

[54] **PRESSURE GLOVE**

2,842,771 7/1958 Foti..... 2/159

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[57] **ABSTRACT**

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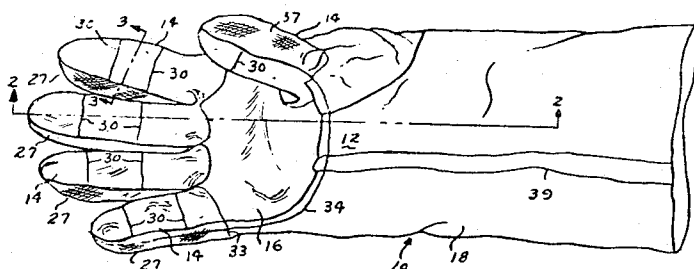
A pressure glove having a single layer on the palm side of the glove with the restraint member being embedded in the gas barrier layer. The restraint member on the front and back of the fingers being made of an anisotropically expandable material having greater expansion in the longitudinal direction than in the direction across the fingers. An interliner is provided which extends only to the base of the palm on the palm side of the hand, but which extends into the fingers on the back of the hand to urge the hand of the wearer against the palm side of the glove.

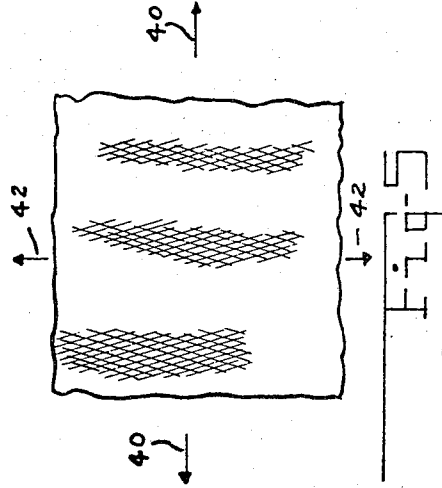
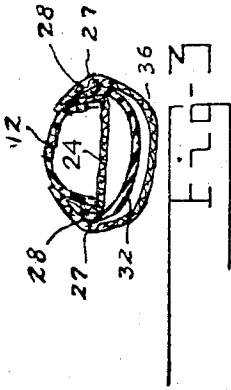
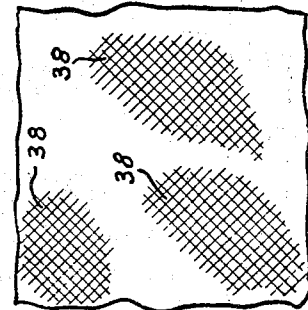
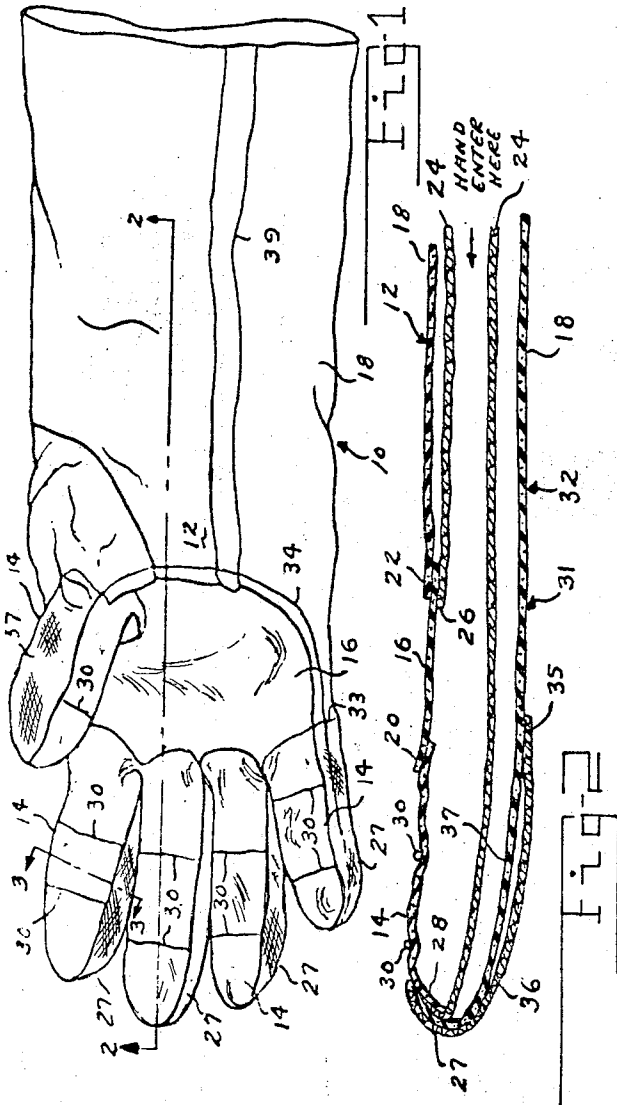
[56] **References Cited**

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3 Claims, 5 Drawing Figures





PRESSURE GLOVE

BACKGROUND OF THE INVENTION

The two major problems commonly associated with pressurized gloves are restricted finger mobility and a lack of tactile sensitivity. The sewn multi-layer construction, typical of conventional pressure gloves consists of a cloth or leather outer restraint layer and a rubber inner gas barrier layer. A knitted fabric inner glove is sometimes used for comfort and to facilitate donning and doffing. The sections of the outer layer of the fingers are sewn together to form seams. The location and bulk of the seams also restrict mobility and reduce tactile sensitivity, especially at the tips of the fingers where the seams converge. The seams reduce mobility because they are not located near the neutral axis, and because they allow the diameter and length of the glove fingers to increase considerably as the internal pressure increases. The force required to bend the fingers increases with the diameter, and the expanded glove fingers do not fit the fingers of the wearer snugly, thereby further reducing sensitivity and control of finger position.

BRIEF SUMMARY OF THE INVENTION

According to this invention, a pressure glove is provided which improves tactile sensitivity and mobility. Tactile sensitivity is increased by reducing the number of layers on the palm and the palm side of the thumb and fingers, and by providing a partial inner liner which holds the palm, thumb and fingers in contact with the palm side of the glove. Mobility is increased by providing a restraint member for the thumb and fingers of an anisotropically expandable fabric which is highly extensible in the direction of finger flexure with low extensibility in the direction across the finger. Mobility is also increased by the use of lap joints for the fabric to eliminate some of the bulk in the seams.

IN THE DRAWING

FIG. 1 is a plan view of a pressure glove according to the invention.

FIG. 2 is a sectional view of the device of FIG. 1 along the line 2—2.

FIG. 3 is a sectional view of the device of FIG. 1 along the line 3—3.

FIG. 4 is a schematic plan view of a material used to make the anisotropically expandable material used in the device of FIG. 1.

FIG. 5 is a schematic plan view of the material of FIG. 4 modified to provide the anisotropically expandable material for the device of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Reference is now made to FIG. 1 of the drawing which shows a pressure glove 10 made up of a plurality of layers, as shown in FIGS. 2 and 3.

The palm side of the glove has a nylon or Dacron material reinforced gas barrier layer 12 having thumb and finger stalls 14, palm member 16 and wrist member 18, joined together at 20 and 22. An interliner member 24 is secured to the fingers and thumb with a lap joint 27, and to the palm member 16 at 26, as shown in FIGS. 2 and 3.

Restraint cords 28, one of which is shown, extend over the ends of the fingers and down along the lap

joint 27, slightly forward of the middle of the fingers. Cross restraint cords 30 extend across the palm side of the fingers at the normal joint position of a person wearing the glove. The gas barrier layer 32 on the back of the glove is secured to the fingers at lap joints 27 and 33, to the palm member at joint 34 and forms a part of wrist member 18. Layer 32 is reinforced with nylon or Dacron fibers, which form an embedded restraint member over the whole glove, except the portions 37 that are at the back of the fingers and thumb. In the portion of the glove at the back of the fingers, a separate restraint member 36 is secured to layer 32 and along lap joints 27 and at joint 35.

Restraint member 36 is made of an anisotropically expandable material, that is the material is extensible in the longitudinal direction of the fingers, but is substantially inextensible in the direction across the fingers, to provide lateral restraint. One type of material which may be used for the anisotropically expandable material is shown in FIGS. 4 and 5.

A nylon marquisette material having rectangular openings 38, as shown in FIG. 4, is stretched on the bias in one direction to produce substantially diamond shaped openings, as shown in FIG. 5. When thermoplastic fiber material, such as nylon or Dacron, is used, the material can be set in the reoriented position with heat. Other materials may be set by other means, for example, with the use of a dilute solution of an adhesive or with a thin coating of an elastomeric material.

The reoriented material provides an anisotropically expandable material which is more readily extendable in the direction shown by the arrows 40 in FIG. 5.

This material is then used for the restraint material 36 with material being located in the longitudinal direction on the fingers, and the direction 42 corresponding to the direction across the fingers.

This material, as shown in FIG. 5, is impregnated with an elastomeric material for use for section 14 of barrier layer 12. Sections 16 and 18 are made of any extensible material impregnated with an elastomeric material. The layer 32 is also made with an inextensible material impregnated with an elastomeric material up to joint 35, with the portion beyond joint 35 adjacent layer 36 being elastomeric material only with no inextensible material.

Restraints, not shown, were also used across the palm and back of the hand to prevent ballooning. These may be either internal restraints built into a glove layer, or external restraints separate from the glove layers.

The inextensible material may be a close weave nylon or Dacron cloth. The elastomeric material may be any of the natural or synthetic elastomers. The elastomeric material used for making the gas barrier for one glove of the invention was a polyurethane sold under the trade name of Estane. However, other elastomeric materials, such as polybutadiene or polyisoprene, could be used. Estane was also used as an adhesive to join the parts to make the lap joints.

The method used to seal the glove to the pressure suit may be any of those known in the art and forms no part of this invention.

While only a single seam 39 is shown in the wrist member 18, this member could be made of several sections joined with lap joints to more easily provide the desired shape.

3

The back portion 31 of the glove can be made continuous with wrist member 18, as shown, or could be made separate and joined with a lap joint.

The restraint member for back portion 31 may be made of the anisotropically expandable material of FIG. 5, with the material oriented so that it is substantially inextensible in the direction across the back of the hand. While all portions of the glove, except portions 37, have been described as having the restraint member embedded in the gas barrier layer, the wrist portion 18 and back portion 31 may also be made with separate layers. Only the front of the fingers, thumb and palm need have the restraint member embedded in the gas barrier to provide greater tactile sensitivity.

There is thus provided a pressure glove which provides greater finger mobility and greater tactile sensitivity.

I claim:

1. A pressure glove assembly, comprising: a palm member; said palm member having a gas barrier layer and a restraint member embedded in the gas barrier layer; a wrist member and a back portion secured to said palm member with an overlapping joint; said wrist member and said back portion having a restraint member and a gas barrier layer; a plurality of finger stalls secured to said palm member and said back portion with overlapping joints; each of said finger stalls having a front member and a back member joined together with overlapping joints extending up one side from the palm member and back portion over the end and down the other side of the palm member and back portion; a thumb stall secured to palm member, said wrist member and said back portion with overlapping joints; said thumb stall having a front member and a back member joined together with an overlapping joint extending up one side from the palm member and the wrist member over the end and down the other side to the palm mem-

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ber and back portion; the front and back members of the finger and thumb stalls each having gas barrier layers and restraint members of an anisotropically expandable fabric being substantially inextensible in the direction across the finger and thumb stalls and easily extensible in the longitudinal direction; the front members of said finger and thumb stalls having the restraint members embedded in the gas barrier layers; the back of said finger and thumb stalls having the restraint members separate from the gas barrier layers; the thumb stall and each of the finger stalls having a restraint cord extending along and embedded in the joints extending up one side over the end and down the other side; the thumb stall and each of the finger stalls having two restraint cords secured thereto and extending across the front thereof from the joint on one side thereof to the joint on the other side along a line adapted to be positioned adjacent the normal finger joint of a person wearing the glove; and means, forming an inner liner, adapted to hold the wearer's hand in contact with the palm member and the front members of the finger and thumb stalls of the pressure glove.

2. The device as recited in claim 1 wherein the inner liner has a back portion which is secured to the finger and thumb stalls along the lap joint between the front and back members and a front portion which is secured to the joint between the palm member and the wrist member whereby the glove is provided with plural layers around the wrist, the back and the back of the thumb and finger stalls and a single layer at the front of the finger and thumb stalls and the palm of the glove.

3. The device as recited in claim 2 wherein the restraint members of the wrist member and back portion are embedded in the gas barrier layers.

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