

## **ADAPTOR FOR COUPLING PROJECTILE AND PROPULSION UNIT**

### **Field of the Invention**

**[0001]** The present invention generally relates to ammunition for conventional weaponry, and more particularly to an adaptor for coupling a projectile to a propulsion unit used in weapons that do not incorporate chemical, biological or nuclear payloads.

### **Background of the Invention**

**[0002]** Typically, a cartridged ammunition comprises a projectile coupled to a propulsion unit. Fig. 1 illustrates one such cartridged ammunition having a projectile 2 and a propulsion unit 4. The projectile 2 is usually filled with explosive or inert materials. The propulsion unit 4 is a metal cartridge case that usually houses a primer 6 and propellant 8.

**[0003]** The common methods of coupling a projectile to the propulsion unit include crimping the projectile to the propulsion unit, and screw-threading the projectile to an insert assembled in the propulsion unit. Both crimping and screw-threading are direct approaches of joining the projectile to the propulsion unit, and can be done with or without a sealant. One of the reasons for crimping and screw-threading is to properly secure the propulsion unit to the projectile, thereby ensuring proper ignition of the propellant during firing. However, crimping and screw-threading are not suitable if the propulsion unit is made of different materials. For example, the projectile is made of metal and the propulsion unit is made of plastic.

**[0004]** Furthermore, different manufacturing parties produce different profiles of projectiles and propulsion units, so crimping and screw threading may not be the appropriate methods for joining different profiles of projectiles and propulsion units. In order to couple the different profiles of projectiles to propulsion units, the profile of the propulsion unit is usually redesigned to accommodate the profile of the projectile. Alternatively, the profile of the projectile can be redesigned to accommodate the profile of the propulsion unit. However, redesigning the profile of the projectile or propulsion unit can be time consuming and costly.

[0005] Therefore, there is an imperative need to couple different types of projectiles and propulsion units without any design modifications. This invention satisfies this need by disclosing an adaptor for coupling the projectile to the propulsion unit. Other advantages of this invention will be apparent with reference to the detailed description.

### **Summary of the Invention**

[0006] The present invention provides an adaptor for coupling a projectile to a propulsion unit.

[0007] Accordingly, in one aspect, the present invention provides an ammunition comprising: a projectile having a head section and a base section; an adaptor having a top surface, a bottom surface and a side surface, wherein the top surface is configured to accommodate the base section of the projectile; and a propulsion unit having a base, and a cylindrical wall extending from the base to form a receptacle, wherein the receptacle is configured to accommodate the adaptor and the base section of the projectile, wherein the side surface of the adaptor is configured to fit into the receptacle, thereby when the ammunition is assembled, the top surface of the adaptor is coupled to the base section of the projectile, and the side surface of the adaptor is coupled to the cylindrical wall of the propulsion unit.

[0008] In another aspect, the present invention provides a method for assembling an ammunition, comprising the steps of: providing a projectile having a head section and a base section; providing a propulsion unit having a base, and a cylindrical wall extending from the base to form a receptacle; providing an adaptor for coupling the projectile to the propulsion unit, wherein the adaptor has a top surface, a bottom surface and a side surface, the top surface of the adaptor is configured to accommodate the base section of the projectile, and the side surface of the adaptor is configured to fit into the receptacle of the propulsion unit; coupling the top surface of the adaptor to the base section of the projectile; and coupling the side surface of the adaptor to the cylindrical wall of the propulsion unit.

### **Brief Description of the Drawings**

[0009] Preferred embodiments according to the present invention will now be described with reference to the Figures, in which like reference numerals denote like elements.

[0010] FIG 1 is an illustrative diagram showing a cross-sectional view of a prior art cartridged ammunition.

[0011] FIG 2 is an illustrative diagram showing a cross-sectional view of an unassembled cartridged ammunition in accordance with one embodiment of the present invention.

[0012] FIG 3 is an illustrative diagram showing a cross-sectional view of the cartridged ammunition of FIG 2 in an assembled configuration.

[0013] FIG 4 is an illustrative diagram showing a cross-sectional view of an unassembled cartridged ammunition in accordance with an alternative embodiment of the present invention.

[0014] FIG 5 is an illustrative diagram showing a cross-sectional view of the cartridged ammunition of FIG 4 in an assembled configuration.

[0015] FIG 6 is an illustrative diagram showing a cross-sectional view of an unassembled cartridged ammunition in accordance with another alternative embodiment of the present invention.

[0016] FIG 7 is an illustrative diagram showing a cross-sectional view of the cartridged ammunition of FIG 6 in an assembled configuration.

[0017] FIG 8 is an illustrative diagram showing a cross-sectional view of an unassembled cartridged ammunition in accordance with yet another alternative embodiment of the present invention.

[0018] FIG 9 is an illustrative diagram showing a cross-sectional view of the cartridged ammunition of FIG 8 in an assembled configuration.

### **Detailed Description of the Invention**

[0019] The present invention may be understood more readily by reference to the following detailed description of certain embodiments of the invention.

[0020] The present invention relates to cartridged ammunition comprising an adaptor for coupling different designs of projectiles and propulsion units. The adaptor can

be designed for different caliber of ammunition and is not restricted to the following embodiments.

**[0021]** Figs. 2 and 3 illustrate one embodiment of a cartridged ammunition comprising a projectile **20**, an adaptor **30**, and a propulsion unit **40**. The projectile **20** has a head section **22** and a base section **24**. The projectile is preferably made of metal, metal alloys or other materials of the like. Furthermore, the projectile **20** contains highly explosive energetic materials with a safety fusing mechanism (not shown). Alternatively, the projectile may be filled with inert materials such as sodium bicarbonate, sand, epoxy and others non-explosive materials.

**[0022]** The adaptor **30** includes a top surface **32**, a side surface **33** and a bottom surface **34**. The top surface **32** is configured to accommodate the base section **24** of the projectile **20**. In particular, the top surface **32** is preferably coupled to the base section **24** using adhesives, wherein the top surface **32** provides additional surface area for adhering the projectile **20** to the adaptor **30**. The adaptor **30** can be made from materials such as metal, metal alloys, or the like. In particular, the adaptor **30** can be made from ferrous or non-ferrous materials. It is also contemplated that the adaptor **30** can be made from other non-metal materials such as plastics.

**[0023]** The propulsion unit **40** comprises a base **41**, and a cylindrical wall **43** extending from the base to form a receptacle **42**, wherein the receptacle **42** is configured to accommodate the adaptor **30** and base section **24** of the projectile **20**. In particular, the side surface **33** of the adaptor **30** is configured to fit into the receptacle **42**. Furthermore, the side surface **33** of the adaptor **30** can be coupled to the cylindrical wall **43** of the propulsion unit **40** using adhesives. The propulsion unit **40** can be made from metal materials, plastic materials, or the like. A primer **52** and a propellant **54** can be centrally disposed at the base **41** of the propulsion unit **40**. The base **41** may have a high pressure chamber **46** that houses the propellant **54**. The bottom surface **34** of the adaptor can be coupled to the high pressure chamber **46** on the base **41** of the propulsion unit **40** using adhesives.

**[0024]** When the cartridged ammunition is assembled as shown in Fig. 3, a low pressure space **47** is formed between the adaptor **30** and propulsion unit **40**. The primer **52** can be initiated by mechanical means such as a weapon striker pin. Alternatively, the primer can be initiated by electrical means. Once initiated, the primer **52** ignites the

propellant **54**, thereby causing a rapid burning effect and a high pressure build up of the propellant **54** in the high pressure chamber **46**. This burning effect releases a large amount of propellant gas that eventually bursts into the low pressure chamber **47**, thereby expelling the projectile **20** from the propulsion unit **40**, wherein the projectile **20** is propelled towards a desired target.

**[0025]** Figs 4 and 5 illustrate an alternative embodiment of the cartridge ammunition shown in Figs 2 and 3. In particular, the cylindrical wall **43** of the propulsion unit **40** comprises an internal thread **48**. The side surface **33** of the adaptor **30** is configured with an external thread **38** that engages the internal thread **48** of the propulsion unit **40**, thereby allowing the adaptor **30** to be screwed onto the propulsion unit **40**. Then, the top surface **32** of the adaptor **30** may be coupled to the base section **24** of the projectile **20** using adhesives. Furthermore, the bottom surface **34** of the adaptor can be coupled to the high pressure chamber **46** on the base **41** of the propulsion unit **40** using adhesives.

**[0026]** Figs. 6 and 7 illustrate another alternative embodiment of the cartridge ammunition comprising a projectile **20**, an adaptor **60** and a propulsion unit **70**. The adaptor **60** includes a top surface **62**, a side surface **63** and a bottom surface **64**. Similarly, the top surface **62** is configured to accommodate the base section **24** of the projectile **20**. The top surface **62** is preferably coupled to the base section **24** by adhesives, wherein the top surface **62** provides additional surface area for adhering the projectile **20** to the adaptor **60**. The adaptor **60** is also made from materials such as metal, metal alloys, or the like. In particular, the adaptor **60** can be made from ferrous or non-ferrous materials. It is also contemplated that the adaptor **60** can be made from other non-metal materials such as plastics.

**[0027]** The propulsion unit **70** comprises a base **71**, and a cylindrical wall **73** extending from the base to form a receptacle **72**, wherein the receptacle **72** is configured to accommodate the adaptor **60** and the base section **24** of the projectile **20**. Similarly, the side surface **63** of the adaptor **60** is configured to fit into the receptacle **72**. Furthermore, the side surface **63** of the adaptor **60** can be coupled to the cylindrical wall **73** of the propulsion unit **70** using adhesives. The propulsion unit **70** can be made from metal materials, plastic materials, or the like. A primer **82** may be centrally disposed at the base of the propulsion unit **70**.

[0028] When the cartridged ammunition is assembled as shown in Fig. 7, a propellant **84** is disposed between the adaptor **60** and the propulsion unit **70**. The primer **82** can be similarly initiated by mechanical means such as a weapon striker pin, or by electrical means. Once initiated, the primer **82** ignites the propellant **84**, thereby causing a rapid burning effect of the propellant **84**. This burning effect releases a large amount of propellant gas that expels the projectile **20** from the propulsion unit **70**, thereby propelling the projectile **20** towards the desired target.

[0029] Figs 8 and 9 illustrate an alternative embodiment of the cartridged ammunition shown in Figs 6 and 7. In particular, the cylindrical wall **73** of the propulsion unit **70** comprises an internal thread **78**. The side surface **63** of the adaptor **60** is configured with an external thread **68** that engages the internal thread **78** of the propulsion unit **70**, thereby allowing the adaptor **60** to be screwed onto the propulsion unit **70**. Then, the first surface **62** of the adaptor **60** is coupled to the base section **24** of the projectile **20** using adhesives.

[0030] As discussed above, the adaptor couples different profiles of projectiles and propulsion units without any need for design modifications. Furthermore, the adaptor allows the projectile to be coupled to propulsion units made of different materials. This facilitates the testing of the projectile by coupling it to different propulsion units without any need of redesigning the profile of the projectile. In addition, different types of propulsion units can be coupled to the projectile to enable the cartridge ammunition to be fired mechanically or electronically. Also, the current production process need not be modified too drastically for producing the cartridged ammunition.

[0031] While the present invention has been described with reference to particular embodiments, it will be understood that the embodiments are illustrative and that the invention scope is not so limited. Alternative embodiments of the present invention will become apparent to those having ordinary skill in the art to which the present invention pertains. Such alternate embodiments are considered to be encompassed within the spirit and scope of the present invention. Accordingly, the scope of the present invention is described by the appended claims and is supported by the foregoing description.

## CLAIMS

What is claimed is:

1. A cartridged ammunition comprising:  
a projectile having a head section and a base section;  
an adaptor having a top surface, a bottom surface and a side surface, wherein the top surface is configured to accommodate the base section of the projectile; and  
a propulsion unit having a base, and a cylindrical wall extending from the base to form a receptacle, wherein the receptacle is configured to accommodate the adaptor and the base section of the projectile, wherein the side surface of the adaptor is configured to fit into the receptacle,  
thereby when the ammunition is assembled, the top surface of the adaptor is coupled to the base section of the projectile, and the side surface of the adaptor is coupled to the cylindrical wall of the propulsion unit.
2. The ammunition of claim 1, wherein the top surface of the adaptor is coupled to the base section of the projectile using adhesives.
3. The ammunition of claim 2, wherein the side surface of the adaptor is coupled to the cylindrical wall of the propulsion unit using adhesives
4. The ammunition of claim 2, wherein the side surface of the adaptor has an external thread and the cylindrical wall of the propulsion unit has an internal thread, and wherein the external thread on the side surface of the adaptor is configured to engage the internal thread on the cylindrical wall of the propulsion.
5. The ammunition of claim 1, wherein the base of the propulsion unit comprises a primer.

6. The ammunition of claim 5, wherein the base of the propulsion unit comprises a chamber for housing a propellant.
7. The ammunition of claim 6, wherein the bottom surface of the adaptor is coupled to the chamber on the base of the propulsion unit using adhesives.
8. The ammunition of claim 5, wherein a propellant is disposed between the bottom surface of the adaptor and the base of the propulsion unit.
9. The ammunition of claim 1, wherein the adaptor can be made of any materials selected from the group consisting of metal, metal alloys or plastics.
10. The ammunition of claim 1, wherein the propulsion unit can be made from any materials selected from the group consisting of metal, metal alloys or plastics.
11. A method for assembling a cartridge ammunition, comprising the steps of:
  - providing a projectile having a head section and a base section;
  - providing a propulsion unit having a base, and a cylindrical wall extending from the base to form a receptacle;
  - providing an adaptor for coupling the projectile to the propulsion unit, wherein the adaptor has a top surface, a bottom surface and a side surface, the top surface of the adaptor is configured to accommodate the base section of the projectile, and the side surface of the adaptor is configured to fit into the receptacle of the propulsion unit; and
  - coupling the top surface of the adaptor to the base section of the projectile; and
  - coupling the side surface of the adaptor to the cylindrical wall of the propulsion unit.
12. The method of claim 11, wherein the step of coupling the top surface of the adaptor to the base section of the projectile is using adhesives.
13. The method of claim 11, wherein the step of coupling the side surface of the adaptor to the cylindrical wall of the propulsion unit is using adhesives.

14. The ammunition of claim 12, further comprising the step of providing an external thread on the side surface of the adaptor and providing an internal thread on the cylindrical wall of the propulsion unit, wherein the external thread on the side surface of the adaptor is configured to engage the internal thread on the cylindrical wall of the propulsion unit.

15. The ammunition of claim 11, further comprising the step of providing a primer at the base of the propulsion unit.

16. The ammunition of claim 15, further comprising the step of providing a chamber at the base of the propulsion unit, wherein the chamber houses a propellant.

17. The ammunition of claim 16, further comprising the step of coupling the bottom surface of the adaptor to the chamber on the base of the propulsion unit using adhesives.

18. The ammunition of claim 15, further comprising a step of providing a propellant between the bottom surface of the adaptor and the base of the propulsion unit.

19. The method of claim 11, wherein the adaptor can be made of any materials selected from the group consisting of metal, metal alloys or plastics.

20. The method of claim 11, wherein the propulsion unit can be made from any materials selected from the group consisting of metal, metal alloys or plastics.

21. An adaptor for coupling a warhead to a propulsion unit to form a cartridge ammunition, including:

an adaptor having a top surface, a bottom surface and a side surface, wherein the top surface is configured for connection to a base section of the warhead and the side surface is configured for connection to a wall portion of the propulsion unit.

22. An adaptor according to claim 21 having a substantially solid body of plastics or metallic material, and wherein the top surface is substantially concave, the bottom surface is substantially flat, and the side surface is substantially cylindrical.

23. An adaptor according to claim 22 wherein the side surface includes screw threads for connection to the propulsion unit.