Improved shot patterns are obtained from a shot shell by filling the interstices between the shot with a suitable liquid.

7 Claims, 2 Drawing Figures
SHOT GUN SHELLS

INTRODUCTION

This invention comprises an improved shot gun shell. A principal object of the invention is to provide for an improved pattern of the flying shot charge by preventing the "flat spots" which are formed on individual shot pellets when, immediately following the explosion of the gunpowder, shot pellets nearest the wad are driven forward into the pellets immediately ahead, and so on until the entire charge is accelerated to the muzzle velocity.

Other objects and advantages will appear hereinafter.

BACKGROUND OF THE INVENTION

When a shot gun shell is fired, the shooter wants a uniform circular pattern with no "holes", and with no "strays" — i.e. shot which fly at a large angle to the line of fire. By concentrating all the shot in the circle (which can vary in radius at any given range depending on the choke of the barrel), the shooter will achieve maximum effectiveness in target shooting or hunting. If the shot are not uniformly distributed in the pattern, a perfectly accurate aim can still miss the target if the shot pattern has a "hole" large enough for the shot to pass around the target. "Strays" are also adverse, since they do not contribute to the density of the pattern.

A major cause of erratic shot flight is flat spots. These cause unbalanced aerodynamic forces in flight, resulting in unwanted curvature of the shot path. One major cause of flat spots, abrasion from the gun barrel, has been eliminated in recent years by the use of a protective plastic sleeve which contains the shot during the travel down the barrel, then falls away after leaving the muzzle. One manufacturer claims that ten percent of the shot would be abraded were it not for the plastic sleeve.

A problem still exists with the other 90 percent however. This is the flat spotting caused by the progressive acceleration of layers of shot immediately after the powder is ignited. The acceleration force is transmitted layer by layer until the entire charge is moving as a unit. Each pellet therefore is subject to distortion and flat spotting from this cause. Numerous attempts have been made to reduce this effect by the use of hardened or nickel plated shot (expensive) or adjustments to wad design. Soft, compressible wads absorb some of the forces of acceleration, but suffer the defect of providing a poor gas seal behind the shot. Present design is an unsatisfactory compromise between these two demands on the wad.

SUMMARY OF INVENTION

In the present invention, flat spots on the shot are prevented by filling the shot chamber of a shot shell with a suitable liquid. Liquids being incompressible, the entire shot charge and its surrounding liquid will move down the barrel as a unit. Upon leaving the barrel, the liquid is and the protected shot fly in a true pattern.

DESCRIPTION OF THE INVENTION

In the accompanying drawings:

FIG. 1 is an enlarged schematic view of an ordinary shell immediately after firing, showing the accelerating force vectors acting on several layers of shot with resultant flat spotting.
3,756,155

4 shot, 2 ¾ Magnum); test shells were made by injecting a 7 poise water solution of carboxy methyl cellulose into the shot chamber by use of a hypodermic syringe. Results of the test firing were as follows. There are slightly less than 200 pellets in each shell.

<table>
<thead>
<tr>
<th>Number of shot within given circle:</th>
<th>Test shells with liquid</th>
<th>Regular shells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twenty yard pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside 6&quot; circle</td>
<td>96</td>
<td>75</td>
</tr>
<tr>
<td>Between 6&quot; and 10¾&quot; circles</td>
<td>58</td>
<td>67</td>
</tr>
<tr>
<td>Between 10¾&quot; and 15&quot; circles</td>
<td>23</td>
<td>33</td>
</tr>
<tr>
<td>Outside 15&quot; circle</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>187</td>
<td>191</td>
</tr>
<tr>
<td>Maximum distance between any two shot</td>
<td>20&quot;</td>
<td>32&quot;</td>
</tr>
<tr>
<td>Forty yard pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inside 30&quot; circle</td>
<td>157</td>
<td>137</td>
</tr>
<tr>
<td>Outside 30&quot; circle</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>174*</td>
<td>166*</td>
</tr>
<tr>
<td>Maximum distance between any two shot</td>
<td>43&quot;</td>
<td>52&quot;</td>
</tr>
</tbody>
</table>

*Some shot completely missed the 36 by 72 inch rectangular paper targets, with a greater number of misses in the regular shell test.

The superiority of the liquid filled shell is evident, especially in reducing the number and spread of "strays". There was no liquid mist in the indoor range after firing; as expected, the liquid was completely vaporized.

Although I have disclosed a preferred embodiment of the invention in detail as required by the patent statute, many modifications and variations within the spirit of the invention will occur to those skilled in the art, and all such modifications and variations are considered to fall within the scope of the following claims.

What is claimed is:

1. An improved shot shell having generally spherical shot therein, in which the interstices between the shot are filled with a liquid which remains in the liquid state at normal ambient temperatures.

2. The improved shot shell of claim 1 in which the liquid is selected from the group consisting of (a) water, and (b) other inorganic liquids.

3. The improved shot shell of claim 1 in which the liquid is selected from the group consisting of (a) hydrocarbons which freeze below −15°C and boil above 60°C, (b) alcohols, including glycols and other polyhydric alcohols, which freeze below −15°C and boil above 60°C, and (c) other organic liquids which freeze below −15°C and boil above 60°C.

4. The improved shot shell of claim 1 in which the liquid is a solution.

5. The improved shot shell of claim 1 in which the liquid is an emulsion.

6. The improved shot shell of claim 1 in which the liquid is thixotropic.

7. The improved shot shell of claim 1 in which the liquid is made highly viscous.

* * *
It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 41, "acceleration" should read -- acceleration --
Column 1, line 55, "flat" should read -- flat --
Column 1, line 60, the word "vaporized" was omitted after the words "liquid is"

Signed and sealed this 22nd day of January 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.          RENE D. TEGTMEYER
Attesting Officer          Acting Commissioner of Patents
CERTIFICATE OF CORRECTION

Patent No. 3,756,155 Dated September 4, 1973

Inventor(s) Donald W. Smith

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