(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 January 2017 (26.01.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/015665 A4

(51) International Patent Classification:
F42B 33/00 (2006.01) *F42B 12/78* (2006.01)
F42B 30/02 (2006.01) *F42B 5/00* (2006.01)
F42B 5/26 (2006.01)

(21) International Application Number:
PCT/US2016/043898

(22) International Filing Date:
25 July 2016 (25.07.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/196,217 23 July 2015 (23.07.2015) US
62/217,533 11 September 2015 (11.09.2015) US
62/250,786 4 November 2015 (04.11.2015) US

(71) Applicant: **VISTA OUTDOOR OPERATIONS LLC** [US/US]; 262 North University Drive, Farmington, UT 84025 (US).

(72) Inventor: **PETERSON, Bryan, P.**; 24203 Riverbank Lane NW, Isanti, MN 55040 (US).

(74) Agents: **CHRISTENSEN, Douglas, J.** et al.; Christensen Fonder P.A., 33 South Sixth Street, Suite 3950, Minneapolis, MN 55402 (US).

(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, 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,

[Continued on next page]

(54) Title: CARTRIDGE WITH IMPROVED PENETRATION AND EXPANSION BULLET

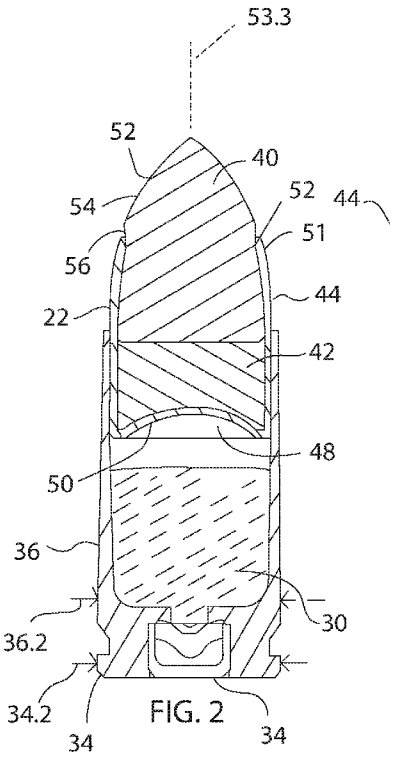

FIG. 2

(57) Abstract: A cartridge with a steel component bullet has desirable penetration capabilities and controlled separation of components upon terminal impact. In embodiments of the invention, the cartridge comprises a steel component, a lead core, and a copper jacket. The lead jacket having a leading edge portion that extends to the cylindrical mid portion. The steel component bullet may have a forward pointed ogive portion, a cylindrical mid portion, and a tapered rearward portion. The rearwardly facing surface may be concave. The leading edge portion may have a taper oriented in a direction opposite the taper of the ogive portion of the steel component. Structure to inhibit spin is positioned on a rearward face of the steel component. The bullet having a concave rear face.

WO 2017/015665 A4

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).

Published:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

Date of publication of the amended claims: 6 April 2017

AMENDED CLAIMS
received by the International Bureau on 15 February 2017 (15.02.2017)

CLAIMS

1. A pistol cartridge comprising a cartridge casing with open mouth and an interior, propellant in the interior of the cartridge casing, and a bullet secured in the mouth of the cartridge casing, the bullet comprising:

a forward component made of a first metal comprising steel, the forward component having forward ogive portion with a forward tip, the forward ogive portion having a forward ogive portion surface, a cylindrical mid portion adjoining the forward ogive portion, the cylindrical mid portion having a cylindrical mid portion surface that adjoins the forward ogive portion surface, and a tail portion with a curved tapered surface adjoining the cylindrical mid portion surface, the tail portion having a maximum diameter portion positioned at a rearward portion of the tail portion, the maximum diameter portion having a diameter greater than the diameter of the cylindrical mid portion; and

a jacket formed of a second metal comprising copper and defining a cup, the steel component seated in the cup.

2. The pistol cartridge of claim 1 wherein the bullet further comprises lead, the lead positioned rearwardly of the steel component in the cup and forming a lead core, the forward component in direct contact with the lead core.

3. The pistol cartridge of claim 1 or 2, wherein the jacket has a leading edge portion that engages the cylindrical mid portion of the forward component.

4. The pistol cartridge of claim 3 wherein the leading edge portion and the cylindrical mid portion define a forward facing annular recess that facilitated opening of the jacket upon impact with a target.

5. The pistol cartridge of claim 2 wherein a rearward facing end surface of the forward component has structural features thereon that are reflected in a forward facing surface of the lead core inhibiting rotation of the forward component with respect to the lead core

6. The pistol cartridge of claim 1, 4, or 5 wherein the bullet has a rearward facing concavity facing the propellant.

7. A pistol cartridge comprising a cartridge casing with open mouth and an interior, propellant in the interior of the cartridge casing, and a bullet secured in the mouth of the cartridge casing, the bullet comprising:

a steel component made of a steel, the steel component having a forward ogived portion with a forward tip, a cylindrical mid portion, and a tail portion; and

a jacket formed of copper and defining a cup, the steel component seated in the cup, the jacket having a forward edge portion extending to the cylindrical mid portion of the steel component;

wherein the forward edge portion of the jacket defines a V-shape groove at an acute angle directed forwardly.

8. A bullet for a handgun cartridge, the bullet comprising:

a jacket comprising copper, the jacket having a forward leading edge portion, an interior, and a rearward facing end piece;

a lead core portion in the jacket;

a forward component retained in the jacket forward of the lead core, the forward component having a forward ogive portion, a cylindrical mid portion adjoined to the forward ogive portion, and a rearward portion adjoined to the cylindrical mid portion, the entirety of the rearward portion diametrically larger than the cylindrical mid portion, the entirety of the cylindrical mid portion diametrically larger than the forward ogive portion,

the jacket forward leading edge portion engaging the cylindrical mid portion of the forward portion.

9. The bullet of claim 7 or 8 wherein the reward portion has a corner portion and then a cylindrical end portion at the rear end of the rearward portion, and then a tapered portion extending from the cylindrical end portion to the cylindrical mid portion.

10. The bullet of claim 7 or 8 wherein the bullet has a concavity at the rearward facing end-piece-of-the-jacket.

11. The bullet of claim 7 or 8 wherein the cylindrical mid portion has a plurality of divots arranged circumferentially around the cylindrical mid portion.

12. The bullet of claim 11 wherein each of the divots extends into the forward ogive portion.

13. The bullet of claim 11 wherein each of the divots has an arcuate shape in cross section.

AMENDED SHEET (ARTICLE 19)

14. The bullet of claim 11 or 12 or 13 wherein each of the divots extends radially inward of forward leading edge of the jacket.

15. The bullet of any one of claim 7 and 8 wherein the jacket extends onto the ogive portion and conforms thereto.

16. The bullet of any one of claim 7 and 8 wherein the jacket has an inner surface and an outer surface and the outer surface extends farther forward than the inner surface.

17. The bullet of any one of claim 7 and 8 wherein in a cross section the jacket has a taper with a forward most leading edge that is separated from the steel component.

18. The bullet of any one of claim 7 and 8 wherein the steel component has a rearward facing surface and said surface has a locking feature thereon to rotationally secure the steel component to the core.

19. The bullet of claim 18 wherein the feature is a projection.

20. The bullet of claim 18 wherein the feature is a recess.

21. The bullet of any of claim 7 and 8 in combination with a casing and propellant.

22. The combination of claim 21 wherein the cartridge is a 9mm cartridge.

23. The combination of claim 21 wherein the cartridge is a handgun cartridge

AMENDED SHEET (ARTICLE 19)

24. A method of manufacturing bullets for pistols comprising:

providing a jacket cup comprising copper;

placing a lead ball inside the jacket cup;

impacting the lead ball in the jacket cup with a steel forward component thereby conforming the lead ball into a shape conforming to the jacket cup and the shape of a rear face of the steel component;

retaining the steel component in the cup after the impacting;

deforming an upper portion of the jacket cup to conform to the steel forward component.

25. The method of claim 24 further comprising selecting a steel component with a non spin feature on a rearward surface of the steel component.

26. The method of claim 24 or 25 further comprising selecting a steel component with a cylindrical surface sized to retain the jacket to the steel component after the impacting.

27. The method of any one of claim 24 to 25 further comprising selecting a die to receive the jacket cup, the die having a convex protrusion for forming a concavity on a rearward facing surface of the bullet.

28. The method of any one of claim 24 to 26 further comprising deforming the jacket cup to have a concavity on a rearward facing surface.

29. A jacketed bullet comprising a forward steel component, a lead core, and a jacket encompassing the lead core and extending partially forward on the steel component, the

bullet having a concave rear face, the forward steel component having locking features on a rearward face for rotationally locking the lead core to the steel component.

30. A pistol bullet comprising a forward component comprised of steel, a lead core rearward of the forward component, and a jacket comprising copper retaining the core and forward component, the forward component and lead core having interlocking features for preventing rotation of one with respect to the other, the bullet having a concavity in a rear face of the bullet, and having a forward facing annular groove defined by the forward component and the jacket.

31. The bullet of claim 30 wherein the forward component has a cylindrical mid portion and wherein the jacket has a leading edge engaged with the cylindrical mid portion.

32. A forward component for a bullet, the forward component having a forward ogive portion with a forward tip, a cylindrical mid portion adjoining and unitary with the forward ogive portion, and a rearward portion having a rearward facing end surface, the rearward portion adjoining and unitary with the cylindrical mid portion.

33. The forward component of claim 32 wherein the component has an axial length and the forward ogive portion has an axial length that is 30 to 50 per cent of the axial length of the component.

34. The forward component of claim 32 wherein the component has an axial length and the cylindrical mid portion has an axial length that is 4 to 20 per cent of the axial length of the component.

AMENDED SHEET (ARTICLE 19)

35. The forward component of claim 32 wherein the component has an axial length and the rearward portion has an axial length that is 35 to 55 per cent of the axial length of the component.

36. The forward component of any one of claims 32 to 35 wherein the ratio of the length of the forward component to the diameter of the forward component is in the range of 1.32 to 1.40.

37. The forward component of any one of claims 32 to 35 in combination with a casing and propellant.