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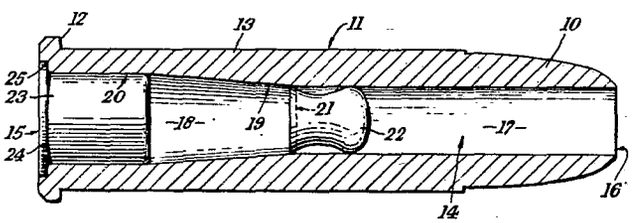
## (54) Small arms practice ammunition.

(57) A round of ammunition comprises a casing (11) having external dimensions and shape conforming to a small arms cartridge. An axial passageway (14) in the casing (11) locates an airgun pellet (22) and a primer cap (23) which upon detonation propels the pellet (22) from a nose opening (16) of the passageway. The round is assembled by inserting the pellet (22) through a base opening (15) of the passageway (14) and then inserting the primer cap (23) into the base opening (15). The diameter of the passageway so reduces in a rearward portion (18) of the passageway as to engage and restrain the pellet at a predetermined firing position along the passageway (14).

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# SMALL ARMS AMMUNITION

The present invention relates to small arms ammunition intended or primarily intended for use as practice ammunition in standard small arms such as rifles and handguns.

It has hitherto been proposed to provide a practice round of ammunition which utilises a casing conforming in shape and size to that of a standard round and a standard airgun pellet which, on firing of the round, is propelled from the casing either by the release of air from a compressed air chamber in the casing or by the firing of a low power explosive charge fitted in the casing. In particular, a primer cap of the kind used in rifle and handgun cartridges has been used as the explosive charge.

In the practice round which utilises a primer cap, the pellet is introduced into an axial passageway in the casing through a base opening and is held at a position mid-way along the passageway by the forward facing surface of the pellet skirt bearing against a shoulder in the passageway and by an insert which is introduced through the base opening following the insertion of the pellet and which bears against the rearwardly facing surface of the skirt. The insert itself may be held in place by engaging with the passageway as an interference fit and the primer cap arranged at the base opening by engagement in the end of the insert as an interference fit. The insert may alternatively be held in place by the primer cap which is inserted into the passageway through the base opening and which engages as an interference fit with the passageway. The insert

itself is formed with an axial passageway, which provides for the transmission to the pellet of the explosive force produced by the primer cap upon detonation.

While the practice rounds as proposed can be supplied in component form so that the casing of a spent round can be recharged with a new pellet and a primer cap, the recharging procedure requires the manipulation of four separate components, namely the casing, the pellet, the insert, and the primer cap. The number of components required for recharging can however be reduced by providing, as the insert, a tube into the end of which the primer cap is fitted during manufacture so that the components are then the casing, the pellet and the tube.

It has been considered necessary to utilise an insert to hold the pellet at the required position in the casing and to provide by means of the axial passageway through the casing an expansion chamber to control the detonation forces generated upon firing of the primer cap. While the practice round functions satisfactorily, it is expensive to produce and with the aim of reaching a wider market for practice ammunition the present invention seeks to provide a practice round which has fewer component parts than the practice round hereinbefore described and which is capable of being produced and sold at a lower cost.

According to the present invention there is provided a round of ammunition comprising a casing having external dimensions and shape conforming to a small arms cartridge and being formed with an axial passageway which extends between a base opening and a nose opening and which includes a forward portion of constant

diameter extending to the nose opening from a position intermediate the nose opening and the base opening and a rearward portion extending from the forward portion to the base opening and having a diameter which in the region of the base opening is greater than the diameter of the forward portion, a projectile having a diameter which is such as to allow propulsion of the projectile along the forward portion of the passageway and out of the nose opening under the action of a propulsive force produced in the rearward portion of the passageway, and a primer cap engageable in the rearward portion of the passageway at the base opening in such a manner as to be held thereby for detonation, characterised by the fact that the diameter of the rearward portion reduces at least in the region of the junction between the forward and rearward portions and is such in relation to the diameter of the projectile that when the projectile is, during assembly, advanced through the base opening and along the rearward portion of the passageway the projectile so interacts with the rearward portion of the passageway in the region of the junction between the forward and rearward portions of the passageway as to restrain the projectile from returning to the base opening.

Preferably, the projectile is in the form of a pellet having a body portion and a trailing skirt portion, the trailing skirt portion having an external diameter equal to or greater than that of the body portion and the diameter of the skirt portion being such that when the pellet, during assembly of the round, is advanced through the base opening along the rearward portion of the passageway with the skirt portion trailing the body portion, the skirt portion engages with the

rearward portion of the passageway in the region of the junction between the forward and rearward portions and is restrained by the rearward portion from returning to the base opening.

In a preferred embodiment of the invention, the rearward portion of the passageway includes, at least in the region of the junction between the forward and rearward portions, a forward section having a diameter which progressively reduces along its length, whereby the skirt portion of the pellet when advanced therethrough during assembly of the round progressively engages as an interference fit therein. Preferably, the diameter of the forward section of the rearward portion of the passageway reduces at a uniform rate throughout its length.

The rearward portion of the passageway preferably includes a rearward section at the base opening for reception of the primer cap as an interference fit therein. The diameter of the rearward section is preferably constant at least in the region of the junction between the forward and rearward sections.

At the junction between the forward and rearward sections of the rearward portion of the passageway the diameter of the forward section may be smaller than that of the rearward section, thereby to provide an annular shoulder against which the primer cap bears when advanced into the base opening.

Alternatively,at the junction between the forward and rearward sections of the rearward portion of the passageway the diameter of the forward section may be the same as that of the rearward section at the said junction. The primer cap may then be of the

kind having a flanged end and the diameter of the rearward section of the rearward portion of the passageway made larger in the region of the base opening than that in the region of the junction between the forward and rearward sections, thereby to provide an annular shoulder for reception of the flanged end of the primer cap.

Two embodiments of the invention will now be described by way of example with reference to the accompanying drawing in which:

Fig. 1 is a schematic cross-sectional side elevation of a round of practice ammunition according to a first embodiment of the invention;

Fig. 2 is an end elevation of the round shown in Fig. 1, viewed from the left in Fig. 1;

Fig. 3 is an end elevation of the round shown in Fig. 1, viewed from the right in Fig. 1; and

Fig. 4 is a schematic cross-sectional side elevation of a round of practice ammunition according to a second embodiment of the invention.

Referring first to Figs. 1 to 3 of the drawings, the round of ammunition shown comprises a casing 11 made from a synthetic plastics material and externally shaped and dimensioned to conform to the shape of a .38 SP handgun cartridge. The casing 11 includes a flange 12 corresponding to the flange of the handgun cartridge, a portion 13 having external dimensions corresponding to those of the casing of the handgun cartridge and a nose portion 10 shaped to

represent in part the projectile of the handgun cartridge.

The casing 11 is formed with an axial passageway 14 extending from a base opening 15 to a nose opening 16. The passageway 14 comprises a forward portion 17 of constant diameter and extending from the nose opening 16 along the casing to a position intermediate the nose and and base openings 15 and 16. The passageway 14 further includes a rearward portion 18 extending from the base opening 15 to the forward portion 17. As will be seen, the rearward portion 18 of the passageway 14 comprises a forward section 19 and a rearward section 20. The rearward section 20 extends inwardly from the base opening 15 and the forward section 19 extends from the rearward section 20 to the junction 21 between the forward and rearward portions 17 and 18 of the passageway. The diameter of the rearward section 20 is constant except in the region of the base opening where it increases to form an annular shoulder 25. The forward section 19 has a diameter which reduces at a constant rate from the end of the section 19 adjacent the section 20 to the other end adjacent the portion 17, where it is equal to the diameter of the forward portion 17.

The round of ammunition further comprises a standard .177 airgun pellet 22 held at the position shown and a primer cap 23 of the kind used in shot-shell cartridges. The casing 11, the pellet 22 and the primer cap 23 constitute all the components of the round and may be supplied separately for assembly by a customer or ready-assembled into rounds.

Assembly of the components 11, 22 and 23 of the round is carried out by inserting a pellet 22 into an empty casing 11 through the base opening 15 using a tool which advances the pellet 22 along the rearward portion 18 of the passageway to the position shown in the drawing, where the skirt portion of the pellet 22 engages as an interference fit with the frusto-conical wall of the section 19, the tool being so constructed as to prevent advancement of the pellet 22 beyond the position shown. The primer cap 23 is then inserted through the base opening 15 into the section 20 of the passageway where it engages with the cylindrical wall of the section 20 as an interference fit, with the flanged end 24 of the cap 23 abutting the shoulder 25 in the passageway.

The primer cap 23 is a standard CCI-109 battery cup primer used in BRI-12-gauge/.500 shot-shell cartridges as described and illustrated on pages 65-78 of "The U.S. Police Shotgun Manual", by Roger H. Robinson, published by Charles C. Thomas, Springfield, Illinois, U.S.A. and as marketed by Smith & Wesson - Fiocchi Inc.

The practice round as hereinbefore described with reference to Figs. 1 to 3 of the drawing is intended for use in a handgun chambered for a .38 SP cartridge. No modification to the magazine is required. While a barrel liner reducing the barrel bore to .177 calibre may be fitted in the handgun the practice round is intended to be used in a gun not fitted with a barrel liner.

The diameter of the forward portion 17 of the passageway 14 is made slightly larger than the bore

of the barrel liner so that the pellet 22 expelled from the round remains of such a size as to properly engage the rifling of the liner. In particular, the diameter of the portion 17 of the passageway 14 is 4.57 mm which is slightly smaller than the diameter of the pellet as manufactured so that the pellet engages as an interference fit in the portion 18 of the passageway at the position shown in the drawing.

The volume provided in the section 19 of the portion 18 of the passageway is chosen to provide optimum propulsive force from detonation of the primer cap 23.

Referring now to Fig. 4, the round of ammunition shown comprises a casing 11 of the same external shape and dimensions as that of the casing 11 of the round shown in Figs. 1 to 3. The casing 11 is formed with an axial passageway 14 which extends from a base opening 15 to a nose opening 16 and which includes forward and rearward portions 17 and 18. The forward portion 17 is of constant diameter throughout its length and extends from the nose opening 16 to its junction 21 with the portion 18, which is formed by forward and rearward sections 19 and 20. The rearward section 20 extends inwardly from the base opening 15 and the forward section 19 extends from the rearward section 20 to the junction 21 between the forward and rearward portions 17 and 18 of the passageway 14.

The forward section 19 in the round illustrated in Fig. 4, likewise, has a diameter which reduces at a constant rate from the end of the section 19 adjacent the section 20 to the other end adjacent the

portion 17, where its diameter is equal to the diameter of the forward portion 17. At the junction between the forward and rearward sections 19 and 20, the diameter of the forward section 19 is smaller than that of the rearward section 20 so as to provide an annular shoulder 26 against which the primer cap 23 is brought to bear when advanced into the base opening 15, with the primer cap engaging the cylindrical wall of the section 20 as an interference fit. The primer cap 23 is preferably a standard large Boxer primer cap having a diameter of 0.210 inches (5.33 mm) and engages as an interference fit in the constant diameter section 20 of the portion 18. With the diameters hereinbefore specified it is believed that the length of the forward section 19 should be of the order of 9 to 10 mm to provide the optimum volume for expansion.

The practice rounds hereinbefore described with reference to the drawing may be supplied assembled and if desired disposed of completely as a spent round after firing. Alternatively, the rounds may be supplied in component parts for assembly by the customer who may recharge the casing of the spent round with a new pellet and primer cap which would then be supplied in greater quantities than the casings for this purpose. By dispensing with the need for an insert to hold the pellet within the casing, a substantial reduction in cost of manufacture of the round can be achieved and it may well be found that the cost per round can be made such that the recharging facility is not utilised.

Although it is believed that the pellets will eject from the portion 17 of the casing 11 and out of the barrel of the unmodified .38 SP handgun with

sufficient directional stability for most target training purposes, a barrel liner may, if desired, be fitted into the barrel of the gun with a view to increasing accuracy.

The casing 11 of the round hereinbefore described with reference to the drawing may be made from a synthetic plastics material as described or from a metal or alloy.

The forward portion 17 of the axial passageway 14 of the casing 11 in each of the embodiments of the invention hereinbefore described with reference to the drawings may if desired be rifled to improve the directional stability of the pellet 22 in flight.

CLAIMS:

1. A round of ammunition comprising a casing (11) having external dimensions and shape conforming to a small arms cartridge and being formed with an axial passageway (14) which extends between a base opening (15) and a nose opening (16) and which includes a forward portion (17) of constant diameter extending to the nose opening (16) from a position intermediate the nose opening (16) and the base opening (15) and a rearward portion (18) extending from the forward portion (17) to the base opening (15) and having a diameter which in the region of the base opening (15) is greater than the diameter of the forward portion (17), a projectile (22) having a diameter which is such as to allow propulsion of the projectile (22) along the forward portion (17) of the passageway (14) and out of the nose opening (16) under the action of a propulsive force produced in the rearward portion (18) of the passageway (14), and a primer cap (23) engageable in the rearward portion (18) of the passageway (14) at the base opening (15) in such a manner as to be held thereby for detonation, characterised in that the diameter of the rearward portion (18) reduces at least in the region of the junction between the forward and rearward portions (17,18) and is such in relation to the diameter of the projectile (22) that when the projectile (22) is , during assembly, advanced through the base opening (15) and along the rearward portion (18) of the passageway (14) the projectile (22) so interacts with the rearward portion (18) of the passageway (14) in the region of the junction between the forward and rearward portions (17,18) of the passageway (14) as to restrain the projectile (22) from returning to the base opening (15).

2. A round according to claim 1, characterised in that the projectile (22) is in the form of a pellet having a body portion and a trailing skirt portion, that the trailing skirt portion has an external diameter equal to or greater than that of the body portion and that the diameter of the skirt portion is such that when the pellet (22), during assembly of the round, is advanced through the base opening (15) along the rearward portion (18) of the passageway (14) with the skirt portion trailing the body portion, the skirt portion engages with the rearward portion (18) of the passageway (14) in the region of the junction between the forward and rearward portions (17,18) and is restrained by the rearward portion (18) from returning to the base opening (15).

3. A round according to claim 2, characterised in that the rearward portion (18) of the passageway (14) includes at least in the region of the junction between the forward and rearward portions (17,18) a forward section (19) having a diameter which progressively reduces along its length, whereby the skirt portion of the pellet (22) when advanced therethrough during assembly progressively engages as an interference fit therein.

4. A round according to claim 3, characterised in that the forward section (19) of the rearward portion (18) of the passageway (14) has a diameter which reduces at a uniform rate throughout its length.

5. A round according to any of claims 1 to 4, characterised in that the rearward portion (18) of the passageway (14) includes a rearward section

(20) in the region of the base opening (15) for reception of the primer cap (23) as an interference fit therein.

6. A round according to claim 5, characterised in that the diameter of the rearward section (20) of the rearward portion (18) of the passageway (14) is constant at least in the region of the junction between the forward and rearward sections (19,20).

7. A round according to claim 5 or 6, characterised in that at the junction between the forward and rearward sections (19,20) of the rearward portion (18) of the passageway (14) the diameter of the forward section (19) is smaller than that of the rearward section (20) thereby to provide an annular shoulder (26) against which the primer cap (23) bears when advanced into the base opening (15).

8. A round according to claim 5, characterised in that at the junction between the forward and rearward sections (19,20) of the rearward portion (18) of the passageway (14) the diameter of the forward section (19) is the same as that of the rearward section (20) at the said junction.

9. A round according to claim 8, characterised in that the primer cap (23) is formed with a flanged end (24) and that the diameter of the rearward section (20) of the rearward portion (18) of the passageway (14) is larger in the region of the base opening (15) than that in the region of the junction of the forward and rearward sections (19,20), thereby to provide an annular shoulder (25) for reception of the flanged end (24) of the primer cap (23).

10. A round according to any of claims 1 to 9, characterised in that the forward portion (17) of the passageway (14) is rifled.

11. A round according to any of claims 1 to 10, characterised in that the casing (11) is externally shaped and dimensioned to conform to the external shape and dimensions of a handgun cartridge or at least a part thereof which receives support in the handgun.

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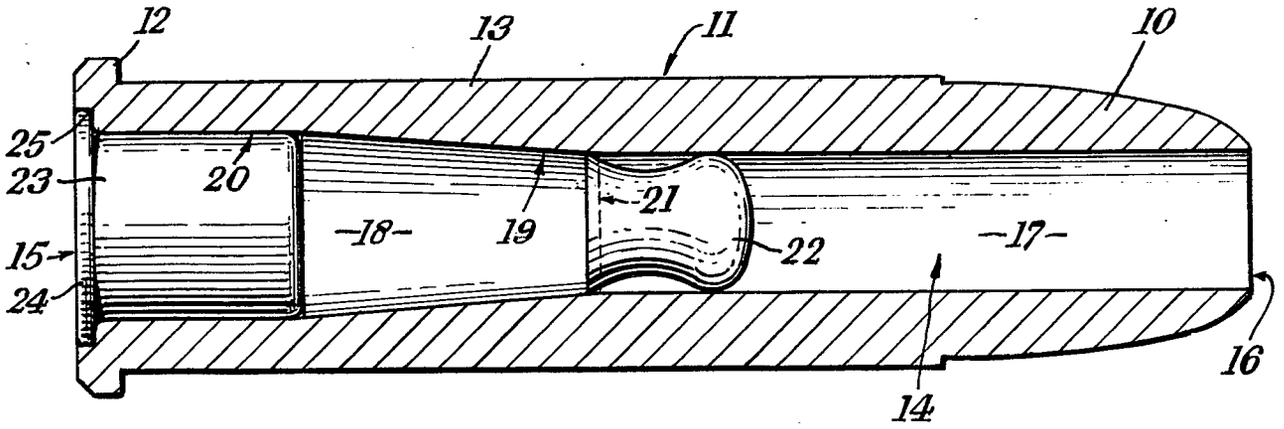


Fig. 1.

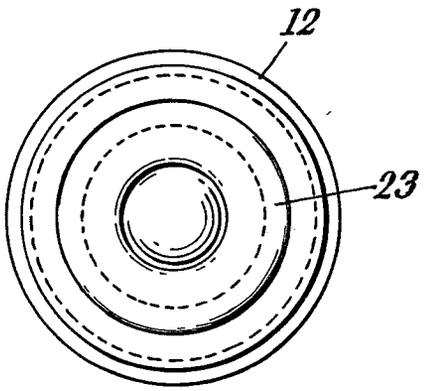


Fig. 2.

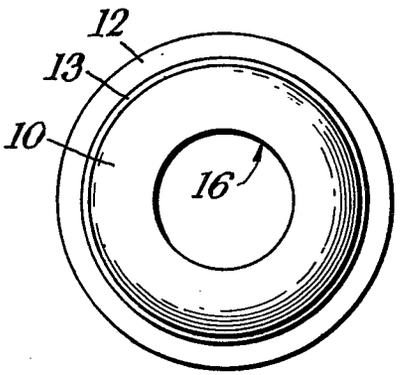


Fig. 3.

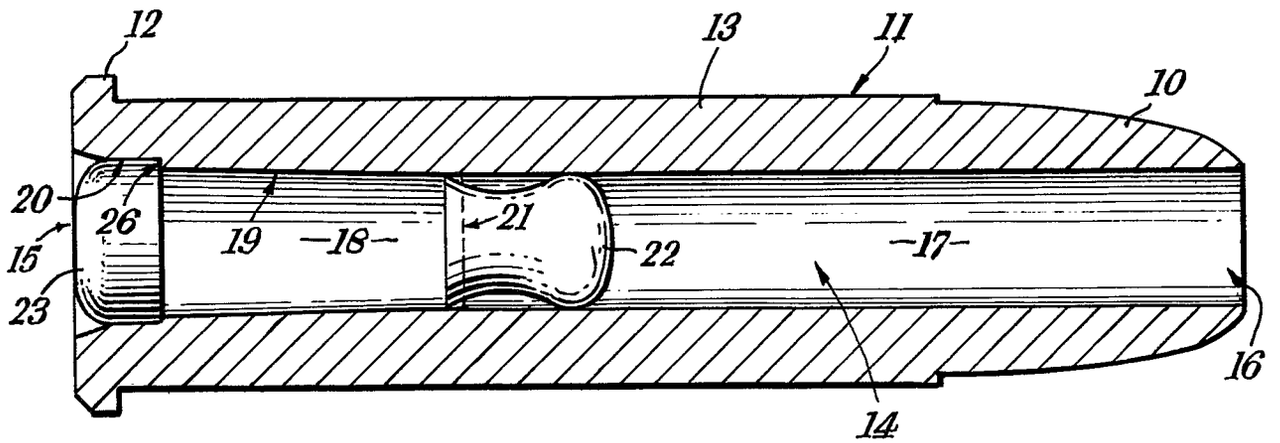


Fig. 4.

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# EUROPEAN SEARCH REPORT

0049125
Application number
EP 81 30 4432

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim |
|---|---|---|
| A | DE - A - 2 947 416 (SAXBY) | |
| A | DE - B - 1 229 419 (JOCH) | |

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

F 42 B 5/22

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

F 42 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 15.12.1981 | FISCHER |

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