United States Patent [19]

Butterweck et al.

[11] **3,736,838**

[45] **June 5, 1973**

[54] **PROTECTIVE SHIELDING**

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[22] Filed: **Dec. 16, 1970**

[21] Appl. No.: **98,628**

[30] **Foreign Application Priority Data**

Dec. 18, 1969 Germany.....P 19 63 405.0

[52] **U.S. Cl.**.....**89/36 A**, 89/36 H, 109/83, 161/404

[51] **Int. Cl.**.....**F41h 5/04**, F41h 7/04

[58] **Field of Search**.....89/36 A; 109/49.5, 109/78, 80, 82, 83; 161/114, 221, 404

[56] **References Cited**

UNITED STATES PATENTS

3,507,739	4/1970	Jacobs	161/114
2,279,110	4/1942	Collins	161/221

FOREIGN PATENTS OR APPLICATIONS

909,792	5/1946	France	89/36 A
867,782	5/1961	Great Britain	161/114

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[57] **ABSTRACT**

A protective shield of steel, especially for chains of armored cars and tanks, which comprises steel plate means each having a plurality of groups of holes with the holes of each group so arranged that the vertical projection of the connecting lines of their central axes defines a quadrangle while a fifth hole has its axis passing through the point of intersection of the diagonals of said quadrangle, rubber means surrounding said steel plate means.

2 Claims, 4 Drawing Figures

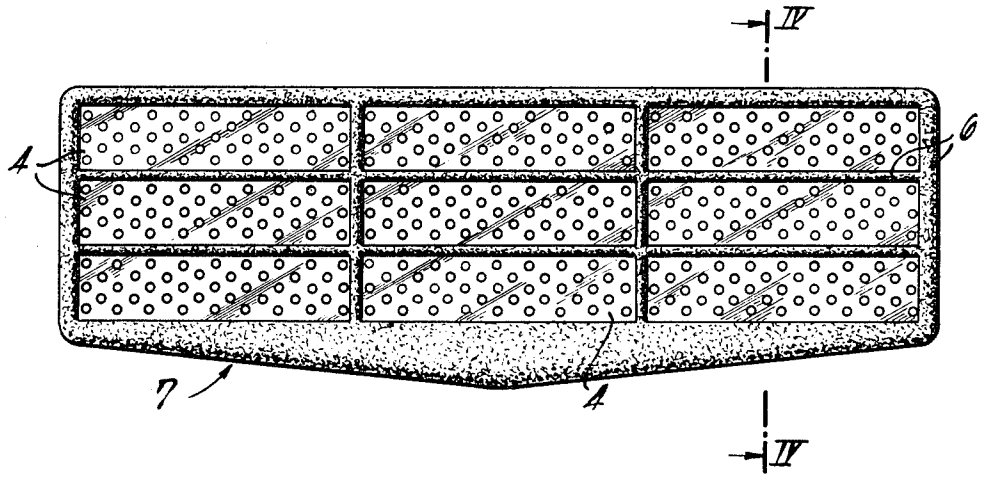


FIG. 1

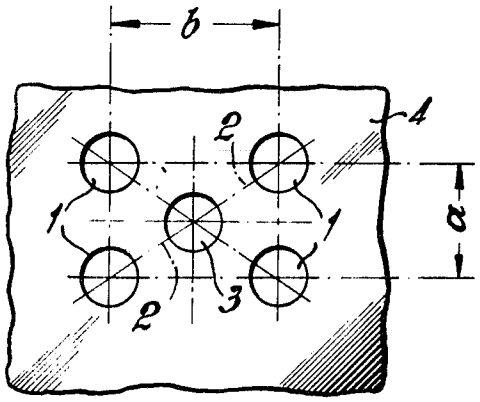
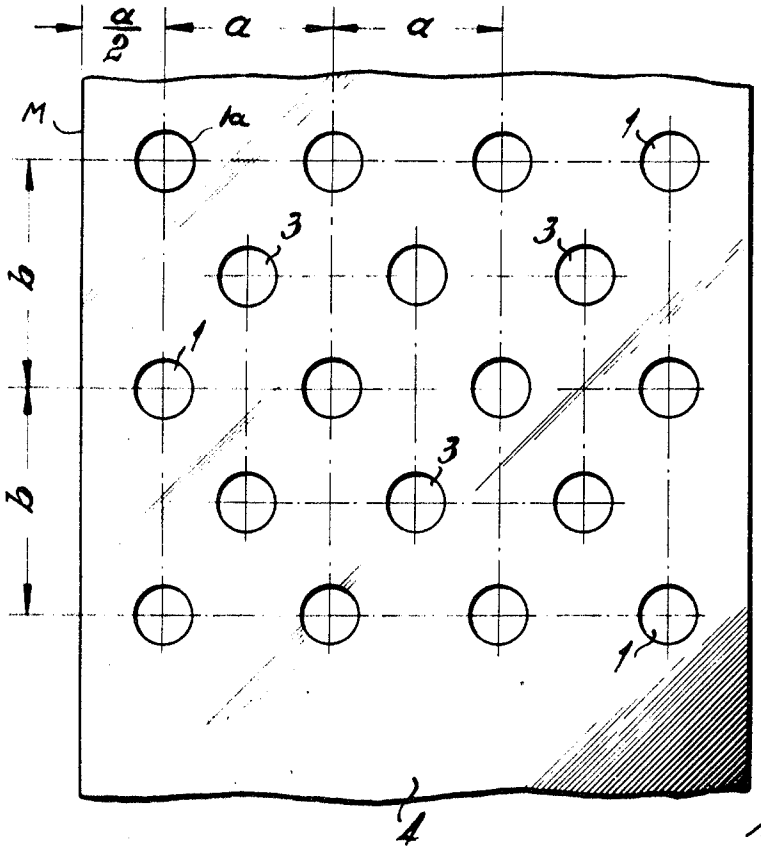


FIG. 2



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FIG. 3

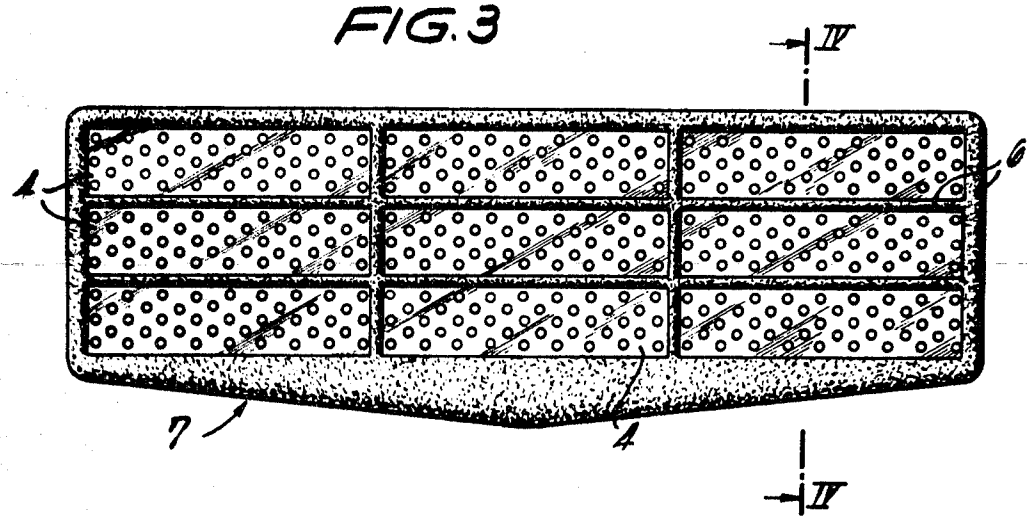
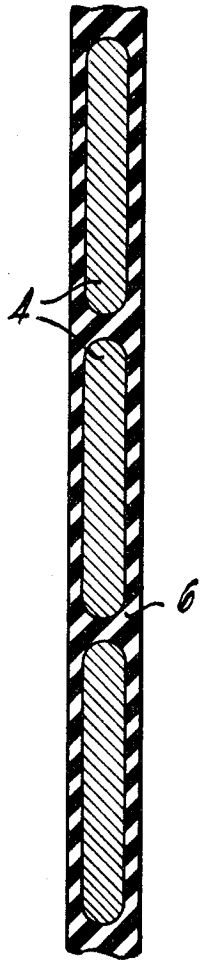


FIG. 4



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PROTECTIVE SHIELDING

The present invention concerns a protective shield make up of a steel plate with holes therein and with a frame of rubber material.

Protective or chain shields or aprons for vehicles have become known which consist of plates with holes therein and a coating of rubber material. With such heretofore known shields, holes are arranged in rows above each other and adjacent to each other, while said holes are arranged in a quadrangle. The spacing between holes of such heretofore known shields is relatively great at the short side of the quadrangle so that the desired optimum reduction in weight of the total shield is not realized. Moreover, this heretofore known shield is suitable only for a certain vehicle type because otherwise the advantages obtained by the reduction in weight are lost again.

It is an object of the present invention to provide a protective shield of the above mentioned type which will permit a considerable saving in weight and which simultaneously will yield an increased safety against projectiles, especially with hard core ammunition.

It is a further object of this invention to provide a protective shield, as set forth in the preceding paragraph, which will greatly simplify the stock keeping and replacement of such protective shields.

These objects and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a cutout of a protective shield showing a single group of five holes arranged in conformity with the present invention.

FIG. 2 shows a portion of a protective shield according to the invention with a plurality of groups of holes.

FIG. 3 illustrates a side view of a protective shield according to the invention.

FIG. 4 represents a section taken along the line IV—IV of FIG. 3, but on a larger scale than the latter.

The protective shield according to the present invention which comprises a perforated steel plate surrounded by a rubber layer or rubber frame is characterized primarily in that the perforation consists of four holes arranged relative to each other in such a way as to define a quadrangle while an additional hole, preferably of the same size as the remaining holes is located at the point of intersection of the diagonals of said quadrangle.

According to a preferred embodiment of the invention, the quadrangle has the shape of a rectangle while the distance *a* between two adjacent holes in said rectangle at the shorter side of the rectangle is at a maximum two-thirds of the spacing *b* between two adjacent holes along the longitudinal side of the rectangle. An optimum will be obtained when the spacing of the centers of two adjacent holes at the short side of the rectangle amounts to approximately 20 millimeters. Expediently, the spacing of a marginal hole from the edge of the plate or shield amounts to *a*/2. Finally, the group of holes comprising the corner holes of a rectangle or quadrangle and the center hole is spaced from the next adjacent group of holes by a distance which does not exceed, and expediently equals the distance between the holes in the group of holes.

Referring now to the drawings in detail, and FIGS. 1 and 2 thereof in particular, it will be noted that a group

of holes according to the invention comprises four holes 1 arranged so that the connecting lines of their centers define a rectangle while at the point of intersection of the diagonals 2 of said rectangle there is provided a fifth hole 3 having the same diameter as the holes 1. The spacing *a* between the holes at the short side of the rectangle amounts to a maximum of two-thirds of the spacing *b* between the holes at the longitudinal side of the rectangle.

FIG. 2 shows the arrangement of a plurality of groups of holes in a metal plate 4 for a protective shield according to the invention. The group of holes comprising the corner holes 1 and the center hole 3 is spaced by a distance *b* and *a* respectively from the next group of holes, said spacings *a* and *b* being the same as the spacing *a* and *b* between corresponding holes of one and the same group of holes. The spacing of a marginal hole, for instance, the hole 1a from the margin M of the plate 4 amounts to *a*/2.

A portion of the protective shield as it is used, for instance,for protecting the chain of tanks and armored cars is illustrated in FIG. 3. The part 7 is composed of plates 4 which are inserted in a rubber frame 6 or in rubber strips 6 and are interconnected thereby.

As will be seen from the above, the advantage of the novel protective shield according to the invention are seen primarily in that due to the greater number of holes and in view of the specific arrangement of the holes, a considerable saving in weight amounting to from 10 to 15 % has been realized. At the same time, with the reduced overall weight of the protective chain shield, a uniform ballistic safety or with the same overall weight of the protective chain shield, a higher ballistic safety against projectiles, especially with hard core ammunition, is realized. In addition thereto, the stock keeping of the protective shields composed of a plurality of identical parts is greatly simplified so that also the repair work will be facilitated and speeded up.

It is, of course, to be understood that the present invention is by no means limited to the particular showing in the drawings, but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A protective shield of steel, especially for chains of armored cars and tanks, which comprises steel plate means including a plurality of substantially identical steel plates of rectangular shape and each having a plurality of groups of holes, each of said groups of holes comprising four holes arranged so that the vertical projection of the connecting lines of their central axes define a quadrangle that is a rectangle in which the spacing between the two holes along the short side of the rectangle does not exceed two-thirds of the spacing between the two holes along the side of said rectangle, those holes which are closest to the edge of said shield being spaced therefrom by a distance approximately one-half the distance between two adjacent holes along the short side of the rectangle, the spacing between adjacent groups not exceeding the maximum spacing between two adjacent holes in said groups, and also comprising a fifth hole having its axis pass through the point of intersection of the diagonals of said quadrangle, and rubber means encasing said steel plate means with said steel plates being arranged in said rubber means in horizontal and vertical rows.

2. A protective shield according to claim 1, in which in each group of holes the spacing between the two holes along the short side of the rectangle is approximately 20 millimeters.

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