

May 15, 1962

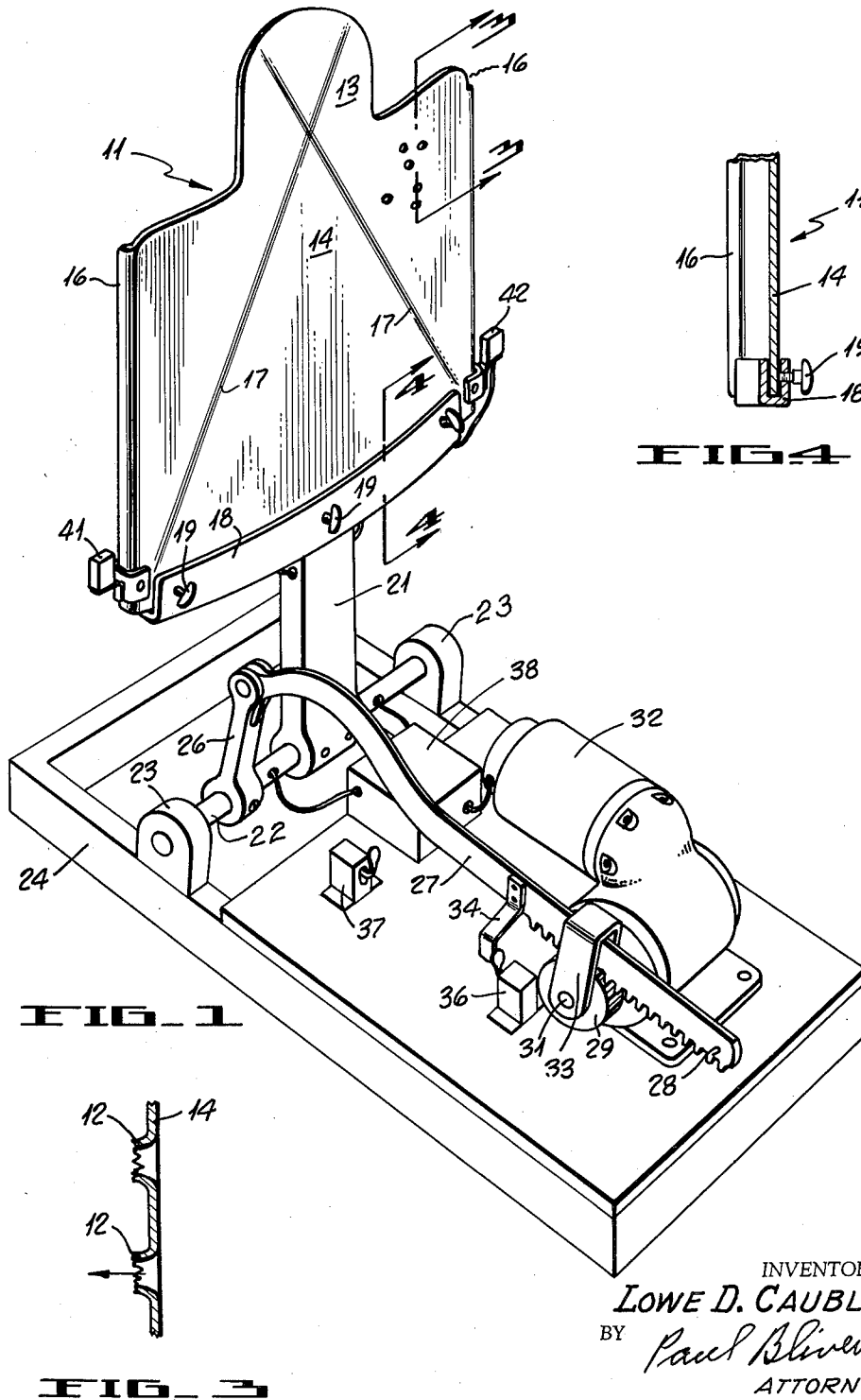
L. D. CAUBLE

3,034,788

TARGET

Filed Dec. 1, 1958

2 Sheets-Sheet 1



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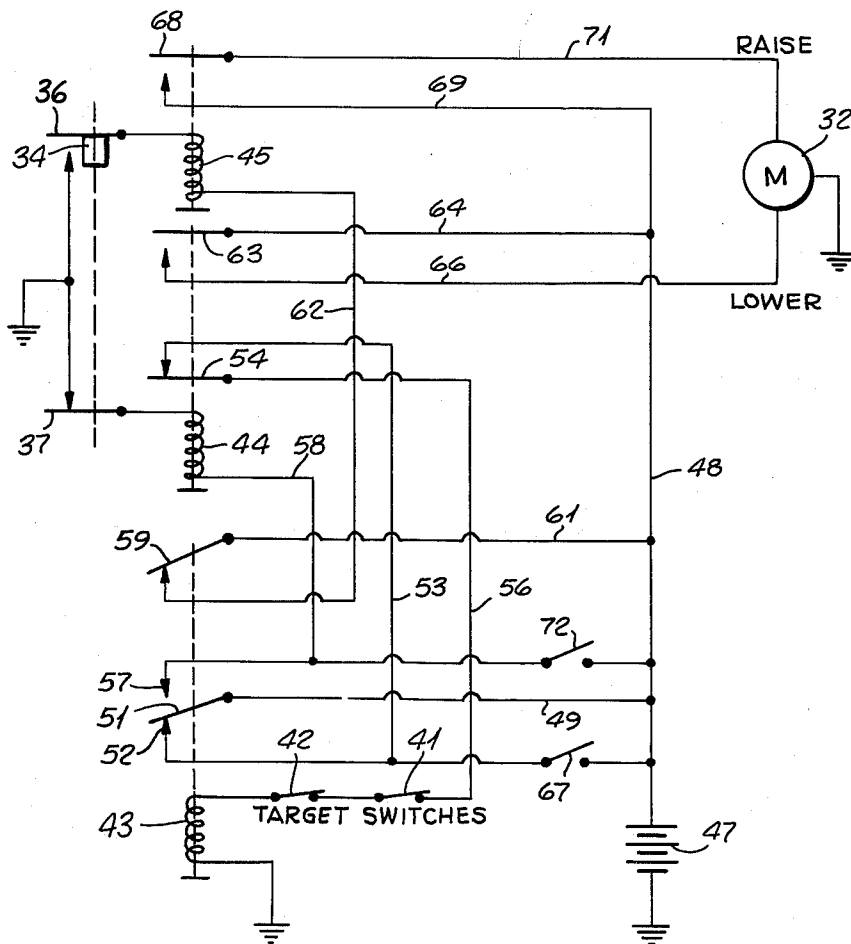


FIG. 2

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3,034,788
TARGET

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The present invention relates to a target suitable for use in rifle practice and where such target is raised to and lowered from firing position by automatic or semi-automatic mechanical means. In more particular, the invention relates to the use of a sheet of metal such as aluminum to form a target which will withstand the shock of heavy rifle fire, such as from the 30 caliber Garand using a steel jacketed bullet fired at 50 to 200 yards, and frequent rapid accelerations in being lowered and raised from and to firing position by mechanical means, and which target when greatly riddled by rifle fire may be easily conditioned for further use practically as extensive as the previous use, and which target will be little affected by the weather conditions to which it may be subjected.

The prior targets, which the present device is intended to replace, where made of cardboard. This cardboard disintegrated to such an extent after a few hits thereon that it became useless and had to be discarded. Further, the cardboard could not be used during a rain or left in the open during a rain or heavy dew without losing its strength and disintegrating. Also, there was no practical method for reconditioning used cardboard targets for further target use. Many times, the pulp material of which the target was made would cushion, or damp, the bullet impact to the extent that the control mechanism would not respond to effect lowering of the target as intended as a result of being struck by the bullet.

Having in mind the aforementioned defects of the prior art targets, it is an object of the present invention to devise a light weight sheet metal target that will replace the prior art pulp sheet targets.

Another object of the present invention is the devising of a target that will have more than double the life of those used in the prior art, and the attainment of such longer life by the use of a ductile sheet metal which will take more bullet hits and which may be reworked to close bullet holes therein so that the target is in condition for further use.

Another object of the present invention is the devising of a target which is impervious to weather conditions.

A further object of the invention is the construction and formation of a light weight sheet metal target which will withstand the forces present when such a target is rapidly raised to and lowered from firing position by power driven means such as are now being used on target ranges.

The above mentioned defects of the prior art are remedied and these objects achieved by the construction of a silhouette target, about two feet by three and a half feet, out of a twenty-two gage or slightly thicker sheet of rolled aluminum that is very ductile, and the forming of the sheet with longitudinal ribs and a transverse curve; and the use of such a sheet with a power operated target holder and actuator that automatically lowers the target from firing position when it has been hit by a bullet.

The devices described briefly above are hereinafter described in detail and shown in the accompanying drawings, in which:

FIGURE 1 is a perspective view of a form of target of the present invention and of a power driven mechanism for holding and moving such target to and from firing positions.

FIGURE 2 is a diagram of the electrical control system associated with the device shown in FIGURE 1.

FIGURE 3 is an enlarged detail sectional view on the

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line 3-3 of FIGURE 1 to show the kind of hole made in the target of the present invention by a bullet.

FIGURE 4 is a sectional view on the line 4-4 of FIGURE 1.

In FIGURE 1 there is shown a perspective view of an embodiment of the invention in which the target 11, the key part of the invention, is shown in one of the forms which it may take. In this showing, the target is made from a sheet of 20 gage rolled aluminum that is ductile enough and tough enough so that when a bullet from the usual army rifle strikes and passes thru the target there will be no significant loss of metal from the target and that the passage of the bullet will form a crater in the target such as one of those shown in FIGURE 3 where each of the bullet holes in the target is surrounded by a rim 12, or collar, that contains practically all of the metal displaced by the bullet in its passage thru the target. A small amount of metal from the target rubs off onto the bullet, but it is desired that the target metal be of a quality such that no chunks or pieces will be torn loose from the sheet.

The target is usually given a top, or head, portion 13 that is narrower than the body portion 14 for simulation purposes. A usual over all dimension for the target is 23 inches wide and 39½ inches high, longitudinally. The side edges of the body portion 14 are bent or broken to provide about a quarter inch flange 16. Further stiffness is provided by breaking, or ribbing the target so that such ribs extend longitudinally, vertically, of the target. These ribs, or breaks, 17 may be crossed as shown in the drawing, and more ribs or ribs of a different form may be used. The purpose of the ribs and flanges being to increase the longitudinal bending strength of the target. Also, this strength is increased by curving the target sheet in its transverse direction. In a target of the size mentioned, this curvature, curve rise, may be about two inches. This curvature may vary with the size and thickness of the sheet, and its ribbing.

When this transverse curvature of the target is maintained while the target is attached to its target operating mechanism, by setting the portion of the target adjacent its bottom edge in a target holder 18 which is part of the target operating mechanism. This holder 18 has a channel shaped cross section in which the flanges of the channel are spaced apart just enough to snugly receive the lower edge of the target 11. Winged set screws 19 are threaded thru one of the channel flanges so as to have an end bear against the target sheet and lock it in the channel. The channel 18 is longitudinally curved to so hold the target. Medially of the length of the holder 18 there is secured thereto an arm 21 that is fastened to a shaft 22 pivoted in blocks 23 fixed to a bed frame 24 that is intended to rest on the ground or other suitable supporting means. Also secured to the shaft 22 is a crank arm 26 which at its outer end is pivoted to one end of a rack link 27. The teeth 28 of this rack are in engagement with the teeth of a pinion 29 carried on the output shaft 31 of a gear head motor 32 secured to and resting on the bed 24. A U-shaped rack retainer 33 is formed with a bearing opening adjacent each arm end, and there is an arm of the retainer alongside of each end face of the pinion 29 with the output shaft passing thru the retainer openings. The inside of the base of the retainer bears against the smooth edge of the rack 27 to maintain the rack and pinion teeth in proper engagement. This kind of a retainer allows the rack to move tangentially about the pinion without losing proper contact therewith. A limit switch operating finger 34 is secured to the rack and contacts a raised 36 or a lowered 37 limit switch when the target is in either such position, and the finger and switches are relatively located so that such takes place. Also, se-

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cured to the bed 24 is a relay box 38 containing relays and their wiring such as will be described in connection with FIGURE 2. Electrical wiring runs from the relay box to the limit switches, the motor, a power source (not shown) and to a pair of small switches 41, 42 secured to the base of the target. These switches are sensitive to shock or vibration and will open briefly when jarred. Each switch is integral with a spring clip, or clamp, so that switch and clamp may be easily attached to and removed from the target 11. Usually the switches are secured to the target adjacent the bottom edge thereof where they will be out of the line of fire. In use, the target holder and the operating mechanism are protected by sand bags and a sloping sheet of heavy steel so that the lower two or three inches of the target and all of the mechanism are protected, and the marksman can see and hit only the upper part of the target, above the protected two or three inches.

FIGURE 2 of the drawings is a diagram of the electrical control system associated with and shown in part in the device of FIGURE 1. Those parts of the electrical system which have been numbered in FIGURE 1 have been given the same reference numbers in FIGURE 2. The figure shows three relays which are numbered and referred to by their solenoid coils. There is the target relay 43, the lower relay 44, and the raise relay 45. The position of the switches is that which would prevail if the target 11 had been raised under power to the firing position, the position shown in FIGURE 1, and the system remained connected to a suitable source of power such as a battery 47 so that there is power on the target switches 41, 42 from the battery, thru the bus 48, the holding lead 49 for the target and lower solenoids and their switch blade 51, to a target contact 52, thru a target blocking line 53, thru a target blocking switch 54 in the unactuated lower relay 44, thru a target switch line 56 in which the target switches 41, 42 are in series, and thru the target relay coil 43 to ground. If either of the target switches 41, 42 is momentarily opened, the target relay will release. This causes the holding lead switch blade 51 to transfer to a lower relay coil contact 57 to deliver power thru a lower coil line 58 to the lower coil 44 and thru the closed lowered limit switch 37 to ground. Power to the lower relay causes it to actuate to open the target blocking switch 54 which prevents actuation of the target relay while the lower relay is actuated. In its actuated position, the target relay holds closed a raise relay coil switch 59 connected to the bus 48 thru a raise lead 61 and to the coil 45 of the raise relay thru a line 62. The raise coil is connected to ground thru the raised limit switch 36 which is held open by the limit switch finger 34 secured to the rack 27, when the target is in its raised position. When the target relay is deactivated by an opening of a target switch, the raise relay coil switch 59 is opened so that closing of the raised limit switch 36 by movement of the target from raised position will not activate the raise relay coil 45.

Actuation of the lower relay 44 opens the target blocking switch 54 and closes a motor lower switch 63 which receives power from a lead 64 connected to the bus 48 and passes it thru a lower line 66 to the motor 32 to cause it to turn in the proper direction to lower the target by means of mechanisms already described. The lowering movement of the target will continue until the limit switch finger 34 engages the lowered limit switch 37 to open the ground line from the lower relay coil 44 to stop the motor. This is usually set so that the target is near the horizontal. Deactivation of the lower relay 44 opens the motor lower switch 63, and closes the target relay blocking switch 54. At this time, all of the relay coils are deactivated and it requires a manual operation to activate the system to cause the target to raise.

The target is raised by closing a manual raise switch 67 which is connected in a lead between the bus 48 and the target blocking line 53. A momentary closing of this manual raise switch will pass power to the blocking line

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53, thru the closed blocking switch 54, the target switch line 56, the target switches 41, 42, and the target relay coil 43 to activate the target relay. Activation of the target relay sets its switches as previously described and as shown and the relay is held by power from the holding lead 49. Activation of the target relay closes the raise relay coil switch 59 to deliver power to the raise relay coil 45 which is now grounded thru the raised limit switch 36 as the limit finger 34 is now holding open the lowered limit switch 37. Activation of the raise relay closes a motor raise switch 68 which is connected to the bus 48 by a motor raise lead 69 and to the motor 32 by a motor raise line 71 to deliver power to the motor to cause it to rotate in the proper direction to raise the target to the position shown in FIGURE 1. As the target reaches its raised position the raised limit switch 36 is opened to deactivate the raise relay and to thereby open the motor raise switch 68 and stop the motor. The circuit is then in the condition shown in FIGURE 2.

The circuit system of FIGURE 2 may be manually actuated to cause lowering of the target by closing a manual lower switch 72 which is connected between the bus 48 and the lower coil line 58. Closing of this switch activates the lower relay 44 to open the target blocking switch 54 to deactivate the target relay 43 which closes the lower holding switch 51, 57 to hold the lower relay, and opens the raise relay switch 59. Activation of the lower relay 44, also, closes the motor lower switch 63 to deliver power to the motor to cause it to turn in the proper direction to lower the target until the lowered limit switch 37 is opened. The target may then be raised by closing the manual raise switch 67.

No invention is claimed in the construction of the target operating mechanism and its related control and power system but the use of the disclosed target with such is believed to be new, and is shown and described for that reason. The machine subjects the target to relatively severe usage as it rapidly accelerates to raise and lower the target, and the prior art targets were unsatisfactory in withstanding such acceleration, particularly when repeated many times. This stress is repeated a greater number of times for the present target than for the prior targets as the present target withstands a greater number of bullet hits and is not worsened by weather conditions. Each hit lowers and raises the target. In the use of both the prior cardboard target and the target of the present invention, it is usual to let the target hit against the ground or a sand bag when it reaches its lowered position to absorb its momentum. The cardboard target would break if this were not done, but even when so cushioned, it would last but a day or two while the present target under similar conditions will last three weeks and more under use. One of the targets of the present invention may receive upwards of 600 hits before it needs to be removed for reworking. The reworking comprises hammering or pressing down the bullet hole rims 12 so that the hole interjacent each rim is partially or wholly closed. This can be done because of the ductility of the metal from which the target is made, and the metal is ductile enough so that this may be done. It is only required that the holes be closed enough so that a bullet striking in the same place as the previous bullet, shock the target enough to trip one of the target switches 41, 42 to cause lowering of the target. After reworking, the target may again receive upwards of three hundred hits before it needs to be discarded. The oftener that a target is reworked, the longer it will last without bullets passing therethru without tripping the lowering mechanism.

Having thus described the construction and use of an embodiment of my invention, I claim:

1. A target comprising a generally elongated sheet of rolled ductile aluminum formed with a lateral curve and formed with longitudinally extending ribs traversing substantially the elongation of said sheet; said metal being of a thickness and so ductile that a rifle bullet upon being

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fired therethrough will form therein a hole having flanges therearound that may be easily worked to reduce and restrict such hole so as to increase the usefulness of such target.

2. The combination of claim 1 in which said ribs intersect. 5

3. The combination of claim 1 in which said sheet is formed with marginal flanges extending longitudinally thereof.

4. The combination of claim 1 in which said sheet is 10 formed with marginal flanges extending longitudinally thereof, and in which said ribs intersect.

5. The combination of claim 4 in which the thickness of said sheet is in the order of 20 gage.

6. The combination of claim 1 in which said sheet is 15

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formed along its elongation with a body portion and a head portion that is narrower than such body portion.

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