and over the sleeve to make a fluid-impermeable closure is shown clearly in FIG. 3.

In the illustrated preferred embodiment, the cuff 22 has a major taper which decreases in diameter from its inner to its outer end. A small reverse taper occurs at the inner end, i.e., in the portion of the cuff 22 which is nearest the hand. The advantage of this reverse taper is that, by rolling the glove down to a point below the maximum diameter of the cuff, the rolled section is prevented from unrolling by itself, which it would tend to do if the cuff were formed with only the single taper of its outer section. However, if desired, the cuff can be formed with only a single taper, as shown in FIG. 4.

Positive attachment of the sleeve and glove portions of the closure is provided by the strips of "Velcro" pile. In the preferred embodiment, the strips of "Velcro" pile extend completely around the sleeve and glove. However, it is possible to form a juncture with as few as two sec-

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tions of "Velcro" pile located on opposite sides of the sleeve and corresponding sections of "Velcro" pile located on the glove. Merely enough "Velcro" is needed to keep the sleeve and glove from pulling apart under ordinary conditions of stress.

The use of "Velcro" sections is the most convenient method of effecting the positive attachment of the sleeve and glove portions of the closure. However, other attachment means such as snap fasteners, for example, could be employed, with the ball sections being affixed to the inner side of the appendage and the socket sections being affixed to the outer end of the sleeve.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, the taper of said cuff decreasing from its innermost end to its outermost end; and a "Velcro"-type fastener comprising two sections, the first section being securely affixed to said receiving section of said impermeable garment with its pile strip forming an extension along the outer edge of said receiving section, and the second section being securely affixed around the inner surface of said free portion of said appendage at a location which enables its pile strip to engage said pile strip of said first "Velcro" section when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly over the "Velcro" juncture and over a portion of said receiving section.

2. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a double-tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, the taper of said cuff increasing from its outermost end to a short distance before its innermost end and thereafter decreasing; and a "Velcro"-type fastener comprising two sections, the first section being securely affixed to said receiving section of said impermeable garment with its pile strip forming an extension along the outer edge of said receiving section, and the second section being securely affixed around the inner surface of said free portion of said appendage at a location which enables its pile strip to engage said pile strip of said first

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"Velcro" section when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly over the "Velcro" juncture and over a portion of said receiving section.

3. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff being rollable along extent thereof, the taper of said cuff decreasing from its innermost end to its outermost end; and fastener means comprising at least two pairs of complementary sections, the first of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

4. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a double-tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, the taper of said cuff increasing from its outermost end and thereafter decreasing; and fastener means comprising at least two pairs of complementary sections, the first set of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

5. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a

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body member such as a hand can be inserted, comprising, in combination: a tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, at least the free portion of said appendage being fabricated from resilient material, the taper of said cuff decreasing from its innermost end to its outermost end; and a "Velcro"-type fastener comprising two sections, the first section being securely affixed to said receiving section of said impermeable garment with its pile strip forming an extension along the outer edge of said receiving section, and the second section being securely affixed around the inner surface of said free portion of said appendage at a location which enables its pile strip to engage said pile strip of said first "Velcro" section when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly over the "Velcro" juncture and over a portion of said receiving section.

6. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a double-tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, at least the free portion of said appendage being fabricated from resilient material, the taper of said cuff increasing from its outermost end to a short distance before its innermost end and thereafter decreasing; and a "Velcro"-type fastener comprising two sections, the first section being securely affixed to said receiving section of said impermeable garment with its pile strip forming an extension along the outer edge of said receiving section, and the second section being securely affixed around the inner surface of said free portion of said appendage at a location which enables its pile strip to engage said pile strip of said first "Velcro" section when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly over the "Velcro" juncture and over a portion of said receiving section.

7. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a

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free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, at least the free portion of said appendage being fabricated from resilient material, the taper of said cuff decreasing from its innermost end to its outermost end; and fastener means comprising at least two pairs of complementary sections, the first set of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

8. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment, said appendage being of a type having an opening through which a body member such as a hand can be inserted, comprising, in combination: a double-tapered cuff formed from rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, at least the free portion of said appendage being fabricated from resilient material, the taper of said cuff increasing from its outermost end to a short distance before its innermost end and thereafter decreasing; and fastener means comprising at least two pairs of complementary sections, the first set of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

9. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment comprising, in combination: an appendage to a garment, said appendage formed with an opening through which a body member such as a hand can be inserted, the material of said appendage being impermeable to fluids; a tapered cuff formed of rigid material and having sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, at least the free portion of

said appendage being fabricated from resilient material, the taper of said cuff decreasing from its innermost end to its outermost end; and fastener means comprising at least two pairs of complementary sections, the first set of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

10. A fluid-impermeable closure for attaching a fluid-impermeable garment appendage to the associated receiving section of a fluid-impermeable garment comprising, in combination: an appendage to a garment, said appendage formed with an opening through which a body member such as a hand can be inserted, the material of said appendage being impermeable to fluids; a double-tapered cuff formed of rigid material and having a sufficient diameter to permit the passage therethrough of the desired body member, said cuff being inserted inside the opening of said appendage and the portion of said appendage nearest the innermost end of said cuff being securely affixed thereto so that said appendage is completely sealed off except for the entrance through the cuff, the edges of the

appendage which formed the original opening therein now comprising a free portion of said appendage, the free portion of said appendage tightly hugging said cuff but being rollable along the extent thereof, the taper of said cuff increasing from its outermost end to a short distance before its innermost end and thereafter decreasing; and fastener means comprising at least two pairs of complementary sections, the first set of sections being securely attached at opposite sides of the outer surface of said receiving section of said garment, and the second set of complementary sections being securely attached at corresponding locations on the inner surface of said free portion of said appendage, so that said sets of complementary fastener sections are in the proper locations to be engaged when said receiving section of said garment is slid inwardly along said tapered cuff as far as it will go, said closure being completed by rolling said free portion of said appendage outwardly until said fastener sections can be engaged, engaging said fastener sections and then continuing to roll said free portion of said appendage outwardly over the fastener juncture and over a portion of said receiving section.

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