Design of Corner Shot for Pistol

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Abstract: To design and manufacture a Corner Shot for a pistol in an economical manner. Our aim is to provide an upper hand in close combat situations and to prevent getting hit by the counter fire. The modus operandi of our project is to create the accessory to swivel within an angle of 180 degrees. We intend to use a rack and pinion mechanism for locking and provide allowance for multiple guns by use of eccentric pins. The control of trigger is by use of mechanical Bowden cable instead of the electronic mechanism used in an actual Corner Shot. The main material of our Corner Shot is Carbon fibre thereby giving it the strength and durability necessary along with a cost effective and light weight approach. The result of our Corner Shot is an accessory which can be readily and economically available in the market and not at the cost of an arm and a leg. Our target is to help the Indian Defense Forces gain an advantage in close combat and thereby give back to our country in our own small way.

Keywords — Accessory on gun, Corner shot, Glock, Indian Defense Forces, Mechanical movement

I. INTRODUCTION

A Corner Shot is a weapon system invented by Lt. Col. Amos Golan of the Israeli Defence Forces. It was designed in the early 2000's for SWAT teams and special forces in the hostile situations usually involving terrorist's and hostages. Its purpose is similar to that of the war time periscope rifle; it allows its operator to both see and attack armed target, without exposing the operator to counter-attack. Employability: The Corner Shot rifles and pistols with detachable high-resolution cameras and monitors will help Army Special Forces to effectively tackle terrorists in urban warfare scenarios. These CQB weapons will help observe and engage targets from behind a Corner in room intervention without exposing soldiers to direct fire from terrorists.

Mechanism: The shoulder part comprises two main section, a handgun section and a shoulder sec. The shoulder part is foldable and detachable for convenience in storage. A pivotal mirror or a camera is affixed at the intersection of the shoulder sec and hand gun section.

The handgun section can be pivoted to either left or right by up to 60° position for firing the gun around Corners.

A spring-loaded pin is mounted on the shoulder section that can be raised or lowered to allow the handgun sec to pivot and lock at a particular-angle with respect to the shoulder section. A remote trigger control allows the user to drop the hammer on targets from behind the safety and comfort of any right-angled structure.

II. SYNTHESIS OF CONCEPT

Corner Shot is a weapon accessory invented by Lt. Col. Amos Golan of the Israeli Defence Forces in cooperation with American investors. It was designed in the early 2000s for use by SWAT teams and special forces in hostile situations usually involving terrorists and hostages. Its purpose is similar to that of the periscope rifle; it allows its operator to both see and attack an armed target, without exposing the operator to counterattack.

The Indian army is on a hunt for a substantial number of firearms that shoot around Corners, according to a Defence Department request for information. The Ministry of Defence wants interested original equipment manufacturers to submit proposals by Jan. 30 and to include some details of a transfer of technology for making the weapons in India. The weapons, often called Corner Shot guns, must also have an accuracy to "engage targets effectively" of just over 200 yards and be capable of day-night Shot for use with the army's counter-terrorist operations. The move has come about because of the Nov. 26, 2008, terror attacks on hotels, train stations and other buildings in central Mumbai, killing 173 people. During the so-called 26/11 attack, the military was involved in a lot of room-to-room fighting in the large Oberoi Hotel, according to a report in the Times of India newspaper. This has increased the importance of the accessory to great extent.

After a lot of research, we decided to make a Corner Shot for a rifle because it is one of the most used weapons at the war front. A rifle weighs about 3 kilograms and the Corner Shot would weigh about 3-4kilograms, which made the entire set up very heavy. Also, the length of the rifle is difficult to deal with, because the controls of the trigger are difficult to, implement.

Another important motive of our project is to make Corner Shots available to the city police too. Therefore, we decided to design a Corner Shot for one of the most commonly used

pistol models that is Glock. The types of Glocks available are Glock 17,19,21 etc. It is comparatively feasible to design the Corner Shot model for a pistol due to its weight, length & recoil forces.

In our project, we aim to provide a simpler mechanism than the one that is available. Also, the intermediate angles provided by our Corner Shot model will be at intervals of 30^0 up to 180^0 included.

Our Corner Shot is different from the market available Corner Shots such that, the available ones only provide you the accessibility for specific 60^0 or 90^0 only, not inclusive in a single Corner Shot. We intend to create a simple mechanism, which is lighter in weight and a more cost-effective model. For our government to make it available to the police department and the defence forces.

Research papers have not been used for this project because all details are classified information. Our work for this project is solely under the guidance of Military Institute Technology.

- The previously made corner shots were for rifle and higher range guns. These guns have greater recoil force, hence, it becomes difficult to provide intermediate angles. Intermediate angles would make the device less rigid and less stable.
- Discrete angles are available for only one specific angle for a specific model.
- Trigger control mechanism used is electronically controlled and complex.
- The material used for mechanism renders the Corner Shot very heavy weight.
- The display is integral.
- Single gun can be fitted in one Corner Shot.
- The cost is also very high amounting to 3 lacs.

III. Design Calculations

Weight of pistol 17: 625g - 22oz
Bullet weight in grains: 115
Velocity in fps: 1180
Powder charge in grains: 6
Weight of firearm in lbs: 1.377
1 Grain = 0.065g
Recoil impulse in lbs sec: 0.71
Velocity of recoiling firearm (fps): 16.56
Free coil energy in (ft/lbs): 5.87
Found from recoil calculator
Impulse = Force * Time
0.71 = Force * 9.1 10^{-3} (standard time)
We know that spring for pistol 17 is 16 lbs
Recoil time for 16 lbs is 9.1 ns
Therefore, Force = 78.02 lbs
Lbs to Newton conversion is 4.45 N = 1lbs
Therefore, Force = 366.66 N

IV. Working Principle

This Corner shot is made of a simple mechanical system/ mechanism which obtaines the specific angles for proper positioning of the Gun.

The pinion track consist of seven holes placed at specific distances to obtain the 30, 60, 90 angles. With the use of locking of the pin, proper angle is obained.

Stage I:

When the pin is placed in the 4^{th} hole or the middle hole on the track which keeps the gun in the straight position.

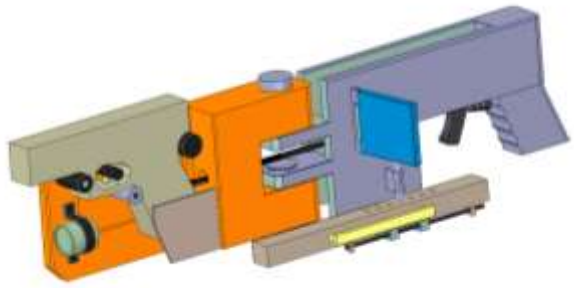

Fig 1: Stage I

Stage II:

When the pin in lached/locked into any of the first three holes, ahead of middle hole on the moving track, due to rotation of the gears, the gun will turn to the left hand side and will help the user get visuals on the left corners without exposing him/herself.

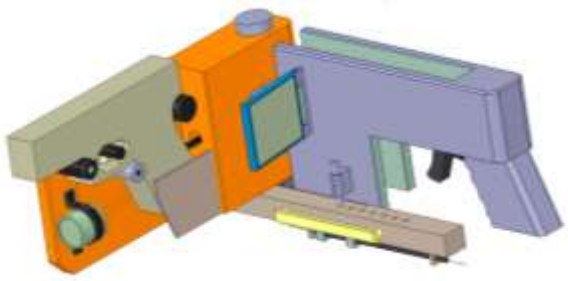

Fig 2 : Stage II

Stage III:

When the pin is lached/locked into any of the three holes after the middle hole on the moving track, due to rotation of the gears, the gun will turn to the right hand side and will help the user get visuals on the right corners without exposing him/herself.

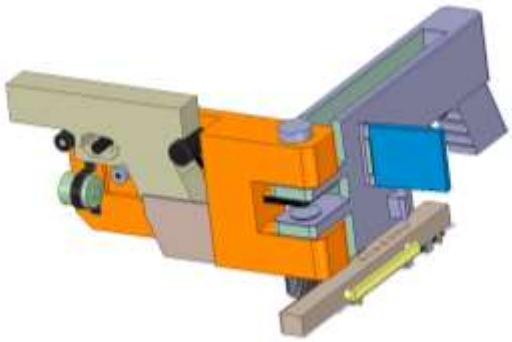

Fig 3 : Stage III

The pseudo trigger and the push-pull cable gives the simultaneous triggering mechanism. The cylindrical pin connected to the cable transfers the pull to the gun trigger and fires the gun.

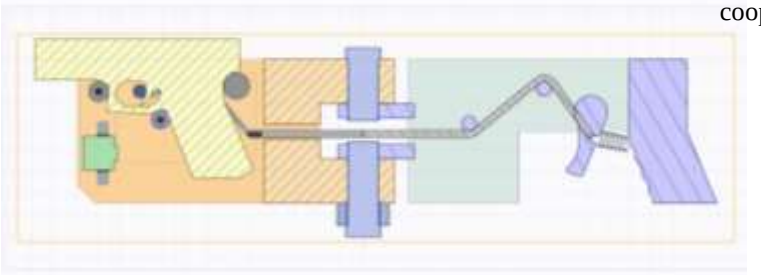

Fig 4 : Simultaneous Trigger By Cable

V. PRODUCT MATERIAL AND PROPERTIES

Carbon Fibre:

Carbon fibres alternatively CF/graphite fibre are fibres about 5–10 micro meters in diameter and composed mostly of carbon atoms. To produce a carbon fibre, the carbon atoms are bonded together in crystals that are more / less aligned parallel to the long axis of the fibre as the crystal alignment gives the fibre high strength-to-volume ratio (making it strong for its size).

Reason to choose this material:

Carbon fibres have several advantages including high stiffness, high tensile strength, low weight, high chemical resistance, high temperature tolerance and low thermal expansion. These properties have made carbon fibre very popular in aerospace, civil engineering, Military, and motorsports, along with other competition sports.

CONCLUSION

With the above design and CAD model we have completed the preliminary part of our project. Further we must find out about the accessories that will go on our Corner Shot. The mounting of these accessories may change the dimensions of the Corner Shot.

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