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H. STADLER ET AL

3,326,133

PRACTICE AMMUNITION

Filed Sept. 3, 1964

FIG. 1

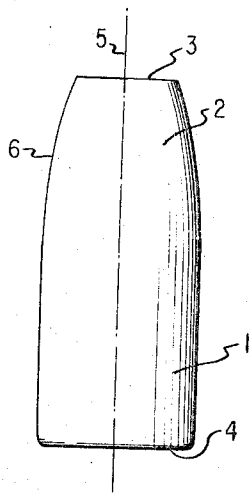


FIG. 2

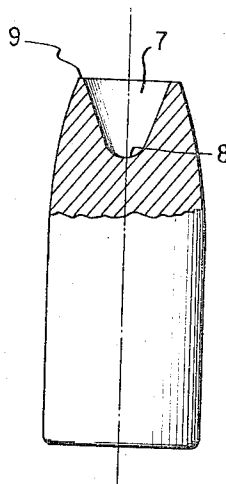


FIG. 3

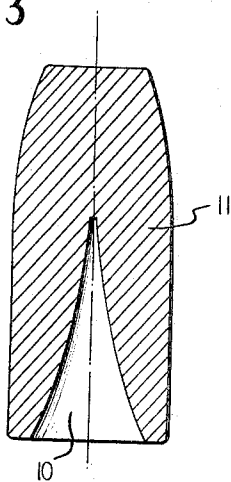
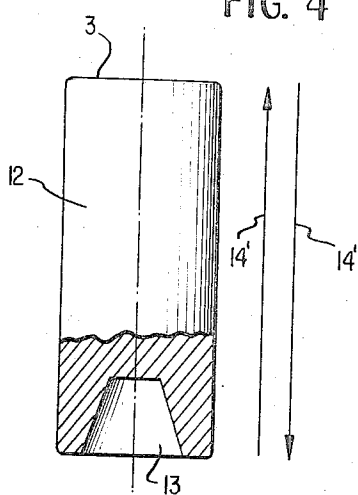


FIG. 4



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PRACTICE AMMUNITION

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2 Claims. (Cl. 102—92.7)

The present invention relates to practice ammunition, and more particularly to target practice ammunition made of thermo-plastic material.

With the use of target practice cartridges in shells or bullets, which are made in the prior art of metallic materials, there exists the danger that the shells or bullets upon impact on hard objects of stone, metal or the like, are deflected or even reflected, which represents especially with short target distances a considerable danger for the sharp-shooter and also for other by-standers disposed in proximity thereto, such as for example observers. Suitable solutions have been sought already for some time to eliminate this disadvantage.

For target practice ammunition with rim ignition a solution has already been found in that the shells were made or compressed of lead oxide or granulated lead. These shells formed of a large number of minute particles have the property that upon impact on a thin steel disk arranged behind the target they readily decompose and disintegrate into these smallest particles and accordingly are safe against any possible deflection, ricocheting and/or reflection.

In the course of the increasing use of plastic materials, one seeks more and more also in the manufacture of ammunition to utilize in lieu of the expensive metals, the considerably more inexpensive plastic materials. In that connection, a so-called plastic training ammunition is already known of which the shell consists of a thermo-plastic material and which is of correspondingly light weight. In addition to the advantages of low cost and of a light weight, this type of prior art plastic ammunition, however, also has the significant disadvantage that is suitable only for a single shot or single round usage but not, in contrast, for use in automatic weapons or arms because, owing to the small weight of the shell, no automatic function of the weapon or arm is realizable without changing the breech mechanism and certain other parts of the weapon.

The aim of the present invention is now to create a target practice ammunition made of plastic material, preferably of thermo-plastic material, which assures in its use the proper operation of automatic weapons but as to the rest exhibits the properties of the aforementioned granulated lead shells or the like that decompose and disintegrate readily and completely upon impact on the hard targets and objects in particular. According to the present invention, with a view to achieve this aim, it is proposed to add to or incorporate in the plastic material by conventional means fibers, chips, splinters, shavings, granulated materials, or powdered materials of heavy metal or heavy pigments whereby the ratio of plastic to metal or pigment amounts to between about 40:60 and 20:80. Tests have demonstrated that such a shell, which may be readily manufactured without difficulty in the

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usual way of the injection moulding or transfer molding processes, possesses in addition to a sufficiently large weight assuring proper operation of the automatic weapon or arm, also the property of easy disintegration upon impact on a target which is completely surprising insofar as the tenacity and toughness of the plastic material would lead one to expect that the shell, upon impact on such an obstacle, would only be deformed but would not decompose and disintegrate.

It is proposed in an appropriate further development of the present invention to construct the shell with a flattened tip in a plane perpendicular to the shell axis whereby, on the one hand, the compression and therewith the readiness to disintegrate upon impact is increased and, on the other—as is generally desired with target practice cartridge shell—the flight distance of the shell is reduced by an increase of the air resistance coefficient thereof. The shell itself is thereby constructed with an essentially cylindrical shank portion and tapers in the direction toward its forward end with a casing surface convexly curved toward the outside. An increase in the disintegration readiness of the shell can still further be achieved in that a central, preferably conical aperture is provided at the forward end thereof.

A good disintegration capability and a high air resistance coefficient however, is also assured by the arrangement of a central, preferably conical aperture at the rear shell end which extends substantially over the entire cylindrical area of the shell. According to one proposal of the present invention provision is made to construct the casing surface of the aperture slightly convexly curved toward the shell axis. With such a construction of the shell, the propellant gases penetrating into the aperture effect a particularly good seal between the shell and the barrel. Additionally, the center of gravity of the shell is displaced by the aperture, similarly as with an arrow, very far towards the forward end thereof which has a very favorable effect on the flight stability of the shell.

If the shell is constructed cylindrically over the entire length thereof, then there exists the possibility to selectively fire the shell with one or the other end in front. If one of the ends is thereby constructed as a plane surface perpendicular to the shell axis and the other end is provided with a central aperture, then in case of a firing of the shell with the aperture disposed in front thereof, there results again a particularly good disintegration capacity whereas in case of a firing of the shell with the plane end face disposed in front thereof, there is obtained a type of lip seal at the shell end and therewith a good adaptation of the walls of the shell rear part to the barrel.

Accordingly, it is an object of the present invention to provide a target practice ammunition which eliminates the aforementioned shortcomings and drawbacks encountered with the prior art constructions yet permits use of plastic materials.

Another object of the present invention resides in the provision of a target practice shell which may be made of plastic material thereby resulting in a considerable reduction in the manufacturing cost without increase in danger to personnel utilizing the same.

Still a further object of the present invention resides in the provision of a target practice cartridge for shells that is made of a thermo-plastic material, yet possesses a high

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capacity to decompose and disintegrate into minute particles upon impact on a hard object.

A further object of the present invention resides in the provision of a plastic target practice shell that can be used with automatic weapons without requiring any change in the automatic firing mechanisms thereof.

A still further object of the present invention resides in the provision of a plastic shell achieving the aforementioned aims and objects while at the same time enhancing the flight stability accompanied with a reduction of the flight distance.

Still another object of the present invention resides in the provision of a plastic training practice shell that can be selectively fired with either end as the leading end thereof.

These and further objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein

FIGURE 1 is an elevational view of a solid shell in accordance with the present invention provided with plane end faces perpendicular to the shell axis;

FIGURE 2 is an elevational view, partly in cross section, of a modified embodiment of a shell in accordance with the present invention, similar to FIGURE 1 but provided with a central aperture in the tip thereof;

FIGURE 3 is an axial longitudinal cross sectional view through a still further modified embodiment of a shell in accordance with the present invention, similar to FIGURE 1 but provided with a central aperture in the rear part thereof, and

FIGURE 4 is an elevational view, partly in cross section, of a cylindrical shell in accordance with the present invention provided with a central aperture at one end thereof.

Referring now to the drawing wherein like reference numerals are used throughout the various views to designate like parts, and more particularly to FIGURE 1, the shell illustrated therein is provided with a cylindrical shank portion 1 and with a tapered end portion 2. Both end faces 3 and 4 of the shell are constructed as plane surfaces extending perpendicularly to the shell axis 5. The casing surface 6 of the tapered forward end portion 2 of the shell is curved slightly convexly toward the outside.

By reason of the flattened forward end, the shell 1 does not penetrate into the object or target but instead is forcibly stopped and strongly compressed upon impact on the same, whereby the texture of the shell is broken down so that the shell, as desired, decomposes and disintegrates into small and smallest parts. In addition thereto, the flattened forward end 3 results in a relatively large air resistance coefficient so that the velocity and flight distance of the shell is considerably reduced, however, substantially without impairing the flight stability of the shell.

According to FIGURE 2 the shell, which corresponds essentially to the shell of FIGURE 1 as regards its shape, is provided at the forward end thereof with a central conical recess 7 which, as shown in this figure of the drawing, is rounded off strongly at the tip 8 thereof but could also be constructed so as to be pointed thereat. Of course, it is within the scope of the present invention to construct the annular rim surface 9 remaining at the forward end of more or less large dimension.

The shell of FIGURE 2 will also fail to bore itself into the target by reason of its relatively large annularly shaped impact surface but instead is stopped and compressed upon impact. The part of the shell concentrated within the area of the shell axis 5 is thereby displaced with respect to the remaining part of the shell in the direction of the shell axis whereby the texture of the shell again is broken up and the shell decomposes and disintegrates into small particles. This readiness to decompose is further enhanced in that the trailing parts within the

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area of the shell axis in cooperation with the conical aperture 7 effect a deformation of the shell tip into mushroom shape and therewith favor the disintegration of the shell. Also in this case the relatively large surface of the forward shell end results in a high air resistance coefficient so that also with this shell form the velocity and flight distance of the shell is considerably reduced.

According to FIGURE 3 the shell is provided at the rear end thereof with a very deep recess 10 whereas the forward end is constructed as plane flat surface 3. During the passage of the shell through the barrel of the weapon or arm (not shown), the propellant gases penetrating into the aperture 10 effect an abutment of the ring-shaped part 11 against the barrel walls whereby a good seal between shell and barrel and therewith a complete utilization of the propellant gases is achieved which permits, inter alia, to reduce somewhat the propellant charge. However, the good seal between shell and barrel also offers the advantage that a pressure of the propellant gases, which is very uniform over the entire cross sectional surface, is established to the rear of the shell and therewith the intended flight direction is imparted with good accuracy to the shell when leaving the barrel.

If the shell of FIGURE 4 constructed over its entire length as cylinder 12, is fired off with its end face 3 extending perpendicularly to the shell axis 5 leading, then by reason of the trapezoidally-shaped recess 13, as viewed in cross section, a good seal results again between shell and barrel as with the shell of FIGURE 3. As to the remainder substantially similar conditions are obtained also in this case as with the shell of FIGURE 3. With a firing of the shell in the opposite direction, that is, with the recess 13 leading, then the behavior of the shell essentially resembles that of the shell of FIGURE 2. The possibility to fire the shell of FIGURE 4 in both directions is indicated by the two arrows 14' and 14''.

While we have shown and described several embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to a person skilled in the art and we therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

The heavy metals and heavy pigments referred to in this specification which may be admixed to the plastic material in any conventional manner, may be of any known types, such as for example lead, iron, copper, the oxides of these metals and mixtures thereof. The plastic shells, preferably thermo-plastic shells, may be realized by any known conventional molding processes such as injection or transfer molding.

We claim:

1. A target practice cartridge shell made of plastic material, comprising:

a body essentially consisting of plastic material to which is added a relatively heavier material selected from the group consisting of relatively heavy metals and relatively heavy pigments,

the ratio of plastic to heavy material being between about 40:60 and 20:80 percent by weight, said shell including a substantially cylindrical shank portion,

the rear end of said shell being provided with a central, approximately conical recess extending substantially over the entire area of the cylindrical shank portion and being provided with slightly convexly curved surfaces.

2. A target practice cartridge shell made of plastic material, comprising:

a body essentially consisting of plastic material to which is added a relatively heavier material selected from the group consisting of relatively heavy metals and relatively heavy pigments,

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the ratio of plastic to heavy material being between about 40:60 and 20:80 percent by weight, said shell including a substantially cylindrical shank portion and a forward end portion tapered in the forward direction and provided with slightly convexly curved outer surfaces, the rear end of said shell being provided with a central, approximately conical recess extending substantially over the entire area of the cylindrical shank portion and being provided with slightly convexly curved surfaces.

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