

**PETTY PATENT APPLICATION No: XXXXXX**

**TITLE: A New Device for Retaliatory or Offensive Firing.**

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**DATE: XXXXXXXXXXXXX**

## INTRODUCTION:

Current tactical weapons training utilises many types of targetry fitted with various devices of a retaliatory nature for added realism. These retaliatory devices currently simulate  
5 the noise and / or the visual emission of weaponry supposedly fired from the engaged targetry, but do not actually shoot back.

One use of this invention enhances such training and achieves an improvement in realism by making the targetry  
10 a true retaliatory device, capable of firing back, thereby stressing personnel to an almost combat level of experience.

Another use of the invention is in combat, where the device may fire live rounds at enemy personnel within the locality of the device position.

15 Figure 1, the General Embodiment of the Invention, depicts one way of realising the invention.

In the side view depiction, container, (5), is a robust case housing the device processing electronics. The retaliation assembly, (8), depicted within the dotted box, consisting of  
20 automatic firearm, (1), ultrasonic transducer, (2), firing means (6), and baseplate, (3), is mounted on bearing shaft, (4), such that retaliation assembly, (8), is free to rotate in the horizontal plane centred about bearing shaft, (4), at the centre of baseplate, (3). Although not shown, it is preferable  
25 that retaliation assembly, (8), be also adjustable in the vertical angle, thereby allowing automatic firearm, (8), to be pointed upwards and downwards. Bearing shaft, (4), may consist of a ball-bearing race and shaft, or any other means of fixing retaliation assembly, (8), securely to container, (5),

30 yet allowing the aforementioned rotation in the horizontal  
plane to occur. Ultrasonic transducer, (2), is mounted  
beneath the barrel of automatic firearm, (1), such that the  
alignment of the centre of the beam of emission from the  
transducer, is collinear with the automatic firearm barrel  
35 discharge direction, as indicated by arrows, (7), towards what  
is termed the front of the retaliation assembly, (8).

In the top view depiction, automatic firearm, (1), is mounted  
on baseplate, (3), with the ultrasonic transducer, (2),  
mounted under the gunbarrel of the automatic firearm, (1),  
40 towards the front of the retaliation assembly, (8), as depicted.  
Although a hand-gun is depicted as the automatic firearm,  
(1), the invention is not restricted to this weapon type, for  
example an automatic machine-pistol, or rifle, et alia, could  
also be used.

45 The means of mounting automatic firearm, (1), to baseplate,  
(3), is not shown as it is not considered unique to the  
invention and may be accomplished by any means known to  
those skilled in the art of mechanics.

The means of adjusting retaliation assembly, (8), in the  
50 vertical plane is not shown, is not considered unique to the  
invention and may be accomplished by any means known to  
those skilled in the art of mechanics.

The means of firing, (6), automatic firearm, (1) is not  
considered unique to the invention and may be  
55 accomplished by any means known to those skilled in the  
art of mechanics.

With reference to Figure 2, the Point of Aim Horizontal Plane  
Scanning, wherein both figures depict the invention as

viewed from the top, the retaliation assembly, (8), being free  
60 to rotate on baseplate, (3), in the horizontal plane, enables  
automatic firearm, (1), and ultrasonic transducer, (2), to be  
aimed over, although not necessarily restricted to, an  
approximate 90 degree arc, as shown in Figure 2 (a) and 2  
(b). In figure 2 (a) the retaliation assembly, (8), is depicted  
65 pointing automatic firearm, (1), in the direction B, whilst in  
figure 2 (b) it is shown pointing automatic firearm, (1), in the  
direction A, having rotated through a horizontal angle of 90  
degrees. The means of angularly positioning automatic  
firearm, (1), is not shown and is not considered unique to  
70 the invention and may take the form of any servo-  
mechanism and shaft-encoder arrangement as may be  
decided by those skilled in the art of Control Engineering.

Retaliation assembly, (8), is rotated through approximately  
90 degrees in a cyclic or scanning fashion, thereby aiming  
75 automatic firearm, (1), collinearly with the direction of  
pointing of ultrasonic transducer, (2), in a repeated cyclic  
fashion. Ultrasonic transducer, (2), under control of the  
processing electronics, transmits successively timed bursts  
of ultrasonic energy, such that an object, for example, an  
80 approaching person, interrupting these ultrasonic bursts,  
will produce ultrasonic echoes and thereby be detected in  
both distance and angular position with respect to the  
forward facing position of the device.

This method of object detection, in both distance and  
85 angular position, is not considered unique to the invention  
and is an established method of object positional location

known to those skilled in several arts such as photography, radar and ranging systems.

When an object such as an approaching, or engaging person  
90 is detected within the field of view area defined by the  
parameters of ultrasonic transducer, (2), the processing  
electronics, within the device, notes the angle that  
automatic firearm, (1), points in and continues to monitor  
the position and presence of this person on successive  
95 sweeps or scans. The internal algorithm, within the  
processing electronics, decides whether the approaching  
person has newly entered the field of view or is continually  
approaching over a period of time, by comparing, on  
successive scans, the background returned echoes from  
100 fixed objects with the returned echoes from the approaching  
person. When a preset distance threshold of the approaching  
person is sensed, the processing electronics stops the cyclic  
scanning of the retaliation assembly, (8), at the known  
position of the approaching person, thereby aiming  
105 automatic firearm, (1), at the approaching person and  
generates the required output to discharge the automatic  
firearm, (1), via firing means, (6), thereby firing in the general  
direction of the detected approaching person, thereby hitting  
the approaching person causing severe pain or causing other  
110 stress to the person due to the sound of a near-miss.

Under training conditions, it is preferable, for safety reasons,  
that automatic firearm, (1), is loaded with any type of small  
calibre training ammunition such as FX cartridges made by  
SNC Industrial Technologies Inc, Canada, et alia. This  
115 training ammunition will provide sufficient pain-penalty,

without endangering life or limb, to enforce realistic tactics from a trainee.

Under training conditions, it is preferable that automatic firearm, (1), is fitted with a conversion barrel kit to enable the  
120 use of such ammunition and eliminate accidental discharge of live ammunition, this conversion barrel kit being an established product known to those skilled in the art of simulated ammunition design.

Under combat conditions it is preferable that automatic  
125 firearm, (1), is fitted with live ammunition for obvious reasons.

The invention may be extended to allow firing back at several engaging persons at any one time, by designing the controlling algorithm to sequentially engage each  
130 approaching person at varying distances at any one time, using either single-shot or automatic fire and increasing the rate of scanning of the retaliation assembly, (8), to generate an arc of offensive fire.

The device may be used in standalone mode or for training  
135 requirements, where it will be connected to a target mechanism, et alia. In this mode it is preferable that the device is slaved to the target mechanism such that the device is enabled to shoot back only if the target is exposed and subsequently not hit by the engaging person, or trainee,  
140 within a reasonable time. This method thereby enhancing the trainee performance by simulating real-life conditions of encounter with a prospective target, firing at it and having it shoot back if it is missed, with the real threat of receiving painful retaliatory fire.

145 One means of realising the invention is depicted within  
Figure 3, the Means of Realising the Invention, wherein  
baseplate, (4), shown as an ellipse for clarity, has ultrasonic  
transducer, (2), mounted at the front with automatic firearm,  
(1), behind it. Firing means, (6), also mounted on baseplate,  
150 (4), consists of, but is not restricted to, a solenoid-wire  
device which, upon being energised, pulls the trigger of  
automatic firearm, (1). Ultrasonic generator, (3), is a  
commercial device which produces ultrasonic energy drive  
to cause ultrasonic transducer, (2), to emit bursts of timed  
155 pulses, (10). D-c motor, (8), drives the centre of baseplate, (4),  
via shaft, (7), to produce the cyclic scanning of the  
retallation assembly. Angular position is derived from  
encoder, (5), attached to shaft, (7), to allow the point of aim of  
automatic firearm, (1), to be ascertained. Power amplifier, (9),  
160 translates the control signals from processing electronics,  
(11), to drive motor, (8). Processing electronics, (11), is  
preferably a microprocessor programmed with the required  
algorithms to produce the resulting action of detecting the  
approaching person, or persons, estimating the distance and  
165 angular position thereof, and firing the automatic firearm,  
(1), at the preset distance threshold(s). Interface connections,  
(12), are required for training purposes when the device is  
slaved to a target mechanism, et alia, and will consist of, but  
not be limited to, target hit signals and target exposed  
170 indications.

Many modifications may be made to the invention as would  
be apparent to those skilled in the arts of mechanics,  
electronics and targetry. These and other modifications may

175 be made without departing from the true ambit of the  
invention, the nature of which is contained in this  
disclosure and Figures 1 through 3 inclusive.

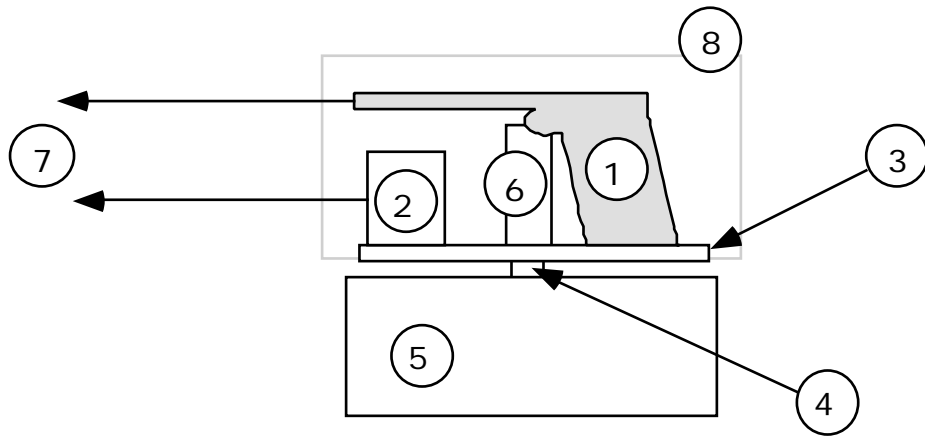
THE CLAIM DEFINING THE INVENTION IS:

A retaliatory or offensive firing device, as disclosed herein and depicted in figures 1, 2 (a) and (b), and 3, consisting of an assembly of an automatic firearm, et alia, a means of  
5 discharging such, together with an ultrasonic transducer producing timed bursts of energy, the aforementioned assembly being mounted on a freely rotatable baseplate, mounted on a container enclosing processing electronics, the emission direction of the aforementioned ultrasonic  
10 transducer being collinearly aligned with the discharge direction of the aforementioned automatic firearm, the complete aforementioned assembly being rotated in a cyclic or scanning fashion, in the horizontal plane, to produce a horizontal plane scanning ultrasonic field of energy which  
15 will detect the presence and progress of moving persons entering this field and reject the presence of static objects in this field, using returned echoes from such intrusions or static objects, thereby identifying the angular position and distance of such moving persons from the retaliatory or  
20 offensive firing device, thereby allowing the automatic firearm to be aimed and discharged at the located person or persons entering the said field, using either live, or training non-lethal, ammunition, as the retaliatory or offensive firing means.

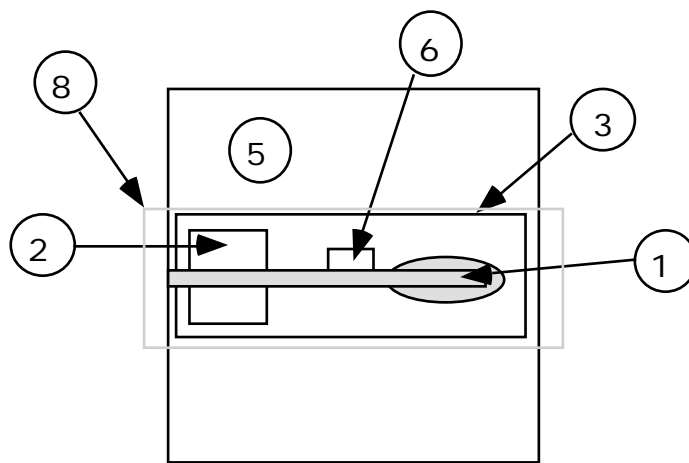
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SIDE VIEW



TOP VIEW

FIGURE 1: GENERAL EMBODIMENT OF INVENTION

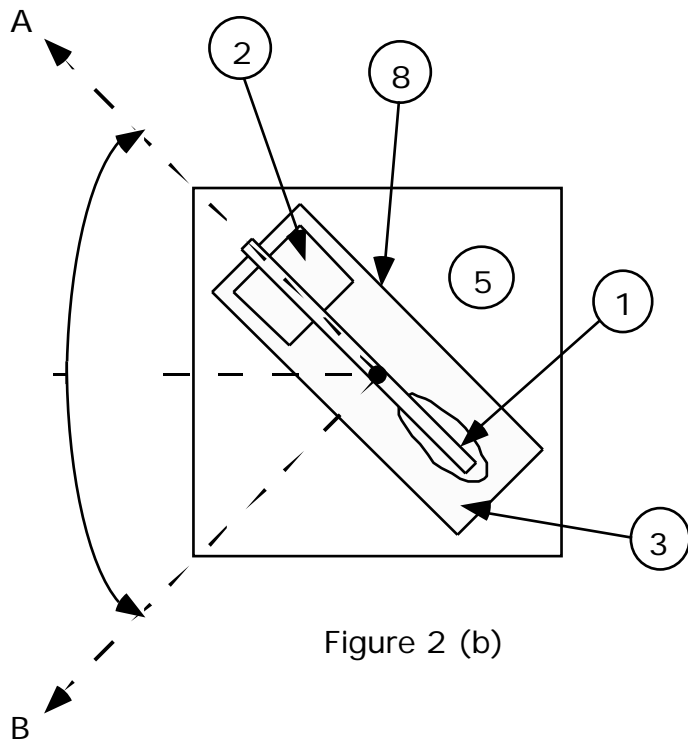
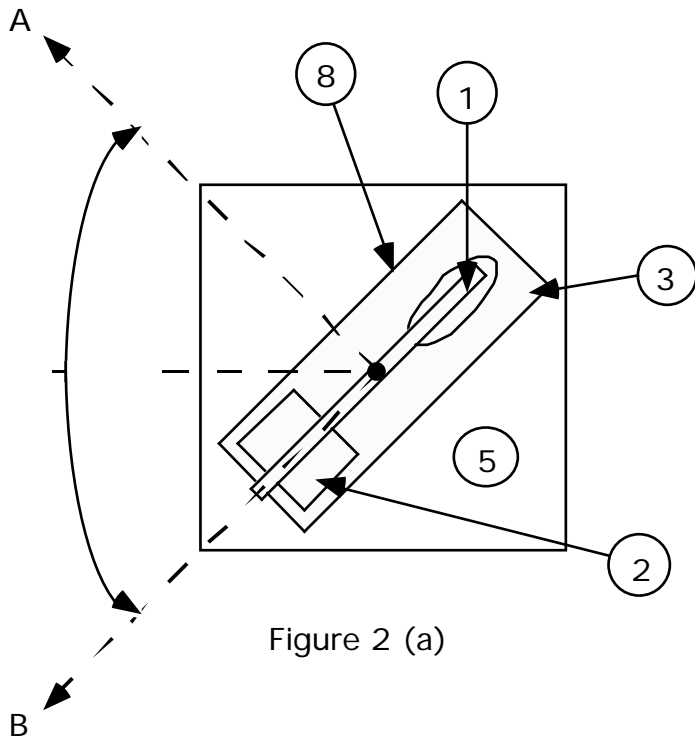


FIGURE 2 : POINT OF AIM HORIZONTAL PLANE SCANNING