Search Room

Jan. 1, 1946. V. R. ABRAMS ET AL 2,392,215

BULLET PROOF GRID

Filed Nov. 17, 1944

Fig-2-

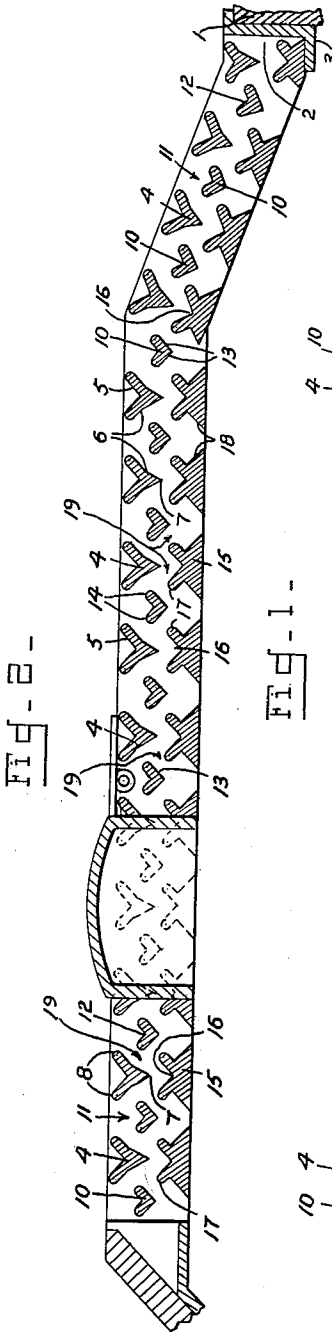
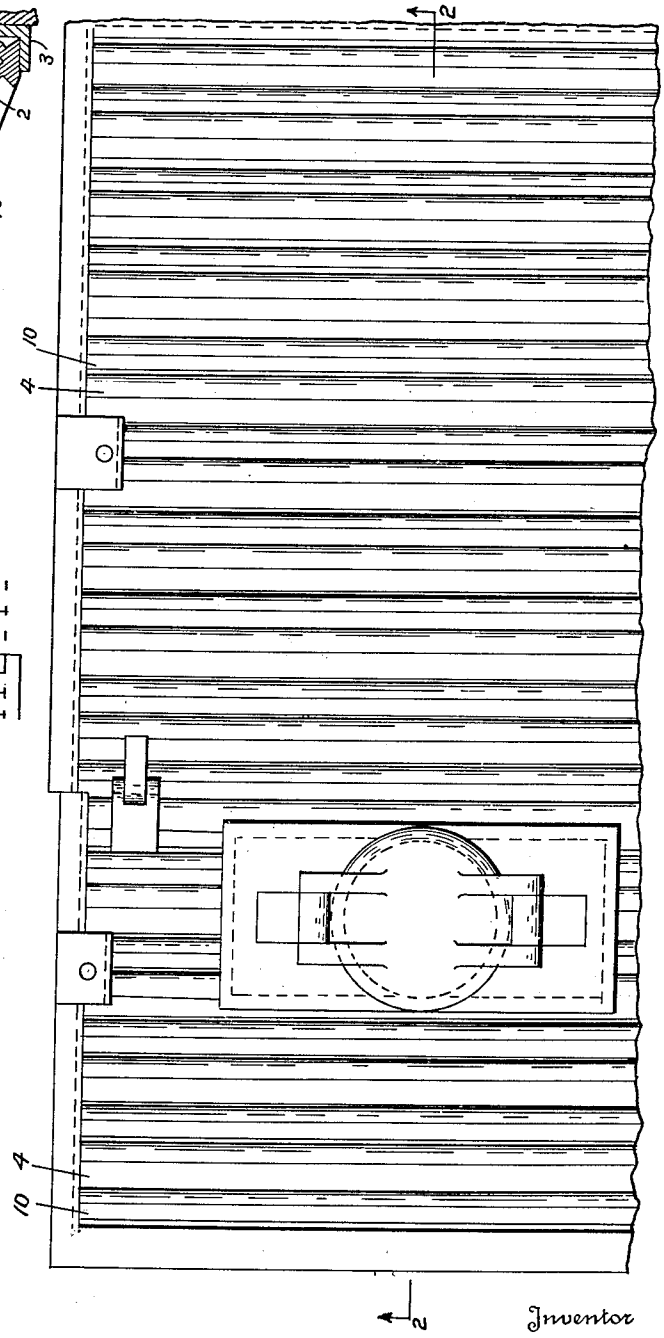


Fig-1-



Inventor

Victor R. Abrams

Walter W. Kennedy

By C. E. Herrstrom & H. E. Thibodeau

Attorneys

AND RELATED DEVICES.

85

Search Room

Patented Jan. 1, 1946

2,392,215

# UNITED STATES PATENT OFFICE

2,392,215

## BULLETPROOF GRID

Victor R. Abrams and Walter W. Kennedy, Rockford, Ill.; said Kennedy assignor to Barber-Colman Company, Rockford, Ill., a corporation of Illinois

Application November 17, 1944, Serial No. 563,907

8 Claims. (Cl. 109—21.5)

The present invention pertains to a novel bullet and spatter proof grid designed to cover a ventilation opening in an armored structure such as a combat tank. The opening may be in a horizontal, vertical or intermediate plane. Many of the combat tanks now in use have the ventilating opening disposed horizontally in the top and therefore exposed to fire from above. Protection of such an opening as well as a vertical opening is extremely important.

The object of this invention is to provide a grid adapted to dissipate the force of a bullet or its spatter, as well as explosive waves, without permitting them to enter the enclosure. Another object of the invention is to avoid serious obstruction to the air stream notwithstanding the obstruction necessarily imposed by the grid elements. These objects are accomplished by the use of a series of parallel grid bars having a unique configuration. In general, each bar is formed with an outwardly directed concave surface and with inwardly converging lateral faces extending therefrom. Bullet spatter from a lateral face is received in the concave face of the next inner bar and thus directed outwardly. Direct hits are stopped by the concave faces, and the series of bars are arranged in staggered relation to prevent entry of an angular hit. The edges of the bars, along the concave faces, are rounded; and the combination of rounded edges and flat lateral faces of adjacent bars forms an efficient air flow path.

An illustrative embodiment of the invention is disclosed in the following description and in the accompanying drawing in which:

Figure 1 is a plan view, and

Figure 2 is a section on the line 2—2 of Figure 1.

The numeral 1 indicates a portion of an armored structure such as the top of a combat tank. The structure is formed with an opening 2 for admission of air. In the opening is mounted a frame 3 of a grid designed to admit air and afford protection from bullets, fragmentation and explosion waves.

The grid structure constituting the invention consists of a series of parallel bars so shaped and arranged as to accomplish the aforementioned object and also admit air through an efficient path. The first or outer series consists of a number of spaced parallel bars 4 lying between two parallel surfaces. Thus, the surface containing the upper edges of the bars is parallel to a surface passed through corresponding points of the respective bars or the surface containing the inner edges. One of the characteristics of each bar is that it presents a concave surface 5 facing outwardly. The term is used in its broad sense and is not limited to a curved surface. Actually the outer surface in dihedral, but the important characteristic is that it forms a pocket facing outwardly in the nature of a concave surface. The side walls 6 of each bar converge inwardly to a point 7, and the concave surfaces 5 are continued at the edges as convex surfaces 8 merging into the lateral faces 6.

A second series of somewhat similar bars 10 is provided inward of the first series, with its members alternating with those of the first series to obstruct the spaces 11 between the members of the first series. Each bar 10 has an outwardly facing concave surface 12 and inwardly converging lateral faces 13. The bars 10 are of less depth than the bars 4. The concave surface 12 of each bar 10 is continued at each edge as a convex surface 14 merging with the adjacent lateral face 13.

A third series of bars 15 is mounted directly behind the bars 4. Each bar 15 also has a concave outward face 16 with rounded or convex longitudinal edges 17. The lateral faces 18, however, preferably diverge inwardly in a manner to intercept prolongations or extensions of the faces 13 of the adjacent bars 10.

In examining the path of bullet spatter in the grid, it will be borne in mind that spatter travels along a surface struck thereby and is not ordinarily reflected angularly therefrom. A bullet or spatter striking any of the concave faces is obviously thrown outward of the grid. Spatter from the faces 12 thrown against the lateral faces 6 is redirected against the surfaces 16 and thence outward. Spatter striking a lateral surface 13 and then directed inwardly is arrested by the intercepting surface 18. Such spatter, before striking the face 13, originates in a concave surface 16 and has spent substantially all its energy immediately on striking the surface 18.

The staggered relation of the bars 10 to the bars 4 and 15, in conjunction with the sloping lateral faces and the rounded edges, forms a comparatively efficient air flow path as indicated by the numeral 19 in Figure 2. It is now evident that the described configuration and arrangement of the bars does not materially obstruct the flow of air while, nevertheless, affording complete protection against bullet and spatter in the manner already described.

The construction is also a shield against explosion waves. These waves, if detrimental, travel with a velocity exceeding that of sound. At such velocities they are not reflected from surfaces in the usual manner but rather travel along such

surfaces after the fashion of bullet spatter and are dissipated in like manner before entering the enclosure.

While specific embodiments of the invention have been shown and been described, it will be understood that various alterations may be made without departure from the spirit of the invention as indicated by the appended claims.

What I claim is:

1. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces.

2. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, and a third series of bars disposed directly inward of the first series and having outwardly facing concave surfaces.

3. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, and a third series of bars disposed directly inward of the first series and having outwardly facing concave surfaces and inwardly diverging lateral faces substantially parallel to the lateral faces of the second series and intercepting the prolonged planes of the last named faces.

4. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, the lateral faces of the first series being wider than those of the second series.

5. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, the lateral faces of the first series being wider than those of the second series, a third series of bars disposed directly inward of the first series and having outwardly facing concave surfaces.

6. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, the lateral faces of the first series being wider than those of the second series, a third series of bars disposed directly inward of the first series and having outwardly facing concave surfaces and inwardly diverging lateral faces substantially parallel to the lateral faces of the second series and intercepting the prolonged planes of the last named faces.

7. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, each bar having convex longitudinal surfaces joining the edges of its concave surface to the respective lateral faces.

8. A bullet-proof grid comprising an open frame member, a series of spaced parallel bars secured in said member, a second series of bars parallel to the first series and displaced inwardly therefrom and alternating therewith, each bar having an outwardly facing concave surface and a pair of inwardly converging lateral faces, and a third series of bars disposed directly inward of the first series and having outwardly facing concave surfaces and inwardly diverging lateral faces substantially parallel to the lateral faces of the second series and intercepting the prolonged planes of the last named faces, each bar having convex longitudinal surfaces joining the edges of its concave surface to the respective lateral faces.

VICTOR R. ABRAMS.
WALTER W. KENNEDY.