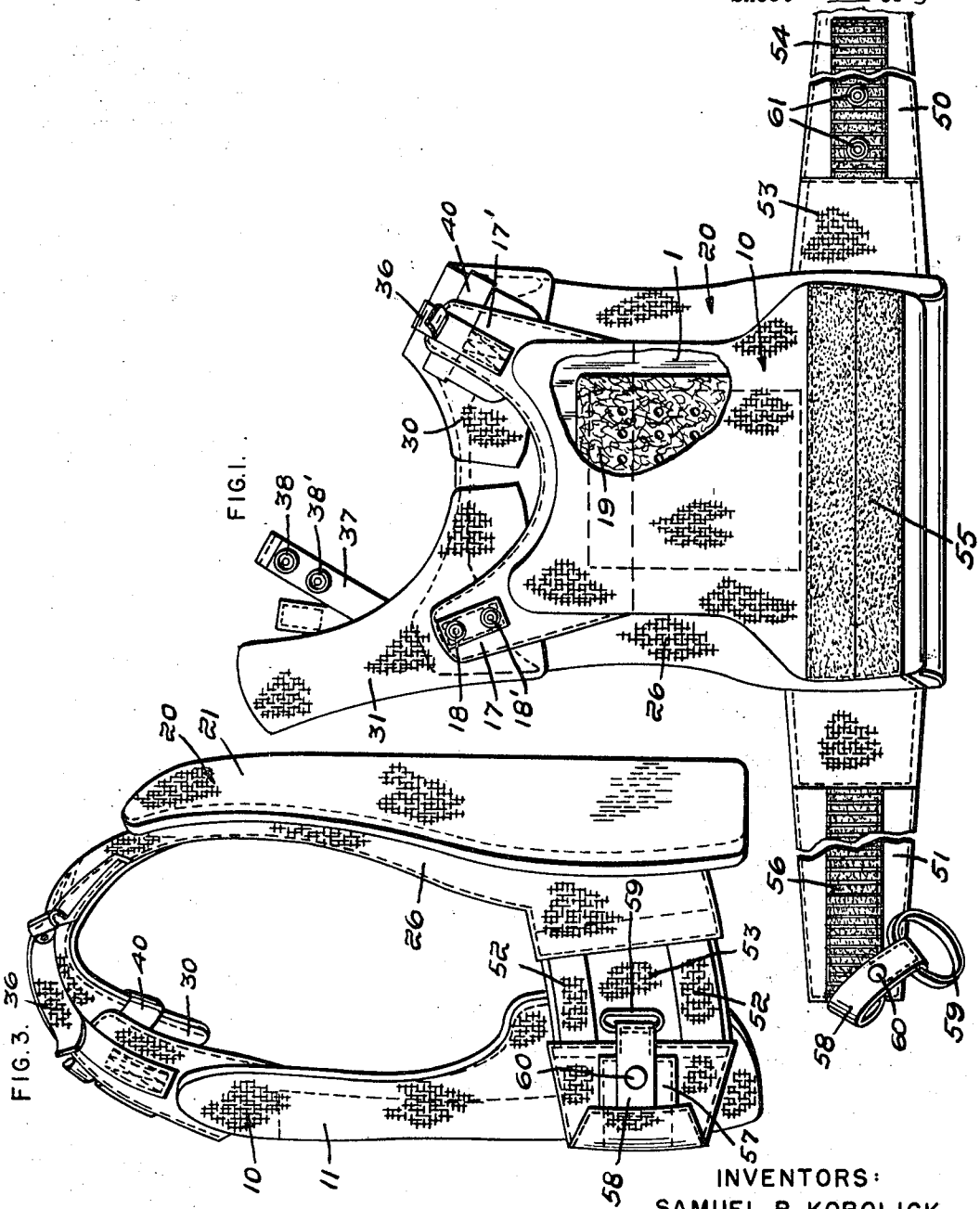
July 1, 1969 S. R. KOROLICK ET AL 3,452,362

TORSO ARMOR CARRIER

Filed April 12, 1967 Sheet 1 of 3



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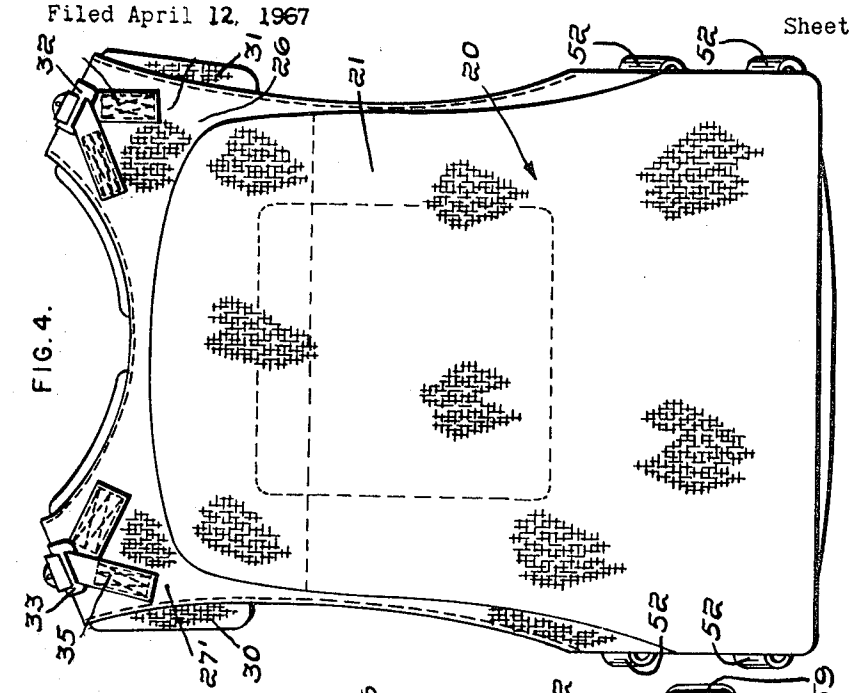

FIG. 4.

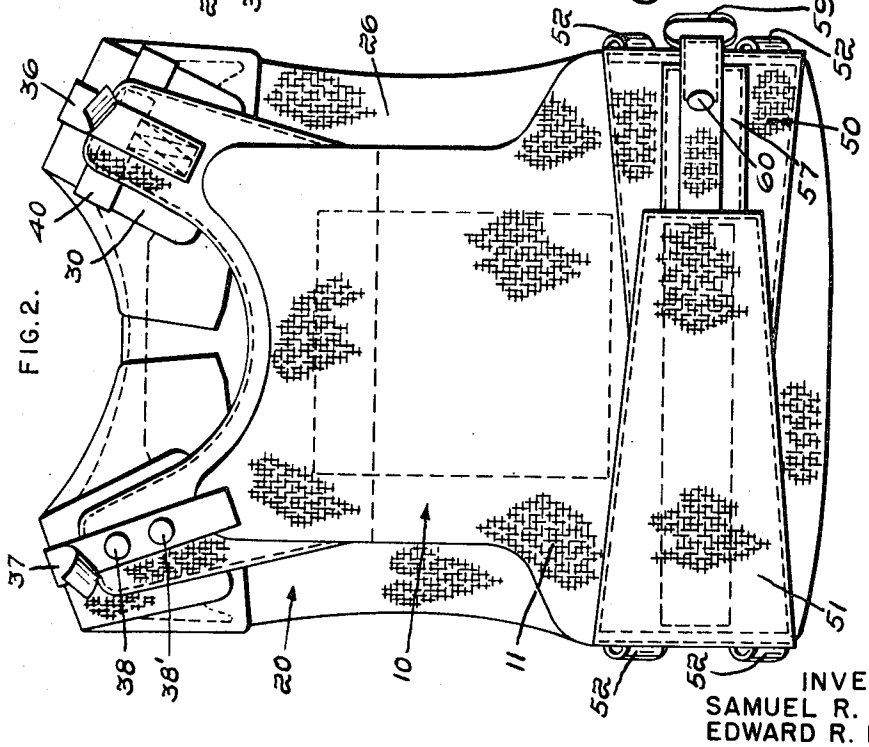

FIG. 2.

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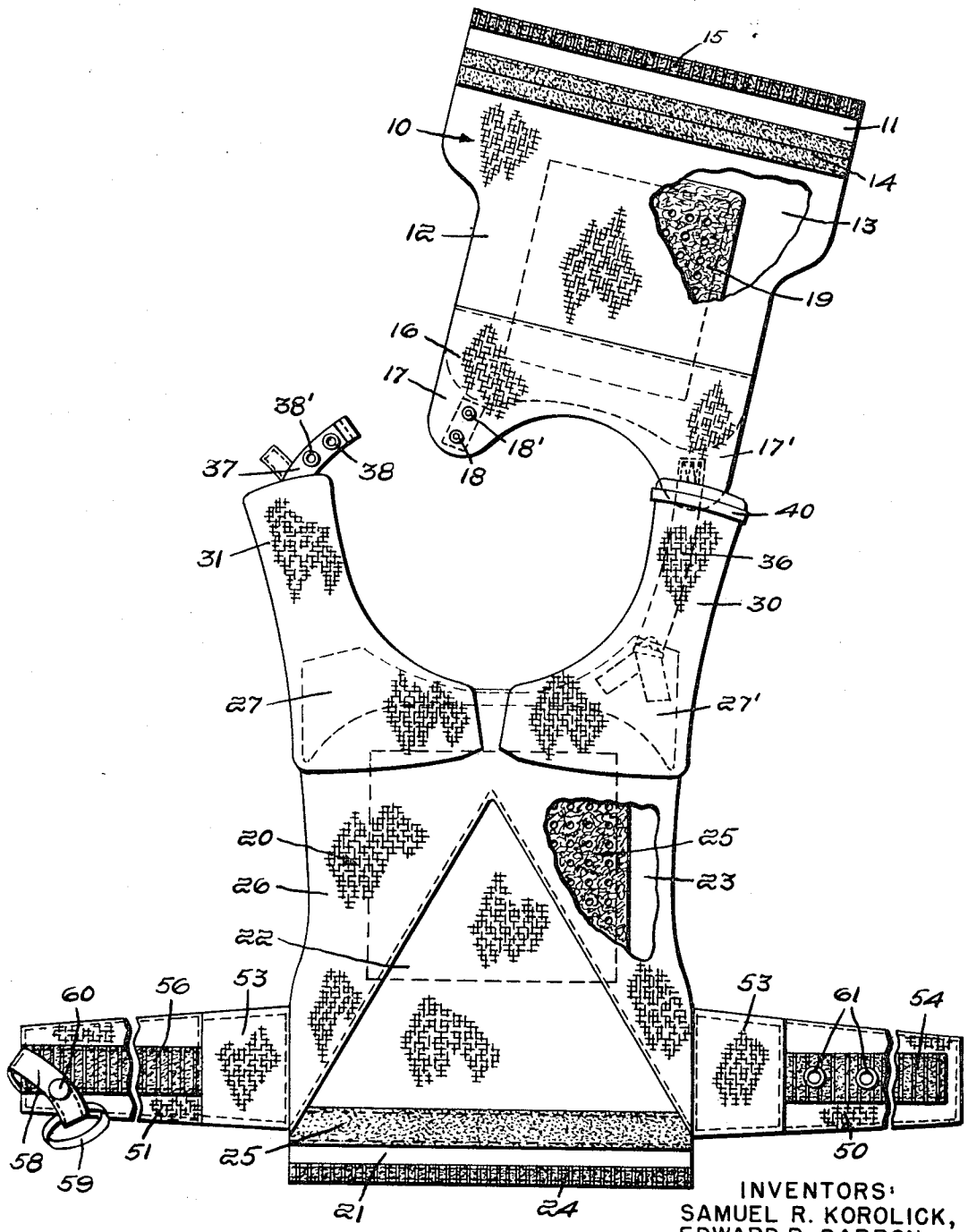
FIG. 5.



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TORSO ARMOR CARRIER

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6 Claims

ABSTRACT OF THE DISCLOSURE

A garment consisting of front and back portions each of which contains a pocket to receive an armor plate, said front and back portions connected by shoulder straps, and having waistbands which extend from said back portion which overlap and are releasably fastened together in front of said front portion.

This invention relates to a flexible body garment for carrying one or more rigid, torso-protective armor plates.

Experience has taught that personnel engaged in the operation of rotary or fixed wing aircraft, which normally travel at relatively low speeds and at low altitudes in areas of military conflict, are highly vulnerable to small arms fire from the ground. Weight limitations imposed on such low performance aircraft, as well as the visibility requirements for low altitude operations, preclude the use of conventional armor covering on the surfaces of the aircraft to protect the occupants from small arms fire. If the occupants are to be afforded any measure of protection, it will have to be on an individual basis with each occupant having his own protective shielding.

Protection of the upper torso, i.e. that portion of the body between the waist and the neck, has in the past been accomplished by garments containing armor capable of providing protection against relatively low velocity fragments. The armor materials used in such fragmentation-protection vests or jackets have principally been one of a number of relatively lightweight materials, such as laminates or layers of nylon ballistic fabrics, overlapping small thin metal plates, reinforced plastics or a combination of any of these materials. Even with the use of lightweight armor, fragmentation-protective jackets or vests range in weight from 6 to 12 pounds. A greater degree of protection for the torso, against high velocity fragments or small arms fire was not practical because the weight of the armor required for such protection was too great a burden for the wearer to carry. Recently, however, there have been developed new armor material, such as composites of ceramic and fiberglass, which have improved ballistic properties (penetration resistance to weight ratio) which provide significant protection against small arms fire at weight levels which are tolerable.

Since the efficiency of such armor material increases with the size of the armor piece, it follows that the preferred armor construction will be that consisting of the minimum number of sections. Thus if the front of the torso is to be protected, this protection preferably should be obtained by using one single piece of armor and if the back is to be protected then this should be accomplished by means of a separate section of armor. Thus two armor pieces, a front and back plate, can, if properly designed, adequately protect the major areas of the upper torso.

Many problems, however, arise from the use of such large, heavy armor sections, the most notable of which relate to such questions as adequate and comfortable

support for the weight burden, means to stabilize the heavy mass of the armor in fixed position, means to accomplish slight changes in the position of the armor, and means to permit rapid donning and offing of the armor. The present invention, which relates to a carrier designed to support torso-protective armor plates, solves these problems.

The accompanying drawings illustrate a preferred embodiment of this invention, but should not be deemed to limit the scope of the invention to any particular dimension, proportion or similar details shown therein.

FIGURE 1 of the drawings is a front elevation view of the torso armor carrier of this invention with the waistbands open to the sides, the right shoulder fastener open and with a portion cut away revealing the interior construction of the carrier;

FIGURE 2 is a front elevation of the carrier of FIGURE 1 with the waistbands fastened in operative position overlapping the front of the carrier;

FIGURE 3 is a side elevation of the carrier of FIGURE 2;

FIGURE 4 is a back elevation of the carrier of FIGURE 2;

FIGURE 5 is a plan view of the carrier, face down, with the armor pockets open, and with portions cut away.

More particularly, the torso armor carrier in accordance with the present invention is a vest-like garment having a large pocket in front and a large pocket in back, each of which contains an armor plate **1**. The armor component, not part of the present invention, may be any of the newer relatively lightweight ballistic resistant armor materials, e.g., a composite material having a hard ceramic component or facing which may be constructed of a single or multiple tiles bonded to a backing of a fiberglass laminate. The ballistic resistance of the armor can be varied to meet the desired requirements by varying the thickness of the ceramic and/or fiberglass components of the armor, as is well known to those skilled in the art. Other armor materials, known in the art, may also be used with the carrier of this invention.

The garment, except where noted otherwise, is constructed of a sturdy, tightly-woven fabric, preferably a wind-resistant sateen fabric composed of a blend of cotton and nylon yarns such as that described in military specification, MIL–C–43191. Referring to FIGURES 1, 2 and 5, it is seen that the torso armor carrier consists of a front portion, designated generally as **10**, and a back portion designated generally as **20**. The front portion of the carrier is designed to cover substantially all of the front of the upper torso of the wearer from the waist to the base of the neck, and the back portion, to the same extent, covers the back of the upper torso. The upper part of the front portion **10** covers the upper chest between the shoulders and the lower part is somewhat wider so as to partially cover the sides of the wearer under his shoulders. In more detail the front portion **10** consists of an outer fabric panel **11** joined to a back fabric panel **12**, the side and upper marginal edges of which are stitched together to form a pocket **13** which opens at the bottom. This pocket, which is adapted to contain an armor panel, is shown closed in FIGURES 1 and 2 and open in FIGURE 5. The closure is preferably accomplished by means of a hook and pile fastener of the type shown in U.S. Patent No. 2,717,437 issued to DeMestral. A strip of pile fabric **14** is attached adjacent to the lower marginal edge of the outside surface of the back fabric panel **12** and, as shown in FIGURE 5, extends from one side of said panel to the opposite side. The outer fabric panel **11** is somewhat longer than the back panel (shown clearly in FIGURE 5) and has a strip of hook fastener

material **15** affixed adjacent to the lower marginal edge of the inside surface thereof. After the armor panel is inserted within pocket **13**, the lower edge of the outer fabric panel **11** is brought around closing the pocket and the hook fastener **15** brought into contact with the pile material **14** to effect the closure. Attached to the upper end of the back panel **12** is a hanger panel **16** curved at its upper edge to fit under the neck of the wearer and having two upwardly extending projections **17** and **17'** which are adapted to extend over the front of each shoulder. Projection **17** has attached thereto two male snap fasteners **18** and **18'** which are used to releasably connect the front portion **10** to the back portion **20** at the right shoulder. Within the pocket **13**, there is attached to the inside surface of the front panel **11** a rectangular piece of perforated wool felt **19** approximately ¼-inch in thickness which acts as a cushion to protect or reduce damage to the relatively brittle ceramic armor shoulder the armor be dropped or bumped.

The back portion **20** of the carrier consists of an outer fabric panel **21** which is joined to a similarly shaped back fabric panel **22** along the top and side marginal edges thereof by stitching. The pocket **23**, thus formed, and into which an armor panel is inserted, is open at the bottom. Any type of closure means, as is known in the art may be used, but again it is preferred to use a hook and pile fastener as shown in FIGURE 5. The hook component **24** is attached adjacent to the inside lower marginal edge of the outer panel **21** and the pile component **25** is attached adjacent to the outside lower marginal edge of the back panel **22**. The slightly longer outer panel is folded over and the hook component is engaged with the pile component to complete the closure. Within the pocket and attached to the outer panel **21** is a rectangular piece of perforated wool felt **25** which performs the same function as does the corresponding piece on the front portion **10**. Attached to the exterior surface of the back panel **22** is an inverted V-shaped fabric hanger panel **26** curved at its upper end and having upward projections **27** and **27'** which extend over the shoulders.

Shoulder pads **30** and **31**, curved to conform to and cover the top of the shoulders of the wearer carry or spread the downward component of the load of the armor over the shoulders of the wearer. Each shoulder pad is respectively attached to one of the upward projections **27** and **27'** of the hanger panel **26**. Each pad contains a layer of nylon felt within a fabric covering, which felt is approximately ¾ of an inch in thickness, weighs 72–76 oz. per sq. yd. and is formed of high tenacity industrial-type nylon yarn, 6 denier per filament, 3-inch crimped staple. The shoulder pads not only spread and cushion the load of the armor but, in addition, provide ballistic protection against low velocity particles in the shoulder area, and serve to space the armor plates in front and back away from the bony structures of the neck and upper back of the wearer.

Buckles **32** and **33**, attached to projections **27** and **27'**, respectively, by fabric loops **34** and **35** serve as points of attachment for straps **36** and **37**. Shoulder strap **36** is stitched at one end to hanger projection **17'** and the opposite free end is threaded through buckle **33**. A fabric loop **40** is attached to the underside of hanger projection **17'** and receives the free end of shoulder pad **30** and serves to hold the pad in place. Shoulder strap **37** is releasably attached at one end to hanger projection **17** by snap fasteners **38** and **38'** affixed to one end thereof which fasteners mate with male fasteners **18** and **18'** located on hanger projection **17**. The opposite end of the strap **37** is threaded through buckle **32**. Straps **36** and **37** hold the front **10** and back **20** portions together. Adjustment in the fit of the carrier about the neck of the wearer can be accomplished by adjusting the length of straps **36** and **37** attached to the buckles. A quick-release of the carrier at the right shoulder can be effected by pulling on strap **37** in the vicinity of the snap fasteners to pull this end of the strap free.

The armor panels contained in the front and back portions of the carrier are held securely in place about the torso of the wearer by means of waistbands **50** and **51** which extend from the back portion **20** and overlap in front of the wearer. Preferably, as depicted in the drawing, the end of each waistband extends beyond the midline of the front portion. These bands can be adjusted to fit snugly so as to hold the panels firmly in position and to assist in supporting the weight of the armor panels. Each waistband is attached to a side extension of the hanger panel **26** by means of heavy elastic straps **52** shown in FIGURES 1 and 3. The elastic straps allow for breathing and other body movements and prevent undue pressure about the waist which would result from the pinching action of the bottom edges of the armor panels. Side gusset fabric panels **53** connect the hanger panel **26** and the waistband on each side of the garment, which gussets limit the extensibility of the elastic straps **52** and prevent separation of the waistband from the hanger panel in the event of failure of the elastic straps. The waistbands are brought into overlapping relationship in front of the front portion **10** of the carrier by first drawing the waistband **50** forward and around the waist and against the front portion **10**. A strip of hook fastener material **54** attached to the waistband **50** is brought into contact with a strip of pile material **55** affixed to the lower part of the front portion **10**. Waistband **51** is then drawn forward and around the waist and placed over band **50** so that a strip of hook material **56** fastened to the inner side of waistband **51** is brought into contact and fastening relationship with a strip of pile material **57** affixed to the outer surface of waistband **50**.

To allow for quick separation of the overlapping waistbands **50** and **51**, there is provided a strap **58** of elastic material which is fastened at one end to waistband **51** and has a loop **59** affixed to the free end. A female snap fastener **60** is located on the strap **58** and is brought into locking relationship with one of a number of spaced male snap fasteners **61** fixed to the waistband **50**. Strap **58** when secured to band **50** prevents the gradual opening or release of the hook **56** and pile **57** fastener which might otherwise occur as the carrier is exposed to wind streams or is otherwise brushed against objects which would tend to pull the material apart. When it is desired to separate the waistbands, a quick pull on the loop **59** pulls waistband **51** free and then the band **50** is stripped from the front portion **10**.

In an emergency situation, it is of course essential that the armor be shed within a few seconds at most. The waistbands can be opened as indicated above with two movements. An additional movement, a pull on strap **37** pulling it free of the snap fasteners **18** and **18'**, separates the front **10** and back **20** portions of the carrier at the right shoulder. The carrier can then be dropped from or allowed to slide off the left shoulder.

While the use of hook and pile fasteners has been employed in the preferred embodiment, it will be obvious to those skilled in the art that other fastening devices such as slide fasteners, snap fasteners, hook and eye fasteners may be used if desired.

As can be seen from the foregoing decription, the torso carrier of this invention is capable of supporting large, cumbersome heavy pieces of armor. The use of broad and thick shoulder pads spreads the load over the shoulders so that the weight burden is not oppressive. The waist bands hold the carrier and the enclosed armor plates snugly against the body to prevent their movement and in addition the tightly drawn waistbands transfer some of the weight of the armor to the torso so that all the weight is not thrust upon the shoulders. As has been indicated, the carrier can be rapidly doffed and by reversing the steps the carrier can be easily donned.

It is also contemplated that the carrier of this invention

may be used without armor in the back portion thereof when back protection is not required. If desired, the carrier could be constructed without the fabric pocket in back if it is known that back protection will never be required.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

We claim:

1. A flexible garment for supporting torso-protective armor comprising

(a) a back portion of woven textile material covering substantially all of the back of the upper torso of a wearer,

(b) a front portion covering substantially all of the front of the upper torso of the wearer, said front portion comprising inner and outer panels of woven textile material joined together to form a pocket open at the bottom, said pocket adapted to receive an armor panel, releasable closure means associated with said fabric panels to retain said armor panel within said pocket, and a rigid armor panel of sufficient size to cover substantially all of the front of the upper torso of the wearer inclosed within said pocket,

(c) separate support means connecting said back portion and said front portion in each shoulder region defining a space therebetween through which the head of the wearer may be inserted,

(d) a shoulder pad under each of said separate support means, each of said shoulder pads being attached at one end to said back portion and being of sufficient length to extend longitudinally under said separate support means and under the top of said rigid armor carried by said front portion, said shoulder pads functioning to cushion and spread the load of the armor and to space the rigid armor away from the bony structures of the neck to prevent injury to such structures,

(e) a pair of transversely disposed flexible fabric waistbands attached to said back portion and extending around the body of the wearer to overlap in front of said front portion and releasable waistband fastening means associated therewith to hold the overlapping portions thereof together, said waistbands when drawn tightly and fastened serving to hold the armor panel in said front portion against the torso of the wearer,

(f) front portion fastening means associated with the exterior of said front portion and the interior surface of said overlapped waistbands which function to releasably attach said front portion to said waistbands to prevent said front portion with its inclosed rigid armor plate from shifting laterally beneath said waistbands, and

(g) positive locking means associated with said overlapped waistbands to prevent unintended separation of said waistbands, said locking means comprising an adjustable member connecting the free end of the outer waistband to a non-overlapped portion of the inner waistband and being releasable by the wearer.

2. A flexible garment according to claim 1 wherein said back portion comprises inner and outer panels of woven textile material joined together to form a back pocket open at the bottom, a rigid armor back panel of sufficient size to cover substantially all of the back of the upper torso of the wearer inclosed within said back pocket, and releasable closure means associated with said back pocket to retain said armor back panel within said pocket.

3. A flexible garment according to claim 2 wherein said separate support means consist of flexible shoulder straps which are adjustable in length.

4. A flexible garment according to claim 3 wherein said shoulder pads extend under said armor back panel to space said armor back panel away from the bony structures of the upper back to prevent injury to such structures.

5. A flexible garment according to claim 4 wherein each of said waistbands is attached to said back portion by elastic connective means.

6. A flexible garment according to claim 5 wherein said releasable closure means, said releasable waistband fastening means, and said front portion fastening means each consist of opposed strips of hook and pile fastener material.

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U.S. Cl. X.R.

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