C. ZEGLEN.
BULLET PROOF FABRIC.

No. 577,999. Patented Mar. 2, 1897.

Witnesses
I. Clinton Hamblin
R. Guthrie Vianas

Inventor
Casimir Zeglen

By: Boley Brown
his Attorney
UNITED STATES PATENT OFFICE.

CASIMIR ZEGLEN, OF CHICAGO, ILLINOIS.

BULLET-PROOF FABRIC.

SPECIFICATION forming part of Letters Patent No. 577,989, dated March 2, 1897.

Original application filed April 24, 1896, Serial No. 588,874. Divided and this application filed June 6, 1896. Serial No. 604,506. (See specimen.)

To all whom it may concern:

Be it known that I, CASIMIR ZEGLEN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bullet-Proof Fabrics; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which forms a part of this specification.

This invention relates to bullet-proof shields, and more specifically to an improved composite elastic fabric adapted to resist penetration of projectiles by cushioning or absorbing the impact of the same.

The object of the invention is to provide a relatively light and more or less flexible fabric which may be worn, without serious inconvenience, to protect the body of a person, and which may also be used for various other purposes.

This application is a division of an application, Serial No. 588,874, filed by me on the 24th day of April, 1896. The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claim. It will be readily comprehended by reference to the accompanying drawing.

The figure of the drawing represents in a perspective view a section of the fabric constructed in accordance with my invention. Referring to the drawing, A designates the outermost layer of the fabric, or that against which the projectile strikes, said outer layer or covering consisting of two or more plies or thicknesses of a closely-woven, relatively heavy, strong fabric, such, for example, as canvas. After experimentation I have ascertained that the most satisfactory results are obtained by making this outer covering of linen canvas of a quality commonly known as "Aberdeen" canvas, and while I recommend the same I do not desire to be limited thereto.

Next inside the canvas cover A, I provide a layer B of fine strong animal hair which is either naturally straight or which may be combed so that the fibers thereof lie substantially parallel with each other and thus very compactly. This layer B is relatively a thick layer, as shown, and may be composed of various kinds of hair. I have obtained the best results, however, by the use of the hair or, as it is more commonly called, the "wool" of the Angora goat, the hair of this animal having the desirable characteristics of strength, straightness, and fineness of staple, and being therefore susceptible of being formed into a very compact mass. Next to the layer of hair I provide a plurality of layers of strong flexible cords, threads, or strands C C', the cords or strands of each layer being laid side by side or parallel with each other and directly in contact with each other. The several layers C C' of parallel-arranged strands are superposed one upon each other in such position that the several strands of one layer will lie in a direction transversely to or diagonally to the direction of the strands of the other layer, that is, at an angle to each other, as clearly shown in the drawing. In practice I have found that these woven inner layers are best constructed of silk cord, which, owing to the fineness of the fiber and its relative great strength, and also, doubtless, to the peculiar characteristics of silk, afford the most satisfactory results, although I do not desire to be limited thereto. The several layers thus formed are arranged, as shown, very compactly, and are secured together preferably by through-and-through stitching of silk thread, as indicated at a a, so that the whole becomes a hard and exceedingly compact mass having peculiar characteristics.

The composite fabric thus formed I may make into jackets or shields, since it possesses sufficient flexibility for that purpose and is of such weight as to permit it to be worn without serious discomfort. Preferably, when the fabric is made into jackets, shields, or other forms of wearing-apparel, it will be covered or lined with any suitable cloth, in order that it may have a more presentable appearance, but as this is obviously a non-essential feature I have not seen fit to illustrate it.

The fabric constructed as above to successfully resist the penetration of bullets fired from revolvers and other small-arms is made the subject of another application for patent, filed by me June 6, 1896, Serial No. 594,657. I have found, however, that in order to resist the penetration of small-caliber project-
iles of the modern rifles, such as the Krag-Jorgensen and the like, as well as the larger projectiles of modern hand-weapons, such as the Springfield and Winchester rifles, it is necessary to provide a reinforcement to the fabric, which reinforcement also has the effect of sufficiently cushioning the impact of the projectile to prevent any serious shock to the wearer. Next inside the layer or layers C C', I place a reinforcement D, of pasteboard or analogous firm yet yielding material, and inside of the reinforcement D and next to it I place a cushioning or relatively thick layer of felt E. The reinforcements or layers D E are secured in position in any suitable manner, but commonly, and as shown in the drawing, by tacking or stitching d d, extending through the whole fabric.

I claim as my invention—

As a new article of manufacture, the bullet-proof fabric comprising an outer layer of closely-woven strong fabric, a relatively thick layer of straight-staple unwoven hair, a plurality of layers of strong parallel cords or strands laid compactly together, a reinforcement of pasteboard laid next said layers of cord, and an inner cushioning of felt, the whole being suitably secured together, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 14th day of August, A. D. 1896.

CASIMIR ZEGLEN.

Witnesses:

ANDREW SPETZ,

W. L. HALL.