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Harel

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(54) **POCKET LIGHTER WITH A SNAP-IN BURNER ASSEMBLY**

(71) Applicant: **Yigal Cohen Harel**, Ratingen (DE)
(72) Inventor: **Yigal Cohen Harel**, Ratingen (DE)
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F23Q 2/28 (2006.01)
(52) **U.S. Cl.**
CPC **F23Q 2/167** (2013.01); **F23Q 2/287** (2013.01); **F23Q 3/01** (2013.01)

(58) **Field of Classification Search**
CPC F23Q 2/167; F23Q 2/287; F23Q 3/01
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,082,440 A * 1/1992 Yamamoto F23D 14/28 431/143
5,531,592 A * 7/1996 Tasi F23D 14/28 431/255
2004/0224272 A1* 11/2004 Rakowski F23Q 2/52 431/344
2018/0320896 A1* 11/2018 VanCleave, III F23D 14/465

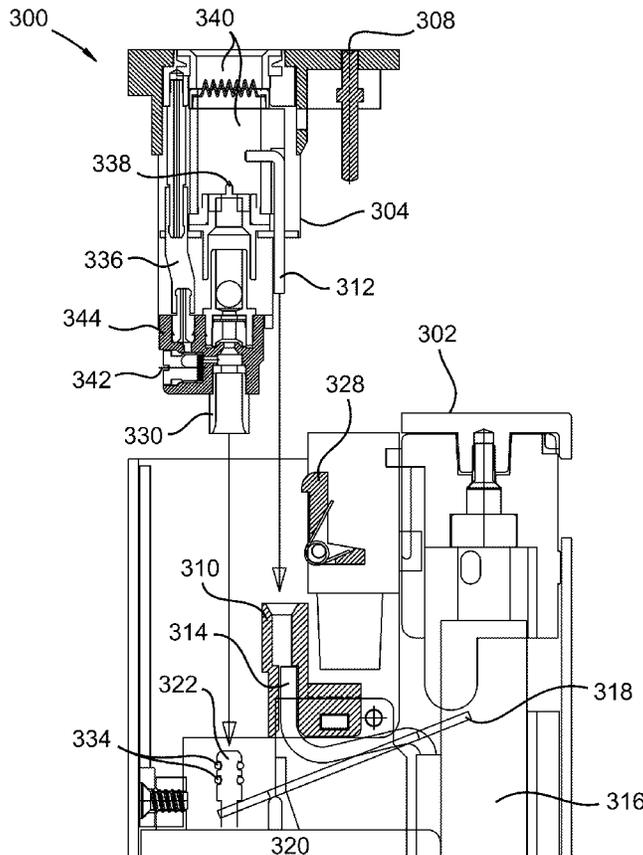
* cited by examiner

Primary Examiner — Grant Moubry
Assistant Examiner — Aaron H Heyamoto
(74) *Attorney, Agent, or Firm* — Malone IP Law; Steven J. Malone

(57) **ABSTRACT**

A pocket lighter with a snap-in burner assembly unit has been developed. The pocket lighter includes a snap-in burner assembly unit comprising: a fuel input port, a fuel regulator, a jet nozzle, and a burner cylinder. The pocket lighter additionally includes a lighter base comprising: a fuel tank, a fuel output port, a fuel ignition source, a fuel lever, and a push button mechanism for actuating the fuel lever and creating a spark; and wherein the fuel input port and the fuel output port mate together forming an airtight seal when the snap-in burner is installed within the lighter base.

18 Claims, 11 Drawing Sheets



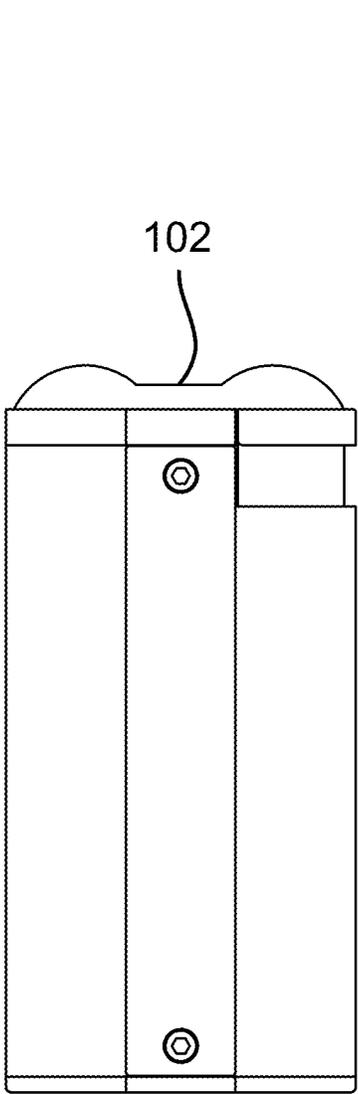


FIG. 1A

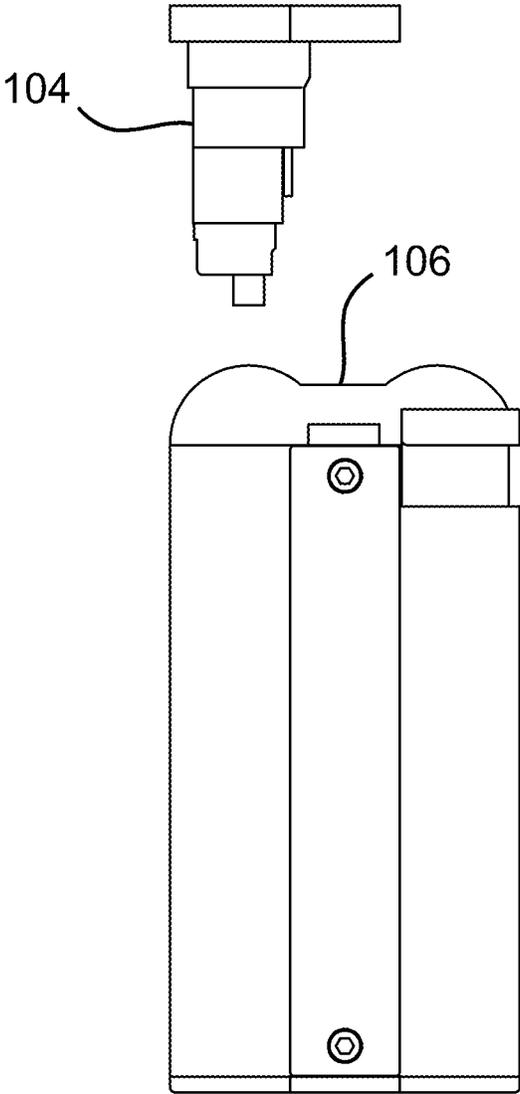


FIG. 1B

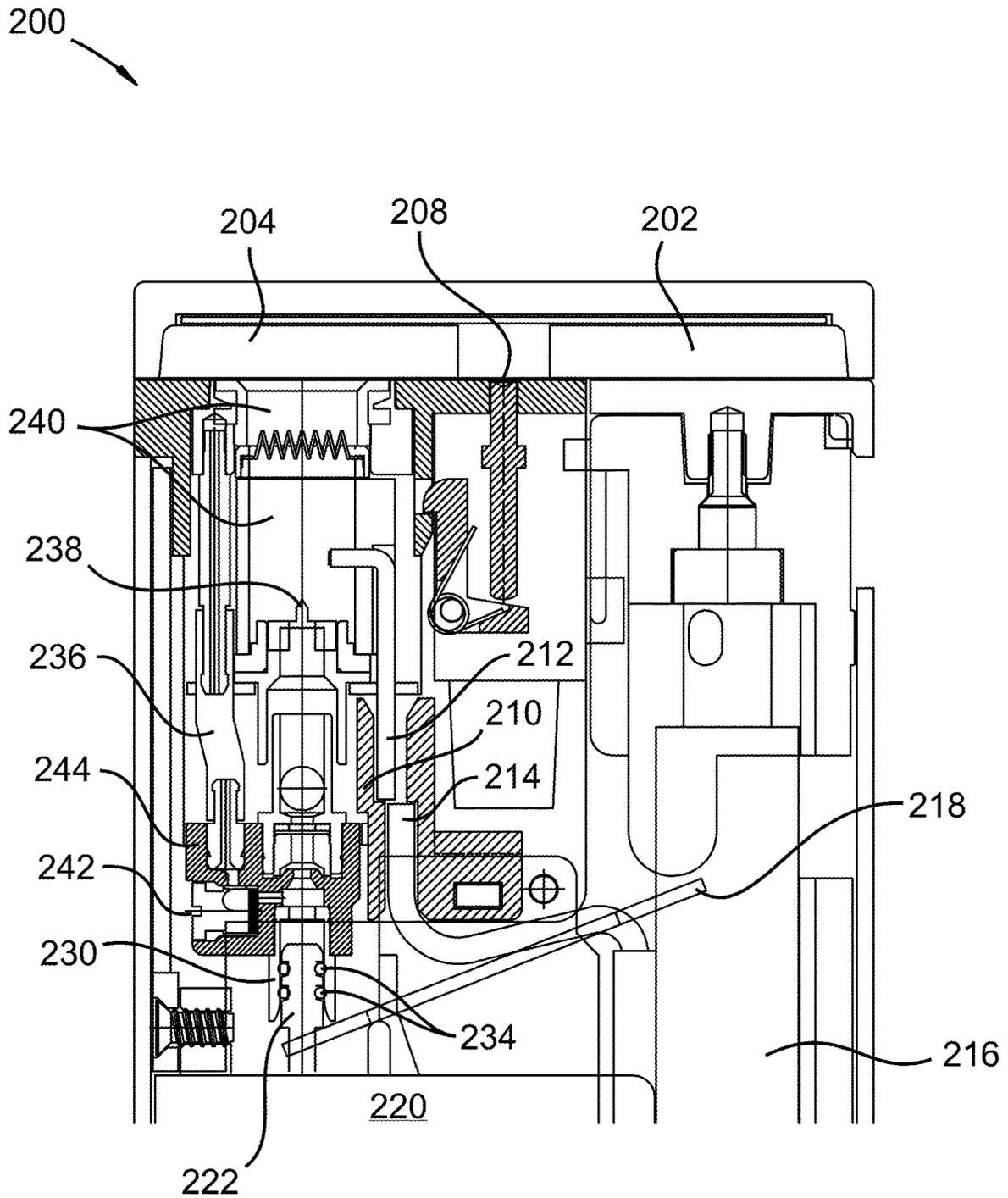


FIG. 2

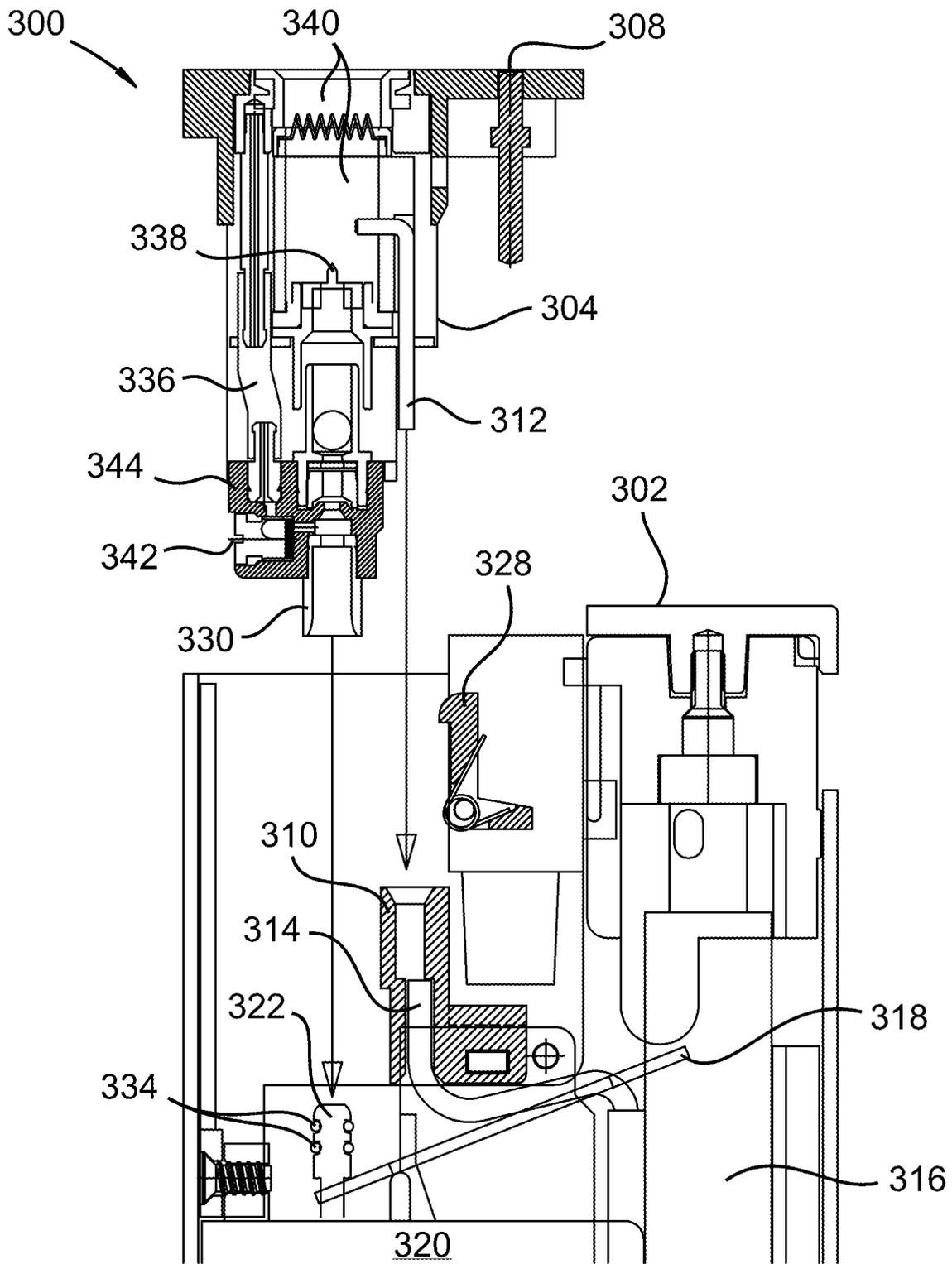


FIG. 3

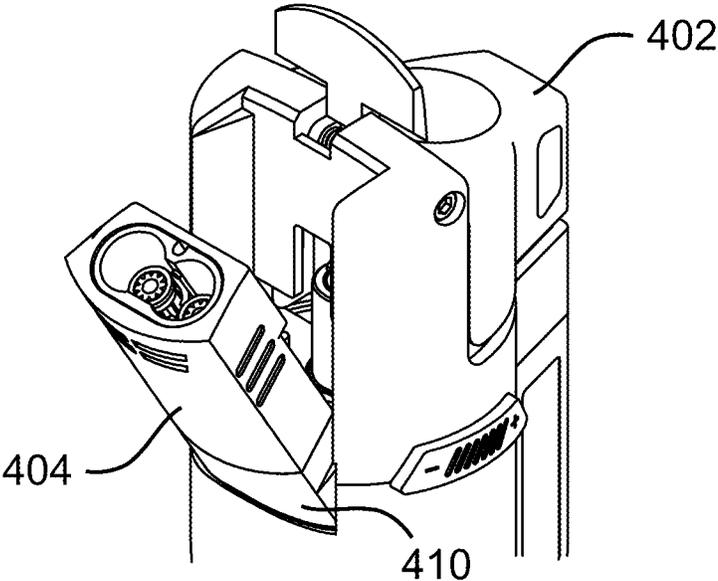


FIG. 4A

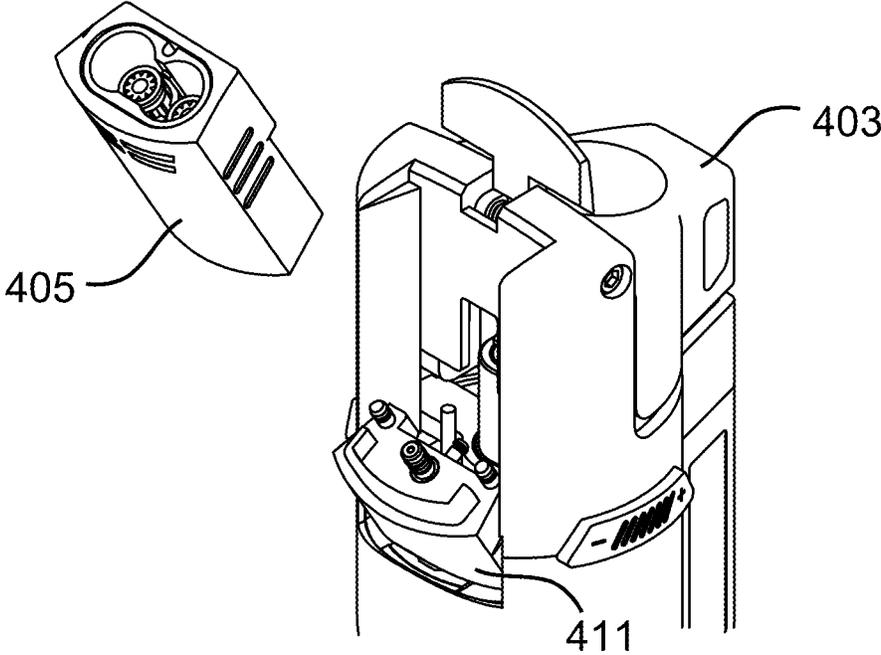
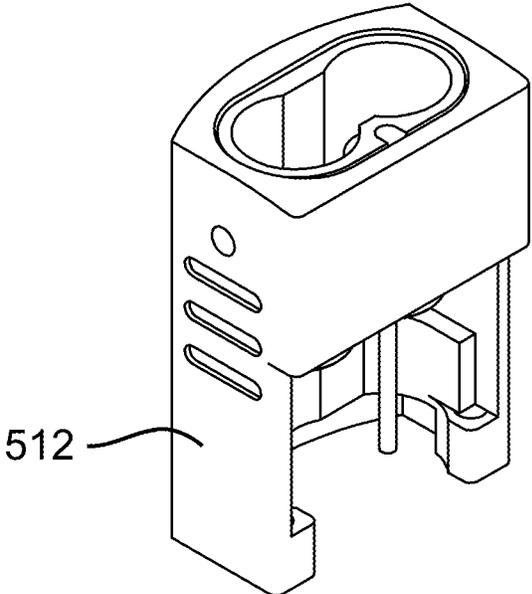
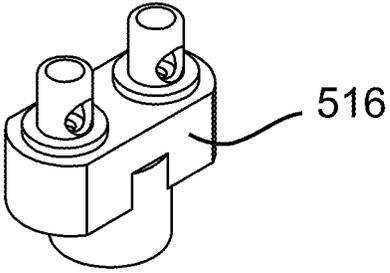


FIG. 4B

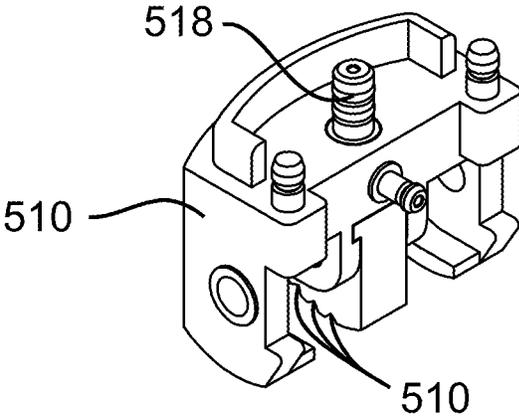
500



512



516



518

510

510

FIG. 5

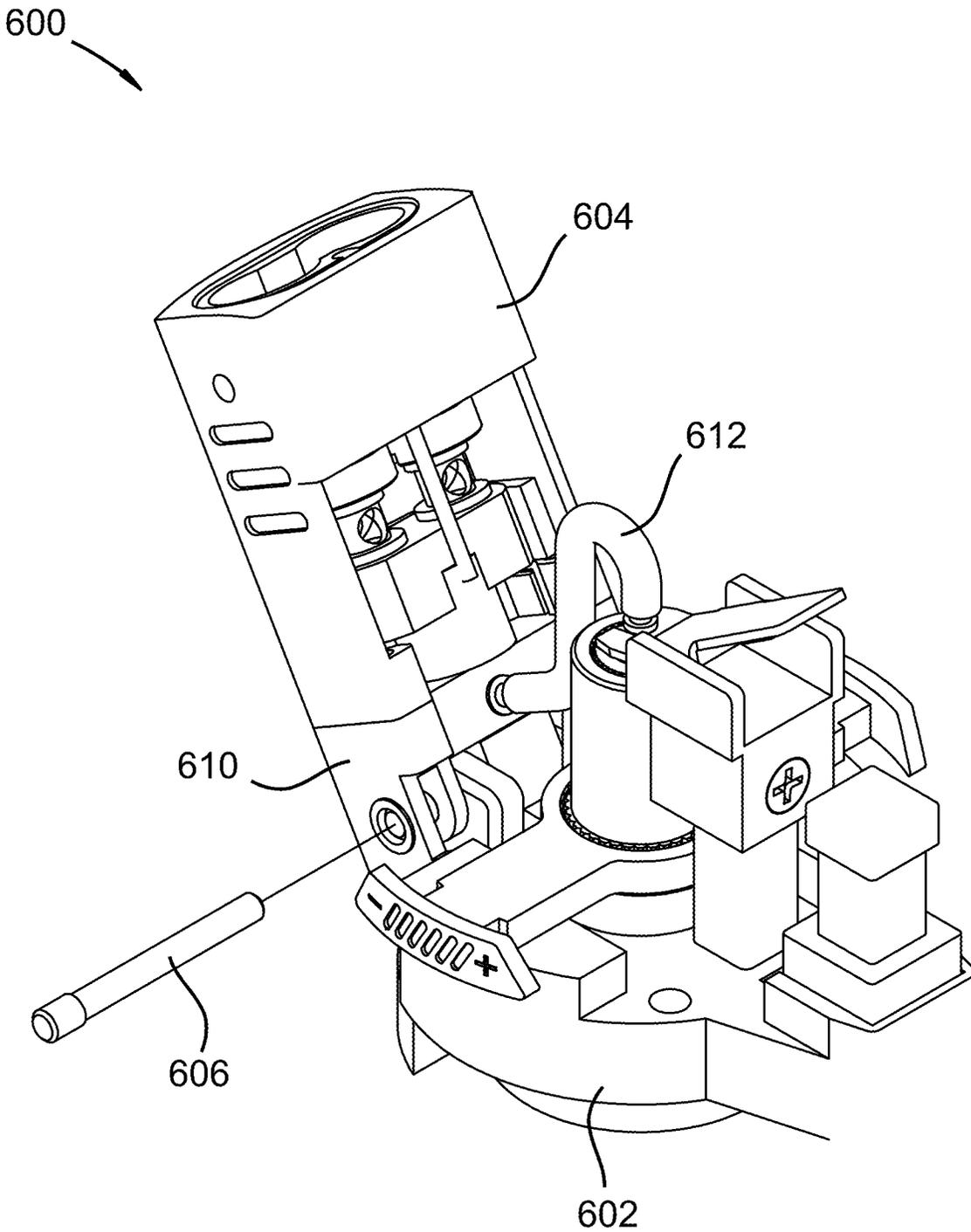


FIG. 6

700

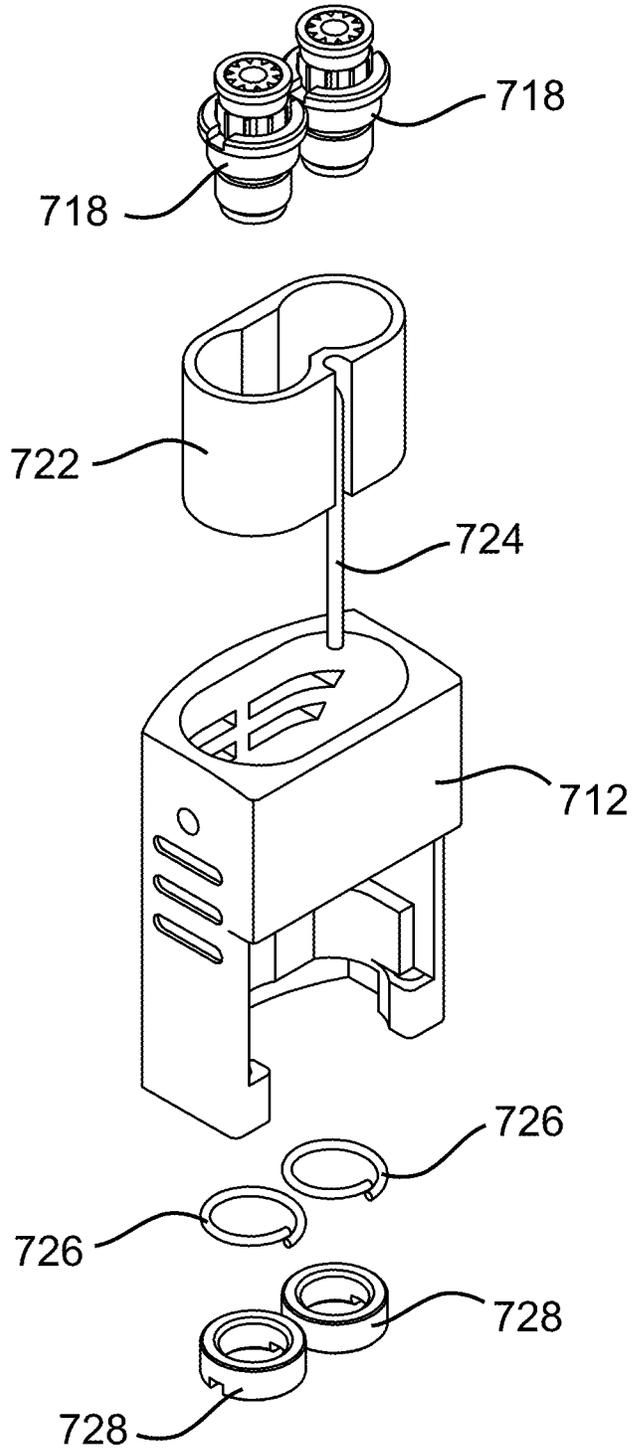
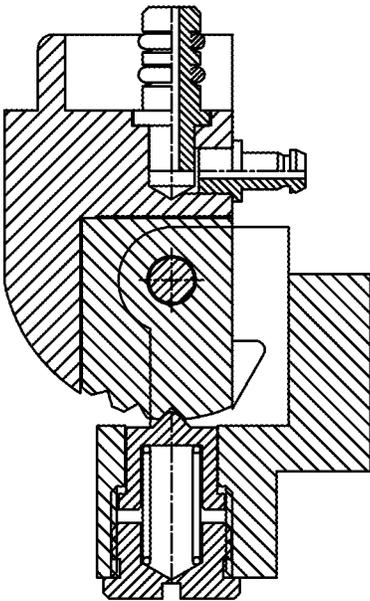
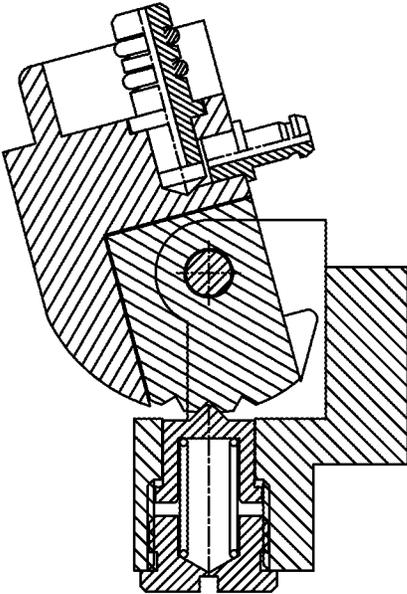


FIG. 7



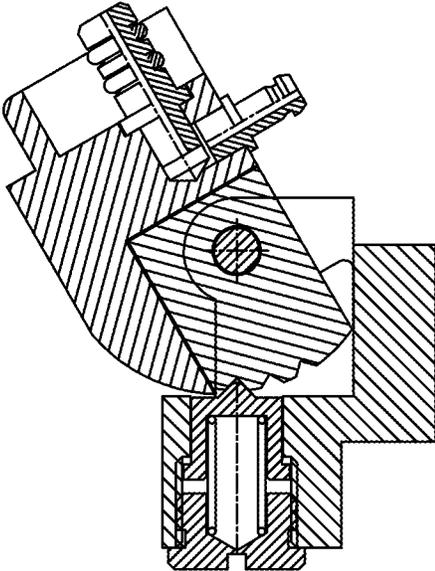
ORIGIN

FIG. 8A



15° ROTATION

FIG. 8B



30° ROTATION

FIG. 8C

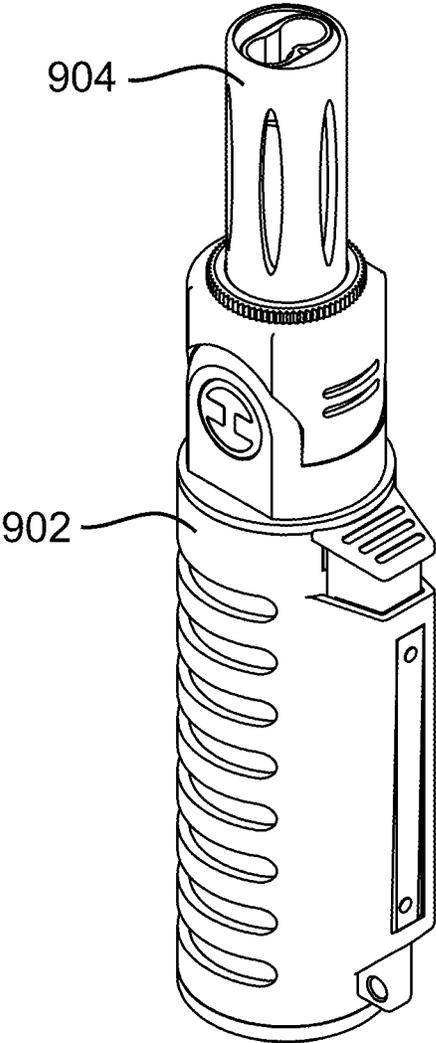
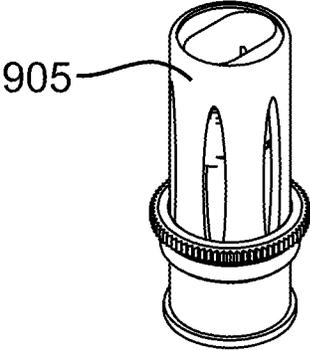


FIG. 9A

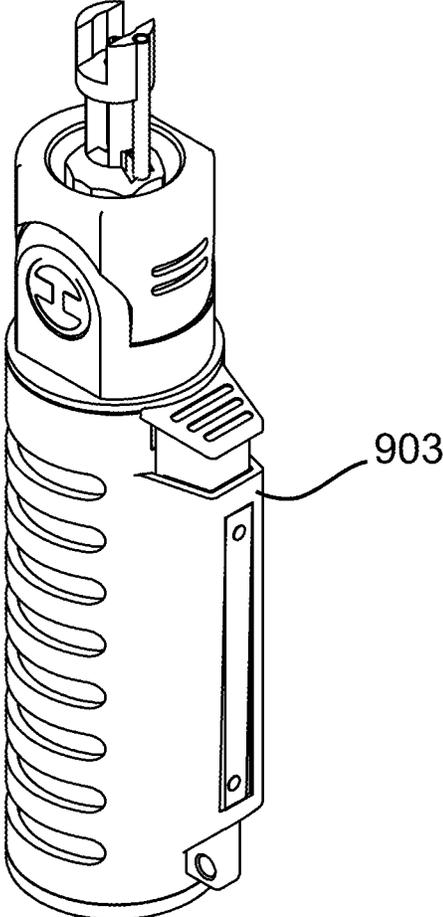


FIG. 9B

1000

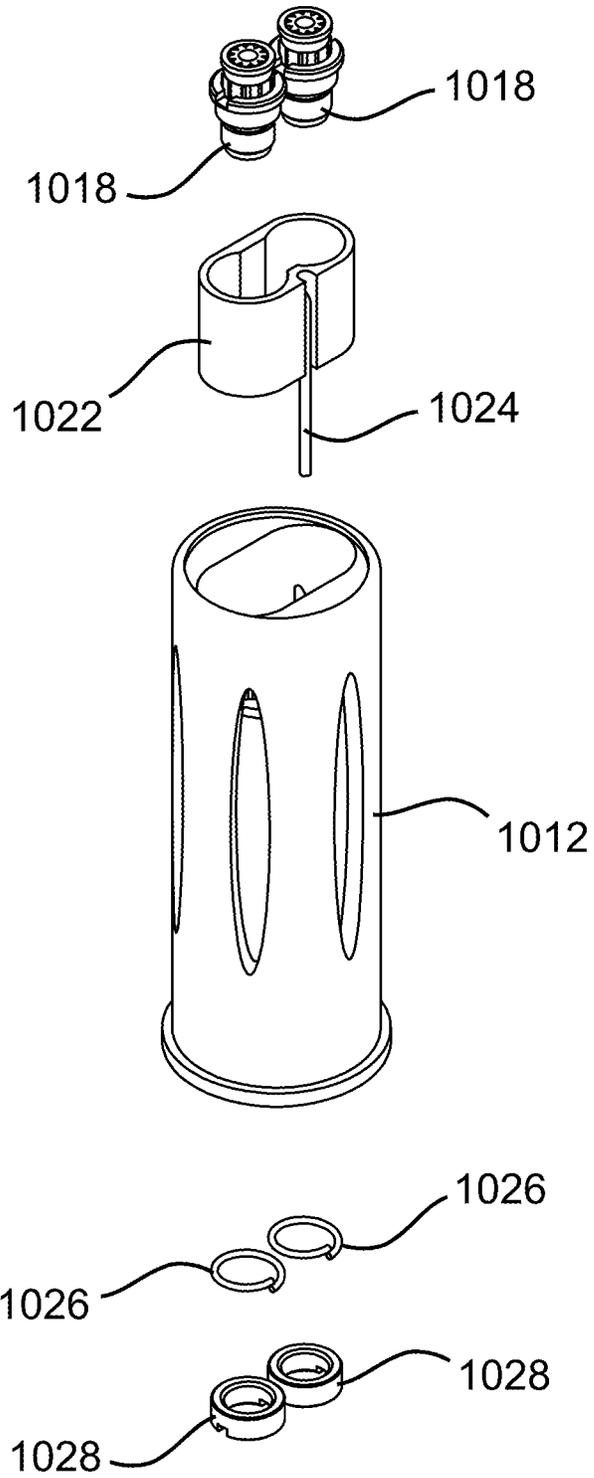


FIG. 10

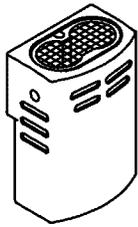


FIG. 11A



FIG. 11B

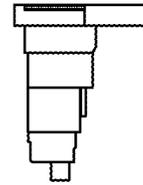


FIG. 11C



FIG. 11D

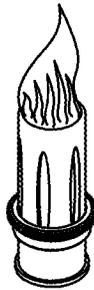


FIG. 11E

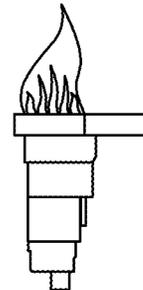


FIG. 11F

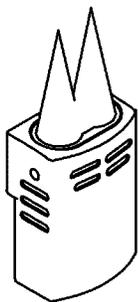


FIG. 11G

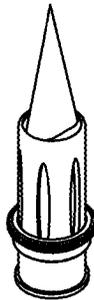


FIG. 11H

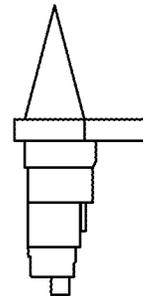


FIG. 11I



FIG. 11J



FIG. 11K

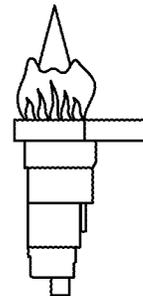


FIG. 11L

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POCKET LIGHTER WITH A SNAP-IN BURNER ASSEMBLY

FIELD OF THE INVENTION

The present invention is related to pocket lighters with replaceable components.

SUMMARY

A pocket lighter with a snap-in burner assembly unit has been developed. The pocket lighter includes a snap-in burner assembly unit comprising: a fuel input port, a fuel regulator, a jet nozzle, and a burner cylinder. The pocket lighter additionally includes a lighter base comprising: a fuel tank, a fuel output port, a fuel ignition source, a fuel lever, and a push button mechanism for actuating the fuel lever and creating a spark; and wherein the fuel input port and the fuel output port mate together forming an airtight seal when the snap-in burner is installed within the lighter base.

The lighter base may further comprise an insulator which receives a conductive portion of a high voltage spark ignitor as the snap-in burner is installed within the lighter base. The insulator may have a tapered opening where the conductive portion of the high voltage spark ignitor is received. The conductive portion of the high voltage spark ignitor and the high voltage conductor may be electrically connected by direct contact, by a defined distance, by a gap, or by a conductive paste. The burner unit may produce a soft flame, torch flame, twin flame, circular flame, or a combination thereof. The lighter base may further comprise a burner assembly release/lock lever. The fuel outlet port may further comprise one or more O-ring seals. The release/locklever may be spring loaded. The release/locklever may be spring loaded in a normally locked position. The release/locklever may be actuated to release the snap-in burner assembly by pushing a pushpin actuator attached to the snap-in burner assembly. The snap-in burner assembly may be locked in place by rotating a locking nut. The lighter base output port may be a pivoting output port. The lighter base may further comprise a flexible gas tube that connects lighter fuel of the pocket lighter to the pivoting output port. The snap-in burner assembly may snap into the pivoting output port. The snap-in burner assembly may rotationally pivot away from the push button mechanism between 0 and 30 degrees. The snap-in burner assembly may be a user replaceable accessory of the pocket lighter. The pivoting output port may comprise one or more notches for positionally fixing an angle of rotation of the snap-in burner assembly. The flexible gas tube may connect to a 90-degree fitting of the pivoting output port. The 90-degree fitting may further comprise one or more O-ring seals. The one or more O-rings seals may create an airtight seal with the input port of the snap-in burner assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the advantages of the invention will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered limiting of its scope, the invention will be described and explained with additional specificity and detail through use of the accompanying drawings, in which:

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FIGS. 1A and 1B are side views of a pocket lighter with a snap-in burner assembly installed and uninstalled in accordance with an embodiment of the invention;

FIG. 2 is a cross-sectional side view of a pocket lighter with a snap-in burner assembly in accordance with an embodiment of the invention;

FIG. 3 is a cross-sectional side view of a pocket lighter with a snap-in burner assembly in accordance with an embodiment of the invention;

FIGS. 4A and 4B are perspective views of a pocket lighter with a snap-in burner assembly installed and uninstalled in accordance with an embodiment of the invention;

FIG. 5 is an exploded perspective view of a snap-in burner assembly in accordance with an embodiment of the invention;

FIG. 6 shows a perspective inside view of a pocket lighter top portion with a pivoting snap-in burner assembly in accordance with an embodiment of the invention;

FIG. 7 shows an exploded perspective view of a snap-in burner assembly in accordance with an embodiment of the invention;

FIGS. 8A, 8B, and 8C show side views of a pocket lighter with a pivoting output port rotated to different angles in accordance with an embodiment of the invention;

FIGS. 9A and 9B show perspective views of a pocket lighter with a snap-in burner assembly installed and uninstalled in accordance with an embodiment of the invention;

FIG. 10 shows an exploded perspective view of a snap-in burner assembly in accordance with an embodiment of the invention; and

FIGS. 11A-11L depict various snap-in burner assemblies with differing flame types in accordance with an embodiment of the invention.

DETAILED DESCRIPTION

It will be readily understood that the components of the present invention, as generally described and illustrated in the Figures herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the invention, as represented in the Figures, is not intended to limit the scope of the invention, as claimed, but is merely representative of certain examples of presently contemplated embodiments in accordance with the invention. The presently described embodiments will be best understood by reference to the drawings.

FIGS. 1A and 1B are side views of a pocket lighter with a snap-in burner assembly **104** installed **102** and uninstalled **106** in accordance with an embodiment of the invention.

FIG. 2 shows a sideview **200** of a pocket lighter with a snap-in burner assembly in accordance with an embodiment of the invention. Piezo-electric spark generator **216** generates a high voltage electric spark when depressed. The high voltage spark travels through high voltage conductor **214** into insulator **210**. Insulator **210** electrically joins high voltage conductor **214** and high voltage spark ignitor **212** allowing for easy removal and installation of the snap-in burner assembly. Insulator **210** is designed to bring high voltage conductor **214** and high voltage spark ignitor **212** into an acceptable proximity to each other allowing a high voltage spark to be transmitted into burner chamber **240**. In one embodiment, a small gap or small misalignment is designed for between high voltage conductor **214** and high voltage spark ignitor **212** as shown in FIG. 2. Because of the nature of the high voltage generated by piezo-electric unit **216**, high voltage conductor **214** and high voltage spark

ignitor **212** do not need to directly touch each other to conduct a high voltage spark. Perfect alignment is not necessary and may cause mechanical difficulties snapping in and taking out the burner assembly. In another embodiment, high voltage conductor **214** and high voltage spark ignitor **212** share a side-by-side path extending in partially overlapping space. In another embodiment, high voltage conductor **214** and high voltage spark ignitor **212** are end connected by touching end-to-end. In another embodiment, insulator **210** is lined with an inner conductive surface or has a conductive paste applied to an inner surface which is shared between high voltage conductor **214** and high voltage spark ignitor **212** and serves to increase electrical conductivity between high voltage conductor **214** and high voltage spark ignitor **212**. Fuel lever **218** is simultaneously depressed as piezo-electric generator **216** is depressed by a push button of the lighter. When depressed, fuel lever **218** lifts and opens fuel outlet valve **222** releasing pressurized fuel from fuel tank **220**. O-rings **234** form an airtight seal between the snap-in burner assembly and outlet valve **222** for safe delivery of fuel to the burner area **240**. The pressurized fuel travel into fuel regulator device **242**. Fuel regulator device **242** serves to control pressure and/or volume of fuel supplied to burner area **240**. Fuel regulator device **242** may be factory adjustable or may be user adjustable to achieve an optimal or desired fuel burn within burner area **240**. A fuel regulator **242** and fuel distribution system is housed by cross-hatched structure **244**. A fuel distribution tube **236** is used to provide fuel into burner area **240**. Burner area **240** is shown as a circular burner unit with spark ignitor **212** providing a high voltage spark against ground point **238** to ignite fuel within burner area **240**. Burner area **240** also includes one or more jet nozzles for delivering fuel to the circular burner unit **240**. In other embodiments, a traditional friction spark ignition system may be used instead of the piezo-electric spark generator.

FIG. 3 is a sideview **300** of a pocket lighter with a snap-in burner assembly in accordance with an embodiment of the invention. Pushpin actuator **308** releases the snap-in burner assembly by depressing the release/lock lever **328**. Release/lock lever **328** may be spring loaded in a normally locked position allowing the snap-in burner assembly to snap in when pressed into the lighter base. Piezo-electric spark generator **316** generates a high voltage electric spark when depressed. The high voltage spark travels through high voltage conductor **314** into insulator **310**. Insulator **310** electrically joins high voltage conductor **314** and high voltage spark ignitor **312** allowing for easy removal and installation of the snap-in burner assembly. Insulator **310** is designed to bring high voltage conductor **314** and high voltage spark ignitor **312** into an acceptable proximity to each other allowing a high voltage spark to be transmitted into burner chamber **340**. In one embodiment, a small gap or small misalignment is designed for between high voltage conductor **314** and high voltage spark ignitor **312** as shown in FIG. 3. Because of the nature of the high voltage generated by piezo-electric unit **316**, high voltage conductor **314** and high voltage spark ignitor **312** do not need to directly touch each other to conduct a high voltage spark. Perfect alignment is not necessary and may cause mechanical difficulties snapping in and taking out the burner assembly. In another embodiment, high voltage conductor **314** and high voltage spark ignitor **312** share a side-by-side path extending in partially overlapping space. In another embodiment, high voltage conductor **314** and high voltage spark ignitor **312** are end connected by touching end-to-end. In another embodiment, insulator **310** is lined with an inner

conductive surface or has a conductive paste applied to an inner surface which is shared between high voltage conductor **314** and high voltage spark ignitor **312** and serves to increase electrical conductivity between high voltage conductor **314** and high voltage spark ignitor **312**. Fuel lever **318** is simultaneously depressed as piezo-electric generator **316** is depressed by push button **302** of the lighter. When depressed, fuel lever **318** lifts and opens fuel outlet valve **322** releasing pressurized fuel from fuel tank **320**. O-rings **334** form an airtight seal between the snap-in burner assembly and outlet valve **322** for safe delivery of fuel to the burner area **340**. The pressurized fuel travel into fuel regulator device **342**. Fuel regulator device **342** serves to control pressure and/or volume of fuel supplied to burner area **340**. Fuel regulator device **342** may be factory adjustable or may be user adjustable to achieve an optimal or desired fuel burn within burner area **340**. A fuel regulator **342** and fuel distribution system is housed by cross-hatched structure **344**. A fuel distribution tube **336** is used to provide fuel into burner area **340**. Burner area **340** is shown as a circular burner unit with spark ignitor **312** providing a high voltage spark against ground point **338** to ignite fuel within burner area **340**.

FIG. 4A shows a perspective view of a pocket lighter **402** with an installed snap-in burner unit **404** in accordance with an embodiment of the invention. Burner unit **404** may produce a soft flame, torch flame, twin flame, circular flame, or a combination thereof. Burner unit may be replaced with a desired flame type burner. For example, a user wanting to light a cigar may want a hot twin flame and install a snap-in twin flame burner. In another example, a user may want to light a cigarette and install a snap-in soft flame burner.

FIG. 4B shows a perspective view of a pocket lighter **403** with a removed (snapped out) burner unit **405** in accordance with an embodiment of the invention. Various types of burners and flame configurations may be used with lighters **402/403** and switch as needed for application type and user preference.

FIG. 5 is an exploded perspective view of a burner unit assembly **500** in accordance with an embodiment of the invention. Burner unit assembly **500** includes a burner unit **512**, an injection burner unit/jet nozzle **516**, and a burner holder unit **510**. Burner holder unit **510** includes one or more notches **510** for positionally fixing an angle of rotation of the burner unit assembly **500**. Injection burner unit/jet nozzle **516** snaps over angle fitting **518** allowing the burner and injection burner unit to be replaced by a user without any tools.

FIG. 6 is a perspective view of a fuel tank adaptor **600** and burner unit assembly **604/610** in accordance with an embodiment of the invention. Burner unit assembly **604/610** comprises a burner holder unit **610** and a burner unit **604**. Burner holder unit **610** is connected to a main body portion **602** of fuel tank adapter **600** by a hinge pin **606** allowing rotational movement of burner assembly **604/610**. Flexible gas tube **612** connects an outlet of gas outlet nozzle to an input of the burner holder unit **610**. Flexible gas tube **612** allows burner holder unit **610** to rotate about an axis formed by the mounting hinge pin while still supplying fuel to the top burner unit **604**.

FIG. 7 is an exploded perspective view of a burner unit assembly **700** in accordance with an embodiment of the invention. Burner unit assembly **700** includes a snap-in burner unit **712**, twin jet nozzles **718**, burner heat shield **722**, and twin jet retainer **726/728**. Burner heat shield includes a high voltage conductor **724** for igniting fuel within snap-in burner unit assembly **700**. Snap-in burner unit **700** snaps

over one or more gas supply fittings allowing the burner unit to be replaced by a user without any tools.

FIGS. 8A, 8B, and 8C show side views of a pivoting output port in accordance with embodiments of the invention. Each Figure contains a snap-in fitting on the top and a 90-degree angled fitting which connects to a flexible fuel supply hose (612 of FIG. 6). Each pivoting output port includes one or more notches for positionally fixing an angle of rotation of the snap-in burner assembly connected to the snap-in fitting.

FIG. 9A shows a perspective view of a pocket lighter 902 with an installed snap-in burner unit 904 in accordance with an embodiment of the invention. Burner unit 904 may produce a soft flame, torch flame, twin flame, circular flame, or a combination thereof. Burner unit may be replaced with a desired flame type burner. For example, a user wanting to light a cigar may want a hot twin flame and install a snap-in twin flame burner. In another example, a user may want to light a cigarette and install a snap-in soft flame burner. Snap-in burner unit 904 may be locked into place with a rotational collar or sleeve after snapping in the burner.

FIG. 9B shows a perspective view of a pocket lighter 903 with a removed (snapped out) burner unit 905 in accordance with an embodiment of the invention. Various types of burners and flame configurations may be used with lighters 902/903 and switch as needed for application type and user preference

FIG. 10 is an exploded perspective view of a burner unit assembly 1000 in accordance with an embodiment of the invention. Burner unit assembly 1000 includes a snap-in burner unit 1012, twin jet burners 1018, burner heat shield 1022, and twin jet retainer 1026/1028. Burner heat shield includes a high voltage conductor 1024 for igniting fuel within snap-in burner unit assembly 1000. Snap-in burner unit 1000 snaps over one or more gas supply fittings allowing the burner unit to be replaced by a user without any tools.

FIGS. 11A-11L depict various snap-in burner assemblies with differing flame types in accordance with an embodiment of the invention. FIGS. 11A-11C are Flameless snap-in burner types. FIGS. 11D-11F are soft flame snap-in burner types. FIGS. 11G-11I are torch flame snap-in burner types. FIGS. 11J-11L are combination flame snap-in burner types.

The systems and methods disclosed herein may be embodied in other specific forms without departing from their spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

The invention claimed is:

1. A pocket lighter comprising:

a snap-in burner assembly unit comprising: a fuel input port, a fuel regulator, a jet nozzle, and a burner cylinder;

a lighter base comprising: a fuel tank, a fuel output port, an ignition source, a fuel lever, and a push button mechanism for actuating the fuel lever and creating a spark;

wherein the fuel input port and the fuel output port mate together forming an airtight seal as the snap-in burner assembly unit is installed within the lighter base;

wherein the lighter base further comprises a piezo-electric spark generator and an insulator;

wherein the snap-in burner assembly unit further comprises a high voltage spark ignitor wire;

and wherein the high voltage spark ignitor wire is electrically connected to the piezo-electric generator when the snap-in burner assembly unit is installed within the lighter base; and

wherein the insulator has a tapered opening where a conductive portion of the high voltage spark ignitor wire is received when the snap-in burner assembly unit is installed within the lighter base.

2. The pocket lighter of claim 1, wherein the conductive portion of the high voltage spark ignitor and a high voltage conductor of the piezo-electric spark generator are electrically connected by direct contact, by a defined distance, by a gap, or by a conductive paste when the snap-in burner assembly unit is installed within the lighter base.

3. The pocket lighter of claim 1, wherein the snap-in burner assembly unit produces a soft flame, torch flame, twin flame, circular flame, or a combination thereof.

4. The pocket lighter of claim 3, wherein the snap-in burner assembly unit is a user replaceable accessory of the pocket lighter.

5. The pocket lighter of claim 1, wherein the lighter base further comprises a burner assembly release/lock lever.

6. The pocket lighter of claim 1, wherein the fuel outlet port further comprises one or more O-ring seals.

7. The pocket lighter of claim 5, wherein the release/lock lever is spring loaded.

8. The pocket lighter of claim 7, wherein the release/lock lever is spring loaded in a normally locked position.

9. The pocket lighter of claim 8, wherein the release/lock lever is actuated to release the snap-in burner assembly unit by pushing a pushpin actuator attached to the snap-in burner assembly unit.

10. The pocket lighter of claim 1, wherein the snap-in burner assembly unit is locked in place by rotating a locking nut.

11. The pocket lighter of claim 1, wherein the lighter base output port is a pivoting output port.

12. The pocket lighter of claim 11, wherein the lighter base further comprises a flexible gas tube that connects lighter fuel of the pocket lighter to the pivoting output port.

13. The pocket lighter of claim 12, wherein the snap-in burner assembly unit snaps into the pivoting output port.

14. The pocket lighter of claim 13, wherein the snap-in burner assembly unit is able to rotationally pivot away from the push button mechanism between 0 and 30 degrees.

15. The pocket lighter of claim 14, wherein the pivoting output port comprises one or more notches for positionally fixing an angle of rotation of the snap-in burner assembly unit.

16. The pocket lighter of claim 12, wherein the flexible gas tube connects to a 90-degree fitting of the pivoting output port.

17. The pocket lighter of claim 16, wherein the 90-degree fitting further comprises one or more O-ring seals.

18. The pocket lighter of claim 17, wherein the one or more O-rings seals create an airtight seal with the input port of the snap-in burner assembly unit.

* * * * *