Aug. 8, 1950 A. P. WEBSTER ET AL 2,517,615

BODY ARMOR

Filed March 20, 1946

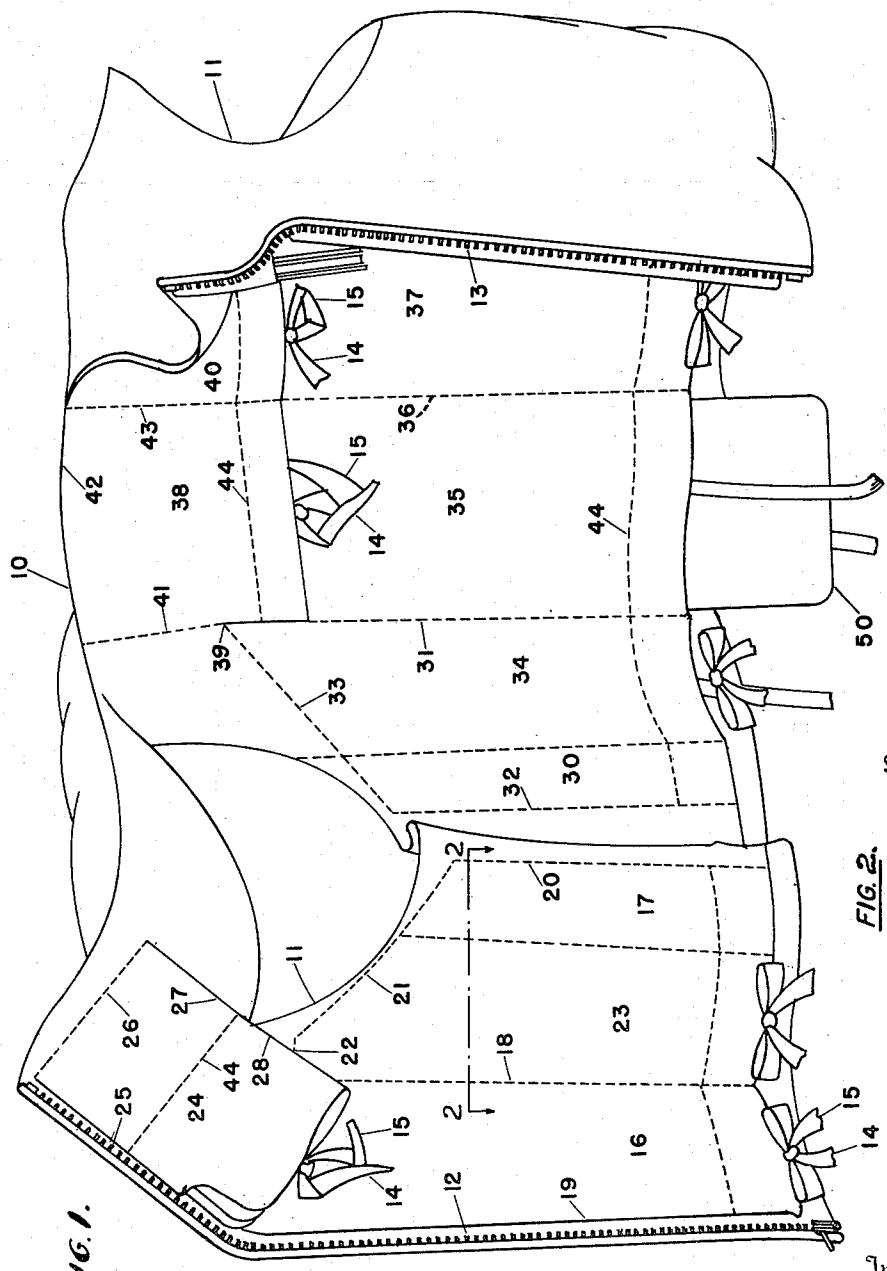


FIG. 1.

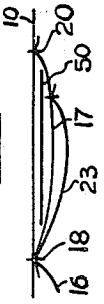


FIG. 2.

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Patented Aug. 8, 1950 2,517,615

UNITED STATES PATENT OFFICE

2,517,615

BODY ARMOR

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Application March 20, 1946, Serial No. 655,677

5 Claims. (Cl. 2—2.5)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to body armor and has for an object to provide an improved body armor which combines the features of an article of clothing and a lightweight armor used in combination therewith.

Another object of this invention is to provide a lightweight body armor utilizing non-metallic armor plates.

Another object of this invention is to provide a body armor consisting of a bullet-resistant vest made up of any cloth material having a plurality of specially shaped pockets adapted to receive and secure therein a plurality specially shaped non-metallic armor plates.

Still another object of this invention is to provide a bullet-resistant vest having a plurality of armor plates secured in pockets therein, yet having the front and back of the vest so flexible that the wearer's natural movements are uninhibited and do not tend to betray the presence of the vest.

A further object of this invention is to provide an armor vest having a flexible overlapping joint located a distance approximately two-thirds of the distance from the bottom thereof and having an additional flexible joint running vertically approximately at the center line both at the front and the back.

Another object of this invention is to provide a flexible joint in a bullet-resistant vest wherein protection is still afforded over the region of the overlapping flexible joint.

Still a further object of this invention is to provide a flexible bullet-resistant vest including a plurality of pockets, each having means for removably securing an armor plate therein so that it may be readily replaced by a new piece of armor plate whenever the original piece of armor plate has been damaged through use.

With the foregoing and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter set forth, claimed and illustrated in the drawing in which:

Fig. 1 is a perspective and somewhat diagrammatic view of an embodiment of this invention; and

Fig. 2 is a diagrammatic sectional view of one of the armor plates and pockets as on line 2—2 of Fig. 1.

There is shown at 10 the body armor of this invention made up in the form of a torso-embracing vest having armholes 11 and separable fastener or "zipper" elements 12 and 13 for securing it in position on the body of a wearer. The vest itself may be of any suitable material or cloth colored to harmonize with the clothing being worn and thus conceal the fact that a bullet-resistant vest is being worn. On the inside of the vest 10 there are provided a plurality of different sized substantially more or less rectangular pockets all closed at the top and sides, but open at the bottom where they are adapted to be closed by means of tie cords 14 and 15, one of the tie cords being fastened to the vest lining on the inner wall of the pocket and the other of the tie cords being fastened to the inner side of the outer wall of the pocket. The pockets are duplicated starting at the mid-line at the front and proceeding to the mid-line at the back; hence the following description of each pocket on one side applies similarly to the pocket on the other side.

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The pockets 16 and 17 are formed by stitching two pieces of material to each other along the line 18 and to the inner side of the vest 10 along the sides 19 and 20 and at the angular top 21 and straight top 22. In order to provide for adjustability in size, a second and somewhat narrower pocket 23 may be superimposed on top of part of the pocket 17 so that for a smaller man, a narrower piece of armor plate will be utilized in the pocket 23 rather than the broader piece in the pocket 17. Above the pocket 16 there is provided an upper chest pocket 24 secured to the inside of the vest along the side line 25, the top line 26 and the other side line 27 as far down as about the point 28, similar tie cords 14 and 15 being present on this pocket also. It will be noted that the bottom of the pocket 24 substantially overlaps the top line 22 of the pockets 16 and 17. The pockets thus described make up the right side from the mid-line over the upper chest and to under the armpit. The left side is a symmetrical duplicate of the right side.

Behind the armpit there is provided a pocket 30 made by sewing a piece of material along the side lines 31 and 32 and the angular top line 33 to the vest material itself, no inner layer of pocket material being here provided as they were in the front pockets just previously described. To provide for further adjustment a smaller pocket 34 may be superimposed on top of a part of the pocket 30, thus providing an additional narrower pocket to receive a narrower armor plate, if desired.

It will be noted that pockets 17 and 30, as well as their superimposed pockets 23 and 34 and their corresponding duplicates are substantially trapezoidal in shape, that is the vertical sides are more or less parallel and about at right angles to their open bottom, but their top sides slant upwardly at

a position from under the armpits. The remaining front and back upper and lower pairs of pockets, 16, 24, 35, 38 and their corresponding duplicates, are more or less substantially rectangular in outline, that is their vertical sides are more or less substantially parallel to each, and similarly their tops and bottoms are more or less substantially parallel.

The right half of the back is provided with a pocket 35 formed by extending the same piece of material forming the pocket 30 to where it is sewed at the line 36 on the other side and at a horizontal line commencing at the point 39. This same piece of material may be continued across the back to the other side to form a similar pocket 37 and likewise form a pocket similar to the pocket 30. The pockets 35 and 37 just as the pocket 16 and its counterpart extend slightly more than two-thirds the distance from the top to the bottom. Above this point two additional pockets 38 and 40 are provided by sewing an inner and an outer layer of pocket material along the side line 41 commencing at about the point 37 across the top line 42 and down a similar line on the other side, the pockets 38 and 40 being separated by a hem line 43. Each of the pockets 38 and 40 is provided with similar tie cords 14 and 15 just as in all the other pockets. The lines 44 near the bottom of the pockets are merely hem lines.

Suitably shaped to fit each of the pockets is a piece of nonmetallic armor plate 50 shown as partly extending from the pocket 35. This nonmetallic armor plate is preferably made of a combination of plastic and fiber glass. One particularly suitable form is made up by impregnating a unidirectional fiber glass cloth, that is, a cloth made up of glass fibers running in one direction and a plurality of non-glass fibers such as cotton fibers, for instance, extending at angles to the glass fibers.

The cloth is impregnated with thermosetting resin and fifteen laminae were used to make up a piece of armor plate ⅛" thick which weighs 1¼ pounds per square foot. As thus prepared and worn in this vest or other suitable clothing, this armor plate is sufficient to stop a .45 caliber bullet fired from a service automatic pistol at a distance of from ten to fifteen feet. It is also sufficient to prevent penetration of fragments from fragmentation shells or hand grenades or other similar explosives which cause as much as two-thirds of all injuries in modern warfare.

It will be noted that the upper pockets 24 and 38 and their counterparts on the other side overlap the lower pockets by a substantial amount, thus providing a flexible yet protected horizontal joint between the upper and lower armor plates. This enables the vest to be somewhat form-fitting and at the same time affords protection to the upper chest and back as well as the abdomen and lower back. Obviously while fifteen laminae have been described as being suitable for the particular vest described, a greater number of laminae may be used when a greater amount of protection is desirable and a lesser number may similarly be used if a lesser amount of protection is sufficient. In testing, it has been found that eight laminae making armor plate 1/16" in thickness is still sufficient to stop a .45 caliber bullet and prevent it from penetrating the wearer.

Although the article of clothing herein described and illustrated has been described as a vest, this invention has been found equally applicable when used with a life-preserver jacket or with other types of clothing wherein the pockets are provided therein according to the manner above described, an important feature being the presence of the flexible horizontal joint at a point about two-thirds above the bottom of the vest, thus permitting the top of the vest to slope inwardly to conform to the natural body shape, yet afford protection across the horizontal joint.

The armored clothing of this invention when provided with flotation material is not only suitable as a life-preserver on board ship, for instance, but also as anti-flak protection on combat aircraft, not only for protection against anti-aircraft shells, but also protection when forced down in the water, for instance, against strafing by enemy aircraft.

In operation, each pocket is provided with an armor plate therein shaped to fit the particular pocket. The bottom of the pocket is then tied with the tie cords. In order to keep the body armor at a light weight and sufficiently flexible for continuing use, the armor plate is kept to the minimum size and weight consistent with reasonable protection, and this has been found to be preferably about fifteen laminae. The armor plate as thus provided will surely stop one and probably two or three bullets or fragments striking on the same point; however, its protective abilities will be exceeded if retained against an indefinite number of bullets. For this reason, a plate is usually discarded and replaced as soon as it has been hit even by a single bullet when possible to do so, so as to afford maximum protection whenever possible. In any case, the wearer is instructed to replace each individual piece of armor plate as soon as it has been hit even once so as to afford him the maximum protection possible. The tie cords 14 and 15 make it very easy and simple to follow out these instructions in removing a damaged plate and replacing it with a new one. Armored vests as herein described are suitable not only for the Armed Forces, but also for use by law-enforcing officials and it is expected that a supply of replacement armor plates will always be available at suitable locations.

Other modifications and changes in the number and arrangement of the parts may be made by those skilled in the art without departing from the nature of this invention, within the scope of what is hereinafter claimed.

The invention herein described and claimed 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.

What is claimed is:

1. Armored garment structure for protecting the torso including a fabric carrier for rigid panels of penetration-resistant material, said carrier being of loosely fitted vest-like form and provided with lower front and back pairs of enclosures of substantially rectangular vertically arranged form, pairs of trapezoidal shaped enclosures at the sides to engage under the armholes of the carrier, and upper front and back pairs of substantially rectangular enclosures at the upper back and upper chest areas of the carrier, said upper front and back enclosures being of lesser length than the lower front and back enclosures and arranged in aligned overlapping relation therewith.

2. Armored garment structure for protecting the torso including a fabric carrier for rigid panels of penetration-resistant material, said carrier being of loosely fitted vest-like form and provided with lower front and back pairs of enclosures of substantially rectangular vertically arranged form, pairs of trapezoidal shaped enclosures at the sides to engage under the armholes of the carrier, and upper front and back pairs of substantially rectangular enclosures at the upper back and upper chest areas of the carrier, said upper front and back enclosures being of lesser length than the lower front and back enclosures and arranged in aligned overlapping relation therewith, said enclosures being formed as inverted open-ended pockets having readily operable securing means at the open ends thereof.

3. Armored garment structure for protecting the torso including a fabric carrier for panels of penetration-resistant material, said carrier being of loosely fitted form and provided with front and back pairs of enclosures of elongated vertically arranged form, a substantially trapezial shaped enclosure at each side of said carrier having an upper inclined edge adjacent the arm hole of the carrier, said trapezial shaped enclosures each having substantially vertically extending sides of different dimension, and each having its side of greater dimension disposed adjacent to the outer side of the proximate one of said elongated front enclosures with the garment in position as worn, and an upper back pair of substantially rectangular enclosures at the upper back area of the carrier, said upper back enclosures being of substantially the same width as and respectively disposed above the corresponding lower back enclosures, said trapezial shaped enclosures being disposed laterally of the outer sides of said elongated front enclosures.

4. Armored garment structure for protecting the torso including a fabric carrier for panels of penetration-resistant material, said carrier being of loosely fitted form and provided with front and back pairs of enclosures of elongated vertically arranged form, a substantially trapezial shaped enclosure at each side of said carrier having an upper inclined edge adjacent the arm hole of the carrier, said trapezial shaped enclosures each having substantially vertically extending sides of different dimension, and each having its side of greater dimension disposed adjacent to

the outer side of the proximate one of said elongated front enclosures with the garment in position as worn, and an upper back pair of substantially rectangular enclosures at the upper back area of the carrier, said upper back enclosures being of substantially the same width as and respectively disposed above the corresponding lower back enclosures, said trapezial shaped enclosures being disposed laterally of the outer sides of said elongated front enclosures, each of said enclosures having a downwardly facing opening in the lower end thereof, and means for releasably securing the said downwardly facing openings of the enclosures to retain the panels therein and to release and drop the panels from said enclosures.

5. Body armor comprising a body garment, a plurality of elongated closable pockets in said body garment, the mouth of said pockets facing the lower edge of said garment, releasable closing means at the mouth of said pockets, and a plurality of elongated plates of projectile-penetration-resistant material insertable in said pockets, whereby said plates may be readily inserted into or instantly dropped from said pockets by the wearer of said garment without opening or removing said garment.

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