



- (51) International Patent Classification: Not classified
- (21) International Application Number: PCT/GB2014/000331
- (22) International Filing Date: 28 August 2014 (28.08.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 1315447.1 30 August 2013 (30.08.2013) GB
- (71) Applicant: THE SECRETARY OF STATE FOR DEFENCE [GB/GB]; DSTL, Porton Down, Salisbury, Wiltshire SP4 0JQ (GB).
- (72) Inventors: LAIRD, Mark Philip Balfour; DSTL IP Group, G01-B Building 005, Porton Down, Salisbury, Wiltshire SP4 0JQ (GB). SAINSBURY, Brian; DSTL IP Group, G01-B Building 005, Porton Down, Salisbury, Wiltshire SP4 0JQ (GB). WEST, Peter John Arthur; DSTL IP Group, G01-B Building 005, Porton Down, Salisbury, Wiltshire SP4 0JQ (GB).
- (74) Agent: FARNSWORTH ALASTAIR GRAHAM; DIPR Formalities Section, Poplar 2#2214, MOD Abbey Wood (South), Bristol BS34 8JH (GB).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

- (54) Title: AMMUNITION COMPRISING PROJECTILE AND CASE

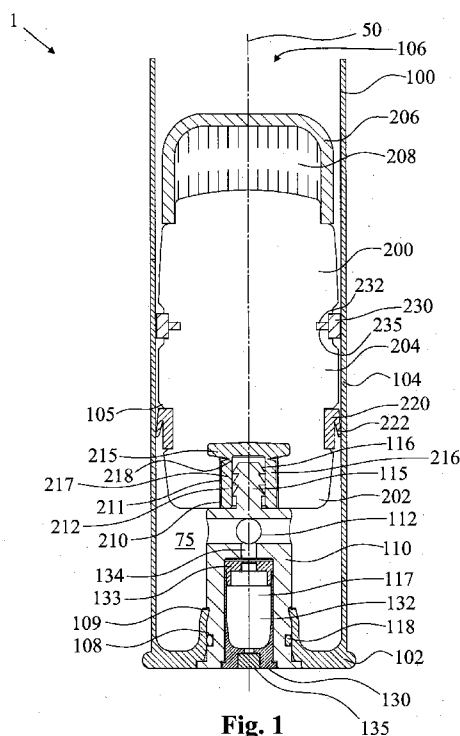


Fig. 1

(57) Abstract: There is provided ammunition (1) comprising a projectile (200) and a case (100) that contains the projectile. The case (100) comprises a support member (110) at a base of the case. The projectile (200) may be retained in the case by an insert member (115) of the case that is received in a socket (210) of the projectile, the insert member (115) being supported by the support member (110) and the socket (210) being at a base of the projectile (200). Or, the projectile may be retained in the case by an insert member of the projectile that is received in a socket of the case, the socket being supported by the support member and the insert member being at a base of the projectile. Further aspects of the invention provide an obturator ring and a driving ring for the ammunition.



---

**Published:**

- *without international search report and to be republished  
upon receipt of that report (Rule 48.2(g))*

## AMMUNITION COMPRISING PROJECTILE AND CASE

### Technical Field of the Invention

This invention relates to ammunition comprising a projectile and a case that contains the projectile. The projectile may be intended to be a non-lethal projectile, and may therefore be formed of lightweight materials.

### Background to the Invention

Known types of ammunition often comprise a projectile and a case. The case is typically placed within a chamber of a barrelled weapon, and then a propellant within the case is initiated to drive the projectile out of the case and down the barrel of the weapon.

Various methods of mounting the projectile within the case are known to those skilled in the art. Clearly, the case must retain the projectile until the projectile is fired, and one known method is to partially or fully close an end of the case so that the projectile is retained in the case and can burst out of the end of the case upon firing.

However the force required for the projectile to burst out of the case may vary from case to case, and this can result in variations in the velocity of the projectile, which makes the flight path of the projectile more difficult to predict and leads to inaccurate targeting. This problem is exacerbated for lightweight projectiles which can be significantly slowed by any forces acting against their direction of travel.

The accurate targeting of projectiles that are intended to be non-lethal is very important, since the risks of the projectile having a lethal effect are greatly increased if the projectile misses its target area and strikes a person in the face or the eyes.

Another known method for mounting the projectile within the case is to use an interference fit between the projectile and the case, such that the propellant is responsible for overcoming the friction between the projectile and the case upon firing. Temporary fixing

points may also be used between the outer circumferential surface of the projectile and the interior of the case, the temporary fixing points breaking upon initiation of the propellant.

However, these methods can also result in variable projectile velocities that make targeting unreliable. Furthermore, the frictional or breaking forces exerted against the body of the projectile during firing can result in damage or uneven forces on the projectile, which can divert the projectile from its intended course or may even cause the projectile to fail altogether.

It is therefore an aim of the invention to provide improved ammunition which helps address one or more of the above problems.

#### Summary of the Invention

According to a first aspect of the invention, there is provided ammunition comprising a projectile and a case that contains the projectile. The case comprises a support member at a base of the case. The projectile may be retained in the case by an insert member of the case that is received in a socket of the projectile, the insert member being supported by the support member and the socket being at a base of the projectile. Or, the projectile may be retained in the case by an insert member of the projectile that is received in a socket of the case, the socket being supported by the support member and the insert member being at a base of the projectile.

Since the projectile is retained in the case by an insert member that fits into a socket, the force required to separate the projectile from the case is more consistent than when using multiple fixing points or friction around an outer circumferential surface of the projectile. Furthermore, the use of the insert member and socket can simplify the attachment of the projectile to the case during manufacturing, since the insert member may simply be pushed into the socket.

The insert member within the socket may be the only fixing or restraining point between the projectile and the case, and so the force required to separate the projectile from the case may be more easily regulated. The distance to be travelled by the projectile along the case before the projectile is no longer restrained by the combination of the insert member and

socket, may be much smaller than in prior art designs where the outer circumferential surface of the projectile is a friction fit against the interior of the case, and so less of the energy generated by a propellant may be consumed in separating the projectile from the case.

The socket may be aligned with a central axis of the projectile, the central axis being along a firing direction of the projectile. This may help prevent any off-axis forces from being imparted to the projectile, thereby straightening its trajectory and improving targeting.

Preferably, the projectile is fully contained within the case so that the case protects the projectile from impacting external objects and becoming damaged. The case may be fully open at an end of the case where the projectile exits the case, so that the end of the case does not present any resistance to the projectile or cause any damage to the nose of the projectile.

The support member of the case may extend perpendicular from the base of the case or alternatively the support member may extend from sidewalls of the case adjacent the base of the case.

Advantageously, the socket may comprise a base portion and a tubular portion that is connected to the base portion. The tubular portion may be engaged with the insert member, and may be configured to break away from the base portion to release the projectile from its attachment to the case upon firing. The force required to break the tubular portion from the base portion may be very consistent across multiple ones of the ammunition and so the velocities achieved may also be more consistent, leading to better targeting. The breaking force is typically a tensional force imparted along the length of the insert member to the tubular portion, as a result of the projectile being forced in a direction out of the case by a propellant. The tubular portion may have a circular cross section, although the tubular portion may alternatively have an angular cross section, such as a square or a hexagonal cross section.

Preferably, the insert member is part of the case and the socket is part of the projectile, since the socket may have a lighter weight than the insert member. A lightweight projectile is desirable to reduce impact damage to the target. In the case where the socket comprises the liner with the tubular portion that breaks away from the socket upon firing, the socket may have a much lighter weight than the insert member after firing.

The tubular portion may comprise a stronger portion and a relatively weaker portion, wherein the stronger portion engages with the insert member, and wherein the relatively weaker portion connects the stronger portion to the base portion and is configured to break upon firing the projectile from the case. The use of a relatively stronger portion means that the tubular portion can be made strong enough to tightly grip the insert member, and the relatively weaker portion means that the tubular portion can still easily break away from the base portion upon firing. The relatively weaker portion may for example be formed as a portion of the tubular portion that has a reduced thickness compared to the relatively stronger portion, or the relatively weaker portion may comprise a series of apertures defining a line along which the tubular portion may break.

The socket may comprise socket walls that define a hole within the base of the projectile, and the base portion and the tubular portion of the socket may be comprised in a liner of the socket that lines the socket walls. According, the socket walls may help support the tubular portion in place, and the tubular portion may be made from a softer material than the socket walls.

Advantageously, the insert member may be an interference fit within the socket so that no adhesives or crimping tools are required when fixing the projectile into the case during manufacturing of the ammunition. The insert member may comprise at least one ridge configured to retain the insert member in the socket. The ridges may be angled towards the entrance of the socket and act as barbs that prevent the insert member from being withdrawn from the socket.

The socket may comprise wings that extend towards a base of the socket and are biased towards a central axis of the socket, so that they grip the insert member and prevent the insert member from being withdrawn from the socket. If the wings are used with an insert member having ridges, then the wings may engage the ridges to further prevent the insert member from being removed from the socket.

Advantageously, the ammunition may comprise a propellant and an empty interior chamber between the base of the projectile and a base of the case. The empty interior chamber may be configured to fill with gases upon initiation of the propellant, so that the

gases drive the projectile out of the case. The use of an empty interior chamber for the gases helps reduce the peak force that acts on the projectile during firing and provides for a smoother acceleration of the projectile out of the case.

The support member may comprise a cavity that houses the propellant, and apertures between the cavity and the empty interior chamber. The apertures may be configured to emit the gases from the cavity upon initiation of the propellant. Since the support member may be aligned along the central axis of the projectile, placing the propellant inside the support member means that that propellant is also aligned along the central axis of the projectile, and so the propellant exerts a balanced force on the projectile that does not tend to tip the projectile away from the central axis, thereby improving targeting.

The apertures are preferably evenly spaced around the central axis of the projectile. Then, the gases exiting the apertures can exert a force that is aligned with the central axis of the projectile upon the projectile, preventing or minimising any off-axis forces that could reduce targeting accuracy.

The case may comprise a primer at the base of the case, the primer configured for initiating the propellant that is within the cavity.

The projectile may comprise a frangible nose portion that is filled with an irritant, for example to irritate a human target. The frangible nose portion is configured to break upon impact with a human target and release the irritant. The frangible nose portion may for example be made of expanded polystyrene. Suitable irritant materials will be apparent to those skilled in the art, for example lachrymators such as CS powders.

Advantageously, the projectile may comprises a body portion formed of a plastics material. Plastics materials are typically lightweight and so should cause minimal injury to a person that is impacted by the projectile. The projectile may be devoid of any metal components.

The body portion may comprise a flexible obturator ring for sealing against an interior of the case. The obturator ring may be flexible so that it can conform to the interior of the case and create a good seal as the projectile passes through the case during firing.

The obturator ring may comprise a flexible lip that is angled towards the base of the projectile and that creates a seal against an interior surface of the case, to improve the seal and present minimal friction between the case and the projectile during firing. The creation of a good seal prevents propellant gases from leaking around the projectile during firing, and leads to more consistent projectile velocities for improved targeting.

The body portion may comprise a driving ring for engaging with a rifling of a barrelled weapon from which the projectile can be fired, the driving ring forcing the projectile to rotate as the projectile passes along the barrel to improve the projectile's stability in flight.

The projectile may be made from lightweight materials to reduce the chances of injuring a human target, however lightweight materials often have a high thermal expansion co-efficient which can result in variable levels of friction between the projectile and the case or barrel of a weapon, giving variable projectile velocities and inaccurate targeting. To help address this problem, the driving ring may have a lower thermal expansion coefficient than the body portion of the projectile, to reduce variations with temperature in the level of friction between the driving ring and the case or barrel. Since the driving ring only makes up a small portion of the projectile, making it from a denser material than the body portion to provide a lower thermal expansion coefficient may not have too much effect on the overall weight of the projectile, keeping the projectile lightweight.

The driving ring may comprise inwardly directed spurs which engage into depressions or apertures around the circumferential surface of the body portion of the projectile. The engagement of the spurs with the depressions or apertures prevents the driving ring from rotating relative to the body portion. The spurs may move further into the depressions or apertures as the body portion expands relative to the driving ring during increases in temperature.

According to a second aspect of the invention, there is provided ammunition comprising a projectile and a case that contains the projectile, and further comprising the flexible obturator ring of the first aspect.

According to a third aspect of the invention, there is provided ammunition comprising a projectile and a case that contains the projectile, and further comprising the driving ring of the first aspect.

### Brief Description of the Drawings

Embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Fig. 1 shows a schematic cross-sectional diagram of ammunition according to an embodiment of the invention;

Fig. 2 shows a schematic perspective diagram of the ammunition of Fig. 1;

Fig. 3 shows a schematic perspective diagram of an integral support member and insert member forming part of the ammunition of Fig. 1;

Fig. 4 shows a schematic perspective diagram of a projectile forming part of the ammunition of Fig. 1;

Fig. 5 shows a schematic perspective diagram of a liner forming part of the ammunition of Fig. 1;

Fig. 6 shows a schematic perspective diagram of a driving ring forming part of the ammunition of Fig. 1;

Fig. 7 shows a schematic diagram of the ammunition of Fig. 1 within a barrelled weapon in preparation for firing; and

Fig. 8 shows a schematic cross-sectional diagram of ammunition according to another embodiment of the invention.

The drawings are purely illustrative and are not to scale. Same or similar reference signs denote same or similar features.

### Detailed Description

An embodiment of the invention will now be described with reference to Fig. 1, which shows a schematic diagram of ammunition 1. The ammunition 1 has a cylindrical shape, and the schematic diagram of Fig. 1 shows a cross section taken along the centre axis 50 of the cylindrical shape. A perspective diagram of the ammunition 1 is shown in Fig. 2.

The ammunition 1 comprises a case 100 and a projectile 200. The case 100 has a body comprising a circular base 102, a tubular sidewall 104, and an open end 106. The circular base 102 has an open-ended tube 108 which extends upwardly into an interior region of the case. The body is formed from aluminium, although other metals or plastics could be used in alternate embodiments.

The case 100 also comprises a support member 110. The support member 110 fits inside the open-ended tube 108, and supports an insert member 115. The insert member 115 is substantially cylindrical and fits into a socket 210 at a base 202 of the projectile 200, to retain the projectile 200 in the case 100 so that the projectile 200 does not simply fall out of the open end 106. The socket 210 is also substantially cylindrical to match the substantially cylindrical shape of the insert member 115. The insert member 115 and socket 210 both have a central axis that is aligned with the central axis 50.

The support member 110 is substantially cylindrical, and has a central axis aligned with the central axis 50. The support member 110 is fixed to the open-ended tube 108 by inserting the support member 110 into the open-ended tube 108 and crimping the end 109 of the tube 108 to grip the support member 110. The support member 110 and insert member 115 are integrally formed as a single piece of steel, although other metals or materials could alternatively be used. A schematic perspective diagram of the integrally formed support member and insert member is shown in Fig. 3.

A ring-shaped interior chamber 75 is defined between the external surface of the support member 110, the internal surface of the tubular sidewall 104, the base 202 of the projectile and the base 102 of the case. A sealing band 118 is positioned between the inside of the open-ended tube 108 and the support member 110 to seal off the interior chamber from the external environment. The sealing band 118 fits within a groove 119 around the support member 110 (refer to Fig. 3).

The support member 110 comprises a cavity 117 that houses a charge 130. The charge 130 comprises a propellant 132 and a primer 135 for initiating the propellant. The charge 130 further comprises a closure cap 133 above the propellant 132 and opposite the primer 135. The closure cap is formed of plastic and has a thin diaphragm at its centre, which is intended

to rupture upon initiation of the propellant 132. The support member 110 also comprises four apertures 112 that are evenly spaced around the central axis 50. The apertures 112 lead from the interior chamber 75 to the central diaphragm of the closure cap 133, via an internal passageway 134 of the support member. Therefore, upon initiation of the propellant 132, the central diaphragm of the closure cap 133 will rupture and allow gases from the propellant to pass along the passageway 134, through the apertures 112, and into the interior chamber 75.

The socket 210 comprises socket walls 211 that define a hole in the base 202 of the projectile 200. The socket 210 further comprises a liner 212 that lines the socket walls 211, and the liner 212 comprises a base portion 215, and a tubular portion 216. The liner 212 is retained within the hole by forming the base portion 215 to have a larger diameter than the diameter of the hole, such that the liner 212 is retained by the base portion 215 resting against ends of the socket walls 211. During manufacturing, the liner 212 is typically inserted into the hole from an interior of the projectile 200. The tubular portion 216 loosely fits within the socket walls 211.

The tubular portion 216 has a relatively stronger portion 217 that engages the insert member 115. The tubular portion 216 also has a relatively weaker portion 218 that is connected to the base portion 215 and that enables the tubular portion 216 to break away from the base portion 215 upon firing the projectile. The relatively weaker portion 218 is weaker than the relatively stronger portion 217, since the relatively weaker portion 218 has a reduced thickness compared to the relatively stronger portion 217. A schematic perspective diagram of the liner 212 is shown in Fig. 5.

The liner 212 is formed of low-density polyethylene (LDPE) so that it has low weight and can easily break at the relatively weaker portion 218 upon firing, although other types of materials could alternatively be used. The steel insert member 115 comprises ridges 116 that are angled backwardly towards the entrance of the socket 210, and that engage the relatively softer material of the liner 212, to prevent the insert member 115 from being withdrawn from the socket 210 after it has been inserted during manufacturing.

To further help prevent the insert member 115 from being withdrawn from the socket 210, the tubular portion 216 of the socket may be fitted with wings that extend towards the

base portion 215 of the socket and that are biased towards the central axis, so that the wings engage the ridges 116 to prevent withdrawal of the insert member 115 from the socket 210.

The projectile 200 comprises a body portion 204, of which the base 202 is part, and a nose cap 206. In this particular embodiment the body portion 204 is a rigid polyurethane foam body, and the nose cap 206 is expanded polystyrene nose cap. The polystyrene nose cap 206 is filled with a CS powder 208 for irritating a human target, and is intended to shatter upon impact with a target to release the CS powder 208. A schematic perspective diagram of the projectile 200 is shown in Fig. 4.

The body portion 204 is fitted with an obturator ring 220 that fits within a groove 105 around the circumferential surface of the body portion 204. The obturator ring 220 is formed of flexible thermoplastic polyurethane and has a flexible sealing lip 222 that is angled towards the base 202 of the projectile and that creates a seal against the interior surface of the tubular sidewall 104 of the case. The flexible sealing lip 222 also creates a seal against an interior surface of a barrel of a weapon once the projectile 200 moves beyond the case 100 after firing.

The body portion 204 is also fitted with a driving ring 230 around the circumferential surface of the body portion 204. The driving ring 230 is formed of a polyamide material to provide strength and a lower thermal expansion coefficient than the body portion 204. The driving ring 230 is a snug fit around the circumference of the body portion 204, and the driving ring constrains excessive thermal expansion of the body portion 204 beneath the driving ring. Alternatively, the driving ring 230 could be a loose fit around the circumference of the body portion 204 to allow for the difference in thermal expansion between the body portion 204 and the driving ring 230 over a range of temperatures.

The driving ring 230 fits inside the tubular sidewall 104 of the case and is sized to present only minimal friction against the tubular sidewall 104 as the projectile 200 travels along the case 100 upon firing.

Once the projectile 200 exits from the open end 106 of the case, the driving ring 230 is intended to engage rifling of a barrel of a weapon to spin the projectile about its axis 50. Accordingly, the driving ring comprises inwardly directed spurs 232 which engage into

apertures 235 that are spaced around the circumference of the body portion 204. The spurs 232 fix the rotation of the driving ring 230 with respect to the body portion 204, so that spinning of the driving ring results in spinning of the overall projectile 200. A perspective diagram of the driving ring 230 is shown in Fig. 6.

The schematic diagram of Fig. 7 shows the ammunition 1 of Figs 1 – 6 within a barrelled weapon 300 in preparation for firing.

In order to fire the projectile 200 from the case 100, the primer 135 is struck by a firing pin 310 of the barrelled weapon 300 to initiate the propellant 132. Gases from the initiation of the propellant 132 burst through the central diaphragm of the closure cap 133, pass upwards along the passageway 134, and are emitted from the apertures 112 into the interior chamber 75. This raises the pressure inside the interior chamber 75 until the relatively weaker portion 218 of the liner 212 breaks, releasing the projectile from the insert member 115 and allowing the projectile 200 to accelerate towards the open end 106 of the case 100 under the pressure in the interior chamber 75. Since the tubular portion 216 of the liner 212 is a loose fit within the socket walls 211, the tubular portion 216 simply withdraws from the socket walls 211 once the relatively weaker portion 218 breaks, and remains attached to the insert member 115 of the case.

As the projectile 200 travels along the case 100, the flexible sealing lip 222 prevents any gases from leaking past the obturator ring 220, thereby helping to maintain consistent firing velocities.

Once the projectile 200 enters the rifled barrel 320 of the weapon, the sealing lip 222 seals against the rifling and continues to prevent gases from moving beyond the obturator ring 220.

The driving ring 230 engages the rifling of the barrel 320, forcing the projectile 200 to spin as it passes along the barrel 320.

Many alternate embodiments to that shown in the figures will be apparent to those skilled in the art without departing from the scope of the appended claims, for example different types of materials may be used to those explicitly described above.

Furthermore, it will be appreciated that the socket 210 could easily be formed on the support member 110 of the case, and the insert member 115 formed upon the base 202 of the projectile, in order to provide another embodiment of the invention as shown in Fig. 8.

## CLAIMS

1. Ammunition comprising a projectile and a case that contains the projectile, wherein the case comprises a support member at a base of the case, and wherein:
  - the projectile is retained in the case by an insert member of the case that is received in a socket of the projectile;
  - the insert member is supported by the support member; and
  - the socket is at a base of the projectile.
2. Ammunition comprising a projectile and a case that contains the projectile, wherein the case comprises a support member at a base of the case, and wherein:
  - the projectile is retained in the case by an insert member of the projectile that is received in a socket of the case;
  - the socket is supported by the support member; and
  - the insert member is at a base of the projectile.
3. The ammunition of claim 1 or 2, wherein the socket comprises a base portion and a tubular portion that is connected to the base portion, wherein the tubular portion is engaged with the insert member, and wherein the tubular portion is configured to break away from the base portion upon firing the projectile from the case.
4. The ammunition of claim 3, wherein the tubular portion comprises a stronger portion and a relatively weaker portion, wherein the stronger portion engages with the insert member, and wherein the relatively weaker portion connects the stronger portion to the base portion and is configured to break upon firing the projectile from the case.
5. The ammunition of claim 4, wherein the relatively weaker portion has a reduced thickness compared to the relatively strong portion.
6. The ammunition of any one of claims 3 to 5, wherein the socket comprises socket walls that define a hole, and wherein the base portion and the tubular portion are comprised in a liner of the socket that lines the socket walls.

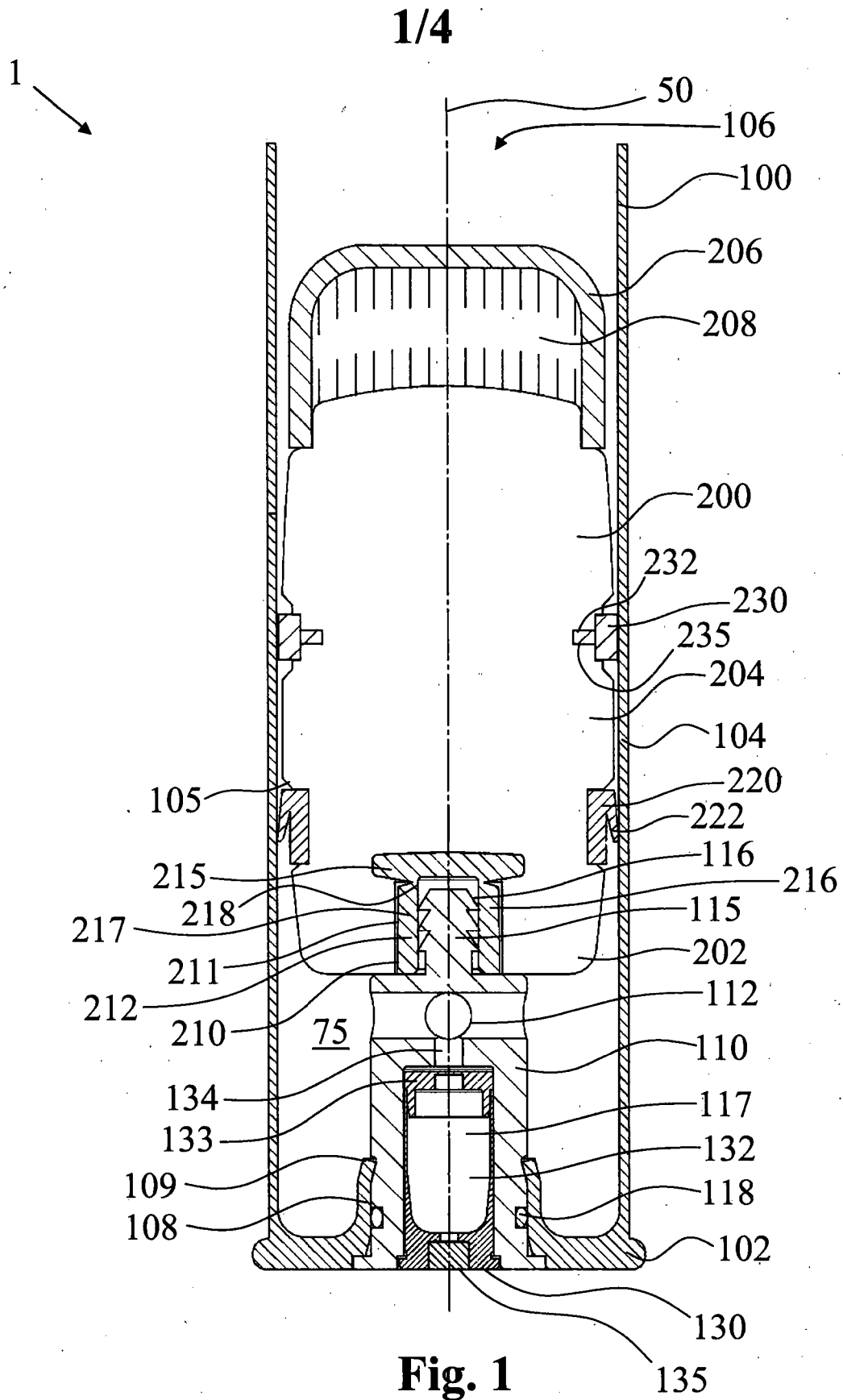
7. The ammunition of any preceding claim, wherein the insert member is an interference fit within the socket.
8. The ammunition of any preceding claim, wherein the insert member comprises at least one ridge configured to retain the insert member in the socket.
9. The ammunition of any preceding claim, wherein the socket is aligned with a central axis of the projectile, the central axis being along a firing direction of the projectile.
10. The ammunition of any preceding claim, wherein the ammunition comprises a propellant and an empty interior chamber between the base of the projectile and the base of the case, the empty interior chamber configured to fill with gases upon initiation of the propellant, the gases for driving the projectile out of the case.
11. The ammunition of claim 10, wherein the support member comprises a cavity that houses the propellant and apertures between the cavity and the empty interior chamber, the apertures configured to emit the gases from the cavity upon initiation of the propellant.
12. The ammunition of any preceding claim, wherein the projectile comprises a frangible nose portion that is filled with an irritant.
13. The ammunition of any preceding claim, wherein the projectile comprises a body portion.
14. The ammunition of claim 13, wherein the body portion is formed of a plastics material.
15. The ammunition of claim 13 or 14, wherein the body portion is fitted with a flexible obturator ring, the flexible obturator ring having a lip that is angled towards the base of the projectile and that creates a seal against an interior surface of the case.
16. The ammunition of any one of claims 13 to 15, wherein the body portion is fitted with a driving ring for engaging with a rifling of a barrelled weapon, and wherein the driving ring has a lower thermal expansion coefficient than the body portion.

17. The ammunition of claim 16, wherein the driving ring comprises inwardly directed spurs which are engaged in depressions or apertures in a surface of the body portion of the projectile to prevent the driving ring from rotating relative to the body portion.

18. Ammunition comprising a projectile and a case that contains the projectile, wherein the projectile comprises a body portion that is fitted with a flexible obturator ring, the flexible obturator ring having a flexible lip that is angled towards the base of the projectile and that creates a seal against an interior surface of the case.

19. Ammunition comprising a projectile and a case that contains the projectile, wherein the projectile comprises a body portion that is fitted with a driving ring for engaging with a rifling of a barrelled weapon, wherein the driving ring has a lower thermal expansion coefficient than the body portion, and wherein the driving ring comprises inwardly directed spurs which are engaged in depressions or apertures in a surface of the body portion of the projectile to prevent the driving ring from rotating relative to the body portion.

20. Ammunition substantially as described herein with reference to the accompanying drawings.



2/4

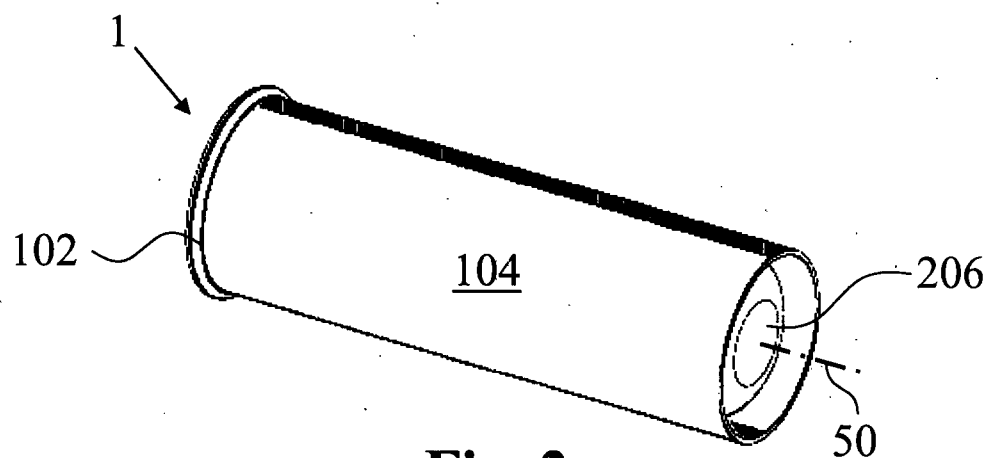


**Fig. 2**

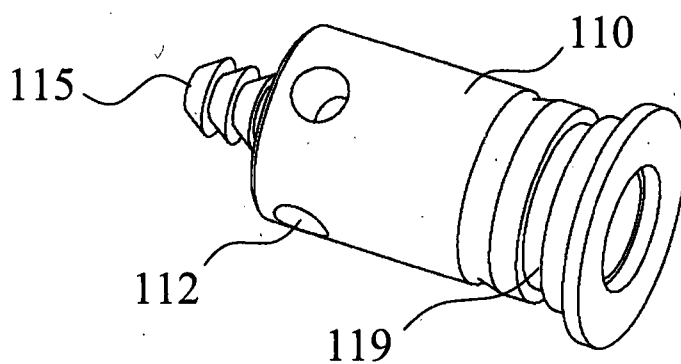


**Fig. 3**

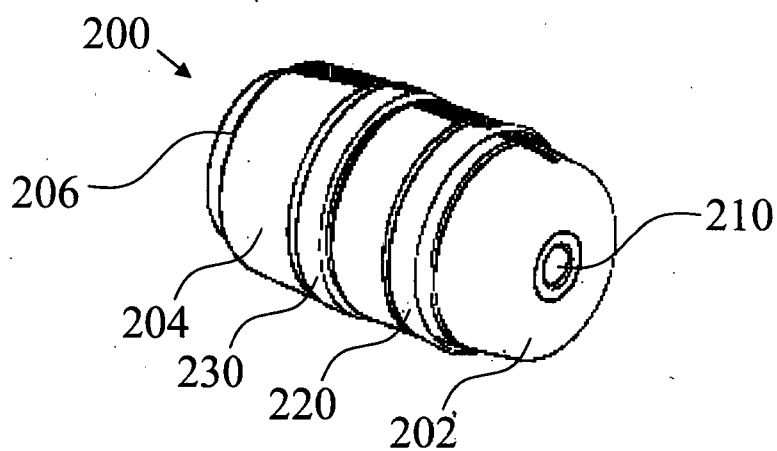


**Fig. 4**

3/4

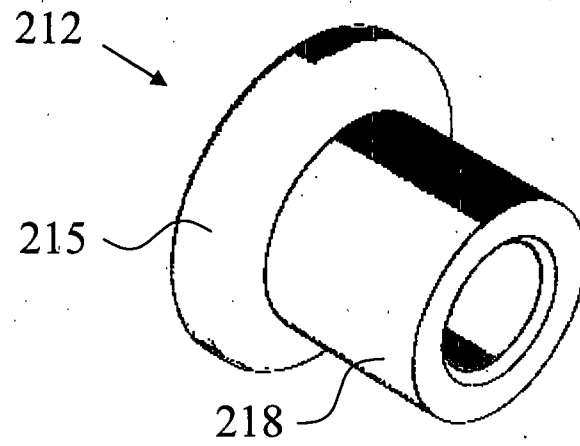


**Fig. 5**

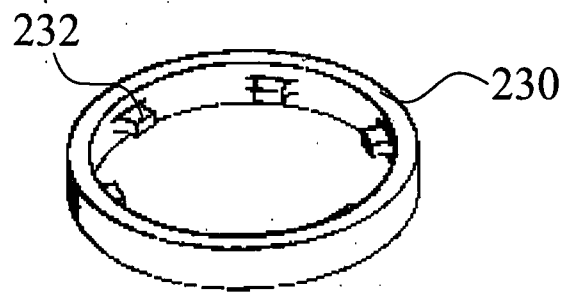


**Fig. 6**

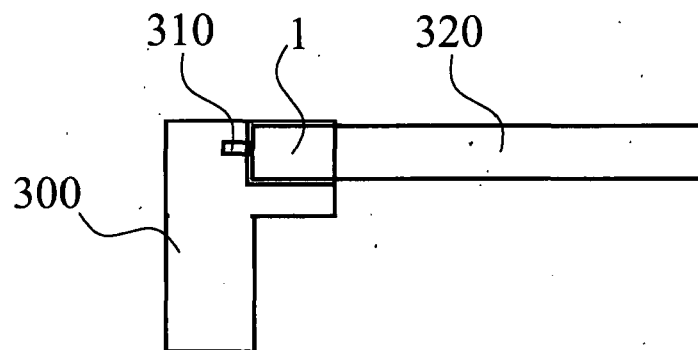


**Fig. 7**

4/4

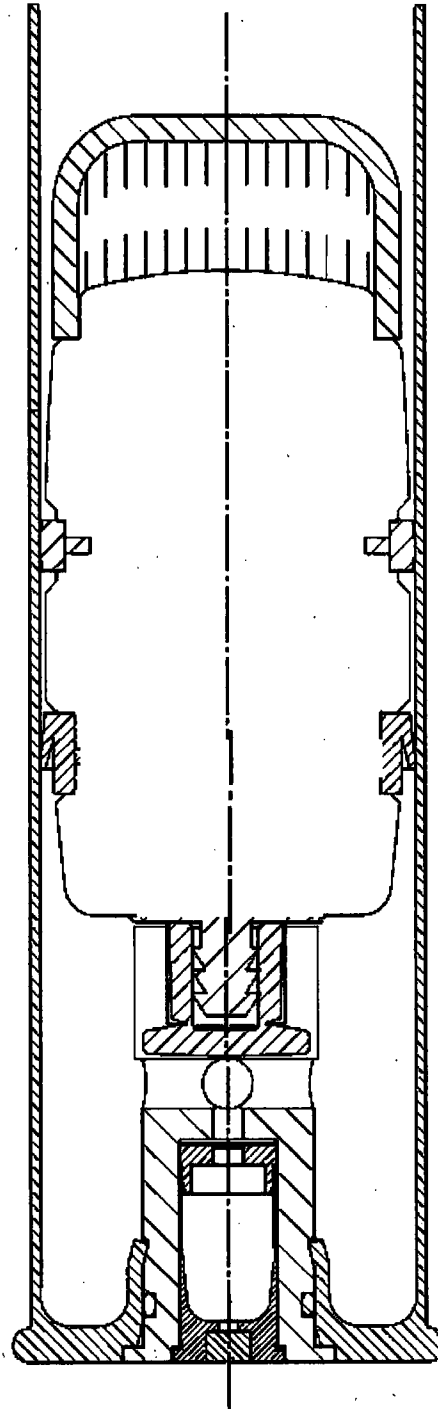


**Fig. 8**