

June 13, 1967

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3,324,768

PANELS FOR PROTECTION OF ARMOR AGAINST SHAPED CHARGES

Filed May 22, 1950

Fig. 1.

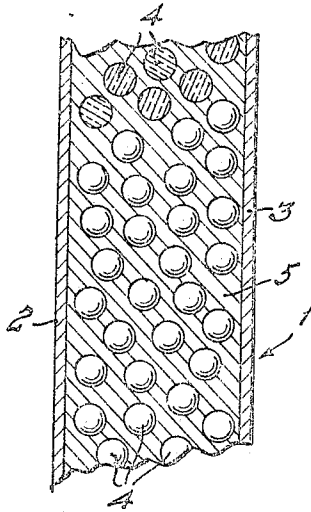


Fig. 2.

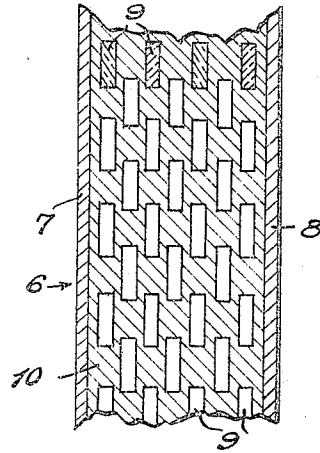


Fig. 3.

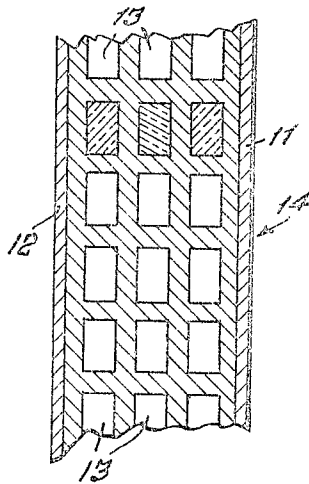
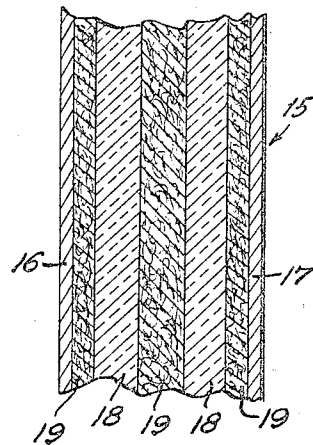


Fig. 4.



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**PANELS FOR PROTECTION OF ARMOR
AGAINST SHAPED CHARGES**

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Filed May 22, 1950, Ser. No. 163,386

2 Claims. (Cl. 89—36)

The very effective penetration of armor plate by the jet from shaped charges when detonated at the proper stand-off distance, is well known. This phenomenon, known as the Munroe effect, forms the basis for a number of weapons which have proven very effective against armored combat vehicles and which have presented a serious problem to counteract.

It is therefore the principal object of this invention to provide protective panels, which may be used, as an outer covering or layer for the armor of combat vehicles and ships to absorb the energy of Munroe jets from shaped charges.

More particularly it is an object to provide panels which may be applied over the armor of combat tanks to enable such vehicles to better resist, withstand and combat the heretofore serious offensive power of weapons employing shaped charge projectiles.

Another object is to provide a panel of the type aforesaid, which will confine the shattering effect of a shaped charge to a relatively small area and which will thus reduce the damage produced thereby.

A still further object is to afford panels which will provide as much protection against Munroe jets for the basis armor of a combat vehicle as the same thickness of homogenous armor three times as heavy.

Other objects and advantages of the invention will become obvious after a study of the following detailed description in connection with the accompanying drawing wherein

FIG. 1 is a cross section through one form of protective panel using glass spheres or marbles,

FIG. 2 is a cross section through a second form of panel using glass plates,

FIG. 3 is a cross section through a third form of the invention using glass blocks, and

FIG. 4 is a cross section of a form of panel using protective sheets of vitreous material.

In FIG. 1 the panel, generally identified at 1, comprises two outer layers 2 and 3 which are preferably of relatively thin metal, separated by an intermediate layer consisting of a number of glass balls or marbles 4 separate and immobilized with relation to one another, by a filler of shock absorbing material 5 such as 85% magnesia, pitch or asphalt.

In FIG. 2 the panel 6 consists of outer layers 7 and 8 which may be of the same material as in FIG. 1, separated by an intermediate layer consisting of glass plates 9 embedded in a filler 10 of 85% magnesia or bitumen, as in FIG. 1. As shown, the glass plates are arranged in overlapping relation so that penetration of a shaped charged jet is not possible without encountering at least a number of the plates.

In FIG. 3, the outer layers 11 and 12 of the panel 14 may be of relatively thin sheet metal separated by glass blocks 13 rectangular in cross section and embedded in a filler of the same material as in FIGS. 1 and 2.

In FIG. 4, I have shown the panel 15, embodied in

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the form of outer sheathing 16 and 17 separated by alternate layers of glass 18 and shock absorbing or fibrous material 19.

The glass elements, whether spheres, plates, blocks or sheets, may be of inexpensive soda lime glass.

In using the panel, each panel will preferably be made up in outline and contour to cover a predetermined area of armor plate likely to be struck by a shaped charge projectile. Each panel will be secured in place by bolting in place, or by tabs formed with or attached to the outer metal layers such as 1 and 2. These tabs may be attached to the armor or other portion of the vehicle to overlie the otherwise vulnerable area.

The invention therefore comprehends an inexpensive and easily attached and replaceable panel which will effectively absorb the energy from a shaped charge jet and thereby afford material added protection to the vehicle and operating personnel, without an excessive increase in weight. The panels may be quickly detachable so that in event one is struck, it can be replaced in the field. When struck by the jet from a shaped charge, only the glass objects in the immediate vicinity of the jet will be shattered so that a given panel may remain useful.

As several modifications will occur to those skilled in the art, the foregoing specification should not be taken in a limiting sense for it is my desire and intention to reserve all variations and modifications falling within the scope of the subjoined claims.

Having now fully disclosed the invention, what I claim and desire to secure by Letters Patent is:

1. A panel for protecting armor plate from the effects of shaped charge jets, comprising, first and second perforate metallic sheets united in spaced parallel relation, a plurality of solid glass objects of flat plate form in the space between said sheets, and shock absorbent material filling the interstices between said objects and sheets, said material, sheets and objects being united to form a unitary panel, said objects being arranged in overlapping relation between said sheets.

2. An armor panel for protection from the effects of shaped charge jets, comprising first and second steel sheets mounted in spaced parallel relation, a matrix of shock absorbing material positioned between said first and second steel sheets, and a plurality of discrete glass bodies embedded in said matrix, each of said discrete glass bodies separated from every other glass body and from said steel sheets by said matrix, said glass bodies being arranged in a plurality of rows in overlapping relation to present a continuous barrier to said shaped charge jet.

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