May 16, 1967 S. W. WILCOX 3,319,960

PELLET TARGET EMPLOYING A FREELY SUSPENDED ELASTOMERIC IMPACT SHEET

Filed Nov. 27, 1964

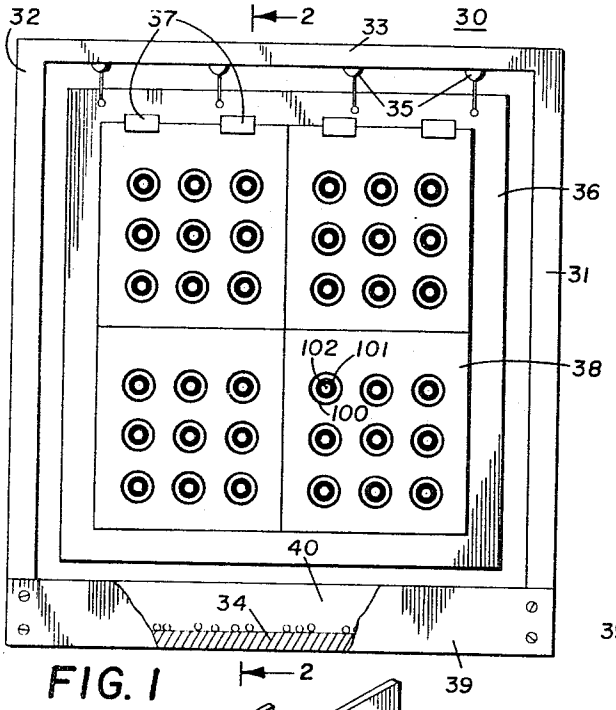


FIG. 1

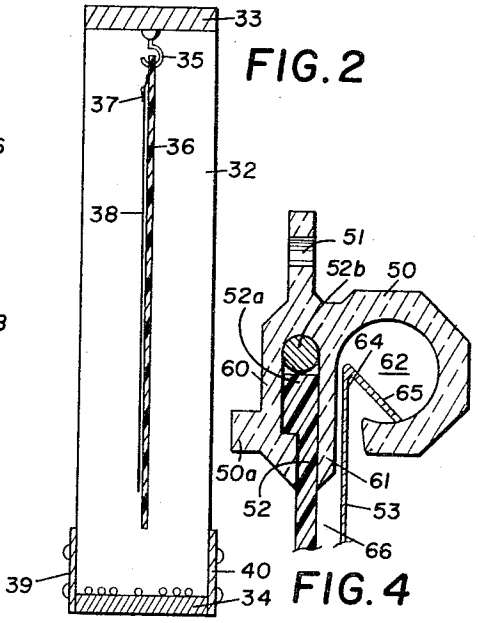


FIG. 4

FIG. 2

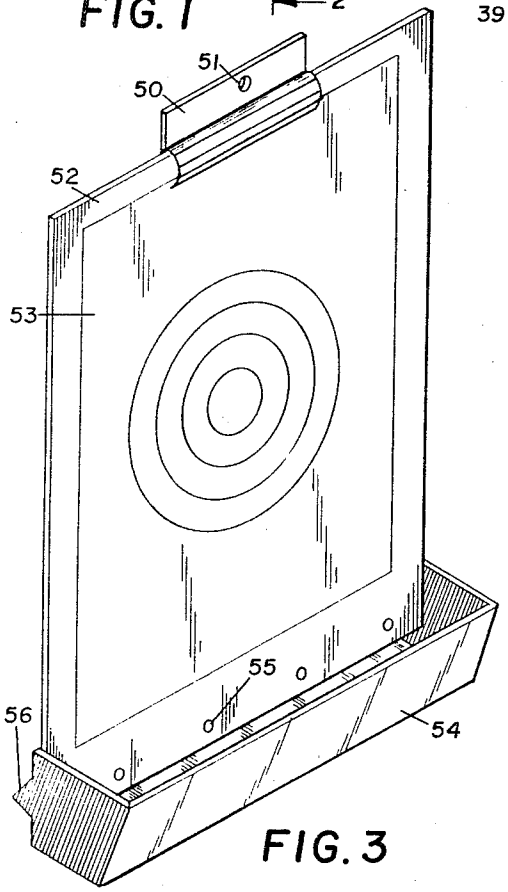


FIG. 3

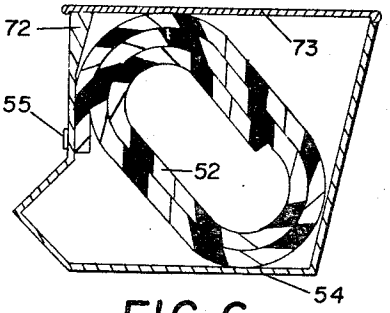


FIG. 6

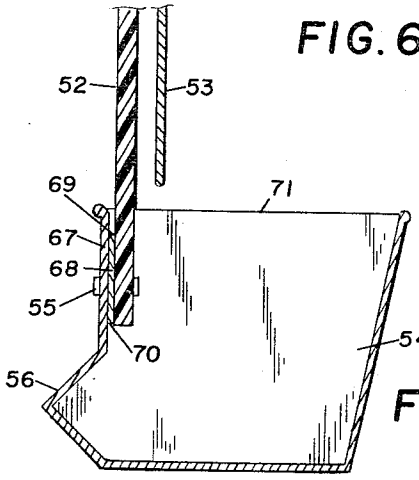


FIG. 5

INVENTOR

STANLEY W. WILCOX

United States Patent Office 3,319,960 Patented May 16, 1967

3,319,960

PELLET TARGET EMPLOYING A FREELY SUSPENDED ELASTOMERIC IMPACT SHEET

Stanley W. Wilcox, Tulsa, Okla., assignor of one-half to Century Geophysical Corporation, Tulsa, Okla., a corporation of Delaware

Filed Nov. 27, 1964, Ser. No. 414,359
5 Claims. (Cl. 273—102.4)

This application is a continuation-in-part of application Ser. No. 271,432, filed Apr. 8, 1963, and now abandoned.

This invention relates to a target for air rifles and more particularly to a target in which steel pellets will be stopped and collected.

In training in the proper handling of firearms many kinds of activities are sponsored among young people. However, substantial limitations and precautions are necessary in the use of firearms in urban areas. Consequently, air guns and the like are widely used by young people. Furthermore, adult interest is widespread in connection with higher velocity, more accurate air rifles. To the present date, no really satisfactory target is available which will safely dispose of or accumulate pellets discharged from air rifles or high energy spring-air and gas guns.

In accordance with the present invention there is provided a target in which the energy of a pellet is absorbed substantially completely so that little or no recoil will be experienced.

For a more complete understanding of the present invention and for further objects and advantages thereof, reference may now be had to the following description taken in conjunction with the accompanying drawings in which:

FIGURE 1 illustrates an embodiment of the invention;

FIGURE 2 is a view taken along the line 2—2 of FIGURE 1;

FIGURE 3 illustrates a modification of the invention;

FIGURE 4 is a sectional view of a suitable hanger for the unit of FIGURE 3;

FIGURE 5 illustrates a tray support arrangement for the unit of FIGURE 3; and

FIGURE 6 illustrates the unit of FIGURE 3 folded for shipping.

Many attempts have been made to find some energy-absorbing means to de-energize steel pellets. One method is to direct the pellets into a funnel, down whose throat they are guided until they land in a pail of water. Other means consist of brushlike rollers; or moving vanes, such as a series of free-hanging shutters. None of the prior systems have proven really effective. They have short life or else they are expensive to build.

An impenetrable, non-reflective barrier which is non-destructive is desired. Such a barrier should be made of a material having a very low reflective index whose elastic limit is not exceeded by the impact of a steel pellet traveling at velocities of 450–500 feet per second, which is conventional in operation of spring-air guns.

Butyl rubber 116, having a durometer test of from 40 to 45 and a thickness of from 3/32 inch to 1/8 inch, has been found satisfactory. Such material can be molded in squares, or it can be used in sheets or rolls with or without fabric embedded therein.

The Butyl rubber above identified is not temperature sensitive within a practical range of interest to shooters. Below freezing the Butyl sheet appears peened. The dents disappear after a period of time at normal temperatures. Above 110° F., the rubber becomes slightly reflective for normal impingement. This reflectivity disappears when the material cools to normal temperatures.

Since the elastic limit of the material is not reached at normal pellet velocities, no evidence has been found of deterioration of the material after several hundred impingements on the same spot.

The rubber is equally effective in stopping high velocity lead pellets of .22 caliber. Deforming of such lead pellet aids in absorbing its energy.

Butyl rubber manufactured by Tulsa Rubber Products Co. of Tulsa, Oklahoma, and identified as SS–17, is a preferred Butyl rubber for the present target use. A rubber manufactured and sold by Goodyear Rubber Company, identified as BB–157, having a durometer test of about 40 to 45, or its equivalent, may be used for stopping pellets. Since it stops pellets without recoil or rebound over a wide temperature range, the pellets are rendered harmless when fired at a target which includes a sheet of this material. Thus, an indestructible target backstop is provided, on which only the paper scoring target need be replaced.

FIGURES 1 and 2 illustrate an embodiment of the invention wherein a target unit **30** is provided with a frame having sides **31** and **32**, a top member **33** and a bottom member **34**. Hooks **35** depend from the top bar **33** and support a sheet of Butyl rubber **36**. A plurality of clips **37** are provided for attaching a scoring target **38** to the face of the sheet **36**. As best shown in FIGURE 2, the scoring target **38** covers most of the front face of the sheet **36**. Both the rubber sheet **36** and the scoring sheet **38** hang free in space so that they will provide suitable control for pellets directed thereto. A pair of side plates **39** and **40** extend across the bottom of the unit **30** to form a tray or receptacle into which pellets will fall.

In practice, pellets directed towards the unit **30** impinge the scoring target **38** and pass therethrough to strike the resilient sheet **36**. As above explained, the presence of the sheet **36**, having characteristics as above described, will absorb the energy of the impinging pellet. Any slight rebound of the pellet from the sheet **36** will be absorbed by the free-hanging scoring target **38**. The pellets will then fall downward between the sheets **36** and **38** into the tray at the bottom of the target unit **30**. In use, this combination permits a substantially greater variation in the properties of the sheet **36** than if a target were to be imprinted directly on the rubber sheet **36**.

The formulations of Butyl rubber suitable for the present target are unique by reason of their temperature reflectivity coefficient. At temperatures of 60° to 65° F. down to 10° F., steel pellets will not rebound from the surface thereof. Above 65° F., rebound begins to develop and becomes several feet at 120° F. Below about 20° F. fracturing of the Butyl may occur on impact. Thus, through a wide range of temperatures, the Butyl rubber absorbs the pellet energy without rebound. At temperatures ordinarily encountered in areas of use, rebound is minimal and is controlled or attenuated by the presence of the paper target sheet **38**, shown in FIGURES 1–3, as above described.

The Butyl rubber employed herein has a high threshold temperature at which incipient reflectivity occurs. Furthermore, when it is impinged normal to its surface or within a cone of 10° to 20° of revolution at 65° F. and below, the pellet falls essentially vertical. Outside of this cone, some reflectivity develops in the direction of the impinging pellet, falling outward a few inches if unimpeded by the paper target. If the angle from normal is increased, there is a secondary circle of no reflectivity when the forces acting on the pellet tending to cause it to slide off the Butyl surface just equal the forces tending to cause the pellet to bounce back toward the shooter. Beyond this circle of no bounce, the pellets glance away from the shooter in a direction essentially parallel to

the rubber sheet. Thus, over a substantial incident angle, the target serves to arrest the travel of high velocity pellets.

A further embodiment of the invention is illustrated in FIGURES 3–6. In this system, a hanger **50** is pierced as to be supported on a suitable suspension bracket or hook which may pass through an aperture **51**. The hanger **50** grips the upper edge of a Butyl rubber sheet **52** and a scoring sheet **53**. The sheet **52** supports a tray **54** at the lower end thereof. The tray **54** may serve as a shipping container for the sheet **52** and the bracket **50** and may serve later as a catch-tray for spent pellets. The sheet **52** is attached to the back wall of the tray **54** as by fasteners **55**. In the form illustrated, the tray has a rearward extending rib **56** so that the sheet **52** will be supported away from any surface adjacent to which the bracket **50** is positioned.

The bracket **50**, in a preferred form, is illustrated in FIGURE 4. The bracket has the aperture **51** near the upper edge thereof. Downwardly depending sections **60** and **61** form a slot into which the formed or beaded upper margin **52***a* of the sheet **52** may be inserted so that the sheet **52** will be supported as a free-hanging body. A rear rib **50***a* extends along the back surface of bracket **50** to assure spacing from any surface so that the rubber sheet will be free-hanging. Bracket **50** is preferably an extruded plastic body of length equal to the width of the rubber sheet **52**. The aperture above the beaded margin **52***a* will accommodate a rod **52***b* which may form an alternative form of support. Rod **52***b* may be part of a stand which supports the sheet above a horizontal surface. Rod **52***b* thus would be a horizontal element of a stand having legs supported on a horizontal surface. The bracket **50** is provided with a forwardly extending downwardly opening hook **62**. The scoring target **53** is folded at point **64** so that the edge **65** will bear against the lower inner surface of the hook **62** and thereby be supported with a space **66** between the scoring sheet **53** and the resilient sheet **52**. It is through the space **66** that the spent pellets fall downwardly into the tray **54**.

In the form illustrated in FIGURE 5, the fasteners **55** secure the lower edge of the sheet **52** to the rear wall **67** of the tray **54**. In the form shown in FIGURE 5, a thin spacer **68** is positioned between the sheet **52** and the wall **67**. The spacer **68** may be wedge-shaped with the upper edge **69** much thicker than the lower edge **70** so that the rim **71** of the tray **54** will be positioned in a horizontal attitude even when the rib **56** is spaced from any rear supporting surface. The wedge will serve to compensate for the bending forces applied along the bottom of the resilient sheet **52** by the weight of the tray **54**. Alternatively and as shown in FIGURE 6, the spacer **68** may be replaced by a rib structure **72** forming a part of the rear wall of the tray **54**. The rubber sheet **52** may be rolled into the tray **54** and a lid **73** secured thereto so that the target may be conveniently packaged for shipping. The bracket **50** may be included inside the package **54** with the rubber sheet **52**.

The scoring target **38** of FIGURE 1 is shown in a new and preferred form wherein the paper sheet serves to limit any rebound of the pellets to direct them into the tray, and at the same time, provides an active pellet scoring target. The scoring target **38** differs from the more conventional scoring target **53** of FIGURE 3. Four arrays of bull's-eyes are imprinted on the scoring target **38**. The four quadrants on the target **38** each contain nine bull's-eye arranged in tic-tac-toe order. The bull's-eyes are all identical and each includes an outer circle **100**, a heavy inner circle **101**, with a center white dot **102**. The margin of the center dot **102**, which may be of diameter of about one-quarter inch, is scored circumferentially except for a small tab by which the center depends from the target **38**. In one embodiment, the tab was one-sixteenth inch wide. When a pellet strikes the center dot of the bull's-eye, the tab is torn or the center dot is pushed aside, causing the rubber sheet **36** to be visible through the opening thus formed. A clear indication of a direct hit is thus provided. Several shooters may, by use of the target gun, engage in a competitive activity according to the well-known rules for tic-tac-toe to which there is the added element of marksmanship in order to become a winner. While four arrays of the bull's-eyes are provided on the single sheet of FIGURE 1, it will be recognized that a single array may be employed or configurations of different character may be employed wherein a partially score bull's-eye element normally is supported by the paper target **38** in the plane thereof to form an active target which serves the double function of arresting or minimizing pellet rebound and delivering the pellets into the catch tray.

Having described the invention in connection with certain embodiments thereof, it is to be understood that further modifications may now suggest themselves to those skilled in the art and it is intended to cover such modifications as fall within the scope of the appended claims.

What is claimed is:

1. A pellet target with rebound control which comprises:

(a) an energy-absorbing impact sheet of Butyl rubber having a durometer test of the order of about 45 and of thickness of not less than $\frac{3}{32}$ inch,

(b) means for supporting said sheet from the upper margin as to hang free in space with the impact face thereof substantially vertical, and

(c) a pierceable sheet supported closely adjacent to and in front of the target face of said impact sheet for intercepting pellets upon rebound from said impact sheet.

2. A pellet target with rebound control which comprises:

(a) an energy-absorbing Butyl rubber sheet having a durometer test of the order of about 45 and of thickness of not less than $\frac{3}{32}$ inch edge-supported at the top edge with the rear surface of the body of said sheet free from constraint and with the impact face oriented at a major angle to the pellet trajectory, and

(b) a paper sheet supported along said trajectory immediately adjacent to said impact face for control of the low energy rebound trajectory.

3. A pellet target with rebound control which comprises:

(a) an energy absorbing impact sheet of a rubber having a durometer test of the order of about 45,

(b) clip means slidable over the upper edge of said sheet of rubber for supporting said sheet,

(c) a paper scoring target having a target indicia thereon and adapted to be folded along the upper edge thereof, and

(d) structure on said clip means forming a slot extending parallel to said upper edge for receiving and engaging the folded edge of said scoring target to support said scoring target next adjacent to the front face of said sheet of rubber.

4. A pellet target with rebound control which comprises:

(a) an energy absorbing impact sheet of a rubber having a durometer test of the order of about 45,

(b) clip means for engaging the upper edge of said sheet of rubber and for supporting said sheet,

(c) a paper scoring target having a target indicia thereon and adapted to be folded along the upper edge thereof,

(d) structure on said clip means for engaging the folded edge of said scoring target to support said scoring target in front of said sheet of rubber, and

(e) a pellet tray fastened to said sheet of rubber and extending in front of the face of said sheet of rubber for catching pellets falling downwardly between said scoring target and said sheet of rubber.

5. The combination set forth in claim 4 in which said clip means has a first downwardly opening slot into which the upper edge of said sheet of rubber is inserted with structure for engaging said upper edge of said sheet of rubber, and has a second downwardly opening slot in front of said first slot to support said scoring target.

References Cited by the Examiner

UNITED STATES PATENTS

570,820	11/1896	Scratton	273—102.4
1,123,051	12/1914	Whitman	273—102.4 X
1,886,562	11/1932	Le Fever	273—102 X
2,059,365	11/1936	King	273—103 X
2,069,822	2/1937	Douglas	273—102.4
2,535,280	12/1950	Gartrell	273—102.4
3,122,367	2/1964	Dale	273—102.4

FOREIGN PATENTS

858,951	12/1952	Germany.

RICHARD C. PINKHAM, *Primary Examiner.*

DELBERT B. LOWE, *Examiner.*

M. R. PAGE, *Assistant Examiner.*