T. DE DRAGIC AND A. SCHWARZ.

BULLET PROOF ARMOR.

APPLICATION FILED MAR. 26, 1920.

1,398,682. Patented Nov. 29, 1921.

Fig. 1.

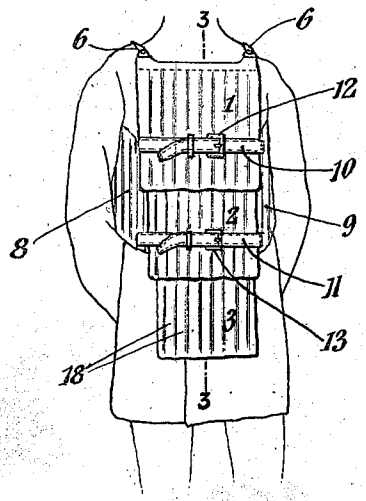


Fig. 2.

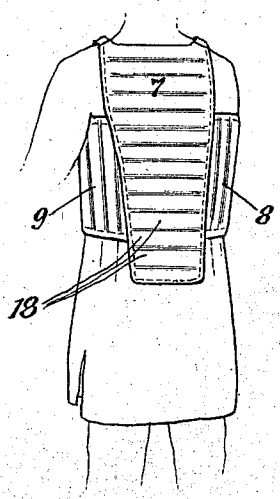


Fig. 4

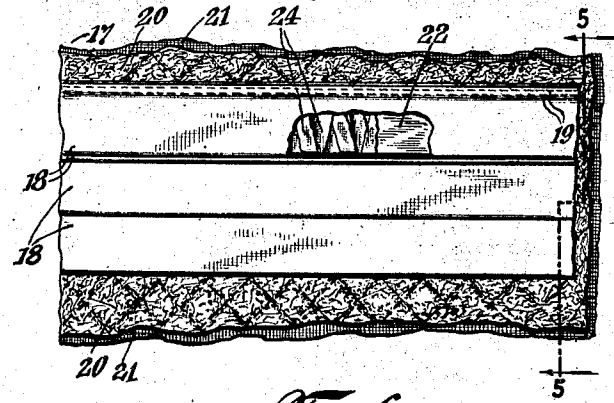


Fig. 3.

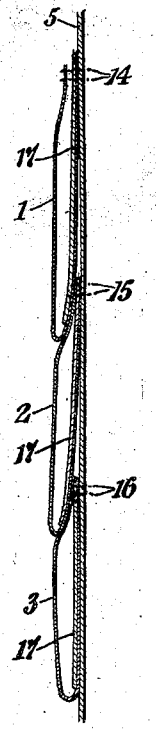


Fig. 5.

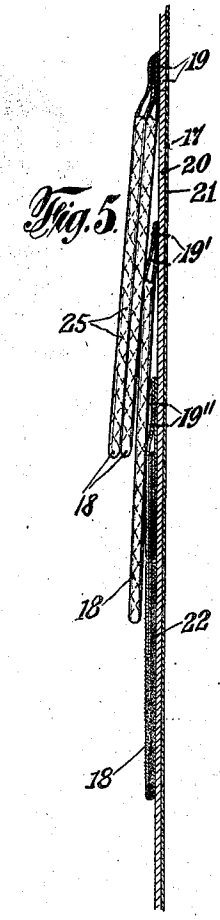
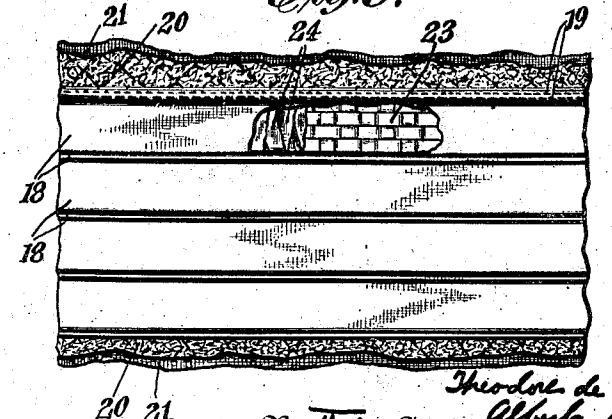


Fig. 6.



Inventors
Theodore de Dragic and
Albert Schwarz
By their Attorney
S. Martin Ward G

UNITED STATES PATENT OFFICE.

THEODORE DE DRAGIC AND ALBERT SCHWARZ, OF NEW YORK, N. Y., ASSIGNORS TO U. S. ARMOR CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BULLET-PROOF ARMOR.

1,398,682. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed March 26, 1920. Serial No. 368,818.

To all whom it may concern:

Be it known that we, THEODORE DE DRAGIC and ALBERT SCHWARZ, both subjects of the King of Servia, and residents of the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Bullet-Proof Armor, of which the following is a specification.

This invention relates to bullet proof armor. The invention is especially useful in bullet proof armor to be worn on the body.

Various kinds of armor to be worn on the body, including bullet proof armor, have been proposed from time to time, but a study of the matter and our experience with bullet proof armor has taught us that wherever such armor has been made reliably bullet proof, it has comprised so much material that it was intolerably heavy and bulky to be worn as a part of an already heavy equipment, or to permit the free use of the body in fighting, and where it has been made light and compact enough to permit it to be carried as a part of a soldier's equipment, it has not been sufficiently flexible and reliable.

Bullet proof armor for a soldier must be sufficiently compact and flexible so that it will not interfere with his other equipment that he must carry and use in marching and fighting, and must not unduly interfere with his agility or the free use of his body or arms in fighting; and it must be sufficiently light so that it will not overtax him and thus cut down his endurance in fighting; and the same is true—at least to a large extent—of bullet proof armor to be worn by policemen in riot work and the like. While they have not marching to contend with, they are frequently brought into closer rough and tumble fighting, and must be able to freely use their arms and weapons and give chase when necessary, even in a manner that a soldier is not called upon to do. So that it becomes essential for a bullet proof armor to be worn on the body for such uses, that it shall be of minimum weight compatible with a safe margin as to its bullet proof qualities.

The object of our invention is to provide a reliable, thoroughly bullet proof armor to be worn on the body, which is amply light and flexible enough to be used by soldiers and policemen without unduly burdening them with weight, and without impeding their free body movements and agility in fighting.

The invention consists in the novel features, arrangements and construction of parts hereinafter described in connection with the preferred embodiment thereof, and the invention will be more particularly pointed out in the appended claims.

Referring to the drawings—

Figure 1 shows a front view of a man's body having our preferred form of bullet proof armor fitted thereto;

Fig. 2 is a back view of the same;

Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 1, with certain parts broken away and the armor plates removed for the sake of clear illustration;

Fig. 4 is an enlarged face view of a series of pockets containing armor, with a part of one of the retaining pockets broken away to show the interior construction;

Fig. 5 is an enlarged view taken on line 5—5 of Fig. 4, with certain parts broken away; and

Fig. 6 is a front view similar to that of Fig. 4, with a part of one of the retaining pockets torn away showing a modified form of armor plate.

Referring to the drawings, the complete armor jacket or form consists of a series of envelops 1, 2, 3, each carrying a suitable bullet proof armor and secured preferably at their upper edges only, as shown at 4 (Fig. 1), to a sheet of flexible material 5 (see Fig. 3) suspended from the shoulders by straps 6 connected to a rear envelop 7 extending down the back and also containing armor, hereinafter described. To the rear envelop 7 is stitched side protecting envelops 8, 9 to the front ends of which are secured straps 10, 11 having buckles 12, 13, for buckling the side envelops in across the front.

In order to put on the armor form or jacket, it is only necessary to slip the head between the shoulder straps and buckle the straps 10 and 11 across the front of the body.

Referring to the arrangement and construction of the envelops 1, 2, 3, this is better illustrated in Fig. 3, where 5 represents a strip of flexible material, preferably in the form of a sheet of coarse muslin hung down from the shoulder strap 6 and to which the envelops 1, 2, 3 are sewn at their upper edges, as shown at 14, 15, 16. Within each of these envelops is sewn at the top

thereof, a flexible armor support 17 preferably made of strong textile fabric, or of a combination of fabrics such as thin felt and coarse muslin stitched together. The envelop 1 is preferably sewed at its top to the armor support 17, and then the combined ends are sewed to the flexible support 5 as at 14. To the support 17 in turn is sewed a series of armor-carrying pockets 18 which may be made of muslin, shown more clearly in Figs. 4 and 5 and indicated by shading in Figs. 1 and 2. The envelops 1, 2, 3 are preferably secured to the front support 5 only at their upper portions, so that as the body bends backward or forward, the envelops are free to move one with respect to the other, the lower end of one sliding over the other or swinging out therefrom, according to the movements of the body, so as to give the utmost feedom of movement of the body. In this way also the parts may be readily put together. The successive envelops overlap just sufficiently to insure overlapping of the armor so as to prevent the penetration of a bullet in between the upper extremity of one envelop and the lower extremity of the next one above it. Either the containing envelops, such for example, as 1, 2, 3, etc., or the individual armor-containing pockets 18, may be made of some moisture-proof material such as oiled linen or the like, in order to protect the armor plates from rusting due to water or perspiration.

Referring to Fig. 5, it will be seen that the individual armor-containing pockets 18 when arranged as shown in this figure, are sewed at their upper ends as at 19, 19′, etc., to the flexible armor support 17, which in this case is shown as consisting of a thin layer of felt 20 and a layer of muslin 21. Each of the individual pockets may be made of muslin, and the pockets are each substantially filled by a sheet of suitable bullet proof armor hereinafter more fully described. The pockets as shown are stitched preferably only along one of their longitudinal edges to the armor support 17 so as to permit free movement of the pockets one with respect to the other with the movements of the body. The pockets are arranged shingle-like in such manner as to always present at least two thicknesses of the bullet proof armor at any point. In the case of the back envelop 7, the individual armor containing pockets are arranged in vertical alinement one above another, and are stitched at their upper edges as shown in Figs. 2 and 5. In the front envelops 1, 2, 3 and in the side protecting envelops 8 and 9, the individual armor containing pockets are likewise arranged shingle-like one overlapping another, but in this case they are arranged in horizontal alinement and are secured along one of their longitudinal edges only so as to allow these envelops as a whole to readily conform to the rounded contour of the chest and sides. It will be understood that the individual pockets may be stitched to their support otherwise than at their edges, and may be stitched one to another, provided the arrangement is such as to permit sufficient flexibility. But it is far more advantageous to have these armor containing pockets free to move one over the other by securing them only along one of their longitudinal edges.

Referring now to the bullet proof armor itself, this may for certain purposes consist of any suitable hard thin metal useful for bullet protection, but we prefer to use plates of highly tempered thin sheet steel such as shown at 22 (Figs. 4 and 5), or to use plates of highly tempered sheet steel woven of strips of relatively narrow thin sheet steel such as shown at 23 in Fig. 5, and in each case, the steel plate, whether solid or woven, is wrapped or padded with suitable layers of textile material, as for example by being wrapped with strips of cloth such as silk 24. Where the solid sheet steel 22 is used, we prefer to use what is known in the trade as Swedish blue tempered steel or Indiana straw tempered steel, of a thickness of .02 inches, and we use pieces of this approximately 2 inches wide to place in the pockets, the strips and pockets being of such length as to conform to the shape of the enevlops to be worn on the different parts of the body. Where the plates are made up from the woven steel strips, we prefer to use the same steel but of a thickness of only .012 inches and in such case to either place two of the wrapped plates in each pocket or else always use two pockets together side by side instead of one, such as is shown in Fig. 6. We prefer to wrap the steel plates to such an extent that the total thickness of the entire bullet proof armor—*i. e.*, the wrapped plate, is about $\frac{1}{8}$ of an inch. Where silk is used as the wrapping instead of other cloth such as drill or muslin, the thickness need not be so great, because the silk is more efficacious, when used in conjunction with the steel plate, in preventing penetration of the bullet, than is the case with cloth that does not present a slippery or so-called frictionless surface which seems to have the effect of turning or diverting the course of the bullet upon contact therewith.

The suspending of the armor plate in individual pockets so that the layers of armor are somewhat separated, permits of a certain amount of movement of the first plate up against the second, upon the impact of the bullet, the effect of which is a, so to speak, yielding resistance to the initial impact of the bullet, and this seems to be of considerable advantage. In this way the yielding resistance to the first impact of the bullet is

obtained without having to provide thick soft padding between the two plates. We have also found that the two layers of woven steel plate for a given weight are more efficacious or bullet-resisting than the solid sheet of steel plate.

In making up the bullet proof armor, we take the pieces of steel and wrap them back and forth with the silk or other suitable cloth, as stated, until the desired thickness is obtained, and then these wrapped plates are inserted in the ends of the individual pockets which preferably were already sewn to the armor support 17. The individual pockets are made by simply looping over the cloth and then stitching the looped ends to the support 17, leaving one or both ends of the pocket open for the insertion of the armor. If desired, the open ends of the pockets may be sewed after the armor is inserted, as shown at 25. The armor support with the filled pockets is then slipped into the containing envelops, such as envelops 1, 2, 3, 7 or 8, which are then sewn in place to their proper support.

While but two thicknesses of armor plates or pockets with armor as above described, are amply sufficient for revolvers; from tests made and as a matter of absolute safety, we deem it advisable to utilize three layers or thicknesses for use against high-powered army rifles.

The armor jacket when made up complete, including front, back and side protecting envelops, as shown and described, using silk wrapping, weighs only about 11 pounds, and is therefore sufficiently light to be utilized by soldiers and policemen.

While, for the sake of those skilled in the art, we have described our invention in great detail in connection with what we now believe to be the preferred embodiment thereof, it will be obvious to those skilled in the art, after understanding our invention, that various features of construction and relative arrangement and location of the parts may be made, and that certain features or parts may be utilized without others, without departing from the spirit or scope of our invention, and we do not wish to be understood as limiting ourselves other than as indicated in the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a bullet proof shield, the combination of a flexible support, and bullet proof armor consisting entirely of plates of highly tempered thin sheet metal wrapped with textile fabric as the bullet resisting members, the said wrapped plates being each independently and flexibly secured to the support, and being arranged in shingle-like overlapping relation one with another.

2. In a bullet proof shield, the combination of a flexible support, and plates of highly tempered sheet steel woven of strips of thin sheet steel, and wrapped with a number of layers of silk, individual pockets for the said wrapped plates, each pocket individually secured to the support so as to have substantial free movement with respect to the support and to each other, and the pockets being arranged in shingled relation one with another.

3. In a bullet proof shield, the combination of a flexible armor support, plates of highly tempered sheet steel wrapped transversely with strips of flexible fabric, the wrapping layers overlapping one another along the length of the plates to form a plurality of layers, the said wrapped plates being each flexibly secured to the support, and the strips being arranged in overlapping or shingled relation one with another, and a flexible inclosing envelop for the support and plates.

4. In a bullet proof shield, the combination of an armor support, a series of pockets made of flexible material and covering said support and secured thereto at but one of their edges and arranged shingle-like one overlapping another, and in each pocket a plate of highly tempered thin sheet steel and one or more layers of textile fabric, said layers of fabric and sheet steel as assembled in the overlapping pockets, forming a protecting armor.

5. In a bullet proof shield, the combination of a flexible armor support, a series of pockets covering the same and made of flexible fabric and individually secured to the support and arranged shingle-like one overlapping another so as to have substantial free movement with respect to the said support, and in each of said pockets a plate of thin highly tempered sheet steel wrapped with textile fabric, said plates substantially filling the pockets and the pockets serving to support and protect the wrapped plates.

6. In a bullet proof shield, the combination of a flexible armor support, a series of pockets covering the same and made of flexible material and secured to the support and arranged shingle-like one overlapping another, and in each pocket a plate of highly tempered thin sheet steel covered with textile fabric, and an outer envelop of textile fabric inclosing said support and pockets.

7. In a bullet proof shield, the combination of a flexible support adapted to extend down the front of the body, a plurality of flexible armor-inclosing envelops secured to the support at their upper ends, one below the other, each envelop containing a flexible armor support having a series of overlapping pockets thereon arranged shingle-like, and in each pocket a plate of armor.

8. In a bullet proof shield, the combination of a flexible support adapted to extend

down the front of the body, a plurality of flexible armor-inclosing envelops secured to the support at their upper ends, one below the other, so as to move freely one with respect to another with the movements of the body, in each envelop a flexible armor support having a series of overlapping pockets thereon arranged shingle-like, and in each pocket a plate of woven highly tempered thin sheet steel wrapped with textile fabric.

9. In a bullet proof shield, the combination of a flexible support adapted to extend down the front of the body, a plurality of flexible armor-inclosing envelops secured to the support at their upper ends, one below the other, each envelop containing a series of overlapping pockets therein arranged shingle-like and in each pocket a plate of armor, a second armor support adapted to extend down the back of the body and comprising an outer envelop containing a series of pockets arranged horizontally and overlapping one another shingle-like vertically and each having a plate of armor therein, and side members extending between said front and back supports and flexibly connected to each and comprising envelops having pockets arranged therein vertically and overlapping each other shingle-like horizontally, and in each pocket a plate of armor, said respective plates overlapping each other.

In testimony whereof we have signed our names to this specification.

THEODORE DE DRAGIC.
ALBERT SCHWARZ.