Jan. 7, 1958 R. M. FERGUSON 2,818,729

BULLET TRAP

Filed July 15, 1955 2 Sheets-Sheet 1

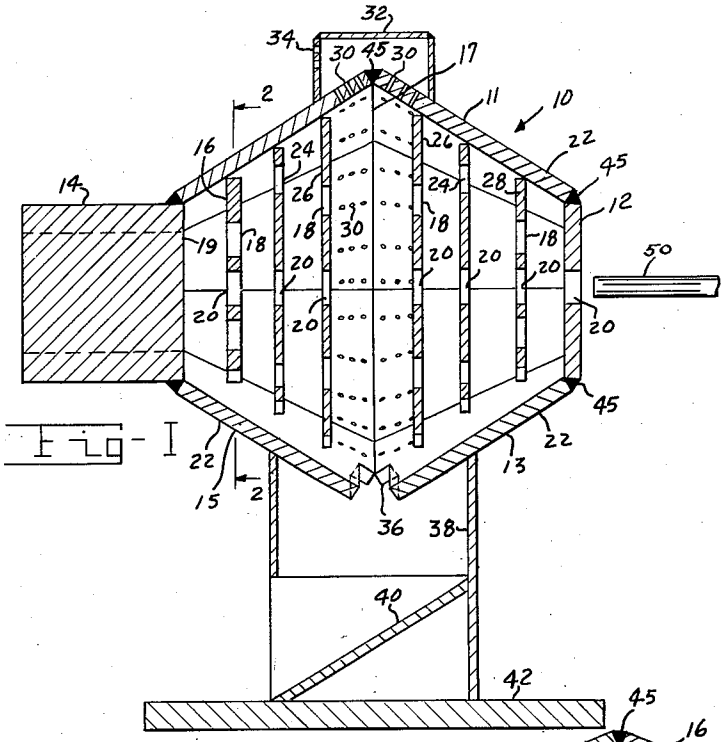


Fig-1

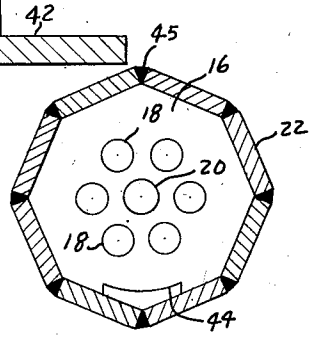


Fig-2

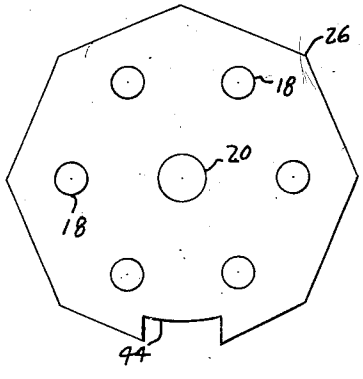


Fig-3

INVENTOR.
RALPH M. FERGUSON
BY Wade Kooney
ATTORNEY
Julius Louis Rubinstein and
AGENT

Jan. 7, 1958 R. M. FERGUSON 2,818,729

BULLET TRAP

Filed July 15, 1955 2 Sheets-Sheet 2

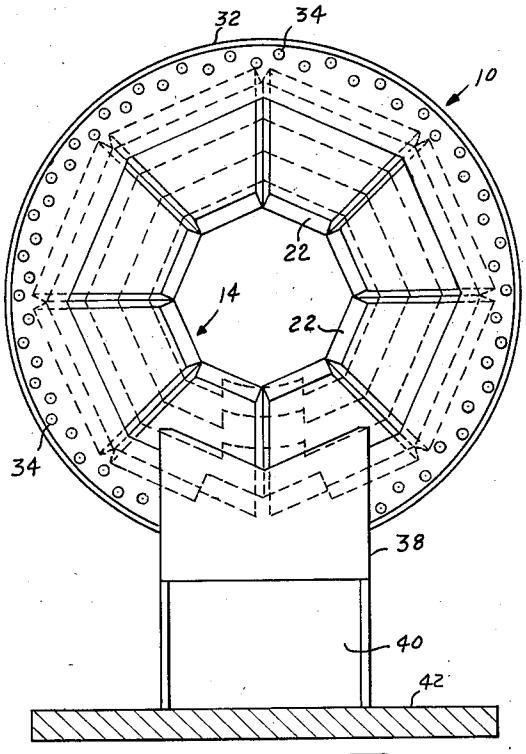


Fig-5

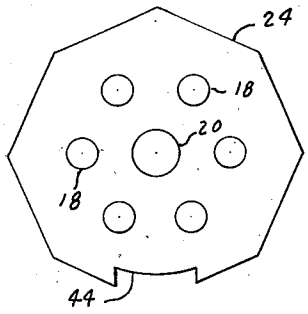


Fig-4

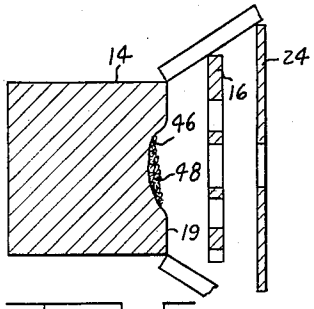


Fig-6

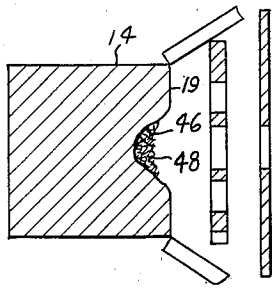


Fig-7

INVENTOR.
RALPH M. FERGUSON
BY Wade Koontz
ATTORNEY
Julius Louis Grubstein and
AGENT

United States Patent Office

2,818,729

Patented Jan. 7, 1958

2,818,729

BULLET TRAP

Ralph M. Ferguson, Dayton, Ohio, assignor to the United States of America as represented by the Secretary of the Air Force

Application July 15, 1955, Serial No. 522,408

6 Claims. (Cl. 73—167)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

This invention relates generally to a bullet trap, and more particularly to a new and improved apparatus for stopping projectiles shot by guns being tested.

The principal object of this invention is to design a new and improved bullet trap which is compact, safe and economical to manufacture.

A further object of this invention is to provide a bullet trap comprising a closed armored chamber and including an armored block positioned in the path of bullets fired into the armored chamber to confine the high velocity bullets to the chamber.

An additional object of this invention is to construct a bullet trap having a bullet smashing armored block able to oppose the progressive increase in the size of bullet impact indentations in the block by a fusion with fragments of bullets smashed on the block at the point of impact.

Another object of this invention is to provide a bullet trap wherein high velocity bullets are fired into an armored chamber and where the chamber is shaped to let spent bullet fragments gravitate or move out of the chamber.

A still further object of this invention is to provide a bullet trap comprising an armored chamber having spaced parallel end walls wherein high velocity bullets are fired into the chamber through an opening in one of the end walls to hit the other end wall, and including means for preventing ricocheting bullet fragments from returning to the first-mentioned end wall.

Another object of this invention is to provide vent means in the armored chamber for relieving high gas pressures caused by a plurality of high velocity bullets fired into the chamber in rapid succession at relatively close range.

Other objects and many of the attendant advantages of this invention will be readily appreciated as it becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation of the present invention.

Fig. 2 is a sectional view taken along the sectional line 2—2 of Fig. 1.

Fig. 3 is a side view of one of the baffle plates.

Fig. 4 is a side view of another baffle plate.

Fig. 5 is a side view of the present invention.

Fig. 6 is an enlarged view disclosing the armored block when relatively few bullets have been fired into it, and when the indentation depth caused by the impacts of bullets on the block is still relatively small.

Fig. 7 is an enlarged view disclosing the armored block after many bullets have been fired into it causing the depth of the indentation to become greater and showing the fusion between bullet fragments in the block at the point of impact that opposes the continued increase in the size or depth of the indentation.

Referring now to the drawings, and more particularly to Fig. 1, the bullet trap which is adapted for use in high altitude test chambers and which is designated generally at **10** includes an armored chamber **11** composed of octagonal frustum-shaped shell portions **13** and **15** secured together. Each shell portion comprises an end wall and diverging side walls. The end walls are made from standard naval homogeneous armor plate commonly designated as S. T. S. These end walls have an octagonal periphery to conform to the cross-sectional shape of the chamber and have parallel end surfaces perpendicular to the side surfaces at the periphery. One edge of each diverging side wall is secured by welding **45** to each edge of the end wall. The opposite edges of diverging side walls of each shell are welded together at junction **17**, see Fig. 1, to form a closed chamber having spaced parallel first and second end walls. The chamber is positioned so the junction of the two shell portions lies in a vertical plane parallel to the end surfaces of the end walls. First end wall **12** of shell portion **13** has a bullet-receiving aperture at its center. Second end wall **14** of shell portion **15** is a thick massive block of standard naval armor plate and has an impact surface or face **19** disposed substantially perpendicular to the path of the bullet. The armored block is sufficiently bullet-resistant to prevent standard steel bullets fired into it from penetrating through it and escaping from the chamber. The armored chamber is further provided with a plurality of venting apertures **30** for relieving high gas pressures in the chamber caused by a plurality of high velocity bullets fired into the chamber in rapid succession from a position near the bullet-receiving aperture in end wall **12**. These venting apertures are disposed adjacent junction **17** of the opposed shell portions. An annular chamber **32**, see Fig. 5, surrounds these venting apertures in the armored chamber, and is itself provided with a plurality of annularly disposed venting apertures **34**. The apertures act to direct gases escaping into the chamber in a direction away from end wall **12** to prevent injury to the gun **50** or to the operator of the gun. An opening **36** for permitting spent bullet fragments to leave the armored chamber is disposed at the lowermost portion of armored chamber **11** at the junction **17** between opposed shell portions **13** and **15**.

A plurality of baffles **16**, **24**, **26** and **28**, see Figs. 1, 2, 3 and 4, are secured to the interior walls of the chamber in spaced parallel relationship to prevent bullet fragments from ricocheting back to end wall **12** and injuring the gun **50** or the operator of the gun. The baffle plates are octagonal in shape to conform to the cross-sectional shape of the armored chamber and have bullet-receiving openings **20** disposed centrally thereof. In addition, they are positioned so that these openings are in alignment defining a passageway for the bullets. This passageway is substantially perpendicular to impact face **19** of the armored block. The baffles are further provided with a plurality of venting apertures **18** to provide a means for relieving high gas pressures in the armored chamber caused by a plurality of high velocity bullets fired into the chamber in rapid succession. These apertures are in staggered relationship so that the bullet fragments which chance to pass through the venting aperture in one of the baffles cannot directly pass through a venting aperture in the next adjacent baffle. In addition, each baffle has a recessed portion **44** disposed at its lowermost edge. These recessed portions are in alignment forming passageways. The passageways are inclined downwardly from each end wall and meet at opening **36**. With this arrangement bullets fired into the chamber through the

bullet-receiving aperture in end wall 12 are smashed on the end wall 14 and their fragments fall to the lower surfaces of the chamber and gravitate through the inclined passageways defined by recesses 44 to opening 36. From there the fragments fall out of the armored chamber through exhaust tube 38 and are deflected by means of deflecting plate 40 outside the apparatus.

There is an important relationship between the composition of armored block end wall 14 and the bullets fired into the chamber. It will be appreciated that when a plurality of high velocity bullets are fired into an armored block, no matter how strong or bullet-resistant the block may be, an indentation will gradually form under the force of the impacts. The rate of growth of this indentation is directly proportional to the number of bullets fired and this limits the useful life of the smasher or end wall block 14. When the armored steel block is sufficiently hard, it is believed that the pointed portion of the standard steel bullets fired into the block produces a pressure sufficient to liquefy a portion of the block at the point of impact whereby fragments of the bullets smashed by the impact become welded or fused to the block. The preferred material of the armored block is made from standard naval homogeneous armor plate commercially referred to as S. T. S. having a Brinell number of 255. However, any steel having a Brinell number around 255 or less would be satisfactory. As seen in Fig. 6, when the size of the indentation 46 is still relatively small the fusion effect between bullet fragments 48 and the block is also small. The situation is different when the indentation size has increatsed. It is seen in Fig. 7 when the indentation 46 has grown greater through the increased number of bullets fired into the block, a greater percentage of the bullet fragments from the smashed bullets come to rest in the indentation. Thereafter when bullets are fired into this indentation the impact pressure liquefies a portion of the block at the point of impact causing a larger amount of the bullet fragments to become welded to the block. This impact fusing opposes the increased growth of the indentation and greatly prolongs the life of the block. Without this self-sealing or welding feature the life of a typical armored block might be good for approximately 1,200 rounds but by selecting a steel of proper hardness so this welding or fusion effect can occur, the life of a block can be increased to more than 10,000 rounds.

In use the gun is tested by firing a plurality of bulelts into the bullet receiving armored block in the armored chamber. As the indentation in end wall 14 in the armored block caused by the successive impacts of the bullets increases, more and more bullet fragments come to rest in the indentation, and under continued pounding by the other incoming bullets, they become welded to the block in the indentation and oppose the continued growth of the indentation. The fragments of the smashed bullets which do not adhere to the block are stopped by one or more of the baffle plates mounted in the interior of the armored chamber 11. These fragments then fall to the lowermost portion of the armored chamber and move through the outlet passageway defined by recesses 44 out of the chamber through opening 36. The high gas pressures developed in the chamber due to high velocity bullets entering the chamber are continuously exhausted through vents 30 and 34.

Thus, it is seen a simple, compact and economical bullet trap has been devised. Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that the invention may be practiced otherwise than as specifically described and still remain within the scope of the appended claims.

I claim:

1. A bullet trap comprising an armored chamber, said chamber having spaced parallel first and second end walls and connecting side walls, said first end wall having a bullet-receiving opening therein, said second end wall comprising an armored steel block having an inner face disposed substantially perpendicular to the path of standard steel bullets fired into said chamber through the bullet-receiving opening in said first end wall, said armored block being sufficiently bullet-resistant to prevent bullets penetrating through it and escaping from the chamber, said armored block formed from standard naval homogeneous armor plate and having a Brinell hardness number of approximately 255 so that the impact pressures between the armored block and the bullets cause fragments of the bullets smashed on the armored block to fuse to the armored block at the point of impact and oppose the progressive increase in the size of the indentation in the block caused by successive impacts with high velocity bullets.

2. A bullet trap comprising an armored chamber, said armored chamber having spaced parallel first and second end walls and connecting side walls, said first end wall having a bullet receiving opening, said second end wall comprising an armored block having an inner face substantially perpendicular to the path of the bullet fired into the chamber through the bullet receiving opening in said first end wall, said armored block being sufficiently bullet resistant to prevent the bullets fired into the chamber from penetrating the block and escaping from the chamber, a plurality of spaced parallel baffles for preventing the spent bullet fragments from ricocheting back to said first end wall, each of said spaced parallel baffles having a bullet receiving aperture extending therethrough, said baffles disposed in said chamber so the bullet receiving apertures are in alignment defining a passageway for the bullets substantially perpendicular to the inner face of said armored block, vent means in the armored chamber for relieving high gas pressures in the chamber caused by a plurality of high velocity bullets shot into the chamber in rapid succession, said baffles have venting apertures to permit free movement of gases in the chamber to the chamber vent means.

3. The apparatus of claim 2 wherein the venting apertures in the successive baffles are in staggered relationship to prevent ricocheting fragments of spent bullets from passing through more than one venting aperture in a baffle without being stopped by the next adjacent baffle.

4. The apparatus set forth in claim 3 including an annular chamber surrounding a portion of the armored chamber, said annular chamber communicating with the vent means in the armored chamber, vent means in said annular chamber adapted to guide escaping gases in a direction away from said first end wall.

5. A bullet trap comprising an armored chamber, said armored chamber including two opposed shell portions, each of said shell portions comprising one end wall and diverging side walls, said diverging side walls secured at one edge to the periphery of each end wall, the opposite edges of the diverging side walls of each shell portion secured together to form a closed chamber having spaced parallel first and second end walls, said armored chamber disposed so the junction of the diverging side walls of the opposed shell portions lies in a vertical plane, an opening in the lowermost portion of the armored chamber at the junction of the shell portions to let spent bullet fragments gravitate out of the armored chamber, said first end wall having a bullet-receiving opening, said second end wall comprising an armored block, said block being sufficiently bullet-resistant to permit high velocity bullets fired into the armored chamber through the opening in said first end wall and into the armored block from penetrating through said armored block and escaping from the chamber.

6. The apparatus set forth in claim 5 including a plurality of spaced parallel baffles mounted in said armored chamber, each of said baffles having a recess at one edge, said baffles positioned so the recesses are in alignment defining passageways, said passageways inclined downward-

ly from the end walls and communicating with the opening in the lowermost portion of the armored chamber at the junction of the two opposed shell portions whereby spent bullet fragments gravitate to the bottom of the chamber move through said passageway to said opening and out of the armored chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,321,039	Nelson	June 8, 1943
2,631,454	Shephard et al.	Mar. 17, 1953
2,713,262	Webster	July 19, 1955
2,772,092	Nikoden	Nov. 27, 1956