

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
5 January 2006 (05.01.2006)

PCT

(10) International Publication Number
WO 2006/002414 A2

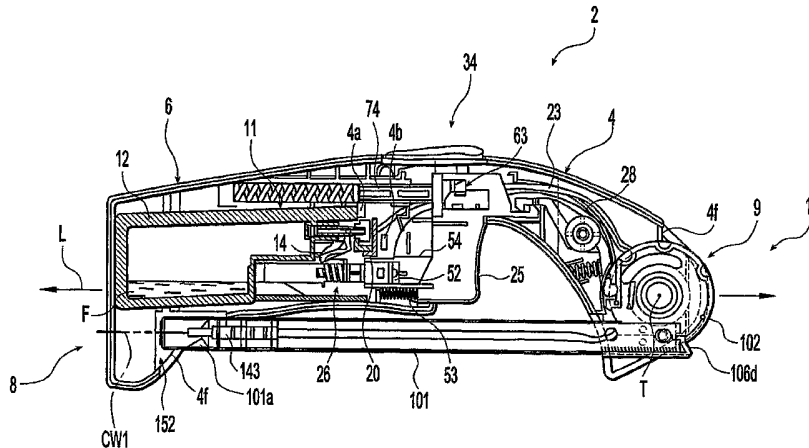
- (51) International Patent Classification:
F23D 11/36 (2006.01)
- (21) International Application Number:
PCT/US2005/022735
- (22) International Filing Date: 22 June 2005 (22.06.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
10/876,112 23 June 2004 (23.06.2004) US
- (71) Applicant (for all designated States except US): **BIC CORPORATION** [US/US]; 500 Bic Drive, Milford, CT 06460 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **SGROI, Anthony** [US/US]; 28 Hintz Drive, Wallingford, CT 06492 (US). **UKLEJA, Jeff** [US/US]; 334 Peck Avenue, West Haven, CT 06516 (US). **ADAMS, Paul** [US/US]; 21 Perry Drive, Monroe, CT 06468 (US).
- (74) Agent: **ROTHERY, Brian, M.**; Jones Day, 222 East 41st Street, New York, NY 10017-6702 (US).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MULTI-MODE LIGHTER



(57) Abstract: The present invention is directed to a lighter including a housing having a supply of fuel, an actuating member extending from the housing and being movable to selectively perform at least one step in igniting the fuel, and an inhibiting member extending from the housing. Moving the inhibiting member a predetermined distance resists, obstructs and/or prevents the actuating member from performing at least one step in igniting the fuel. For example, moving the inhibiting member the predetermined distance may resist and/or prevent movement of the actuating member, may obstruct and/or prevent the release of fuel, and/or may resist and/or prevent the creation of a spark to ignite the fuel. Various other features which improve the functioning of the lighter may be provided separately or in combination.

WO 2006/002414 A2

MULTI-MODE LIGHTER

Cross-Reference to Related Applications

[001] The present application is a continuation-in-part of United States Patent Application No. 10/647,505, filed August 26, 2003, which is a continuation-in-part of United States Patent Application No. 10/389,975, filed March 18, 2003, which is a continuation-in-part of United States Patent No. 10/085,045, now U.S. Patent No. 6,726,469, filed March 1, 2002, which is a continuation-in-part of both United States Patent Application No. 09/817,278 and United States Patent Application No. 09/819,021, now U.S. Patent No. 6,488,492, both of which were filed on March 27, 2001, and both of which are continuation-in-part applications of United States Patent Application No. 09/704,689, now U.S. Patent No. 6,491,515, filed November 3, 2000. The contents of these six applications are expressly incorporated herein by reference thereto.

Technical Field of the Invention

[002] The present invention generally relates to lighters such as pocket lighters used to light cigarettes and cigars, or utility lighters used to ignite candles, barbecue grills, fireplaces and campfires, and more particularly to such lighters which resist inadvertent operation or undesirable operation by unintended users.

Background of the Invention

[003] Lighters used for igniting tobacco products, such as cigars, cigarettes, and pipes, have developed over a number of years. Typically, these lighters use either a rotary friction element or a piezoelectric element to generate a spark near a nozzle which emits fuel from a fuel container. Piezoelectric mechanisms have gained universal acceptance because they are simple to use. United States Patent No. 5,262,697 ("the '697 patent") to Meury discloses one such piezoelectric mechanism, the disclosure of which is incorporated by reference herein in its entirety.

[004] Lighters have also evolved from small cigarette or pocket lighters to several forms of extended or utility lighters. These utility lighters are more useful for general purposes, such as lighting candles, barbecue grills, fireplaces and campfires. Earlier attempts at such designs relied simply on extended actuating handles to house a typical pocket lighter at the end. United States Patent Nos. 4,259,059 and 4,462,791 contain examples of this concept.

[005] Many pocket and utility lighters have had some mechanism for resisting undesired operation of the lighter by young children. For example, pocket and utility

lighters have included a spring-biased blocking latch which arrests or prevents movement of the actuator or push-button. United States Patent No. 5,145,358 to Shike *et al.*, discloses an example of such lighters.

[006] There remains a need for lighters which resist inadvertent operation or undesirable operation by unintended users, but which provide each intended user with a consumer-friendly method of operating the lighters so that the lighters appeal to a variety of intended users.

Summary of the Invention

[007] The present invention is directed to a lighter including a housing having a supply of fuel, an actuating member extending from the housing, the actuating member movable to selectively perform at least one step in igniting the fuel, and an inhibiting member extending from the housing. Moving the inhibiting member a predetermined distance may resist, obstruct and/or prevent the actuating member from performing at least one step in igniting the fuel. For example, moving the inhibiting member the predetermined distance may resist, obstruct and/or prevent the actuating member from moving sufficiently to perform at least one step in igniting the fuel. Alternatively or additionally, moving the inhibiting member the predetermined distance may resist, obstruct and/or prevent the actuating member from releasing the fuel. Further, alternatively or additionally, moving the inhibiting member the predetermined distance may resist, obstruct and/or prevent the actuating member from creating a spark to ignite the fuel.

[008] The actuating member may be movable in a first direction, and the inhibiting member may be movable in a second direction that is substantially opposite the first direction. Additionally or alternatively, the actuating member may be movable along a first axis and the inhibiting member may be movable along a second axis that is substantially parallel to the first axis. The housing may include a proximal end and a distal end, and the inhibiting member may extend from the proximal end, although other locations are contemplated. The proximal end may be substantially blunt and/or planar, although other shapes are contemplated. The actuating member may be movable along a first axis, and at least a portion of the proximal end may be substantially normal to the first axis. According to one aspect of the invention, an enlarged contact surface may be associated with the inhibiting member. The contact surface may cover greater than about half of the proximal end of the housing, or alternatively, may cover substantially all of the proximal end of the housing. The contact surface and at least a portion of the inhibiting member may be monolithic, or alternatively, may be formed separately. According to one embodiment, the contact surface is a beam that acts on the inhibiting member. The beam may be pivotally or

hingedly connected to the housing by a pivot member. Alternatively, the beam may be a cantilever beam associated with the inhibiting member. Additionally or alternatively, the lighter may include a wand member extending from the distal end of the housing, and the wand member may optionally be pivotable between an open position and a closed position.

[0009] The lighter may additionally or alternatively include a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode. A first actuating force may be required to move the actuating member to perform at least one step in igniting the fuel when the actuating member is in the high-force mode, and a second actuating force may be required to move the actuating member to perform at least one step in igniting the fuel when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

[0010] According to one exemplary embodiment of the present invention, the lighter may include a housing having a supply of fuel, a valve operable to release the fuel, an ignition mechanism operable to create a spark to ignite the fuel, an actuating member extending from the housing, wherein moving the actuating member a first distance operates the valve and/or the ignition mechanism, and an inhibiting member extending from the housing and movable between a first position and a second position, wherein when the inhibiting member is in the first position, the actuating member is capable of moving the first distance, and when the inhibiting member is in the second position, the actuating member is resisted and/or prevented from moving the first distance, further, wherein the inhibiting member is biased toward the first position. A resilient or elastic member may be provided for biasing the inhibiting member toward the first position. When the inhibiting member is in the second position, the actuating member may be capable of moving a second distance that is less than the first distance. Alternatively, the actuating member may be substantially blocked from movement when the inhibiting member is in the second position. The lighter may further include a blocking member associated with the inhibiting member, and the blocking member may engage the actuating member when the inhibiting member is in the second position. The inhibiting member and the blocking member may be monolithic, or alternatively, may be formed as separate pieces. The blocking member may be disposed in a cavity in the actuating member.

[0011] According to another exemplary embodiment of the present invention, the lighter may include a housing having a supply of fuel in communication with a nozzle, an ignition mechanism operable to create a spark to ignite the fuel proximate the nozzle, an actuating member extending from the housing and movable to release the fuel from the supply of fuel, and an inhibiting member extending from the housing and biased to a first

position, wherein the inhibiting member is movable to a second position to resist, obstruct and/or prevent the ignition and/or the release of fuel from the nozzle. The lighter may further include an elastic element for biasing the inhibiting member to the first position. Additionally or alternatively, the lighter may include a conduit extending from the supply of fuel to the nozzle, and the fuel may be obstructed from flowing through at least a portion of the conduit when the inhibiting member is in the second position. For example, a piston may be associated with the conduit, and the piston may obstruct the fuel from flowing through at least a portion of the conduit when the inhibiting member is in the second position. The piston may be disposed within the conduit, although other configurations are contemplated. The lighter may further include a junction connecting a first portion of the conduit to a second portion of the conduit, and the piston may be disposed within the junction. The piston may be normally biased toward a first position in which the fuel flows through the junction. For example, an elastic element may be provided to bias the piston toward the first position. Moving the inhibiting member to the second position may move the piston to a second position in which fuel is obstructed and/or prevented from flowing through the junction.

[0012] According to still another exemplary embodiment of the present invention, the lighter may include a housing having a supply of fuel, a nozzle for releasing the fuel, an electrical circuit having a spark gap proximate the nozzle, an ignition mechanism for creating a spark across the spark gap, an actuating member extending from the housing and movable to operate the ignition mechanism, and an inhibiting member extending from the housing and movable from a first position where a portion of the electrical circuit (*e.g.*, a switch) is closed to a second position where the portion of the electrical circuit is open. The inhibiting member may be biased to the first position, for example by an elastic element. The lighter may further include a first electrical pathway extending from the ignition mechanism to a first terminal of the spark gap, and a second electrical pathway extending from the ignition mechanism to a second terminal of the spark gap, and at least one of the first and second electrical pathways may be opened when the inhibiting member is in the second position. The lighter may also include a switch located in at least one of the first and second electrical pathways, and the switch may be closed when the inhibiting member is in the first position, and the switch may be open when the inhibiting member is in the second position. The actuating member may be operable to release the fuel from the nozzle, although other configurations are contemplated.

[0013] According to yet another exemplary embodiment of the present invention, the lighter may include a housing having a supply of fuel, a nozzle for releasing the fuel, an

ignition mechanism connectable to a first electrical circuit and a second electrical circuit, the first electrical circuit having a first spark gap proximate the nozzle, an actuating member extending from the housing and movable to operate the ignition mechanism, and an inhibiting member extending from the housing and movable between a first position where energy generated by the ignition mechanism travels through the first electrical circuit and a second position where energy generated by the ignition mechanism travels through the second electrical circuit, wherein the inhibiting member is biased toward the first position. Operation of the ignition mechanism may create a spark across the first spark gap when the inhibiting member is in the first position. The first electrical circuit may have a first resistance and the second electrical circuit may have a second resistance, wherein the second resistance is greater than the first resistance when the inhibiting member is in the first position, and the second resistance is less than the first resistance when the inhibiting member is in the second position. The second electrical circuit may have a second spark gap when the inhibiting member is in the first position, and the second spark gap may be larger than the first spark gap. A portion of the inhibiting member may close the second spark gap when the inhibiting member is in the second position. For example, a conductive strip may be associated with the inhibiting member, and the conductive strip may close the second spark gap when the inhibiting member is in the second position. The first electrical circuit may be closed when the inhibiting member is in the first position, and/or the second electrical circuit may be closed when the inhibiting member is in the second position. Additionally or alternatively, the first electrical circuit may be open when the inhibiting member is in the second position. The first electrical circuit may include the second electrical circuit. Movement of the actuating mechanism may release the fuel from the nozzle, although other configurations are contemplated.

Brief Description of the Drawings

[0014] Preferred features of the present invention are disclosed in the accompanying drawings, wherein similar reference characters denote similar elements throughout the several views, and wherein:

[0015] Fig. 1 is a cut-away, side view of a utility lighter according to one illustrative embodiment of the present invention, shown with various components removed, wherein the lighter is in an initial state, a wand assembly is in a closed position, and an actuating member and latch member are in initial states, and a plunger member is in a high-actuation-force position;

[0016] Fig. 1A is an enlarged, exploded, perspective view of several components of a fuel supply unit for use in the lighter of Fig. 1:

- [0017] Fig. 1B is an enlarged, cut-away, side view of a rear portion of the utility lighter of Fig. 1;
- [0018] Fig. 2 is a partial, side view of the lighter of Fig. 1, shown with various components removed, wherein the actuating member and latch member are in initial states, and the plunger member is in a high-actuation-force position;
- [0019] Fig. 3 is an enlarged, exploded, perspective view of various components of the lighter of Fig. 1, shown without a housing;
- [0020] Fig. 3A is an enlarged, exploded, perspective view of another illustrative embodiment of the plunger member and a piston member for use with the lighter of Fig. 1;
- [0021] Fig. 4 is an enlarged, side view of the components of Fig. 3;
- [0022] Fig. 5 is an enlarged, partial, side view of the lighter of Fig. 1, where the plunger member is in the high-actuation-force position and the actuating member is in the initial position;
- [0023] Fig. 6 is an enlarged, partial, side view of the lighter of Fig. 1, where the plunger member is in the high-actuation-force position and the actuating member is in a depressed position;
- [0024] Fig. 7 is an enlarged, partial, side view of the lighter of Fig. 1, where the latch member is depressed, the plunger member is in a low-actuation-force position and the actuating member is in the initial position;
- [0025] Fig. 8 is an enlarged, partial, side view of the lighter of Fig. 1, where the latch member is depressed, the plunger member is in the low-actuation-force position and the actuating member is in the depressed position;
- [0026] Fig. 9 is an exploded, partial, perspective view of the lighter of Fig. 1 showing the housing and the wand assembly separated;
- [0027] Fig. 9A is an exploded, partial, perspective view of various components of the wand assembly for use with the lighter of Fig. 1;
- [0028] Fig. 10 is an enlarged, partial, side view of a front portion of the lighter of Fig. 1 showing the wand assembly in a closed position;
- [0029] Fig. 10A is an enlarged, partial, side view of the front portion of the lighter of Fig. 10 showing the wand assembly partially-extended and pivoted by about 20°;
- [0030] Fig. 11 is an enlarged, partial, side view of the front portion of the lighter of Fig. 10 showing the wand assembly partially-extended and pivoted by about 45°;
- [0031] Fig. 12 is an enlarged, partial, side view of the front portion of the lighter of Fig. 10 showing the wand assembly partially-extended and pivoted by about 90°;

- [0032] Fig. 13 is an enlarged, partial, side view of the front portion of the lighter of Fig. 10 showing the wand assembly fully-extended;
- [0033] Fig. 14 is an enlarged, partial, side view of the front portion of the lighter of Fig. 10 showing the wand assembly partially-extended and pivoted by about 135°;
- [0034] Fig. 15 is an enlarged, perspective view of a cam follower of the lighter of Fig. 1;
- [0035] Fig. 16 is a cut-away, side view of a utility lighter according to a second illustrative embodiment of the present invention, shown with various components removed, and shown with the actuating member in an initial position and an inhibiting member in a first or rest position;
- [0036] Fig. 17 is a partial, side view of the lighter of Fig. 16, shown with various components removed, and shown with the actuating member in the initial position and the inhibiting member in the first position;
- [0037] Fig. 17A is an enlarged, detail view of the actuating member and other components shown in Fig. 17;
- [0038] Fig. 18 is a partial, side view of the lighter of Fig. 16, shown with various components removed, and shown with the actuating member in the initial position and the inhibiting member in a second or depressed position;
- [0039] Fig. 18A is an enlarged, detail view of the actuating member and other components shown in Fig. 18;
- [0040] Fig. 19 is a partial, side view of an alternative embodiment of the lighter of Fig. 16;
- [0041] Fig. 20 is an enlarged, partial, side view of an end portion of another alternative embodiment of the lighter of Fig. 16;
- [0042] Fig. 21 is an enlarged, partial, side view of the end portion of yet another alternative embodiment of the lighter of Fig. 16;
- [0043] Fig. 22 is a partial, side, schematic representation of a utility lighter according to a third illustrative embodiment of the present invention, shown with various components removed, and shown with the inhibiting member in a first or rest position;
- [0044] Fig. 22A is a partial, side, schematic representation of the lighter of Fig. 22, shown with various components removed, and shown with the inhibiting member in a second or depressed position;
- [0045] Fig. 23 is a partial, side, schematic representation of a utility lighter according to a fourth illustrative embodiment of the present invention, shown with various

components including the actuating member removed, and shown with the inhibiting member is a first or rest position;

[0046] Fig. 23A is a partial, side, schematic representation of the utility lighter of Fig. 23, shown with various components removed, and shown with the inhibiting member in a second or depressed position;

[0047] Fig. 24 is a partial, side, schematic representation of a utility lighter according to a fifth illustrative embodiment of the present invention, shown with various components including the actuating member and fuel supply removed, and shown with the inhibiting member is a first or rest position;

[0048] Fig. 24A is a partial, side, schematic representation of the utility lighter of Fig. 24, shown with various components removed, and shown with the inhibiting member in a second or depressed position;

[0049] Fig. 25 is a partial, side, schematic representation of a utility lighter according to a sixth illustrative embodiment of the present invention, shown with various components including the actuating member, fuel supply, and housing removed, and shown with the inhibiting member is a first or rest position;

[0050] Fig. 25A is a partial, side, schematic representation of the utility lighter of Fig. 25, shown with various components removed, and shown with the inhibiting member in a second or depressed position.

Detailed Description of the Preferred Embodiments

[0051] Turning to Fig. 1, an embodiment of a utility lighter 2 constructed in accordance with the present invention is shown with the understanding that those of ordinary skill in the art will recognize many modifications and substitutions which may be made to various elements. While the invention will be described with reference to a utility lighter, one of ordinary skill in the art could readily adapt the teaching to conventional pocket lighters and the like.

[0052] Lighter 2 generally includes a housing 4 which may be formed primarily of molded-rigid-polymer or plastic materials such as acrylonitrile butadiene styrene terpolymer or the like. The housing 4 may also be formed of two-parts that are joined together by techniques known by those of ordinary skill in the art, such as ultrasonic welding.

[0053] Housing 4 includes various support members, such as support member 4a discussed below. Further support members are provided in the lighter 2 for various purposes, such as supporting components or directing the travel path of components. The housing 4 further includes a handle 6, which forms a first end 8 and a second end 9 of the

housing. A wand assembly 10, as discussed in detail below, is pivotally connected to the second end 9 of the housing.

[0054] Referring to Figs. 1, 1A, and 1B, handle 6 preferably contains a fuel supply unit 11 that includes a fuel supply container or main body 12, a valve actuator 14, a jet and valve assembly 15, a spring 16, a guide 18, and a retainer 20. The container 12 supports the other components of the fuel supply unit 11 and defines a fuel compartment 12a and a chamber 12b, and further includes a pair of spaced support members 12c extending upward from the top edge thereof. The support members 12c define openings 12d. The fuel compartment 12a contains fuel F, which may be compressed hydrocarbon gas, such as butane or a propane and butane mixture, or the like.

[0055] Referring to Figs. 1A and 1B, a valve actuator 14 is rotatably supported on the compartment 12 below the support members 12c. The valve actuator 14 is connected to a jet and valve assembly 15 that includes a jet or valve stem 15a and an electrode 15b. The electrode 15b is optional. The jet and valve assembly 15 is a normally open valve design, and closed by the pressure of a spring member 16 on valve actuator 14. Alternatively, a jet and valve assembly with a normally closed valve design can also be used.

[0056] A suitable fuel supply unit 11 is disclosed in United States Patent No. 5,934,895 ("the '895 patent"), the disclosure of which is incorporated herein by reference in its entirety. An alternative arrangement for the fuel supply unit 11 that can be used is disclosed in United States Patent No. 5,520,197 ("the '197 patent") or United States Patent No. 5,435,719 ("the '719 patent"), the disclosures of which are incorporated by reference in their entirety. The fuel supply units disclosed in the above patents can be used with all of the disclosed components or with various components removed, such as windshields, latch springs, latches, and the like, as desired by one of ordinary skill in the art. Alternative arrangements of the fuel supply unit can be used.

[0057] Referring to Fig. 1A, the guide 18 with walls to define a slot 18a and projections 18b. When the lighter is assembled, the guide 18 is disposed between the support members 12c, and the support members 12c flex outward to accommodate the guide 18. Once the projections 18b are aligned with the openings 12d, the support members 12c may return to their vertical, initial positions. The interaction between the projections 18b and the openings 12d allow the guide 18 to be retained within the main body 12.

[0058] Referring to Figs. 1A and 1B, the retainer 20 includes a front portion 20a that defines a bore 20b and a L-shaped rearward portion 20c. A fuel connector 22 is disposed on the top of jet 15a and receives a fuel conduit 23 therein. The connector 22, however, is optional and if not used the conduit 23 can be disposed on the jet 15a directly.

[0059] The retainer 20 properly positions fuel conduit 23 with respect to the jet and valve assembly 15 by receiving conduit 23 through the bore 20b so that the conduit 23 is within the connector 22. Details of the conduit 23 will be discussed below. The rearward portion 20c of the retainer 20 is disposed within the slot 18a of the guide 18. The retainer 20 and guide 18 may be configured so that these components snap-fit together so that the conduit 23 is properly positioned with respect to the jet and valve assembly 15. The guide 18 and retainer 20 are optional and the housing 4 or other components of the lighter can be used to support and position the connector 22 and the conduit 23. In addition, the guide and retainer 20 may be configured differently so long as they function to locate connector 22 and conduit 23 to jet 15a.

[0060] The container 12, guide 18, retainer 20, and connector 22 may be made with plastic material. However, the valve actuator 14, valve stem 15a, and electrode 15b are preferably formed of electrically conductive materials. The fuel supply unit 11 can be a preassembled unit that may include the fuel supply container 12, the jet and valve assembly 15, and the biased valve actuator 14. When the fuel supply unit 11 is disposed within the lighter, the housing support member 4a aids in locating and maintaining the position of the unit 11, as shown in Fig. 1. The housing support member 4b aids in positioning the retainer 20.

[0061] Referring again to Fig. 1, lighter 2 also includes an actuating member 25 which facilitates movement of the valve actuator 14 to selectively release fuel F. In this embodiment, the actuating member also selectively activates an ignition assembly 26 for igniting the fuel. Alternatively, the actuating member may perform either the fuel release or ignition function, and another mechanism or assembly may perform the other function. It is also possible for the actuating member to be part of an actuating assembly.

[0062] Referring to Fig. 1B, although not necessary for all aspects of this invention, an electric ignition assembly such as a piezoelectric mechanism is the preferred ignition assembly 26. The ignition assembly may alternatively include other electronic ignition components, such as shown in United States Patent No. 3,758,820 and United States Patent No. 5,496,169, a spark wheel and flint assembly or other well-known mechanisms in the art for generating a spark or igniting fuel. The ignition assembly may alternatively include a battery having, for example, a coil connected across its terminals. The piezoelectric mechanism may be the type disclosed in the '697 patent. Piezoelectric mechanism 26 has been illustrated in Fig. 1B schematically and particularly described in the '697 patent.

[0063] The piezoelectric unit 26 includes an upper portion 26a and a lower portion 26b that slide with respect to each other along a common axis. A coil spring or return

spring 30 is positioned between the upper and lower portions 26a, 26b of piezoelectric unit. The return spring 30 serves to resist the compression of piezoelectric unit, and when positioned in the actuating member 25 resists the depression of actuating member 25. The lower portion 26b of piezoelectric unit is received in cooperating chamber 12b in fuel supply unit 11.

[0064] The piezoelectric unit 26 further includes an electrical contact or cam member 32 fixedly connected to the upper portion 26a. In the initial position, the portions 26a and 26b are separated by a gap X. The cam member 32 is formed of a conductive material. The upper portion 26a is coupled to actuating member 25. Spark conductor or wire 28 is partially insulated and may be electrically connected with the electrical contact 29 of the piezoelectric unit in any known manner.

[0065] As shown in Fig. 1, latch member 34 is on the top side of the handle 6 and the actuating member 25 is opposite the latch member 34 near the bottom side of the handle 6. Referring to Figs. 2-4, the latch member 34 generally includes an unsupported, movable, front end 36 which includes a downwardly extending boss 36a and a rear end 38 pivotally fixed to a hinge 40 of the housing 4. One of ordinary skill in the art can readily appreciate that latch member 34 also may be coupled to the housing in another manner such as in a cantilevered fashion, slidably or rotatably. When the latch member 34 is slidable a cam may be used therewith.

[0066] Referring to Figs. 3 and 4, a leaf spring 42 includes a front end 42a and a rear end 42b. The leaf spring 42 is bent, as best seen in Fig. 4, so that the front end 42a is spaced above the rear end 42b. The shape of the leaf spring can be modified such as being planar depending on the arrangement of the components in the lighter and the necessary space considerations. Alternatively, the leaf spring may be disposed in front of latch member 34. In addition, the leaf spring may be replaced with a coil spring, a cantilever spring or any other biasing member suitable for biasing the latch member 34.

[0067] Referring to Fig. 5, the rear end 42b of the leaf spring 42 is disposed within the housing 4 between support members 4c such that end 42b is coupled to the housing 4 such that spring 42 operates substantially like a cantilevered member. Due to the configuration, dimensions, and material of the spring 42, the front end 42a is free to move and is biased upward to return the latch member front end 36 to its initial position, as shown in Fig. 5. Thus, unsupported front end 36 of latch member 34 may be moved downwardly along with the front end 42a of spring 42.

[0068] Latch member 34 is preferably formed of plastic, while leaf spring 42 is preferably manufactured from a metal having resilient properties, such as spring steel,

stainless steel, or from other types of materials. It should be noted that while leaf spring 42 is shown mounted to housing 4 it may alternatively be coupled to other components of the lighter.

[0069] Referring to Fig. 1, further details of the actuating member 25, will now be discussed. Actuating member 25 is preferably slidably coupled to housing 4. The actuating member 25 and housing 4 may be configured and dimensioned so that movement of the actuating member forward or rearward is limited. One of ordinary skill in the art can appreciate that the actuating member can alternatively be coupled or connected to the housing in another manner, such as in a pivotal, rotatable or cantilevered fashion. For example, the actuating member can be a linkage system or formed of two pieces, where one piece is slidably coupled to the housing and the other piece pivots.

[0070] Turning again to Fig. 3, the actuating member 25 includes a lower portion 44 and an upper portion 46. Referring to Figs. 3-4, the lower portion 44 includes a forward finger actuation surface 48, a first chamber 50 (shown in phantom), and a second chamber 52 (shown in phantom). When the actuating member 25 is disposed within the housing 4, the finger actuation surface 48 extends from the housing so that it is accessible by a user's finger (not shown).

[0071] In this embodiment, the actuating member 25 lower and upper portions are formed as a single piece. Alternatively, the upper and lower portions can be two, separate pieces coupled together or the actuating member can be part of a multiple piece unit.

[0072] Referring to Figs. 4 and 5, the first and second chambers 50 and 52 of the actuating member 25 are horizontally disposed. The first chamber 50 is below the second chamber 52, and the first chamber 50 is configured to receive an actuating member return spring 53. The spring 53 is disposed between the actuating member 25 and a first spring stop portion or support member 4d of the housing 4. Referring to Fig. 4, the actuating member 25 further includes an extension 54 extending rearwardly from the lower portion 44. The second chamber 52 extends into the extension 54. The second chamber 52 is configured to receive the ignition assembly 26 (as shown in Fig. 1).

[0073] Referring to Figs. 3 and 4, the upper portion 46 of the actuating member 25 includes two L-shaped guides. In this embodiment the guides are side cutouts, represented by cutout 56, in side wall 57. The cutout 56 includes a first portion 56a and a second portion 56b in communication with the first portion 56a. The second portion 56b includes a wall 56c substantially parallel to vertical axis V. Vertical axis V is perpendicular to longitudinal axis L and transverse axis T (shown in Fig. 1). In this embodiment, the guides

are cutouts but in another embodiment the actuating member can have solid side walls and the guides can be formed on the inner surface of the side walls.

[0074] Referring to Fig. 3, the upper portion 46 of the actuating member also includes a rear cutout 58 and slot 60 in an upper wall 61 of the actuating member. The upper portion 46 further includes a forwardly extending engaging portion 62 with an engaging surface 62a. The function of the engaging portion 62 will be discussed in detail below.

[0075] Referring to Figs. 1 and 3, in this embodiment the upper portion 46 of the actuating member 25 and the guides 56 form a portion of a dual-mode assembly. The dual-mode assembly also includes a plunger member 63 and a piston member 74. In this embodiment, the lower and upper portions 44 and 46 of the actuating member are formed as a single piece. In another embodiment, the lower and upper portions 44 and 46 can be formed as separate pieces and operatively connected together.

[0076] The plunger member 63 when installed in the lighter is disposed below the latch member 34. The plunger member 63 is substantially T-shaped with a longitudinally extending body portion 64 and transversely extending head portions 66. As best seen in Fig. 4, the head portions 66 have a planar, front surface 66a. Surface 66a is generally parallel to vertical axis V, when plunger member 63 is installed within actuating member 25.

[0077] Referring again to Fig. 3, the body portion 64 includes two transversely extending pins 68 at the rear end, a recess 70 on the upper surface, and a vertically extending projection 72 that extends from the bottom surface of the body portion 64. Recess 70 is optional.

[0078] Referring to Figs. 3 and 4, in alternative embodiments, the wall 56c of the actuating member 25 and the wall 66a of the plunger member 63 can be configured differently. For example, walls may alternatively be angled with respect to vertical axis V. For example, walls 66a and 56c may be angled to be substantially parallel to line A1, which is angularly offset from vertical axis V by angle β . Walls 66a, 56c may alternatively be angled to be substantially parallel to line A2, which is angularly offset from vertical axis V by angle θ . Alternatively, wall 56c can be configured to include a V-shaped notch and the wall 66a can include a V-shaped projection to be received in notch of wall 56c or vice versa.

[0079] Referring to Figs. 4 and 5, the piston member 74 includes a rear portion 76 and a front portion 78. The rear portion 76 includes a vertical rear wall 76a for contacting a high-force spring or biasing member 80. The spring 80 is disposed between the wall 76a

and the second spring stop portion or support member 4e of the housing 4. Turning again to Fig. 4, the rear portion 76 further includes horizontal cutouts 76b that define a stop member 76c. The cutouts 76b and stop member 76c allow the piston member 74 to be slidably mounted to rails (not shown) in the housing and to allow the piston member 74 to slide longitudinally a predetermined distance so that the plunger member 63 can function as discussed below.

[0080] Referring to Figs. 3 and 4, the front portion 78 of the piston member 74 includes two spaced apart arms 82. The arms 82 and front portion 78 define a cutout 84 that receives the pins 68 of the plunger member 63. The cutout 84 and pins 68 of the plunger member 63 are configured and dimensioned to allow the plunger member 63 to pivot with respect to the piston member 74, as discussed in detail below. In this embodiment, the plunger member 63 is pivotally connected to the piston member 74, however in another embodiment the plunger member 63 can be fixedly connected to the piston member 74 but be a resiliently deformable.

[0081] The front portion 78 of piston member 74 further includes a downwardly extending support portion 86 that includes a horizontal platform 88 with an upwardly extending pin 90. Referring to Figs. 3 and 5, when the piston member 74 is assembled within the lighter, the platform 88 is disposed through the rear cutout 58 of actuating member 25, and the pin 90 may be aligned with the pin 72 of the plunger member 63 so that the pins 72, 90 retain a plunger return spring 92 there between. The plunger member 63 contacts the bottom surface of upper wall 61 (as shown in Fig. 3) due to the return spring 92 that biases the plunger member upward toward an initial position.

[0082] Referring to Fig. 3A, a preferred embodiment of a plunger member 63' and a piston member 74' are shown for use with the lighter 2 of Fig. 1. The plunger member 63' is similar to plunger member 63 except the body portion 64' includes a single central pin portion 68' and a slot 68''. The piston member 74' is similar to piston member 74 except the front portion 78' of the piston member 74' includes a single arm 82' for defining a cutout 84' for pivotally supporting the pin 68' of the plunger member 63'. When the plunger member 63' pivots downward the slot 68'' receives the arm 82'.

[0083] Operation of the actuating member 25 will be discussed in detail below with reference to Figs. 6-8. With reference to Fig. 9, according to a further aspect of the lighter 2, it may include a wand assembly 10, the details of which will now be discussed. The wand assembly 10 may be movably coupled to housing 4 and/or formed separately from housing 4. Wand assembly 10 may be pivoted between a first position or closed position, shown in Figs. 1 and 10 and a second or open or fully-extended position, shown in Fig. 13.

In the closed position, the wand assembly 10 is folded closely to housing 4 for convenient transportation and storage of lighter 2. In the fully-extended position, the wand assembly 10 extends outward and away from housing 4.

[0084] Referring to Figs. 9 and 9A, wand assembly 10 includes wand 101 fixedly connected to a base member 102. The wand 101 is a cylindrical tube of metal that receives the conduit 23 (as shown in Fig. 1) and wire 28. The wand 101 also includes a tab 101a formed integrally therewith near the free end of the wand. Alternatively, a separate tab may be associated with wand.

[0085] Referring again to Figs. 9 and 9A, base member 102 is receivable in a recess 104 formed in the second end 9 of housing 4. Recess 104 is located between the sides of housing 4, and therefore locates wand assembly 10 between these sides.

[0086] Base member 102 includes two body portions 106a and b and is generally cylindrical and defines a bore 108. According to the embodiment shown, body portions 106a and b define channels 106c so that when the body portions 106a and b are joined the channels 106c define a chamber 107 therein. One technique that can be used to join the base member pieces is ultrasonic welding. The present invention, however, is not limited to this configuration or construction of base member 102.

[0087] Body portion 106b defines an aperture 109 therein. As best seen in Fig. 10, aperture 109 is an arcuate slot that extends through body portion 106b and is in communication with the channel 106c and chamber 107 (as shown in Fig. 9) formed therein. The function of the arcuate slot 109 will be discussed in detail below.

[0088] Referring again to Fig. 9, housing 4 includes a pair of axles 110a and 110b formed on an inner surface 112 thereof. Axle 110a is a male member and axle 110b is a female member. These axles 110a,b may be configured and dimensioned so that they snap-fit together when joined. Alternatively, axles 110a,b may be joined by ultrasonic welding or other methods of joining known to one of ordinary skill in the art. In another alternative, the axles 110a,b may be spaced apart. Once assembled, axles 110a and 110b extend into bore 108 to pivotally couple wand assembly 10 to housing 4. Axles 110 thus define a pivot axis P about which wand assembly 10 pivots. The pivot axis P is preferably transversely extending (*i.e.*, extends from one side of the housing 4 to the other, not vertically extending from) and is perpendicular to a longitudinal axis L, however other orientations of pivot axis P are included within the present invention. Housing 4 may also include spacers 113 formed on the inner surface 112 of housing 4, to support base member 102 in recess 104. Base member 102 may also include a pair of optional frictional members on opposite sides thereof. For example, a pair of rubber O-rings may be seated on opposite sides of base

member and rest against spacers 113. The optional frictional members may be used to provide resistance against pivoting of wand assembly 10 about pivot axis P.

[0089] Referring back to Fig. 1, the lighter housing 4 further includes a vertical wall 4f at the front end 9. The base member 102 further includes a projection 106d extending generally radially therefrom. Cooperation between the wall 4f and the projection 106d prevents movement of the wand 101 in the direction W1 substantially beyond a fully-extended position, shown in Fig. 13. Furthermore, when wand assembly 10 is in the fully-extended position, a slight clearance may exist between vertical wall 4f and projection 106d of base member 102.

[0090] Referring to Figs. 10-14, lighter 2 may be provided with a cam member 116 that releasably positions or retains wand assembly 10 at various positions from the closed position (shown in Fig. 10) to the fully-extended position (shown Fig. 13), and at various intermediate positions (shown in Figs. 11 and 12) there between. Cam follower 116 also may prevent a user from moving, or more specifically sliding, actuating member 25 sufficiently to ignite lighter 2 when wand assembly 10 is in the closed position of Fig. 10, and continues to prevent such sufficient movement of the actuating member 25 until wand assembly 10 has been pivoted to a predetermined position, such as a position about 40° from closed, as discussed below. Such immobilization of actuating member 25 may prevent the ignition of the lighter by preventing fuel release, or flame ignition. Flame ignition may be prevented, for example, by preventing creation of a spark.

[0091] Referring to Fig. 15, cam follower 116 is rotatably mounted on a boss 117 (as best seen in Fig. 9) formed on housing 4. The cam follower 116 includes a hub 118 and first and second engaging portions 119, 120 extending from approximately opposite sides of the hub 118. Hub 118 includes a bore 118a for receiving boss 117. First portion 119 includes a follower end 122 for interacting with a camming surface 124 formed on base member 102 (see Fig. 9). Second portion 120 includes a second engaging surface 126a for contacting first engaging surface 62a (as shown in Fig. 10), which may be formed on actuating member 25. While first and second surfaces 62a, 126a are shown as portions of hooks 62, 126, other forms of engaging surfaces known to one of ordinary skill in the art are also within the scope of the present invention. Hook 126 may alternatively engage with other elements of a lighter, such as a linking member, to prevent the creation a flame.

[0092] Referring again to Fig. 10, cam follower 116 is biased counter-clockwise by a biasing member 128, shown as a compression spring, such that follower end 122 contacts and follows camming surface 124. A seat 130 is formed on housing 4 and a lug 132 (shown in Fig. 15) is formed on first portion 119, to position biasing member 128 in place. The seat

130 and lug 132 may be formed on the opposite members in an alternative embodiment. In addition, biasing member 128, although shown as a coil spring, may alternatively be a torsion spring or a leaf spring, or any other type of biasing member known to be suitable by one of ordinary skill in the art. Follower end 124 may alternatively be biased against camming surface 124 by providing a cam follower 116 with resilient properties. For example, cam follower 116 may be a resilient member that is compressed in housing 2 such that follower end 122 is resiliently biased against camming surface 124.

[0093] Camming surface 124 is an undulating surface and includes a series of first engaging portions 134a-d, shown as detents 134a-d. First engaging portions 134a-d may engage a follower end 122 of the first engaging portion 119. Detents 134a-d are shown as indentations formed in base member 102, which may receive an outward protrusion on follower end 122 such that follower end 122 is displaced radially inward causing cam follower 116 to rotate clockwise about boss 117. In the embodiment shown, the first detent 134a is a sloped cutout larger than the remaining detents 134b-d, which are concave cutouts. The detent 134a includes a sloped surface portion 135 to provide a low pressure angle as follower end 122 rides along camming surface 124 within the first detent 134a. As a result of this low pressure angle, biasing member 128 is gradually compressed as base member 102 is rotated clockwise and follower end 122 moves from the first detent 134a toward the second detent 134b, thus providing a smooth and gradual feel to the user as the wand assembly 10 is pivoted away from the closed position. This low pressure angle also reduces wear and stresses on cam follower 116 and base member 102.

[0094] The present invention is not to be limited to the shape and configuration of detents 134a-d shown, and detents 134a-d may alternatively be, for example, bumps, ridges or protrusions formed on base member 102 that engage follower end 122 and displace it radially outward, causing cam follower to rotate counter-clockwise. The present invention is also not limited to the number and location of the detents shown. Furthermore, the present invention is also not limited to the shape and configuration of cam follower 116 and ends 122 and 126. The configurations of the cam follower 116, ends 122, 126 and detents 134a-d may change, for example, to vary the force necessary to move the wand assembly 10. The configurations of the cam follower 116, ends 122, 126 and detents 134a-d may also change, for example, to vary the force necessary to hold the wand assembly in any closed or extended position including the intermediate positions.

[0095] Still referring to Fig. 10, lighter 2 is shown with wand assembly 10 in the closed position. In this position, follower end 122 is biased into first detent 134a, and located at a first radial distance R1 from pivot axis P. Because first detent 134a includes

sloped surface portion 135, wand assembly 10 must be pivoted a predetermined distance, preferably about 40°, before hook 126 is disengaged from hook 62. When wand assembly 10 is in the closed position, or pivoted less than the predetermined distance, hook 126 is aligned with hook 62 of actuating member 25 such that hook walls 62a and 126a will engage upon depression of actuating member 25. Hooks 62, 126 may be spaced apart or otherwise configured so that actuating member 25 may be partially depressed, but not depressed sufficiently to ignite lighter 2, or alternatively so that actuating member 25 may not be depressed at all.

[0096] Hook walls 62a and 126a contact when hooks 62, 126 engage one another. Hook walls 62a, 126a are shown oriented substantially parallel to vertical axis V, which is perpendicular to longitudinal axis L and pivot axis P. This configuration of the hooks 62, 126 increases the force necessary to depress the actuating member 25 sufficiently to ignite the lighter.

[0097] Hook walls 62a, 126a may alternatively be angled. For example, hook walls 62a, 126a may be angled to be substantially parallel to line B1, which is angularly offset from vertical axis V by angle γ , such that hooks 62, 126 interlock. Such a configuration of the hooks would increase the force necessary to depress the actuating member 25 sufficiently to ignite the lighter. The force necessary in the interlocked configuration may be greater than the force necessary in the vertical wall configuration.

[0098] Hook walls 62a, 126a may alternatively be angled to be substantially parallel to line B2, which is angularly offset from vertical axis V by angle δ . With application of a predetermined force, such hooks may deflect and disengage. Such a configuration of the hooks would increase the force necessary to depress the actuating member 25 sufficiently to ignite the lighter, but to a lesser extent than if the walls 62a and 126a were vertical or at an angle γ .

[0099] According to the embodiment shown in Fig. 10 of hooks 62 and 126, actuating member 25 may be depressed sufficiently to ignite lighter 2 when wand assembly 10 is in the closed position, however a greater amount of force will be required to do so than when wand assembly 10 is pivoted to the extended position or one of the intermediate positions therebetween due to the interaction between hooks 62 and 126. The amount of additional force required to depress actuating member 25 sufficiently to ignite lighter 2 when wand assembly 10 is in the closed position may vary, for example, by varying the angle of hook walls 62a, 126a and/or varying the materials used to form hooks 62, 126.

[00100] Wand assembly 10 provides resistance against unintentional pivoting when in the closed position, because pivoting of wand assembly 10 toward the extended position,

or in first direction W1, would cause follower end 122 to ride along sloped surface 135 and compress biasing member 128. Thus, in order to pivot wand assembly 10 when wand assembly 10 is positioned in the closed position, a user must apply enough force to wand assembly 10 to cause follower end 122 to ride on sloped surface 135 and compress biasing member 128.

[00101] One of ordinary skill in the art will know and appreciate that the amount of force required may also be varied by selecting a biasing member 128 with a specific spring constant and/or modifying the geometry of camming surface 124. As a result of this feature, the wand assembly 10 is releasably retained in the closed position. Referring to Fig. 1, the lighter 2 may further include optional projections (not shown) within recess 4f of the housing 4 for releasably retaining the wand 101 in the closed position.

[00102] Referring to Figs. 10A, 11 and 12, lighter 2 is shown with wand assembly 10 located in partially-extended or intermediate positions. In the initial position, as shown in Fig. 10, the wand assembly has a central axis CW1. In the first intermediate position, as shown in Fig. 10A, wand assembly 10 is pivoted through a pivot angle of α of about 20°. The pivot angle α is defined between the wand 101 initial central axis CW1 and the central axis CW20 of the illustrated position with the follower end 122 (as shown in phantom) in the first detent 134a.

[00103] In the second intermediate position, as shown in Fig. 11, wand assembly 10 is pivoted through a pivot angle of α of about 45°. The pivot angle α is defined between the wand 101 initial central axis CW1 and the central axis CW45 of the illustrated position with the follower end 122 in the second detent 134b.

[00104] In the third intermediate position, as shown in Fig. 12, wand assembly 10 is pivoted through a pivot angle of α of about 90°. The pivot angle α is defined between the wand 101 initial central axis CW1 and the central axis CW90 of the illustrated position with the follower end 122 in the third detent 134c.

[00105] In the fourth intermediate position, as shown in Fig. 14, wand assembly 10 is pivoted through a pivot angle of α of about 135°. The pivot angle α is defined between the wand 101 initial central axis CW1 and the central axis CW135 of the illustrated position with the follower end 122 between the third detent 134c and the fourth detent 134d.

[00106] In the fully-extended position, as shown in Fig. 13, wand assembly 10 is pivoted through a pivot angle α of about 160°. The pivot angle α is defined between the wand 101 initial central axis CW1 and the central axis CW160 of the illustrated position with the follower end 122 in the fourth detent 134d.

[00107] Referring to Fig. 10A, the cam follower 116 is shown in solid lines in its initial position, and shown in phantom lines in its radially displaced position. With the wand 101 at an angle of 20° from its initial position, follower end 122 (as shown in phantom) is in contact with sloped surface 135 within detent 134a and cam follower 116 is slightly rotated about boss 117, however hook 126 (as shown in phantom) and hook 62 are sufficiently aligned to engage upon depression of actuating member 25. Thus, in this position, the actuating member 25 cannot be moved sufficiently to ignite lighter 2 without applying a force greater than the force sufficient to ignite the lighter in the remaining intermediate positions (shown in Figs. 11-12 and 14) and the closed position (shown in Fig. 13).

[00108] Referring to Figs. 11-13, in these positions the follower end 122 is disposed within the second, third and fourth detents 134b, 134c, 134d, respectively, which are all located at a second radial distance R2 from pivot axis P. Second radial distance R2 is greater than first radial distance R1 (shown in Fig. 10) and, as a result, when wand assembly 10 is pivoted from the closed position, discussed above, to the intermediate and fully-extended positions, follower end 122 is displaced toward the first end 8 (shown in Fig. 1) of housing 4, causing cam follower 116 to rotate clockwise about boss 117 and rotate hook 126 out of alignment with hook 62. Thus, in these three positions, hook walls 62a and 126a will not engage upon full depression of actuating member 25. In Fig. 11, the cam follower 116 is shown in phantom lines in its initial position, and shown in solid lines in its radially displaced position. In Figs. 12-14, the cam follower 116 is shown in its other radially displaced positions.

[00109] Wand assembly 10 exhibits variable resistance against pivoting. When wand assembly 10 is in one or more high-wand-force positions, such as, for example, the closed position (shown in Fig. 10), extended position (shown in Fig. 13), and certain intermediate positions (shown in Figs. 11-12) between the closed and extended positions, follower end 122 contacts one of the detents 134a-d. When in any of these high-wand-force positions, pivoting of wand assembly 10 causes first portion 119 to compress biasing member 128 as follower end 122 rides along camming surface 124 and is displaced radially outward by the second, third or fourth detents, 134b, 134c, 134d, respectively. The force necessary for wand movement from the closed position is less than the force necessary for wand movement from the positions shown in Figs. 11-13 since the detent 134a has a sloped surface portion 135. As mentioned above, a user must therefore exert sufficient force on wand assembly 10 to compress biasing member 128 and move follower 122 out of the detent, in order to pivot wand assembly 10. Lighter 2 can thus be selectively and releasably

positioned or retained and stabilized at whichever of the intermediate or extended positions is most suitable. For example, the intermediate positions may be suitable for lighting jarred candles, and the fully-extended position may be suitable for lighting a barbeque grill. One of ordinary skill in the art will know and appreciate that cam surface 124 may be provided with any number of detents 134a-d spaced apart at various intervals to provide a wand assembly 10 with any number and combination of different closed, intermediate, and fully-extended positions. One of ordinary skill in the art will also know and appreciate that any number of high-force and low-wand-force positions may be located between the closed and fully-extended positions. Furthermore, the closed position may be a high-wand-force position or a low-wand-force position, and the fully-extended position may also be a high-force position or a low-wand-force position.

[00110] Referring to Fig. 14, lighter 2 is shown with wand assembly 10 in a low-wand-force position. In the low-wand-force position shown, wand assembly 10 is partially-extended and located at an angle of about 135° from the closed position. Follower end 122 is biased against camming surface 124 between the third detent 134c and the fourth detent 134d at point A, and is located at a third radial distance R3 from pivot axis. Third radial distance R3 is the nominal radius of camming surface 124 and thus, follower end 122 is located at third radial distance R3 from pivot axis P whenever follower end 122 is not aligned with one of the detents 134a-d. Third radial distance R3 is larger than first radial distance R1 and second radial distance R2, and as a result, positions follower end 122 such that hook 126 is rotated out of engagement with hook 62. Thus, when follower end 122 contacts camming surface 124 between the detents 134a-d, actuating member 25 may be depressed to ignite the lighter. As discussed above, actuating member 25 is therefore only immobilized sufficiently to prevent ignition of lighter 2 when wand assembly 10 is in or within about 40° of the closed position. In an alternative embodiment, this angle may vary.

[00111] Still referring to Fig. 14, wand assembly 10 is shown in a low-wand-force position, where follower end 122 contacts cam surface 124 between detents 134 c and d. Follower end 122 is thus out of contact with detents 134 c and d. In this position, less force is required to pivot wand assembly 10 than when in a high-wand-force position with follower end 122 received in detents 134a-d. When in a low-wand-force position, wand assembly 10 still provides some resistance against pivoting because biasing member 128 is at its maximum state of compression and therefore biases follower end 122 against camming surface 124, and creates frictional forces between follower end 122 and camming surface 124 upon pivoting of wand assembly 10. Thus, when wand assembly 10 is in a low-wand-force position, a user must only apply a low force sufficient to overcome these

frictional forces in order to pivot wand assembly 10. The high-wand-force position requires more force to pivot wand assembly 10 than the low-wand-force position because the user must provide additional force to further compress biasing member 128 and move the follower 122 out of the detents 134a-d. The wand assembly 10 is similarly in low-wand-force positions when the follower 122 is located between detents 134a and b and detents 134b and c.

[00112] The geometry of the detents 134 and the follower end 122 may be varied to increase or decrease the amount of force required to pivot wand assembly 10 when in a high-wand-force position. For example, the detents may be relatively deep and of a size and shape that closely matches follower end 122, thus requiring a large increase in force when in a high-wand-force position. Alternatively, the detents may be relatively shallow and oversized with respect to follower end 122 to provide a small increase in force when in a high-wand-force position.

[00113] Referring to Figs. 10 and 13, movement of the wand 101 in a second direction W2 opposite from the first direction W1 allows the wand 101 to be moved toward the closed position. The wand 101 acts as discussed above when moved toward the closed position, in that it is releasably retained in the intermediate positions (shown in Figs. 11 and 12) during movement.

[00114] Referring again to Fig. 9A, one embodiment of a conduit 23 for use with lighter 2 of Fig. 1 is shown. Conduit 23 includes a flexible tube 140 defining a channel 142 for fluidly connecting fuel supply unit 11 to nozzle 143. Flexibly tube 140 thus transports fuel F (as shown in Fig. 1) from the fuel supply unit 11 to nozzle 143. A suitable material for flexible tube 140 is plastic. An un-insulated, electrically conductive wire 144 is disposed in channel 142, and extends from a first end 146 of tube 140 to a second end 148 of tube 140. A suitable material for electrically conductive wire 144 is copper or the like. In this embodiment, the wire 144 may be at least partially coiled. The coils may be more closely packed in some sections than other sections. In an alternative embodiment, the wire 144 may not be coiled. Fuel connector 22 is coupled to first end 146 of tube 140. Nozzle 143 is connected to second end 148 of tube 140 by nozzle connector 147. Wire 144 thus acts as an electrical conductor to pass an electrical charge to nozzle 143 to generate a spark to ignite the fuel. The wire 144 may also reinforce flexible tube 140 to provide resistance to kinking.

[00115] The conduit 23, connector 147 and nozzle 143 are supported within a pair of guide and insulator members 145, one being shown. One the pair of members 145 are

positioned around these components an isolator 146 is disposed over the end of the members 145. Then the wand 101 is disposed thereon.

[00116] As shown in Figs. 1-1B and 16, the tube 140 is supported within bore 20b of retainer 20 and joined to fuel connector 22 so that wire 144 extends through fuel connector 22 and is in electrical contact with electrode 15b. The second end 148 of tube 140 is connected to nozzle 143 located adjacent the tip 152 of wand 101. Tube 140 thus conveys fuel F from the fuel supply unit 11 to the nozzle 143 at tip 152 of wand assembly 10 via channel 142. Nozzle 143 may optionally include a diffuser 154, preferably in the form of a coil spring.

[00117] Referring to Figs. 1 and 11, conduit 23 and wire 28 run from the inside of housing 4, through at least a portion of wand assembly 10. Wire 28 is electrically connected adjacent to the end of metal wand 101 coupled to base member 102. Wire 28 may be at least partially coiled around tube 140. The conduit 23 extends to the nozzle 143. To better facilitate pivoting of wand assembly 10 with respect to housing 4, the conduit 23 and wire 28 extend through an aperture 109 in base member 102, and through the chamber 107 (as shown in Fig. 9) within base member 102. Aperture 109 is preferably spaced apart from pivot axis P. Thus, as wand assembly 10 pivots with respect to housing 4, conduit 23 and wire 28 slide within arcuate slot 109 from end 109a to end 109b. The length of conduit 23 and wire 28 also allow the wand 101 to pivot.

[00118] Once the wand assembly 10 is moved to the partially-extended or fully-extended positions, the lighter 2 may be operated in two different modes. Referring to Fig. 5, each mode is designed to resist undesired operation by unintended users in different ways. The first-operative mode or high-actuation-force mode (*i.e.*, the high-force mode) and the second mode of operation or low-actuation-force mode (*i.e.*, the low-force mode) are configured so that one mode or the other may be used. The high-force mode of lighter 2 provides resistance to undesirable operation of the lighter by unintended users based primarily on the physical differences, and, more particularly, the strength characteristics of unintended users versus some intended users. In this mode, a user applies a high-actuation or high-operative force to the actuating member 25 in order to operate the lighter. Optionally, the force which is necessary to operate the lighter 2 in this mode may be greater than unintended users can apply, but within the range which some intended users may apply.

[00119] The low-force mode of lighter 2 provides resistance to undesirable operation of the lighter by unintended users based more on the cognitive abilities of intended users than the high-force mode. More specifically, the second mode provides resistance due to a

combination of cognitive abilities and physical differences, more particularly the size characteristics and dexterity between intended users and unintended users.

[00120] The low-force mode may rely on the user operating two components of the lighter to change the force, from the high-actuation force to the low-actuation force, which is required to be applied to the actuating member to operate the lighter. The low-force mode may rely on a user repositioning a plunger member 63 from a high-actuation-force position to a low-actuation-force position. The user may move the plunger member 63 by depressing a latch member 34. After moving the plunger member, the user may operate the lighter by applying less force to the actuating member. The low-force mode may rely on a combination of the physical and cognitive differences between intended and unintended users such as by modifying the shape, size or position of the latch member in relation to the actuating member, or alternatively, or in addition to, modifying the force and distance required to activate the latch member and the actuating member. Requiring the actuating member and latch member to be operated in a particular sequence also may be used to achieve the desired level of resistance to unintended operation.

[00121] Referring to Fig. 5, one embodiment of a lighter 2 having a high-force mode and a low-force mode will be described. The lighter of Figs. 3 and 5 has a movable plunger member 63, operatively associated with latch member 34.

[00122] In an initial or rest position in the high-force mode, as shown in Fig. 5, the plunger member 63, and more particularly portions 66 are disposed within portion 56b of cutout 56 defined in actuating member 25. The wall 66a of plunger member 63 contacts vertical wall 56c of slot 56 and is thus in a high-actuation-force position. When a user attempts to actuate actuating member 25, vertical wall 66c applies a force to vertical wall 66a which applies a force to piston member 74, which thru wall 76a moves to compress spring 80. Spring 80 applies a spring force FS which opposes movement of the actuating member 25. In the initial position, the spring 80 is uncompressed and has a length has a length of D1.

[00123] In this embodiment, the length D1 is substantially equal to the space between support 4d and piston member 74 end wall 76a. In another embodiment, the length D1 can be greater than this space so that the spring 80 is compressed and pre-loaded when installed or the length D1 can be less than this space.

[00124] To actuate the lighter in this high-force mode, *i.e.*, when the portions 66 are disposed in slot portion 56b, a user applies at least a first actuating member force FT1 to the actuating member 25 which is substantially equal to or greater than the sum of a spring force FS, and all additional opposing forces FOP. (not shown). The spring force FS may

comprise the force necessary to compress the spring 80. The opposing forces FOP may comprise the forces applied by the various other elements and assemblies which are moved and activated in order to operate the lighter, such as the spring force from the return spring 30 (see Fig. 1B) in piezoelectric unit 26, the force to compress spring 53, and the frictional forces caused by the movements of the actuating member, and any other forces due to springs and biasing members which are part of or added to the actuating member or actuating assembly, fuel container, or which are overcome to actuate the lighter. The particular forces FOP opposing operation of the lighter would depend upon the configuration and design of the lighter and thus will change from one lighter design to a different lighter design. In this mode, if the force applied to the actuating member is less than a first actuating member force FT1, ignition of the lighter does not occur.

[00125] As shown in Fig. 6, when a user applies a force to the actuating member 25 at least substantially equal to or greater than the first actuating member force FT1, the actuating member 25 moves the distance d , and the plunger member 63 and piston member 74 compress spring 80. This movement of the actuating member 25, with reference to Fig. 1B, causes the upper and lower portions 26a, 26b of the piezoelectric unit 26 to compress together, thereby causing the cam member 32 on the upper portion 26a to move, which moves the valve actuator 14 to act on jet and valve assembly 15 to move valve stem 15a forward to release the fuel F from compartment 12a. When the cam member 32 contacts the valve actuator 14 electrical communication occurs between the piezoelectric unit 26 and the wire 144 (as shown in Fig. 9A). Further depression of the actuating member 25 causes a hammer (not shown) within the piezoelectric unit to strike a piezoelectric element (not shown), also within the piezoelectric unit. Striking the piezoelectric element or crystal, produces an electrical impulse that is conducted along wire 28 (as shown in Fig. 1) to wand 101 to the tab to create a spark gap with nozzle 143. A spark also travels from the cam member 32 to valve actuator 14, then to valve stem 15a and then to jet 15a then electrode 15b and wire 144 and to connector 150, and nozzle 143. An electrical arc is generated across the gap between the nozzle 143 and the wand 101, thus igniting the escaping fuel.

[00126] In the high-actuation-force mode when the actuating member 25 is depressed, the spring 80 has a length D2 (as shown in Fig. 6) less than the length D1 (as shown in Fig. 5). During this mode of operation, the latch member 34 remains substantially in the original position and boss 36a does not hinder actuating member 25 movement due to its location and forward movement in slot 60.

[00127] When the actuating member 25 is released, the return spring 30 (as shown in Fig. 1B) within the piezoelectric mechanism 26 and the springs 53 and 80 move or assist in

moving the piston member 74, plunger member 63 and actuating member 25 into their initial, at rest, positions. Spring 16 (as shown in Fig. 1B) biases valve actuator 14 to close jet and valve assembly 15 and shut off the supply of fuel. This extinguishes the flame emitted by the lighter. As a result, upon release of the actuating member 25, the lighter automatically returns to the initial state, where the plunger member 63 remains in the high-actuation-force position (as shown in Fig. 5), which requires a high-actuation-force to actuate the actuating member.

[00128] The lighter may be designed so that a user would have to possess a predetermined strength level in order to ignite the lighter in the high-actuation-force mode. The lighter optionally may be configured so that a user may ignite the lighter in the high-actuation-force mode with a single motion or a single finger.

[00129] Alternatively, if the intended user does not wish to use the lighter by applying a high first actuating member force FT1 (*i.e.*, the high-actuation-force) to the actuating member, the intended user may operate the lighter 2 in the low actuation-force mode (*i.e.*, the low-force mode), as depicted in Fig. 7. This mode of operation comprises multiple actuation movements, and in the embodiment shown, the user applies two motions to move two components of the lighter for actuation. If the pivotal wand assembly 10 (as shown in Fig. 1) and the cam follower 116 are incorporated into the lighter, operation of the lighter in the low-actuation-force mode may include three motions, including moving the wand assembly to an extended position.

[00130] In the lighter of Fig. 7, the low-force mode includes repositioning the plunger member 63 downward such that spring 80 does not oppose motion of the actuating member 25 to the same extent as in the high-force mode. In the low-force mode, a force substantially equal to or greater than second actuating member force FT2 (*i.e.*, a low-actuation-force) is applied to the actuating member 25 to ignite the lighter in conjunction with depressing the latch member. In this mode of operation, the second actuating member force FT2 is preferably less, and optionally significantly less, than the first actuating member force FT1.

[00131] As shown in Fig. 7, to operate the lighter 2 in the low-force mode of this embodiment includes depressing the free end 36 of the latch member 34 from the initial position (shown in phantom) toward the actuating member 25 to a depressed position. Due to the operative association between the latch member 34 and the plunger member 63, downward movement of the latch member 34 moves boss 36a which in turn moves front end of the plunger member 63 downward. When the latch member 34 and plunger member 63 are in their depressed positions, the recess 70 (as shown in Fig. 3) receives boss 36a of

latch member and recess 70 provides a horizontal contact surface for the boss in this position.

[00132] The latch member may be partially or fully depressed with different results. Depending on the configuration of the lighter components, if latch member is partially depressed, the wall 66a may be in contact with or adjacent the vertical wall 56c. If the latch member 34 is depressed so that the wall 66a is in contact with or adjacent the vertical wall 56c of the actuating member 25, the lighter 2 is still in the high-force mode. If the latch member 34 is depressed so that the wall 66a is equal to or below wall 56c the lighter can slip into the low-force mode or is in the low-force mode. In some configurations, the lighter may be designed so that when the latch member 34 is fully depressed, the plunger member 63 is completely out of contact with (*e.g.*, below) upper portion 46 (as shown in Fig. 4) of the actuating member 25.

[00133] The force applied to the actuating member in order to activate the lighter in the low-force mode, *i.e.*, second actuating member force FT2, at least has to overcome the opposing forces FOP as discussed above to actuate the lighter. In addition, if the plunger member 63 contacts the actuating member 25, the second actuating member force must also overcome the friction forces generated by this contact during movement of the actuating member. The user, however, may not have to overcome the additional spring force Fs (as shown in Fig. 5) applied by spring 80 depending on whether the user partially or fully depresses the latch member. If partially depressed, the mode of the lighter will depend on whether vertical wall 66a is contacting the vertical wall 56c or the actuating member 25. In case the vertical wall 66a contacts the vertical wall 56c, the user may still have to overcome the high spring forces due to the extensions 66 still being within the slot portion 56b.

[00134] Referring to Fig. 8, in the case of the member 63 contacts the upper surface of the slot portion 56a forces due to contact will have to be overcome. If fully depressed, the user may not have to overcome any spring forces since the wall 66a is out contact with wall 56c. As a result, the second actuating member force FT2 required for the low-force mode is less than the first actuating member force FT1 required for the high-force mode. If the lighter is designed so that full depression of the latch member 34 moves the plunger member 63 out of contact with the actuating member 25, the spring force Fs (shown in Fig. 5) may be substantially zero. Thus, a predetermined actuation force without forces other than the spring force Fs may be substantially zero. The user, however, will have to apply a force sufficient to overcome the other forces in the lighter to ignite the lighter.

[00135] In the low-force mode in the lighter as shown in Fig. 8, as the actuating member 25 is pressed gap g (shown in Fig. 7) decreases. In addition, as shown in Fig. 8,

the spring 80 is not compressed and has its original length D1, piston 74 remains in its original position, spring 53 has been compressed and actuating member 25 moves with respect to extensions 66. This allows the lighter to be ignited in the low-force mode. When the actuating member 25 and latch member 34 are released, the spring 30 within the piezoelectric mechanism and the return spring 53 move or assist in moving the actuating member 25 into its initial position. In addition, the leaf spring 42 and spring 92 move the latch member 34 and the plunger member 63 back to their initial positions. Thus, the lighter automatically returns to the initial position, where the plunger member 63 is in a high-actuation-force position and the lighter requires a high-actuation force to operate.

[00136] Preferably, in order to perform the low-force mode, the user has to possess a predetermined level of dexterity and cognitive skills so that depression of the latch member 34 and movement of the actuating member 25 are carried out in the correct sequence. In the low-force mode, a user may use a thumb to press latch member 34 and a different finger to apply the actuating member force. The lighter may be designed so that the actuating member force preferably is applied after the latch member 34 is depressed so that a proper sequence is carried out to operate the lighter. Alternatively, another sequence can be used for actuation, and the present invention is not limited to the sequences disclosed but also includes such alternatives as contemplated by one of ordinary skill in the art. For example, the sequence can be pulling the actuating member partially, depressing the latch member, and then pulling the actuating member the rest of the way. The lighter in the low-force mode also may rely on the physical differences between intended and unintended users, for example, by controlling the spacing of the actuating member and the latch member, or adjusting the operation forces, or shape and size of the latch member, actuating member or lighter.

[00137] In order to make the lighter so that it is not excessively difficult for some intended users to actuate, the high-actuation force FT1 preferably should not be greater than a predetermined value. It is contemplated that for the lighter of Fig. 5, the preferred value for FT1 is less than about 10 kg and greater than about 5 kg, and more preferably less than about 8.5 kg and greater than about 6.5 kg. It is believed that such a range of force would not substantially negatively affect use by some intended users, and yet would provide the desired resistance to operation by unintended users. These values are exemplary and the operative force in the high-force mode may be more or less than the above ranges.

[00138] One of ordinary skill in the art can readily appreciate that various factors can increase or decrease the high-actuation force which an intended user can comfortably apply to the actuating member. These factors may include, for example, the leverage to pull or

actuate the actuating member provided by the lighter design, the friction and spring coefficients of the lighter components, the actuating member configuration, the complexity of the actuating member actuation motion, the location, size and shape of the components, intended speed of activation, and the characteristics of the intended user. For example, the location and/or relationship between the actuating member and the latch member and whether the intended user has large or small hands.

[00139] The design of the internal assemblies, for example the configuration of the actuating assembly, the configuration of any linking mechanism, as discussed below, the number of springs and forces generated by the springs all affect the force which a user applies to the actuating member in order to operate the lighter. For example, the force requirements for a actuating member which moves along a linear actuation path may not equal the force requirements to move a actuating member along a non-linear actuation path. Actuation may require that a user move the actuating member along multiple paths which may make actuation more difficult. While the embodiments disclosed have shown the preferred actuating member with a linear actuation path, one of ordinary skill in the art can readily appreciate that non-linear actuation paths are contemplated by the present invention.

[00140] In the illustrated embodiment, in Fig. 7, the second actuating member force FT2 for the low-force mode is less than the first actuating member force, preferably, but not necessarily, by at least about 2 kg. Preferably in the illustrated embodiment in Fig. 7, the low-actuation force FT2 is less than about 5 kg but greater than about 1 kg, and more preferably greater than about 3.0 kg. These values are exemplary, as discussed above, and the present invention is not limited to these values as the particular desirable values will depend upon the numerous lighter design factors outlined above and the desired level of resistance to operation by unintended users.

[00141] One feature of the lighter 2 is that in the high-force mode multiple actuating operations may be performed so long as the user provides the necessary actuation force. Another feature of the lighter 2 is that in the low-force mode multiple actuating operations may be performed so long as the user depresses the latch member and provides the necessary actuation force and motions required to ignite the lighter. In particular, if the lighter does not operate on the first attempt, the user may re-attempt to produce a flame by actuating the actuating member again in the low-force mode if the user continues to depress the latch member.

[00142] Referring to Figs. 16 to 18A, an alternative embodiment of a lighter according to the present invention is shown. Lighter 202 is substantially similar to lighter 2, shown in the previous Figs, with only the relevant differences described herein in detail.

For clarity, lighter 202 is shown with some of its parts removed. Lighter 202 may include an inhibiting member 205 that extends from housing 204 and is movable between a first position (shown in Figs. 16-17A) and a second position (shown in Figs. 18 and 18A). Moving the inhibiting member 205 a predetermined distance, for example, between the first position and the second position, may resist, obstruct and/or prevent the actuating member 225 from performing at least one of the steps required to ignite the fuel to create a flame. For example, moving the inhibiting member 205 a predetermined distance may resist, obstruct and/or prevent the actuating member 225 from causing fuel to be released at the nozzle (not shown) or from creating a spark proximate the nozzle (not shown), or both.

[00143] According to the illustrative embodiment shown in Figs. 16 to 18A, moving the inhibiting member 225 a predetermined distance increases the difficulty of moving the actuating member 225 a sufficient distance to ignite a flame. That is, moving the inhibiting member 225 a predetermined distance may resist the actuating member 225 from moving a sufficient distance to ignite the flame, or alternatively, may block and/or prevent the actuating member 225 from moving at all or may block and/or prevent the actuating member 225 from moving a sufficient distance. Inhibiting member 205 may include, or may be associated with, a blocking member 207 that is capable of engaging the actuating member 225, thus increasing the difficulty of moving the actuating member 225. That is, the inhibiting member 205 may include, or may be associated with, a blocking member 207 that is capable of engaging the actuating member 225 to resist and/or prevent sufficient movement of the actuating member 225. As shown, the inhibiting member 205 may include a rod-like shaft portion that extends through housing 204 and terminates with blocking member 207 near the actuating member 225. In the illustrative embodiment shown, blocking member 207 is located in and slidable within a cavity 215 in actuating member 225, however other configurations are contemplated (*e.g.*, blocking member 207 may simply abut a surface of actuating member 225, as shown in the illustrative embodiment of Fig. 19). Inhibiting member 205 and blocking member 207 may be monolithic, or alternatively, may be formed as two or more separate parts that are associated with one another.

[00144] Inhibiting member 205 may be biased to the first position (shown in Figs. 16-17A), such that inhibiting member 205 only resists and/or prevents operation of the actuating member 225 when a user, or other outside force, acts upon inhibiting member 205 to move inhibiting member 205 the predetermined distance (*e.g.*, to the second position shown in Figs. 18 and 18A). A resilient element 209 (such as a coil spring, leaf spring, elastomer, or other resilient element known in the art) may bias inhibiting member 205 to

the first position. In the illustrative embodiment of Figs. 17-18A, a coil spring 209 extends between a shoulder 211 located on inhibiting member 205 and a shoulder 213 located on actuating member 225. Alternatively, the resilient element 209 may extend between a boss 215, or other member associated with housing 204, and inhibiting member 205, as shown in Fig. 19; however, any number of structures known to one of ordinary skill in the art may alternatively be implemented to bias inhibiting member 205 to the first position.

[00145] Referring specifically to Figs. 17-18A, the actuation member 225 may need to move at least a first distance in order to create a spark and/or to release fuel to ignite a flame. When the inhibiting member 205 is in the first or initial position, shown in Figs. 17 and 17A, a first gap D1 equal to or greater than the first distance may exist between the actuation member 225 and the blocking member 207. When the inhibiting member 205 is moved to the second position, shown in Figs. 18 and 18A, a second gap D2, smaller than the first gap D1, may exist between the actuation member 225 and the blocking member 207. Thus, when the inhibiting member 205 is moved to the second position, the actuating member 225 may be limited to moving a second distance (*e.g.*, approximately less than or equal to the second gap D2) which is less than the first distance and which is insufficient for the actuating member to create a spark and/or to release fuel.

[00146] Alternatively, the inhibiting member 205 may be operatively associated with a spring which is sized and configured to bear against the actuation member 225 so that in the first position the actuation member 225 is capable of moving a distance sufficient to create a spark and/or to release fuel by a first actuation force. When the inhibiting member 205 is moved to the second position, however, the spring is sized and configured to compress against the actuation member 225 so that a second actuation force is required to create a spark and/or to release fuel, the second actuation force being more than the first actuation force.

[00147] Lighter 202 may also have a latch member 234, shown in Fig. 16, that is movable by a user to selectively change the actuating member 225 from a high-force mode (in which a first actuating force is required to move the actuating member 225 sufficiently to release fuel and/or to create a spark) to a low-force mode (in which a second, lesser, actuating force is required to move the actuating member 225 sufficiently to release fuel and/or to create a spark). The details of latch 234 and the associated high-force and low-force modes are described in detail above.

[00148] Inhibiting member 205 may be located on a portion of housing 202 that a user might press against a generally stable surface (such as a table, wall, bed or their body) in order to apply additional force or leverage to actuating member 225 to actuate the lighter

202. For example, an unintended user may possess insufficient physical strength to move the actuating member 225 far enough to actuate the lighter 202. This may be especially true when actuating member 225 is in the high-force mode, although it may also apply when actuating member is in the low-force mode. The unintended user may attempt to press a portion of the housing 202 against a stable surface in order to apply their body weight or to gain leverage to apply a larger force to the actuating member 225 to apply additional force to the actuating member 225 to operate the lighter. Inhibiting member 205 preferably extends from the portion of housing 202 that a user would typically apply to such a surface. For example, actuating member 225 may move along an actuation axis 217 (straight or curved), and the inhibiting member 205 may extend from a surface of the housing 204 that is substantially normal to the actuation axis 217. Additionally or alternatively, inhibiting member 205 may move along an inhibiting axis 219 (straight or curved), which may be substantially parallel to the actuation axis 217. Moreover, actuating member 225 and inhibiting member 205 may move in directions that are substantially opposite one another. As shown in Fig. 16, housing 204 may include a proximal end 204a and a distal end 204b, and the inhibiting member 205 may extend from the proximal end 204a. The proximal end 204a may be substantially blunt or planar, as shown, although other configurations are contemplated.

[00149] Referring to Figs. 20 and 21, a contact surface 221, such as an enlarged button or pad, may be associated with inhibiting member 205. The enlarged contact surface 221 acts to increase the overall surface area of the inhibiting member 205. Contact surface 221 preferably covers more than about half of the distal end 204a of the housing 204, and more preferably, covers substantially the entire distal end 204a, in which case, contact surface 221 may serve as the base of the lighter 202. Apertures of various shapes and sizes may be provided in contact surface 221. Contact surface 221 may be formed monolithically with inhibiting member 205, as shown in Fig. 20, or alternatively, may be a separate piece that is connected to or otherwise associated with inhibiting member 205. In the illustrative embodiment of Fig. 21, contact surface 221 is a beam that acts on inhibiting member 205. As shown, the beam may be pivotally or hingedly connected to the distal end 204a of the housing 204 by a pivot member 223. Alternatively, the contact surface 221 may be a cantilever beam or may be rigidly or otherwise connected to housing 204 by any means known in the art.

[00150] Referring to Figs. 22 and 22A, and alternative embodiment of a lighter including the inhibiting member is shown as lighter 302. Lighter 302 is shown schematically with various components removed. The omitted components may be

substantially similar to those shown in Figs. 1-15 and described in connection therewith. Lighter 302 may be configured and dimensioned so that moving the inhibiting member 305 a predetermined distance (such as from the first position shown in Fig. 22 to the second position shown in Fig. 22A) obstructs and/or blocks the actuating member 325 from releasing enough fuel to achieve ignition and/or to sustain a flame at the nozzle. As shown in Figs. 22 and 22A, a fuel conduit 323 may connect fuel supply container 312 to the nozzle. When inhibiting member 305 is moved to the second position, fuel may be substantially obstructed (*i.e.*, substantially blocked and/or resisted) from flowing through at least a portion of conduit 323 so that ignition and/or a sustained flame is not achieved at the nozzle. For example, conduit 323 may include a first portion 323a and a second portion 323b, and a piston 327 may obstruct and/or block enough fuel from flowing from the first portion 323a to the second portion 323b so that ignition and/or a sustain flame is not achieved at the nozzle. Piston 327 may be located directly inside the first portion 323a and/or the second portion 323b, or alternatively, may be located in a junction box 331 that connects the first portion 323a to the second portion 323b, as shown in Figs. 22 and 22A. Junction box 331 may include an inlet 331a that is connected to first portion 323a and an outlet 331b that is connected to second portion 323b. Piston 327 may include a stem portion 327a that extends through an orifice in junction box 331 and contacts inhibiting member 305. A gasket or other type of seal may be provided at the interface of stem portion 327a and the orifice to prevent fuel from leaking through the orifice.

[00151] Piston 327 may be biased toward a first position, shown in Fig. 22, in which piston 327 is spaced from both the inlet 331a and the outlet 331b, thereby allowing fuel to flow from first portion 323a to the second portion 323b. As shown in Figs. 22 and 22A, an elastic element 333, such as a coil spring or other elastic member known in the art, may bias piston 327 to the first position. When inhibiting member 305 is moved a predetermined distance, such as to the second position shown in Fig. 22a, piston 327 may block inlet 331a and/or outlet 331b and consequently obstruct and/or block fuel flow through the second portion 323b to the nozzle. As a result, pressing inhibiting member 305 the predetermined distance while pulling actuating member 325 will result in substantially no fuel flow from the nozzle, and consequently will inhibit the creation of a flame at the nozzle. One of ordinary skill in the art will know and appreciate that any number of known valves may be provided in cooperation with inhibiting member 305 to substantially obstruct and/or block fuel flow to the nozzle when inhibiting member 305 is moved the predetermined distance. United States Patent No. 6,527,546 to LaForest et al. and United States Patent No. 6,332,771 to Adams et al. illustrate additional structures and methods for controlling fuel

release that may be implemented in lighter 302; the entire contents of these two patents are incorporated herein by reference.

[00152] Figs. 23 to 25A illustrate further embodiments of the present invention, in which moving the inhibiting member a predetermined distance may resist and/or prevent the actuating member from creating a spark to ignite fuel released at the nozzle (*e.g.*, it may redirect the spark to a location away from the nozzle or completely prevent the creation of the spark). Referring specifically to the embodiment of Figs. 23 and 23A, lighter 402 may include an electrical circuit that originates from piezoelectric unit 426 and extends to a spark gap X between the nozzle 443 and a tab 401a formed on the conductive wand member 401 (only a portion of which is illustrated), or between optional conductive diffuser 454 and tab 401a, as shown. The electrical circuit may include a first electrical pathway including a first electrical contact (shown as conductive cam member 432) located on piezoelectric unit 426, a wire 444 and a nozzle 443 (and optionally a diffuser 454). The electrical circuit may also include a second electrical pathway including a second electrical contact 429 located on the piezoelectric unit 426, a first wire or contact strip 455 extending from the second electrical contact 429 to a switch 459, and a second wire 465 extending from the switch 459 to the conductive wand member 401. When the inhibiting member 405 is located in the first position, shown in Fig. 23, the switch 459 may be closed, such that energy created by the piezoelectric unit 426 may flow through the switch 459 from the first wire 455 to the second wire 465 and eventually to the conductive wand member 401. Thus, when the inhibiting member 405 is in the first position and a user moves the actuating member 425 a sufficient distance, the piezoelectric unit 426 may create an electrical impulse that travels through the first electrical pathway to the nozzle 443, and through the second electrical pathway to the tab 401a, thereby creating an electrical arc or spark across spark gap X. The movement of the actuating member 425 may also cause the release of fuel from the nozzle 443, resulting in the creation of a flame at the nozzle 443. Illustrative structures for controlling the release of fuel are discussed above in connection with Figs. 1-15, 22 and 22A.

[00153] When, however, the inhibiting member 405 is moved a predetermined distance (*e.g.*, to the second position as shown in Fig. 23A) so that the switch 459 becomes substantially opened, the second electrical passageway becomes broken thus resisting and/or preventing the creation of a spark across spark gap X. More specifically, movement of the inhibiting member 405 may, for example, cause a second spark gap Y to be created. Movement of the inhibiting member 405 causes the size of spark gap Y to increase until the point where spark gap Y is sufficiently large (*e.g.* where spark gap Y becomes approximately twice as large as spark gap X). At which point, the current will no longer

jump across spark gap Y and no spark will be generated proximate the nozzle 443 to ignite the released fuel. Preferably, spark gap Y may become approximately twice as large as the gap across the piezoelectric crystal or more for the spark to be generated across the piezoelectric crystal.

[00154] As shown in Fig. 23, the switch 459 may include a conductive disk 467 that may be biased into electrical contact with the second wire 465 by a conductive spring 469 or other resilient element. Conductive spring 469 may also be in electrical contact with the first wire 455, thereby electrically connecting the first wire 455 to the second wire 465 when the inhibiting member 405 is in the first position, shown in Fig. 23. Conductive disk 467 may include, or otherwise be associated with, a stem portion 467a that is movable by the inhibiting member 405. When the inhibiting member 405 is moved to the second position, shown in Fig. 23A, the inhibiting member 405 may act against the stem portion 467a and move the conductive disk 467 to a corresponding second position, which may be spaced from the second wire 465, creating a second spark gap Y. Spark gaps X and Y, and the piezoelectric unit 426, may be configured such that the resistance across spark gap Y is greater than the resistance across spark gap X, resulting in a short at the piezoelectric crystal instead of at spark gap X. As a result, no spark will be created at nozzle 443 to ignite the released fuel. One of ordinary skill in the art will know and appreciate that any number of switches known in the art may alternatively be substituted for switch 459. In addition, switch 459 may alternatively or additionally be provided in the first electrical pathway or in some other part of the electrical circuit.

[00155] Referring to Figs. 24 and 24A, another embodiment of the present invention is shown in which the piezoelectric unit 526 may be associated with a first electrical circuit and a second electrical circuit. As shown in Fig. 24, the first electrical circuit may originate with the piezoelectric unit 526 and include a spark gap X formed between the nozzle 543 and the tab 501a of the conductive wand member 501 (only partially illustrated), or optionally between a diffuser 554 and the tab 501a. More specifically, the first electrical circuit may include a first electrical pathway including a first electrical contact (shown as conductive cam member 532) located on the piezoelectric unit 526, a first wire 544 including a first portion 544a and a second portion 544b, and the nozzle 543 (and optionally the diffuser 554). When the inhibiting member 505 is located in the first position, the first portion 544a and the second portion 544b of the first wire 544 may be electrically connected to one another by a first conductive strip 575 or other conductive member located on the inhibiting member 505. The first electrical circuit may also include a second electrical pathway including a second electrical contact 529 located on the piezoelectric unit 526, a

second wire 577 including a first portion 577a and a second portion 577b, and the conductive wand member 501. When the inhibiting member 505 is located in the first position, the first portion 577a and the second portion 577b of the second wire 577 may be electrically connected to one another by a second conductive strip 579 or other conductive member located on the inhibiting member 505.

[00156] Referring to Fig. 24A, the second electrical circuit may originate with the first electrical contact (shown as conductive cam member 532) on the piezoelectric unit 526, and include the first portion 544a of the first wire 544, the first portion 577a of the second wire 577, and the second electrical contact 529 located on the piezoelectric unit 526. When the inhibiting member 505 is moved a predetermined distance (*e.g.*, moved to the second position shown in Fig. 24A), the first portion 544a and the first portion 577a may be electrically connected to one another by the first conductive strip 575 located on the inhibiting member 505, thereby forming a closed circuit between the first electrical contact and the second electrical contact of the piezoelectric unit 526. As is apparent from Figs. 24 and 24A, the first electrical circuit may include, or may share components with, the second electrical circuit. Alternatively, the first and the second electrical circuits may be completely separate.

[00157] When the inhibiting member 505 is located in the first position, shown in Fig. 24, the first and the second conductive strips 575, 579 may connect the first portions 544a, 577a to the second portions 544b, 577b, of the first and the second wires 544, 577, respectively, thereby closing the first electrical circuit (and also opening the second electrical circuit). Accordingly, when the piezoelectric unit 526 is operated with the inhibiting member 505 in the first position (*e.g.*, by moving the actuating member 525 a sufficient distance), an electrical impulse may be generated that travels through the first and the second electrical pathways and creates an arc or spark across spark gap X. This spark may ignite the fuel that is released from the nozzle 543 to create a flame. Illustrative structures for releasing the fuel are discussed above in connection with Figs. 1-15, 22, 22A. Moving the inhibiting member a predetermined distance (*e.g.*, to the second position shown in Fig. 24A) may move the first and/or the second conductive strips 575, 579 to open the first electrical circuit and close the second electrical circuit. In this case, operating the piezoelectric unit may create an electrical impulse that travels through the second electrical circuit from the first electrical contact 532 on the piezoelectric unit 526 to the second electrical contact 529. Accordingly, no spark will be generated proximate the nozzle 543.

[00158] Referring to Figs. 25 and 25A, another alternative embodiment of the present invention is shown. According to this embodiment, the piezoelectric unit 626 may be

associated with a first electrical circuit and a second electrical circuit. The first electrical circuit may include a first electrical pathway that originates at a first electrical contact 632 of the piezoelectric unit 626, and includes a wire 644 that extends to the conductive nozzle 643 (and optionally a diffuser 654). The first electrical circuit may also include a second electrical pathway including a second electrical contact 629 located on the piezoelectric unit 626, and a second wire 665 extending from the second electrical contact 629 to the conductive wand member 601. The first electrical circuit, comprised of the first and the second electrical pathways, may form a closed circuit including the piezoelectric unit 626 and first spark gap X. The first electrical circuit may have a "first resistance" that is substantially constant. The second electrical circuit may include a second wire 681 that includes a first portion 681a and a second portion 681b. The first portion 681a may be electrically connected to the first electrical contact 632 of the piezoelectric unit 626, and the second portion 681b may be electrically connected to the second electrical contact 629 of the piezoelectric unit 626. Intermediate terminals 683a, 683b may be formed on the first and the second portions 681a, 681b, respectively, and may form a second spark gap Y. Inhibiting member 605 may include a conductive strip 675 that is movable relative to spark gap Y, for example, to vary the resistance of spark gap Y.

[00159] The resistance of the second electrical circuit, referred to as the "second resistance," may vary depending on the position of the inhibiting member 605, and more specifically, the position of the conductive strip 675 in relation to spark gap Y. The distance between the first and the second intermediate terminals 683a, 683b is normally larger than the first spark gap X, and preferably approximately twice as large as spark gap X, so that the first resistance is less than the second resistance when the inhibiting member is in the first position, shown in Fig. 25. Thus, when the inhibiting member 605 is in the first position and the piezoelectric unit 626 is operated (*e.g.*, by moving the actuating member, not shown), the electrical impulse generated by the piezoelectric unit 626 will travel through the first electrical circuit (*e.g.*, because the corresponding first resistance is less than the second resistance) and create an electrical arc or spark across the first spark gap X. The spark may ignite fuel that is released from the nozzle 643. Illustrative structures for releasing the fuel are discussed above in connection with Figs. 1-15, 22, and 22A. The second resistance may alternatively be made greater than the first resistance by varying the materials and/or other properties of the first and the second intermediate terminals 683a, 683b, and/or by modifying other components of the second electrical circuit.

[00160] As the inhibiting member 605 is moved toward the second position shown in Fig. 25A, the conductive strip 675 may come into contact with the intermediate terminal 683a, and approach the intermediate terminal 683b, consequently decreasing the size of second spark gap Y. As the size of second spark gap Y decreases, the second resistance also decreases. The first spark gap X and second spark gap Y may be configured and dimensioned such that once the inhibiting member 605 is moved a predetermined distance, the second resistance becomes less than the first resistance, causing the electrical impulse generated by piezoelectric unit 626 to travel through the second electrical circuit and create a spark across the second spark gap Y instead of the first spark gap X. Furthermore, once inhibiting member 605 is moved to the second position, as shown in Fig. 25A, the conductive strip 675 may electrically connect both the intermediate terminals 683a, 683, thereby closing second spark gap Y. In this case, operating the piezoelectric unit 626 may create an electrical impulse that travels through the second electrical circuit from the first electrical contact 632 on the piezoelectric unit 626 to the second electrical contact 629. Accordingly, no current will flow through the first electrical circuit, and no spark will be generated proximate the nozzle 643. Other structures and methods of inhibiting creation of a spark proximate the nozzle 643 are disclosed in United States Patent No. 6,065,958 to Adams *et al.*, the entire contents of which are incorporated herein.

[00161] While various descriptions of the present invention are described above, it should be understood that the various features of each embodiment may be used singularly or in any combination thereof. Therefore, this invention is not to be limited to only the specific embodiments depicted herein. Further, it should be understood that variations and modifications within the spirit and scope of the invention may occur to those skilled in the art to which the invention pertains. Accordingly, all expedient modifications readily attainable by one versed in the art from the disclosure set forth herein which are within the scope and spirit of the present invention are to be included as further embodiments of the present invention.

The Claims

We claim:

1. A lighter comprising:
a housing having a supply of fuel;
an actuating member extending from the housing, the actuating member movable to selectively perform at least one step in igniting the fuel; and
an inhibiting member extending from the housing, wherein moving the inhibiting member a predetermined distance resists the actuating member from performing the at least one step in igniting the fuel.
2. The lighter of claim 1, wherein moving the inhibiting member the predetermined distance resists the actuating member from moving sufficiently to perform the at least one step in igniting the fuel.
3. The lighter of claim 2, further comprising a blocking member, wherein moving the inhibiting member the predetermined distance causes the blocking member to resist the actuating member from moving sufficiently to perform the at least one step in igniting the fuel.
4. The lighter of claim 3, wherein the blocking member engages the actuating member to resist the actuating member from moving sufficiently to perform the at least one step in igniting the fuel.
5. The lighter of claim 3, wherein the inhibiting member and the blocking member are monolithic.
6. The lighter of claim 2, wherein the inhibiting member is movable between a first position where the actuating member is movable sufficiently to perform the at least one step in igniting the fuel and a second position where the inhibiting member resists the actuating member from moving sufficiently to perform the at least one step in igniting the fuel, and the inhibiting member is biased toward the first position.
7. The lighter of claim 6, further comprising a resilient element for biasing the inhibiting member toward the first position.
8. The lighter of claim 6, wherein the actuating member is movable when the inhibiting member is in the second position.

9. The lighter of claim 6, wherein the actuating member is prevented from moving when the inhibiting member is in the second position.

10. The lighter of claim 6, wherein the inhibiting member has a first end and a second end, the first end extends from the housing while the second end contacts the actuating member when the inhibiting member is in the second position.

11. The lighter of claim 1, wherein moving the inhibiting member the predetermined distance obstructs the actuating member from releasing the fuel.

12. The lighter of claim 11, further comprising a nozzle from which the fuel is released, wherein moving the inhibiting member the predetermined distance obstructs the release of fuel from the nozzle.

13. The lighter of claim 12, further comprising a conduit connecting the supply of fuel to the nozzle, wherein moving the inhibiting member the predetermined distance substantially obstructs adequate fuel from flowing through at least a portion of the conduit to create a flame.

14. The lighter of claim 13, further comprising a piston associated with the conduit, wherein moving the inhibiting member the predetermined distance causes the piston to obstruct the fuel from flowing through at least a portion of the conduit.

15. The lighter of claim 1, wherein moving the inhibiting member the predetermined distance resists the actuating member from creating a spark to ignite the fuel.

16. The lighter of claim 15, further comprising a nozzle from which the fuel is released, wherein moving the inhibiting member the predetermined distance resists the actuating member from creating a spark proximate the nozzle.

17. The lighter of claim 16, wherein moving the inhibiting member the predetermined distance redirects the spark to a location inside the housing.

18. The lighter of claim 16, wherein moving the inhibiting member the predetermined distance resists the creation of the spark at the nozzle.

19. The lighter of claim 1, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.

20. The lighter of claim 19, wherein a first actuating force is required to move the actuating member to perform the at least one step in igniting the fuel when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member to perform the at least one step in igniting the fuel when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

21. The lighter of claim 1, further comprising a wand member extending from the housing.

22. The lighter of claim 21, wherein the wand member is pivotable between an open position and a closed position.

23. The lighter of claim 1, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.

24. The lighter of claim 1, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.

25. The lighter of claim 1, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.

26. The lighter of claim 25, wherein the proximal end is substantially blunt or planar.

27. The lighter of claim 25, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.

28. The lighter of claim 1, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

29. The lighter of claim 28, wherein the contact surface covers substantially all of the proximal end of the housing.

30. The lighter of claim 28, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

31. The lighter of claim 28, wherein the contact surface is a beam that acts on inhibiting member.

32. The lighter of claim 31, wherein the beam is pivotally connected to the housing by a pivot member.

33. The lighter of claim 28, wherein the contact surface is a cantilever beam associated with the inhibiting member.

34. A lighter comprising:
a housing having a supply of fuel;
a valve operable to release the fuel;
an ignition mechanism operable to create a spark;
an actuating member extending from the housing, wherein moving the actuating member a first distance operates at least one of the valve and the ignition mechanism; and
an inhibiting member extending from the housing and movable between a first position and a second position, wherein when the inhibiting member is in the first position, the actuating member is capable of moving the first distance, and when the inhibiting member is in the second position, the actuating member is resisted from moving the first distance, further wherein the inhibiting member is biased toward the first position.

35. The lighter of claim 34, wherein when the inhibiting member is in the second position, the actuating member is capable of moving a second distance which is less than the first distance.

36. The lighter of claim 34, wherein when the inhibiting member is in the second position, the actuating member is substantially resisted against movement.

37. The lighter of claim 34, further comprising a resilient member for biasing the inhibiting member toward the first position.

38. The lighter of claim 34, further comprising a blocking member associated with the inhibiting member, wherein the blocking member engages the actuating member when the inhibiting member is in the second position.

39. The lighter of claim 38, wherein the inhibiting member and the blocking member are monolithic.

40. The lighter of claim 38, wherein the blocking member is spaced a first distance from the actuating member when the inhibiting member is in the first position, and the blocking member is spaced a second distance from the actuating member when the inhibiting member is in the second position, further wherein the second distance is less than the first distance.

41. The lighter of claim 38, wherein the blocking member is disposed in a cavity in the actuating member.

42. The lighter of claim 34, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.

43. The lighter of claim 42, wherein a first actuating force is required to move the actuating member the first distance when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member the first distance when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

44. The lighter of claim 34, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.

45. The lighter of claim 34, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.

46. The lighter of claim 34, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.

47. The lighter of claim 46, wherein the proximal end is substantially blunt or planar.

48. The lighter of claim 46, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.

49. The lighter of claim 46, further comprising a wand member extending from the distal end, wherein the wand member is pivotable between an open position and a closed position.

50. The lighter of claim 34, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

51. The lighter of claim 50, wherein the contact surface covers substantially all of the proximal end of the housing.

52. The lighter of claim 50, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

53. The lighter of claim 50, wherein the contact surface is a beam that acts on inhibiting member.

54. The lighter of claim 53, wherein the beam is pivotally connected to the housing by a pivot member.

55. The lighter of claim 50, wherein the contact surface is a cantilever beam associated with the inhibiting member.

56. A lighter comprising:
a housing having a supply of fuel in communication with a nozzle;
an ignition mechanism operable to create a spark to ignite the fuel proximate the nozzle;
an actuating member extending from the housing and movable to release the fuel from the supply of fuel; and
an inhibiting member extending from the housing and biased to a first position, wherein the inhibiting member is movable to a second position to obstruct the release of fuel from the nozzle.

57. The lighter of claim 56, further comprising an elastic element for biasing the inhibiting member to the first position.

58. The lighter of claim 56, further comprising a conduit extending from the supply of fuel to the nozzle, wherein the fuel is obstructed from flowing through at least a portion of the conduit when the inhibiting member is in the second position.

59. The lighter of claim 56, further comprising a piston associated with the conduit, wherein the piston obstructs the fuel from flowing through at least a portion of the conduit when the inhibiting member is in the second position.

60. The lighter of claim 57, wherein the piston is disposed within the conduit.

61. The lighter of claim 57, further comprising a junction connecting a first portion of the conduit to a second portion of the conduit, wherein the piston is disposed within the junction.

62. The lighter of claim 61, wherein the piston is normally biased toward a first position in which the fuel flows through the junction.

63. The lighter of claim 62, further comprising an elastic element for biasing the piston toward the first position.

64. The lighter of claim 62, wherein moving the inhibiting member to the second position moves the piston to a second position in which fuel is obstructed from flowing through the junction.

65. The lighter of claim 56, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.

66. The lighter of claim 65, wherein a first actuating force is required to move the actuating member to release the fuel when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member to release the fuel when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

67. The lighter of claim 56, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.

68. The lighter of claim 56, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.

69. The lighter of claim 56, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.

70. The lighter of claim 69, wherein the proximal end is substantially blunt or planar.

71. The lighter of claim 69, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.

72. The lighter of claim 69, further comprising a wand member extending from the distal end, wherein the wand member is pivotable between an open position and a closed position.

73. The lighter of claim 56, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

74. The lighter of claim 73, wherein the contact surface covers substantially all of the proximal end of the housing.

75. The lighter of claim 73, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

76. The lighter of claim 73, wherein the contact surface is a beam that acts on inhibiting member.

77. The lighter of claim 76, wherein the beam is pivotally connected to the housing by a pivot member.

78. The lighter of claim 73, wherein the contact surface is a cantilever beam associated with the inhibiting member.

79. A lighter comprising:
a housing having a supply of fuel;
a nozzle for releasing the fuel;
an electrical circuit having a spark gap proximate the nozzle;
an ignition mechanism for creating a spark across the spark gap;
an actuating member extending from the housing and movable to operate the ignition mechanism; and
an inhibiting member extending from the housing and movable from a first position where a portion of the electrical circuit is closed to a second position where the portion of the electrical circuit is open.
80. The lighter of claim 79, wherein the inhibiting member is normally biased to the first position.
81. The lighter of claim 80, further comprising an elastic element for biasing the inhibiting member to the first position.
82. The lighter of claim 79, further comprising a first electrical pathway extending from the ignition mechanism to a first terminal of the spark gap, and a second electrical pathway extending from the ignition mechanism to a second terminal of the spark gap, wherein at least one of the first and second electrical pathways is opened when the inhibiting member is moved to the second position.
83. The lighter of claim 82, further comprising a switch located in at least one of the first and second electrical pathways, wherein the switch is closed when the inhibiting member is in the first position, and the switch is open when the inhibiting member is in the second position.
84. The lighter of claim 82, wherein at least one of the first and second electrical pathways includes a conductive spring.
85. The lighter of claim 82, wherein at least one of the first and second electrical pathways includes a conductive disk.
86. The lighter of claim 79, wherein the actuating member is operable to release the fuel from the nozzle.

87. The lighter of claim 79, wherein the ignition mechanism includes a piezoelectric crystal.
88. The lighter of claim 79, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.
89. The lighter of claim 88, wherein a first actuating force is required to move the actuating member when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.
90. The lighter of claim 79, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.
91. The lighter of claim 79, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.
92. The lighter of claim 79, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.
93. The lighter of claim 92, wherein the proximal end is substantially blunt or planar.
94. The lighter of claim 92, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.
95. The lighter of claim 92, further comprising a wand member extending from the distal end, wherein the wand member is pivotable between an open position and a closed position.
96. The lighter of claim 79, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

97. The lighter of claim 96, wherein the contact surface covers substantially all of the proximal end of the housing.

98. The lighter of claim 96, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

99. The lighter of claim 96, wherein the contact surface is a beam that acts on inhibiting member.

100. The lighter of claim 99, wherein the beam is pivotally connected to the housing by a pivot member.

101. The lighter of claim 96, wherein the contact surface is a cantilever beam associated with the inhibiting member.

102. The lighter of claim 79, wherein the portion of the electrical circuit is a switch.

103. A lighter comprising:

a housing having a supply of fuel;

a nozzle for releasing the fuel;

an ignition mechanism connectable to a first electrical circuit having a first electrical resistance and a first spark gap proximate the nozzle and a second electrical circuit having a second electrical resistance, an operative configuration and an inoperative configuration;

an actuating member extending from the housing and movable to operate the ignition mechanism; and

an inhibiting member extending from the housing and movable between a first position where the second electrical circuit is inoperative and a second position where the second electrical circuit is operative;

wherein in the operative configuration, the resistance of the second electrical circuit is less than the resistance of the first electrical pathway such that the electrical current generated by the ignition mechanism selectively travels in the second electrical pathway;

wherein in the inoperative configuration, the resistance of the second electrical pathway is greater than the resistance of the first electrical pathway such that the electrical current generated by the ignition mechanism selectively travels in the first electrical pathway and jumps across the first spark gap to form a spark to ignite the fuel.

104. The lighter of claim 103, wherein the inhibiting member is normally biased to the first position.

105. The lighter of claim 104, further comprising an elastic element for biasing the inhibiting member to the first position.

106. The lighter of claim 103, wherein the second electrical circuit has a second spark gap when the inhibiting member is in the first position, and the second spark gap is larger than the first spark gap.

107. The lighter of claim 106, wherein the second spark gap is at least twice as large as the first spark gap.

108. The lighter of claim 106, wherein a portion of the inhibiting member closes the second spark gap when the inhibiting member is in the second position.

109. The lighter of claim 108, further comprising a conductive strip associated with the inhibiting member, wherein the conductive strip closes the second spark gap when the inhibiting member is in the second position.

110. The lighter of claim 103, wherein the first resistance is substantially constant.

111. The lighter of claim 103, wherein the first electrical circuit is closed when the inhibiting member is in the first position.

112. The lighter of claim 103, wherein the second electrical circuit is closed when the inhibiting member is in the second position.

113. The lighter of claim 112, wherein the first electrical circuit is open when the inhibiting member is in the second position.

114. The lighter of claim 103, wherein the first electrical circuit includes the second electrical circuit.

115. The lighter of claim 103, wherein the ignition mechanism includes a piezoelectric crystal.

116. The lighter of claim 103, wherein movement of the actuating mechanism releases the fuel from the nozzle.

117. The lighter of claim 103, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.

118. The lighter of claim 117, wherein a first actuating force is required to move the actuating member when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

119. The lighter of claim 103, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.

120. The lighter of claim 103, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.

121. The lighter of claim 103, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.

122. The lighter of claim 121, wherein the proximal end is substantially blunt or planar.

123. The lighter of claim 121, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.

124. The lighter of claim 121, further comprising a wand member extending from the distal end, wherein the wand member is pivotable between an open position and a closed position.

125. The lighter of claim 103, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

126. The lighter of claim 125, wherein the contact surface covers substantially all of the proximal end of the housing.

127. The lighter of claim 125, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

128. The lighter of claim 125, wherein the contact surface is a beam that acts on inhibiting member.

129. The lighter of claim 128, wherein the beam is pivotally connected to the housing by a pivot member.

130. The lighter of claim 125, wherein the contact surface is a cantilever beam associated with the inhibiting member.

131. A lighter comprising:
a housing having a supply of fuel;
a nozzle for releasing the fuel;
an electrical circuit having a spark gap proximate the nozzle;
an ignition mechanism for generating a voltage;
an actuating member extending from the housing and movable to operate the ignition mechanism; and
an inhibiting member extending from the housing and movable from a first position to a second position;
wherein the electrical circuit includes a first electrical pathway extending from the ignition mechanism to a first terminal of the spark gap, and a second electrical pathway extending from the ignition mechanism to a second terminal of the spark gap, the first and second electrical pathways are closed when the inhibiting member is in a first position and at least one of the first and second electrical pathways is opened when the inhibiting member is in the second position.

132. The lighter of claim 131, wherein the first and second electrical pathways each include a conductive strip which closes the first and second electrical pathways when the inhibiting member is in the first position.

133. The lighter of claim 132, wherein the conductive strips are associated with the inhibiting member.

134. The lighter of claim 133, wherein the first and second electrical pathways each include a first wire and a second wire joined by the conductive strips when the inhibiting member is in the first position.

135. The lighter of claim 134, wherein one of the wires of the first electrical pathway is joined to one of the wires of the second electrical pathway by one of the conductive strips when the inhibiting member is in the second position.

136. The lighter of claim 131, wherein the inhibiting member is normally biased to the first position.

137. The lighter of claim 136, further comprising an elastic element for biasing the inhibiting member to the first position.

138. The lighter of claim 131, wherein the actuating member is operable to release the fuel from the nozzle.

139. The lighter of claim 131, wherein the ignition mechanism includes a piezoelectric crystal.

140. The lighter of claim 131, further comprising a latch member movable by a user to selectively change the actuating member from a high-force mode to a low-force mode.

141. The lighter of claim 140, wherein a first actuating force is required to move the actuating member when the actuating member is in the high-force mode, and a second actuating force is required to move the actuating member when the actuating member is in the low-force mode, with the first actuating force being greater than the second actuating force.

142. The lighter of claim 131, wherein the actuating member is movable in a first direction and the inhibiting member is movable in a second direction that is substantially opposite the first direction.

143. The lighter of claim 131, wherein the actuating member is movable along a first axis and the inhibiting member is movable along a second axis that is substantially parallel to the first axis.

144. The lighter of claim 131, wherein the housing includes a proximal end and a distal end, and the inhibiting member extends from the proximal end.

145. The lighter of claim 144, wherein the proximal end is substantially blunt or planar.

146. The lighter of claim 144, wherein the actuating member is movable along a first axis, and at least a portion of the proximal end is substantially normal to the first axis.

147. The lighter of claim 144, further comprising a wand member extending from the distal end, wherein the wand member is pivotable between an open position and a closed position.

148. The lighter of claim 131, further comprising an enlarged contact surface associated with the inhibiting member, wherein the contact surface covers greater than about half of a proximal end of the housing.

149. The lighter of claim 148, wherein the contact surface covers substantially all of the proximal end of the housing.

150. The lighter of claim 148, wherein the contact surface and at least a portion of the inhibiting member are monolithic.

151. The lighter of claim 148, wherein the contact surface is a beam that acts on inhibiting member.

152. The lighter of claim 151, wherein the beam is pivotally connected to the housing by a pivot member.

153. The lighter of claim 148, wherein the contact surface is a cantilever beam associated with the inhibiting member.

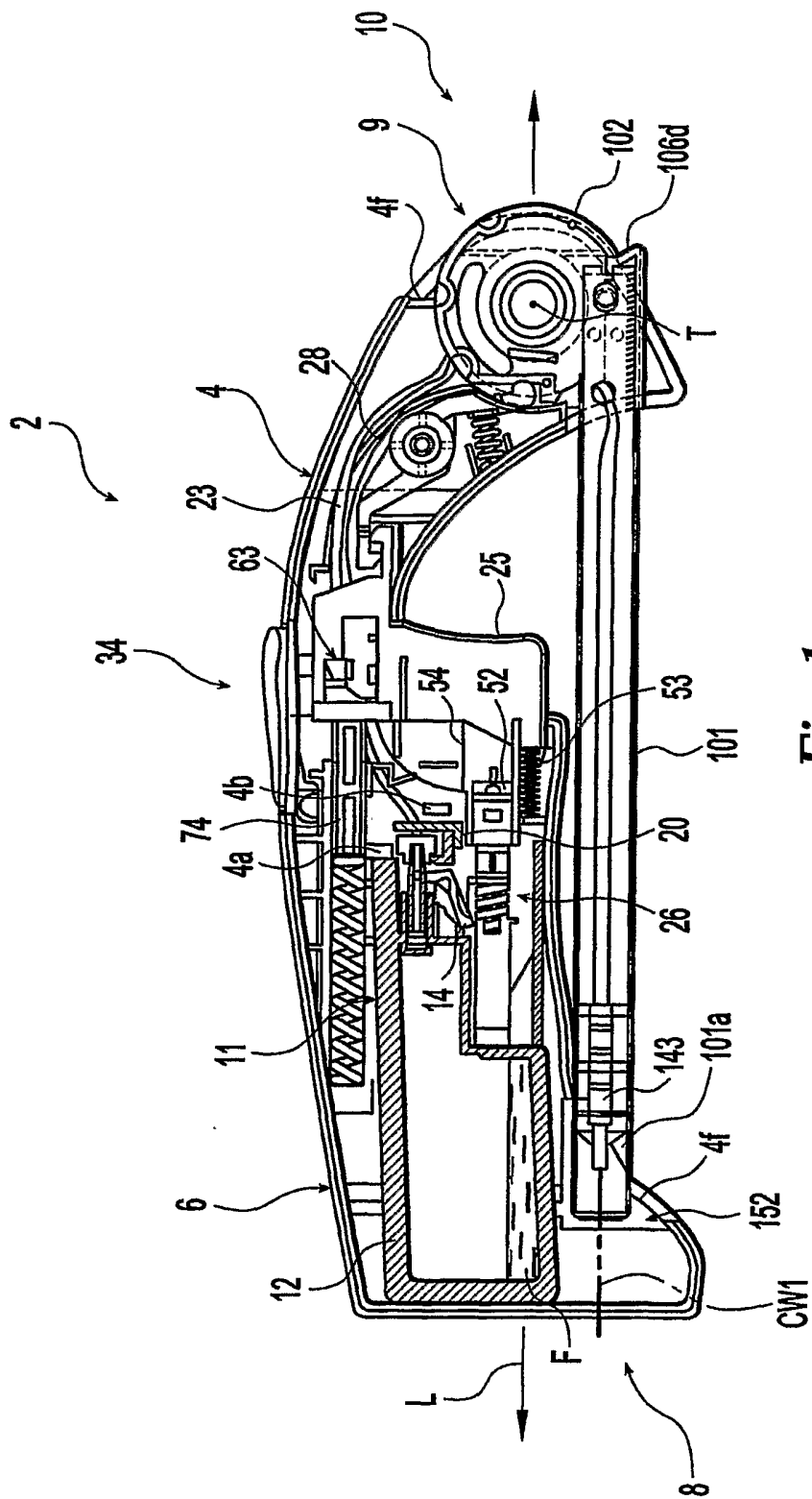


Fig. 1

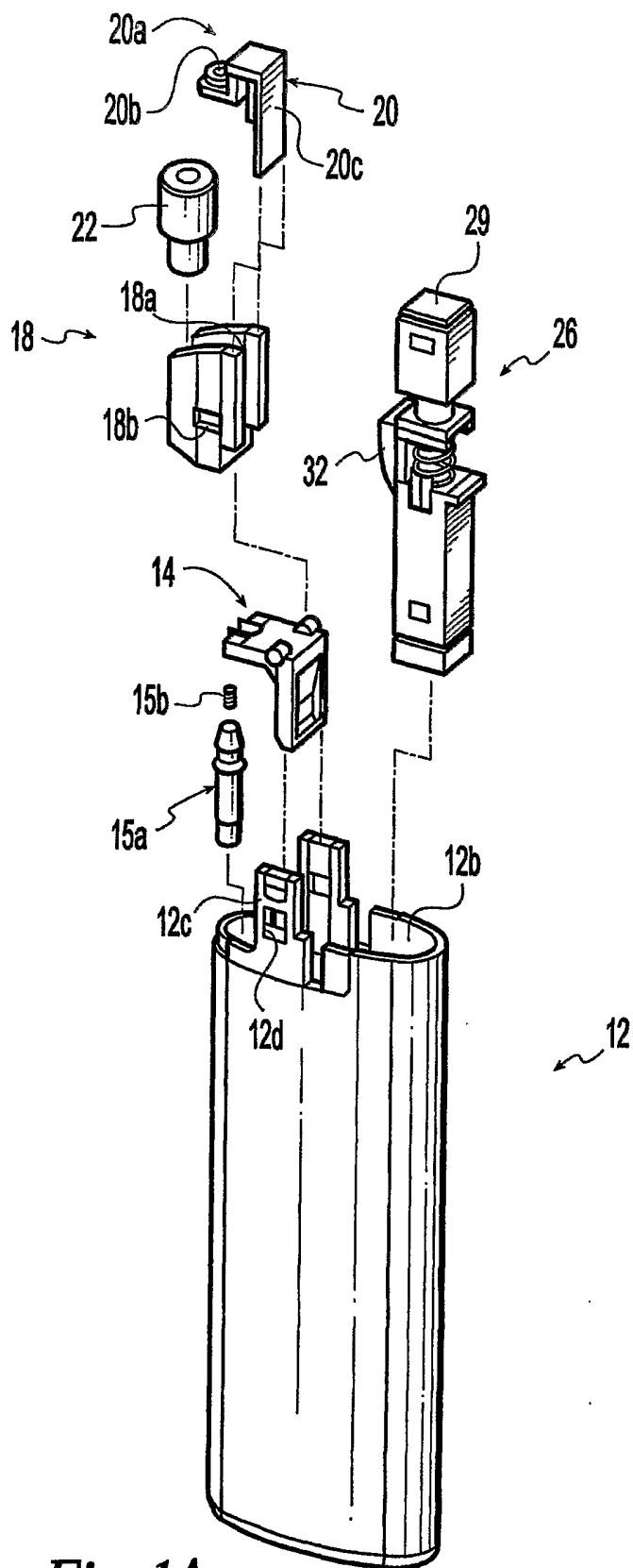


Fig. 1A

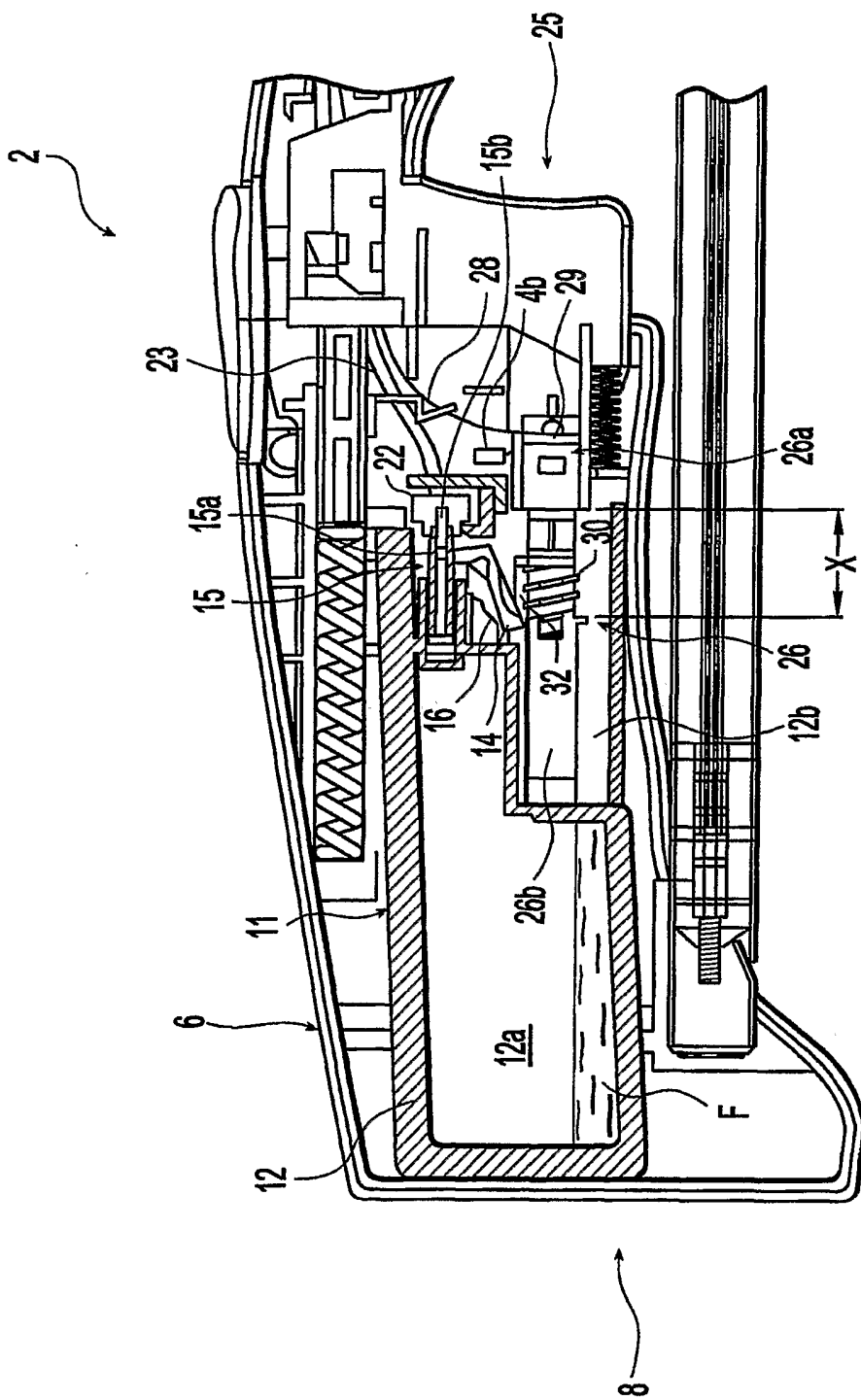


Fig. 1B

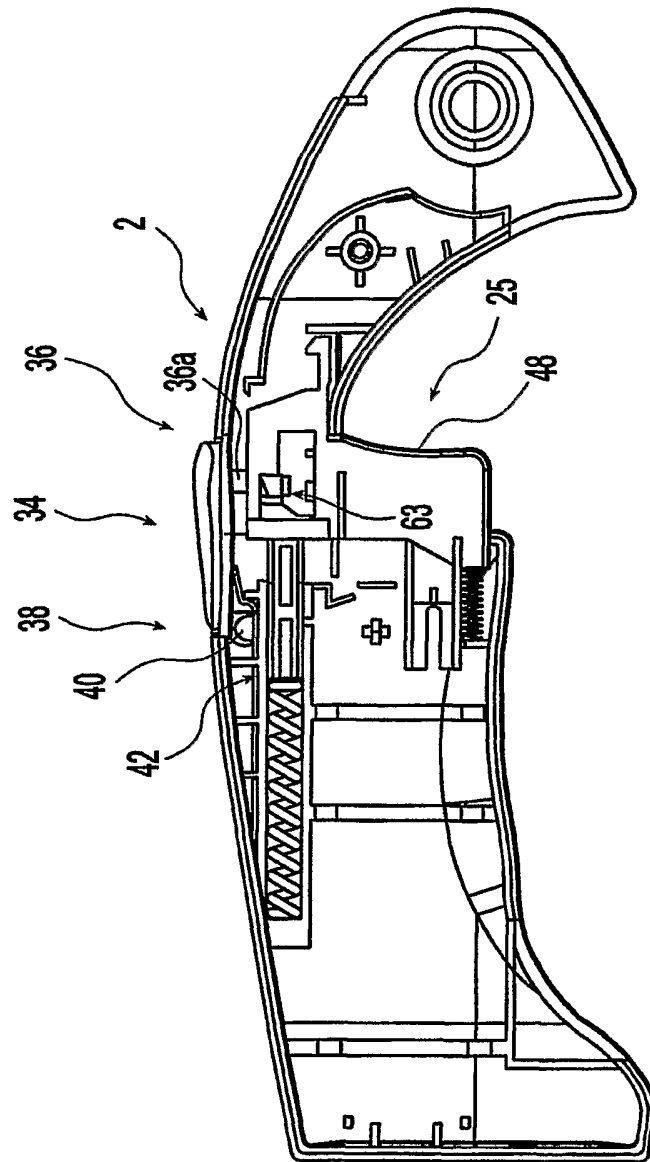


Fig. 2

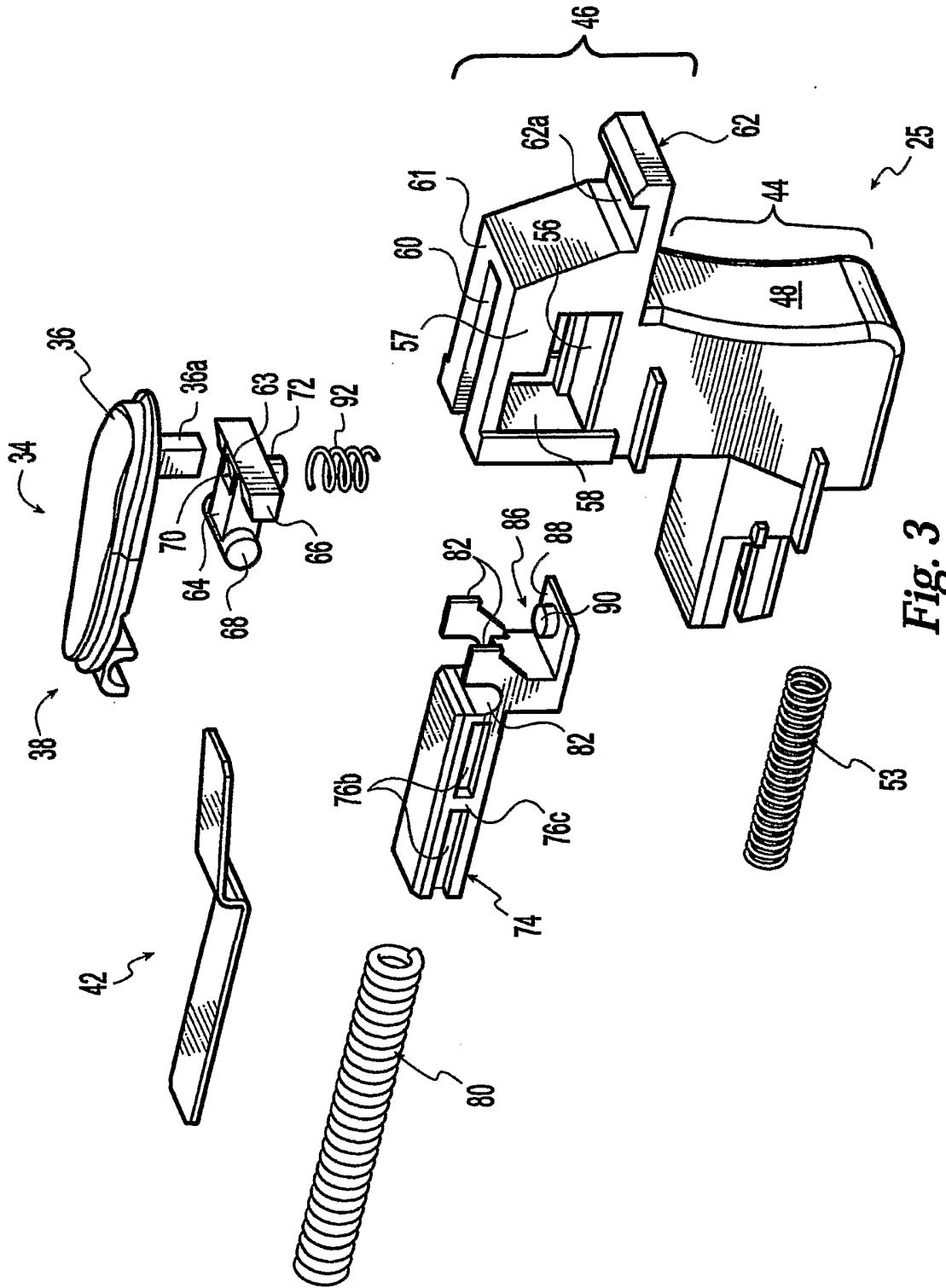


Fig. 3

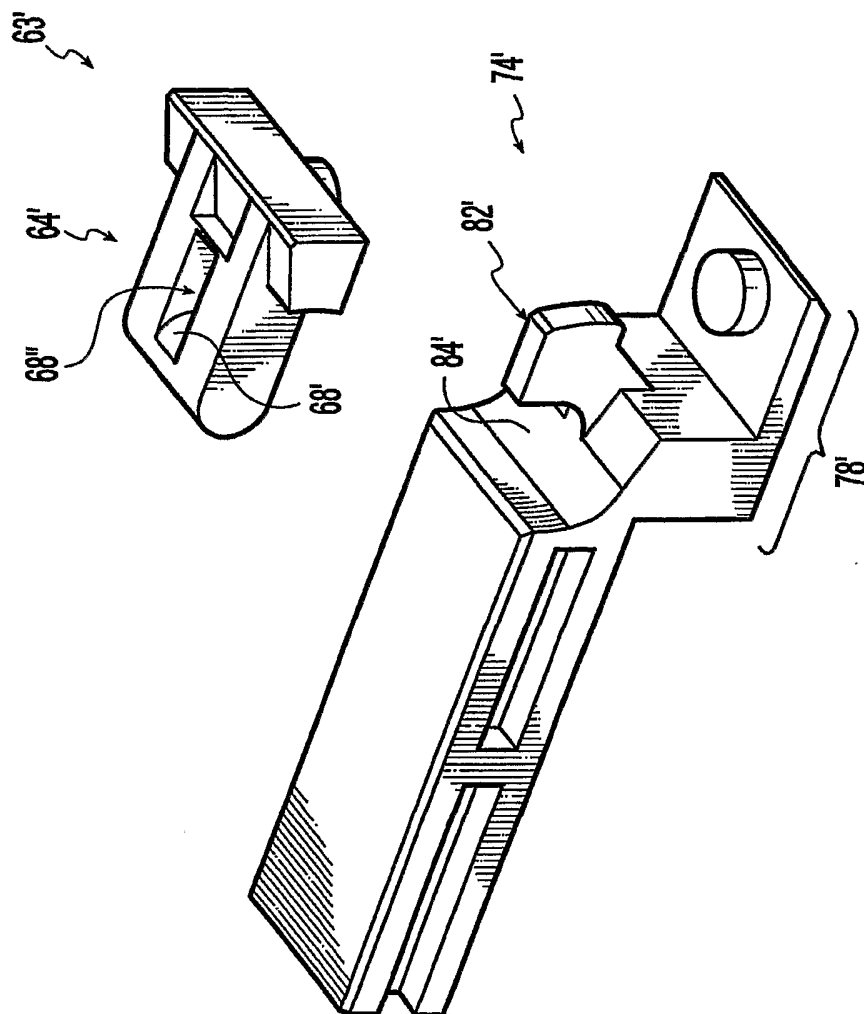


Fig. 3A

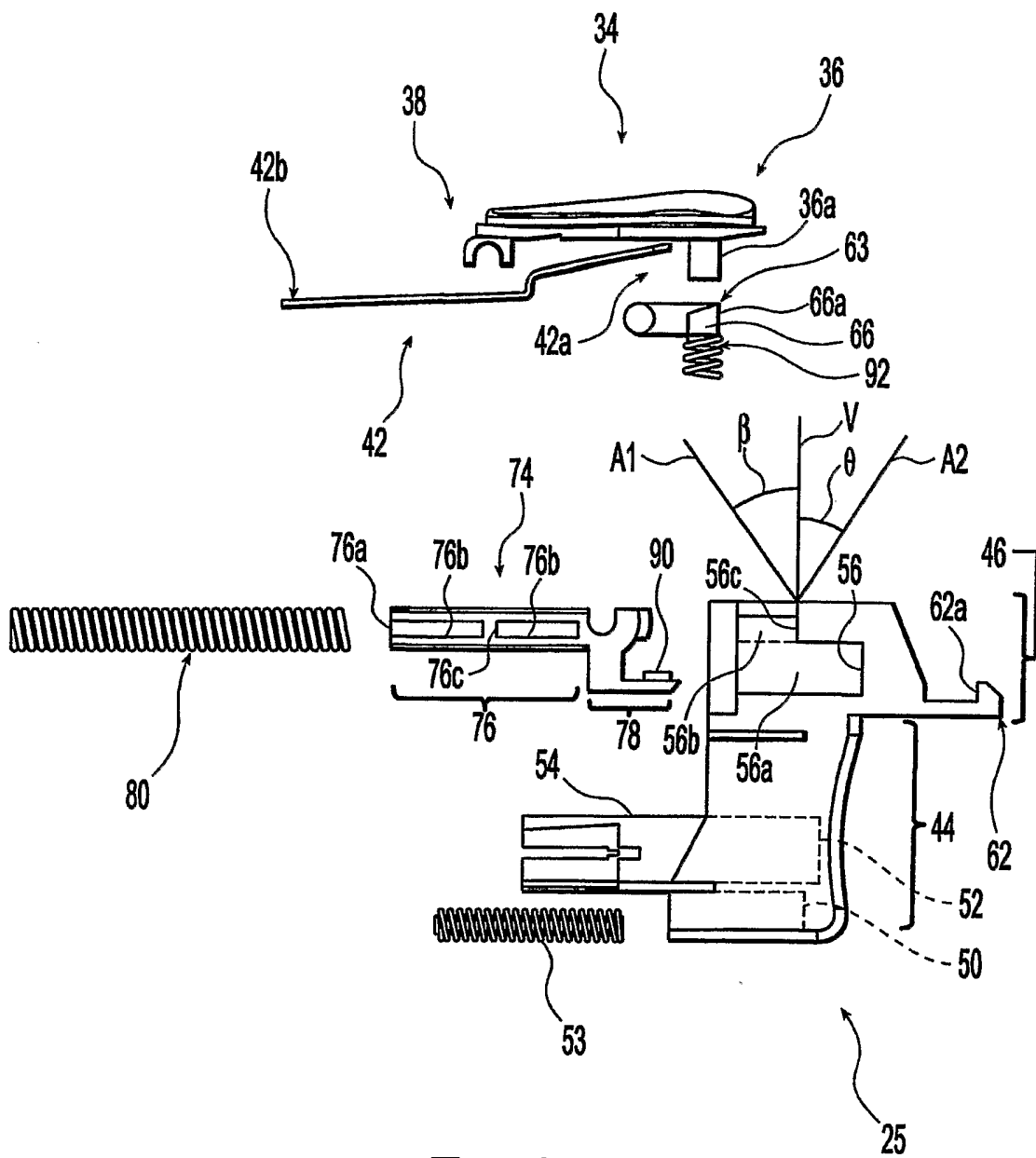


Fig. 4

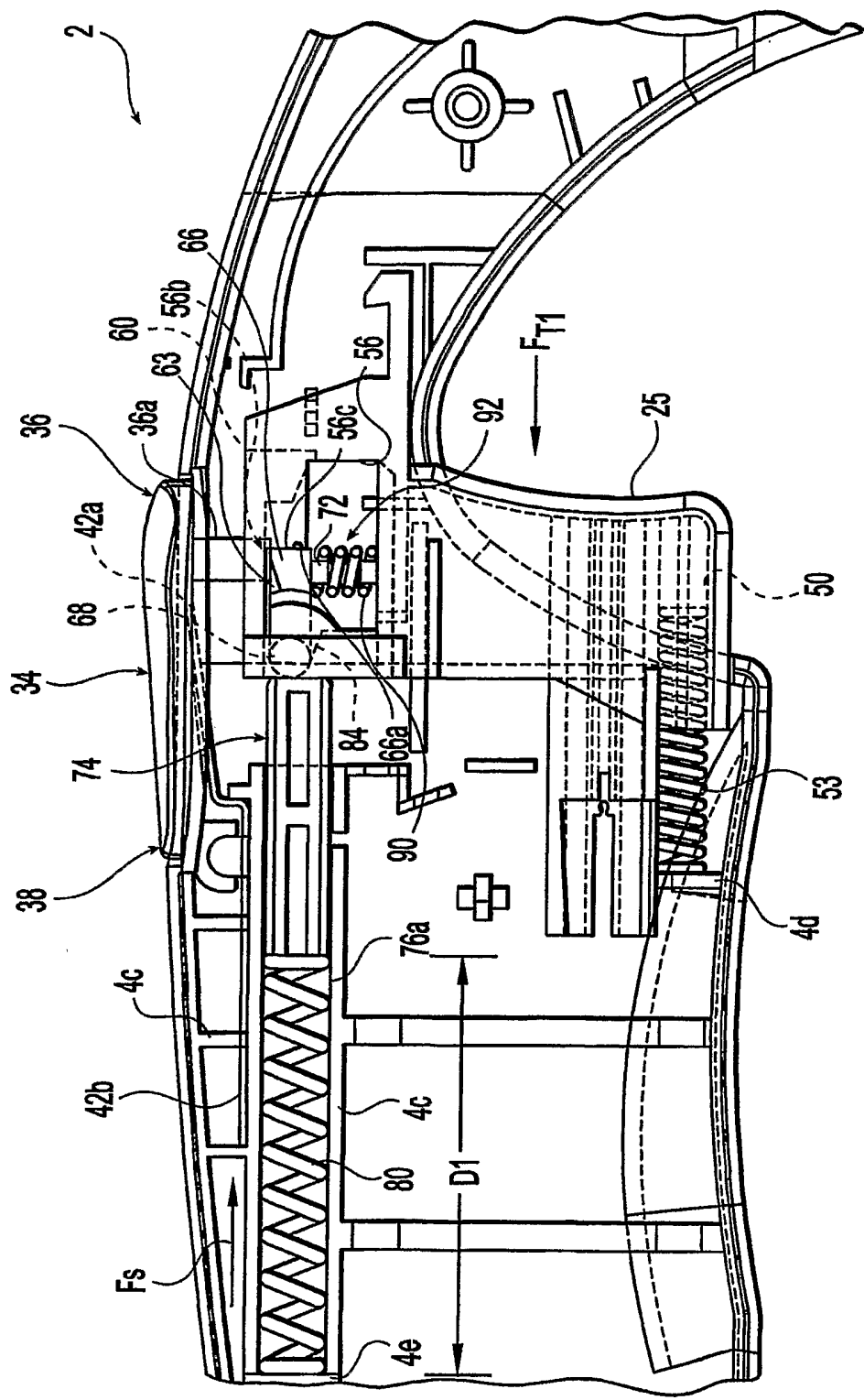


Fig. 5

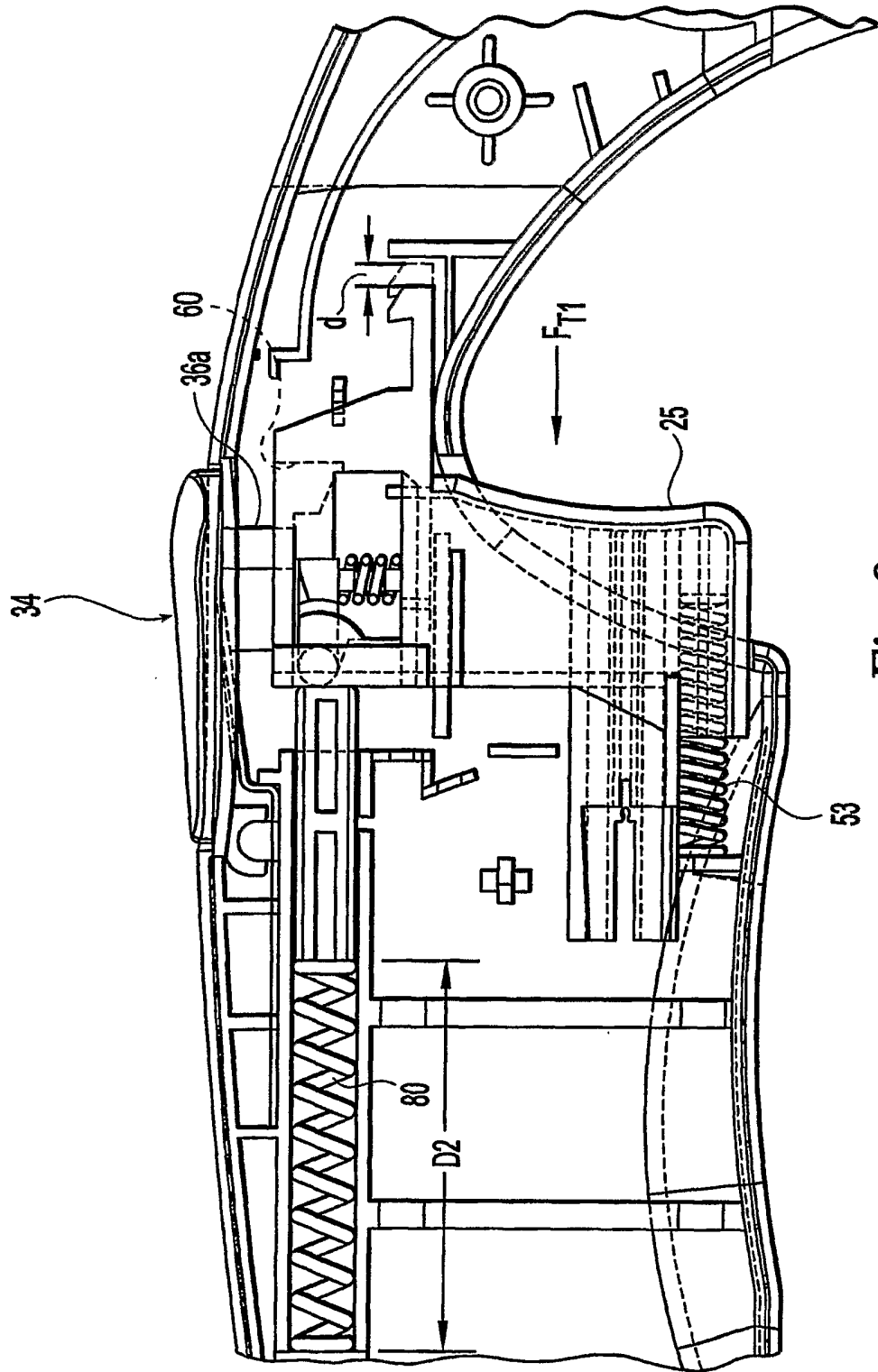


Fig. 6

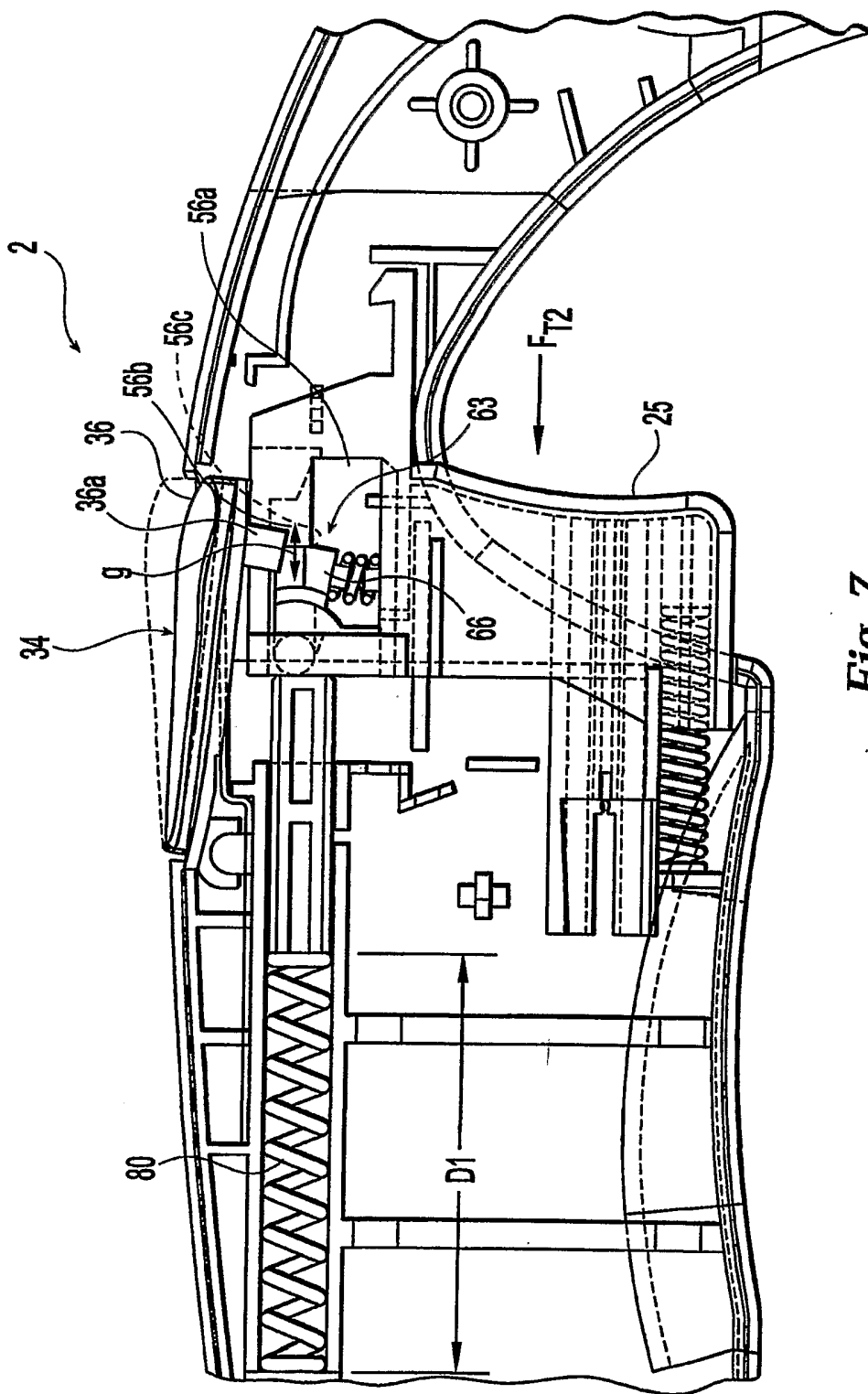


Fig. 7

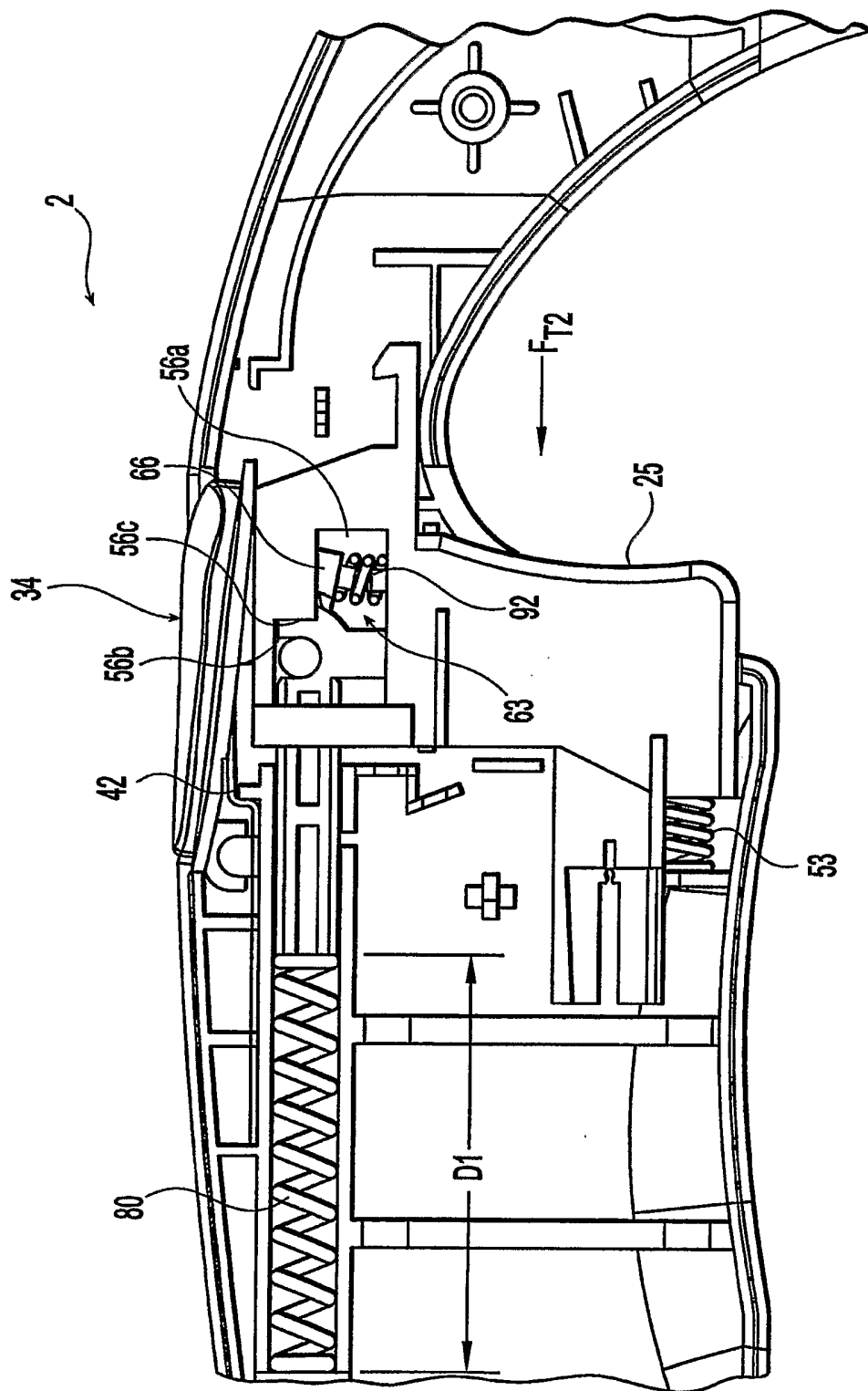


Fig. 8

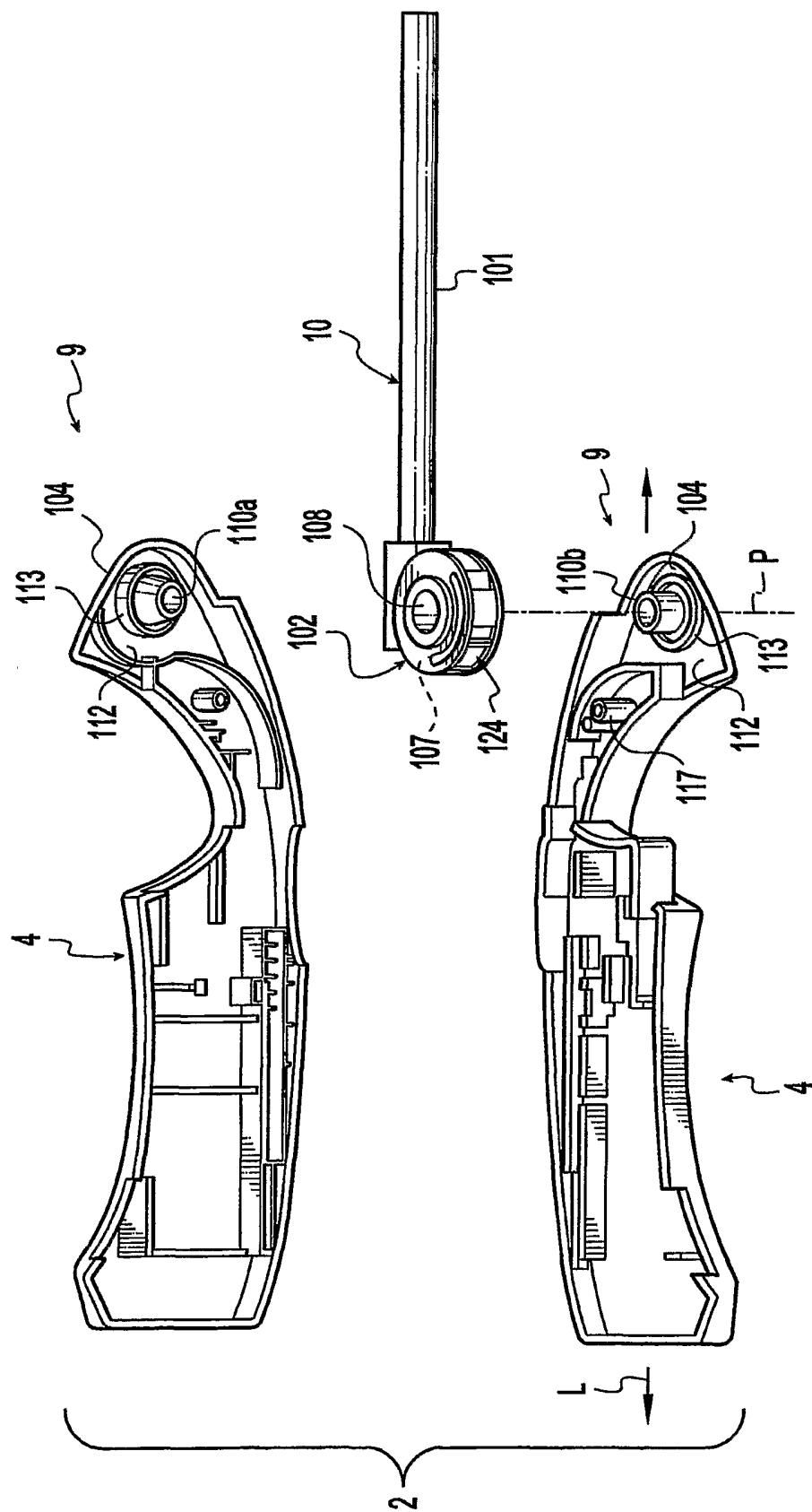


Fig. 9

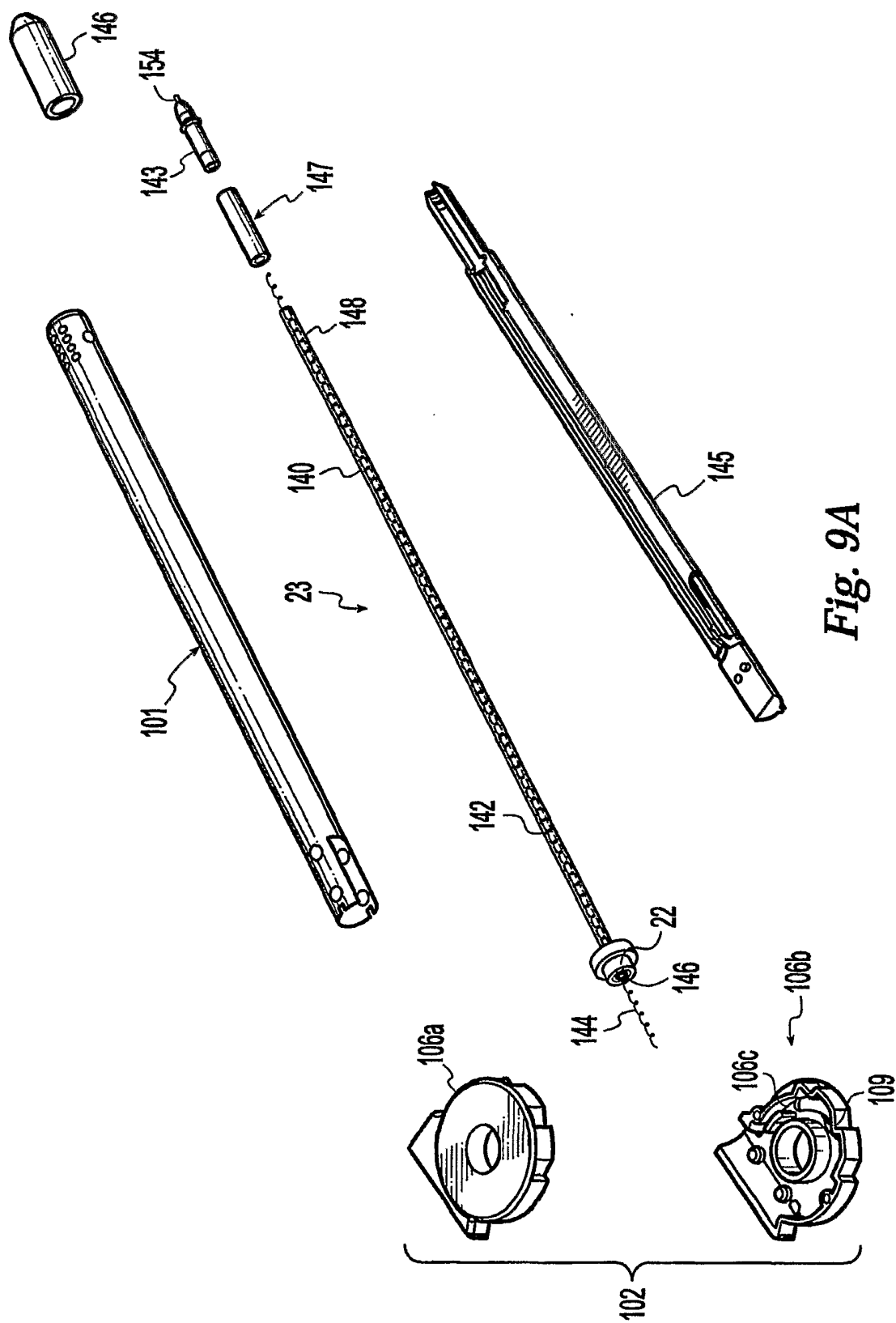


Fig. 9A

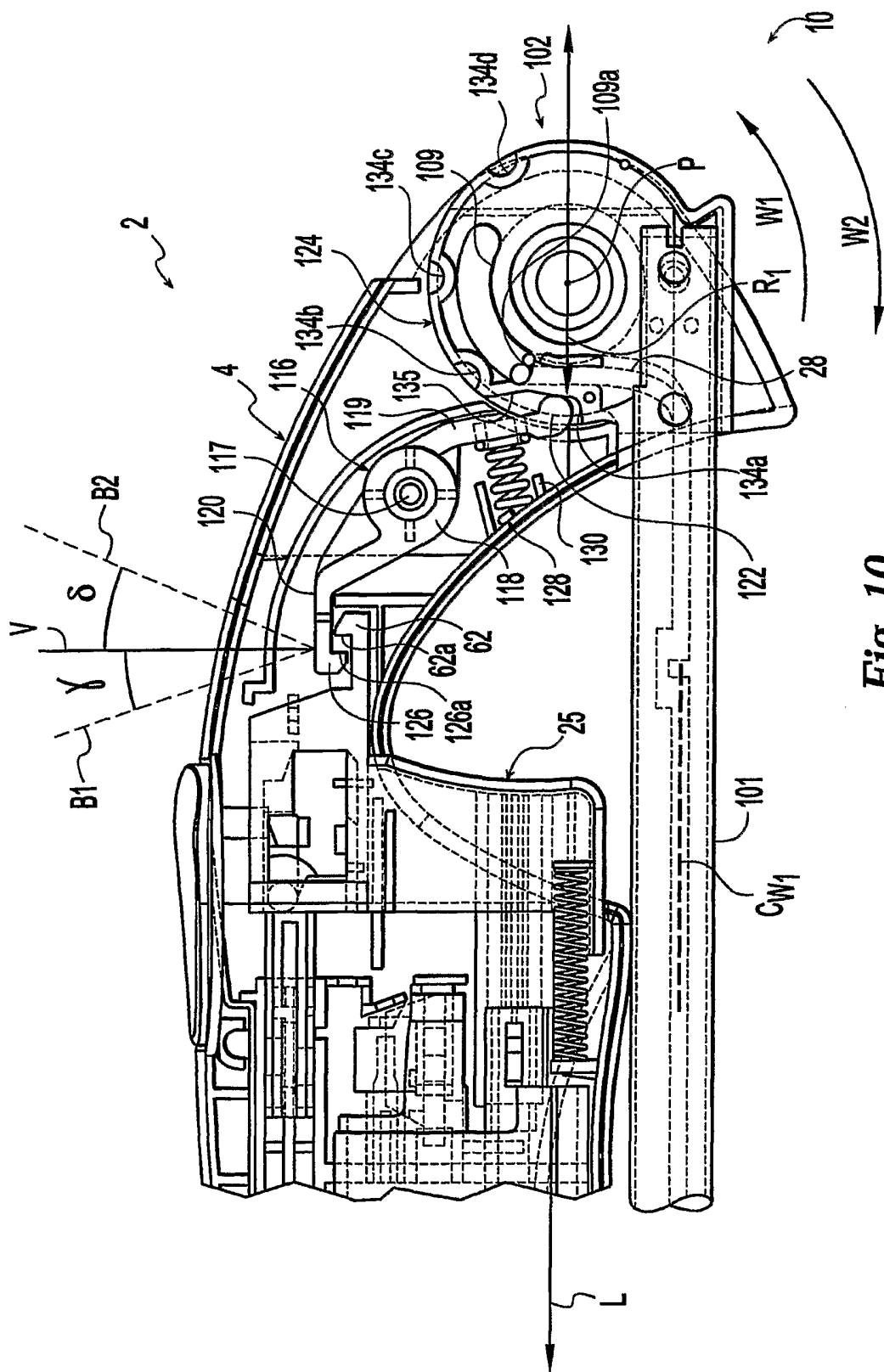


Fig. 10

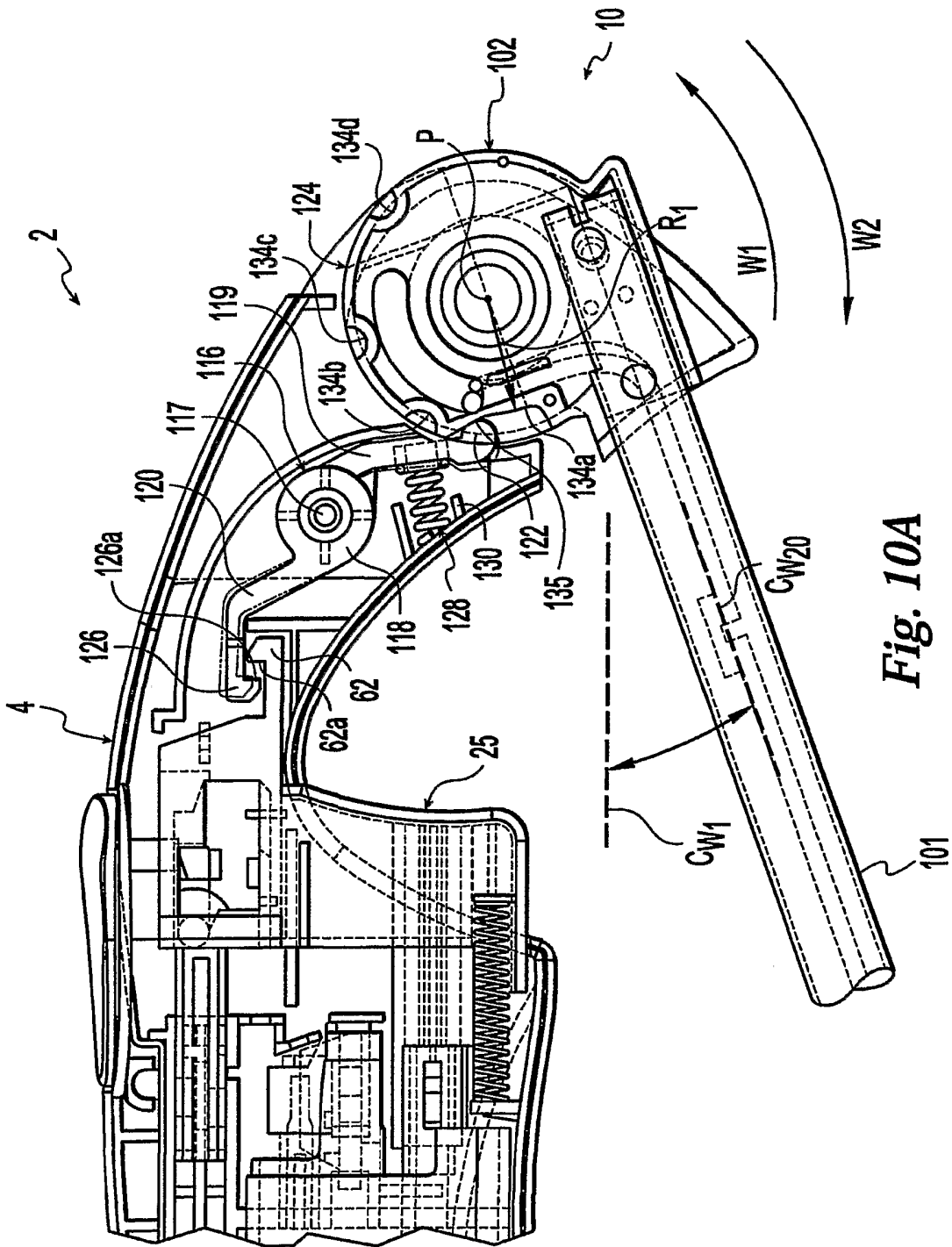


Fig. 10A

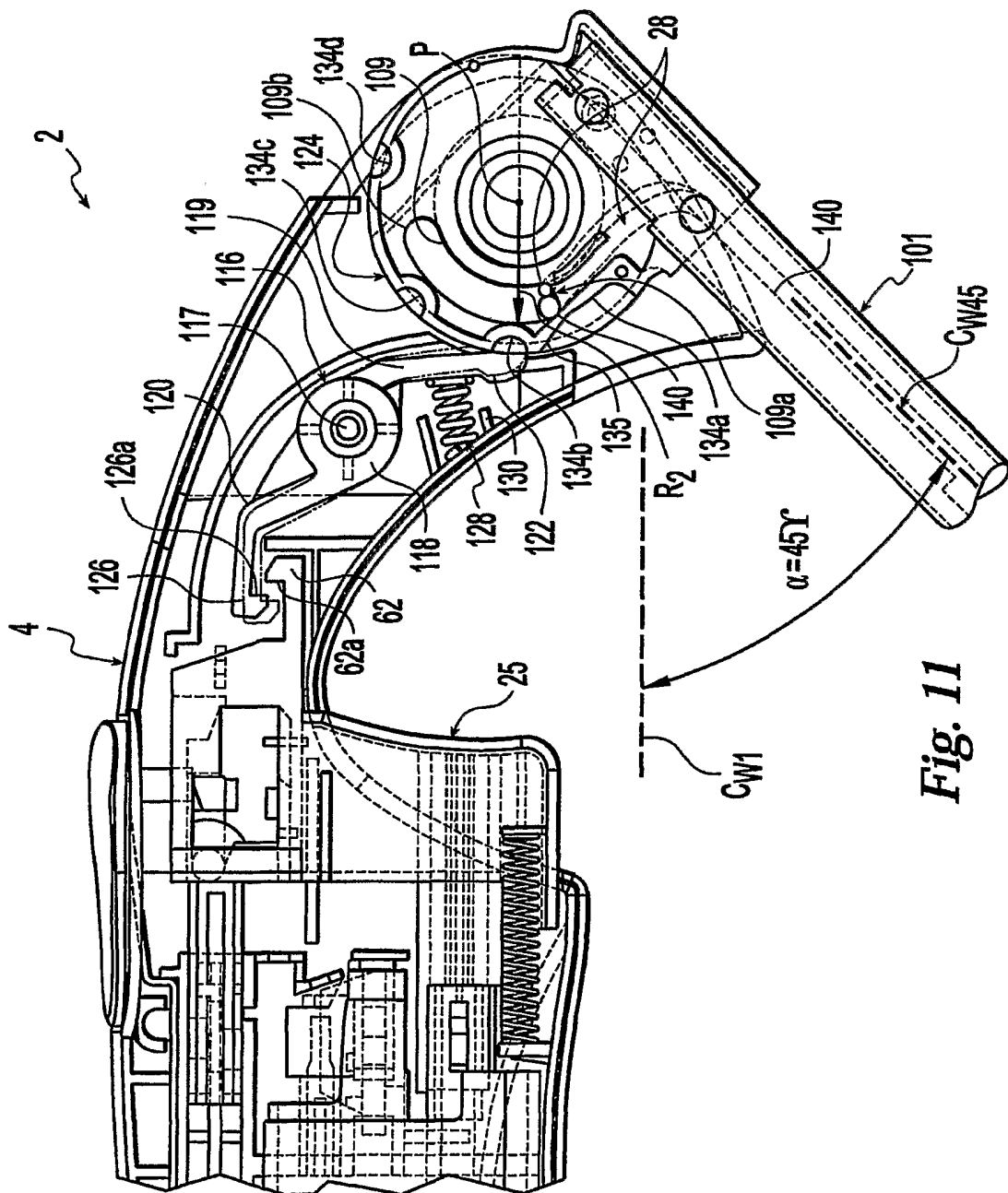


Fig. 11

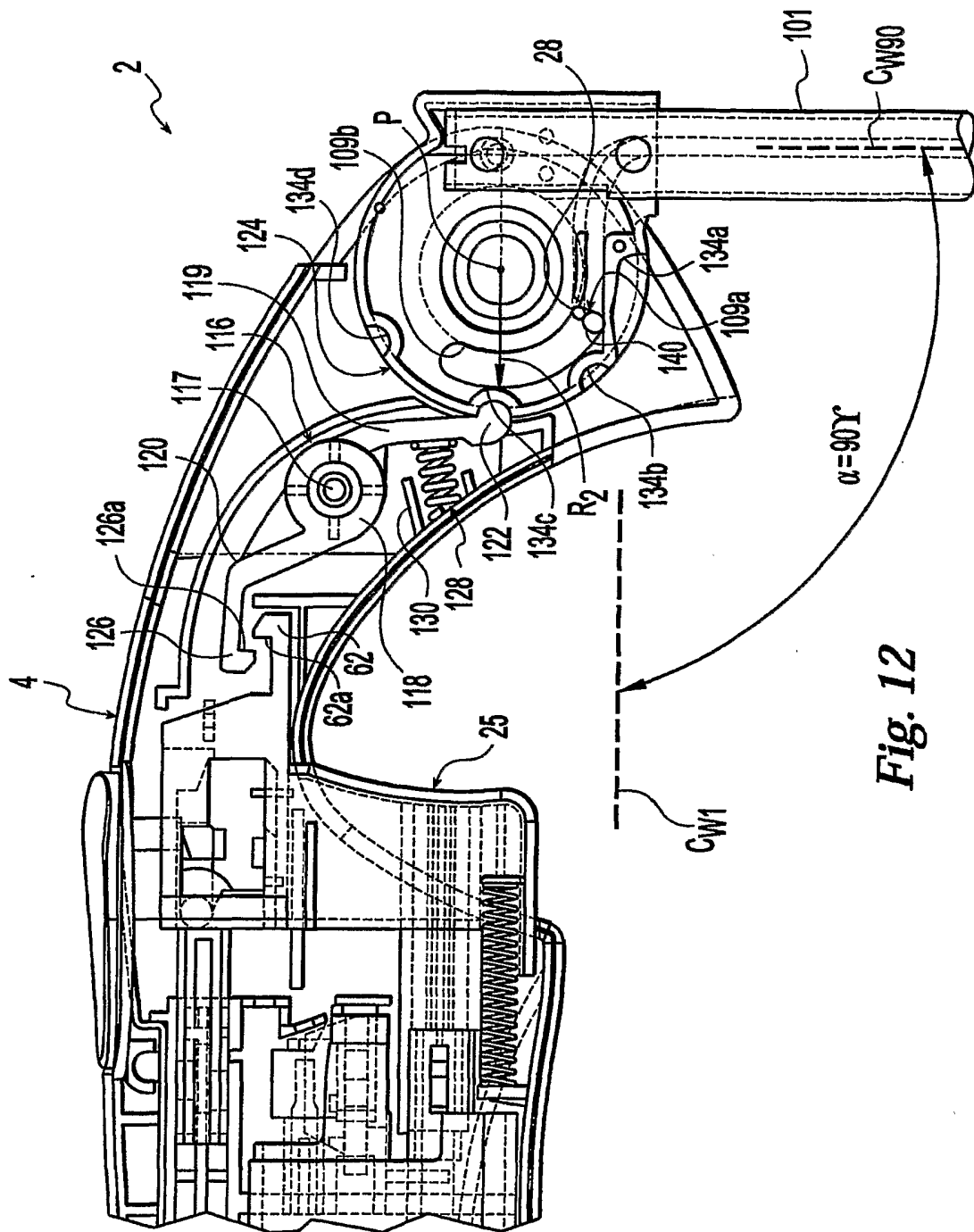


Fig. 12

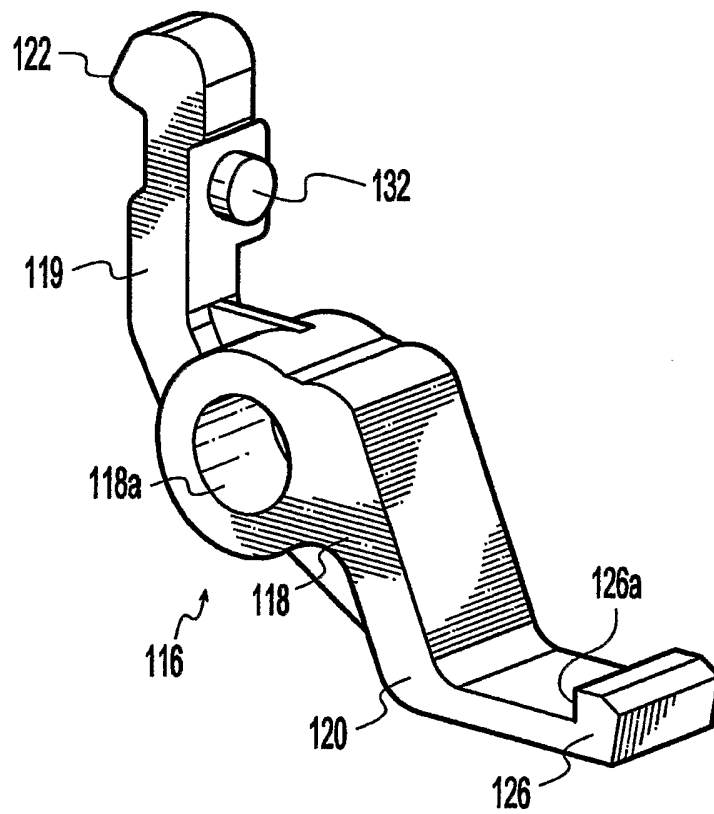


Fig. 15

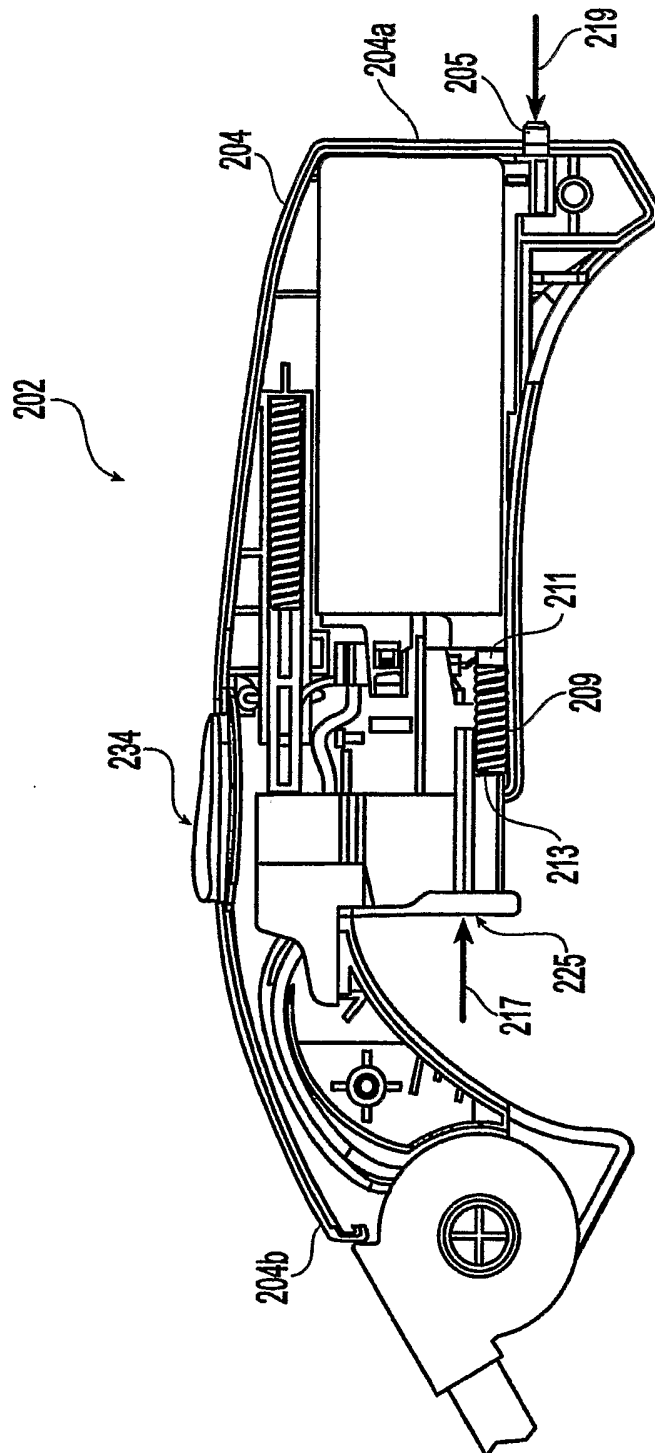


Fig. 16

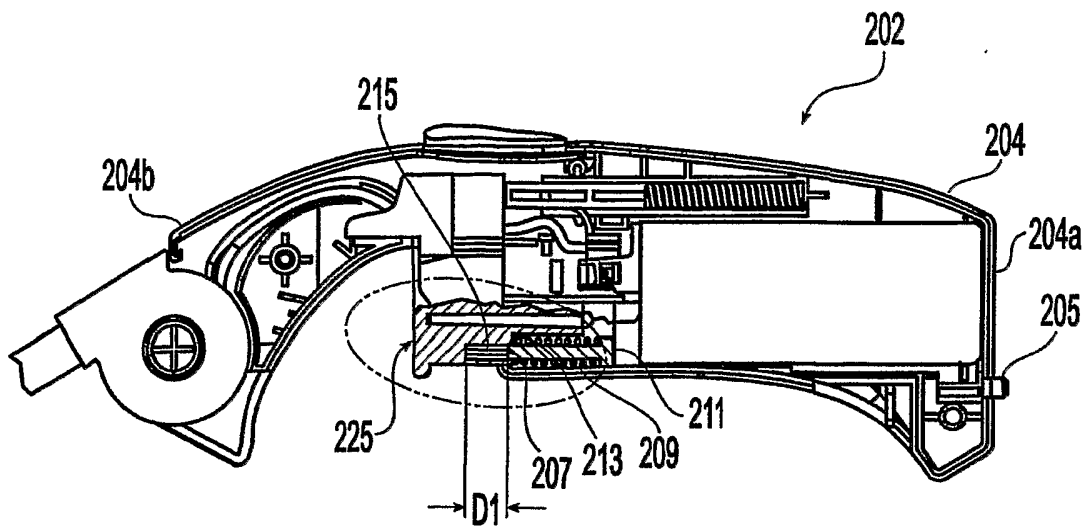


Fig. 17

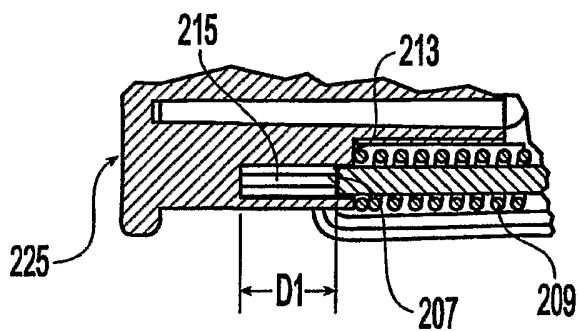


Fig. 17A

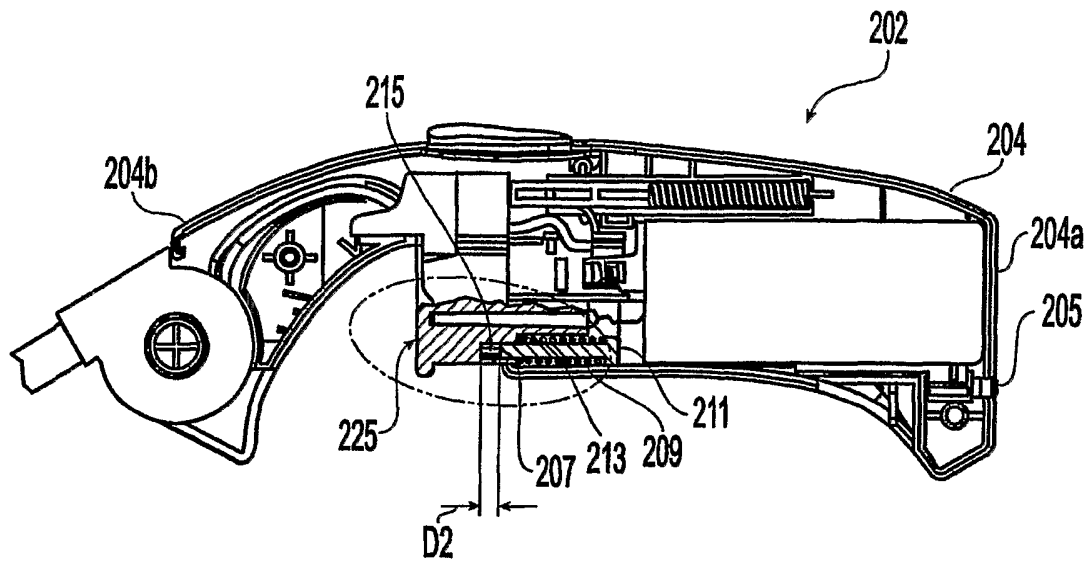


Fig. 18

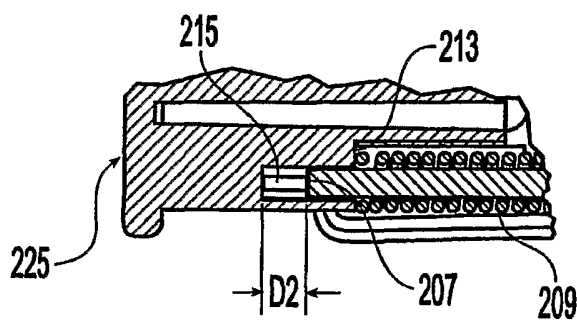


Fig. 18A

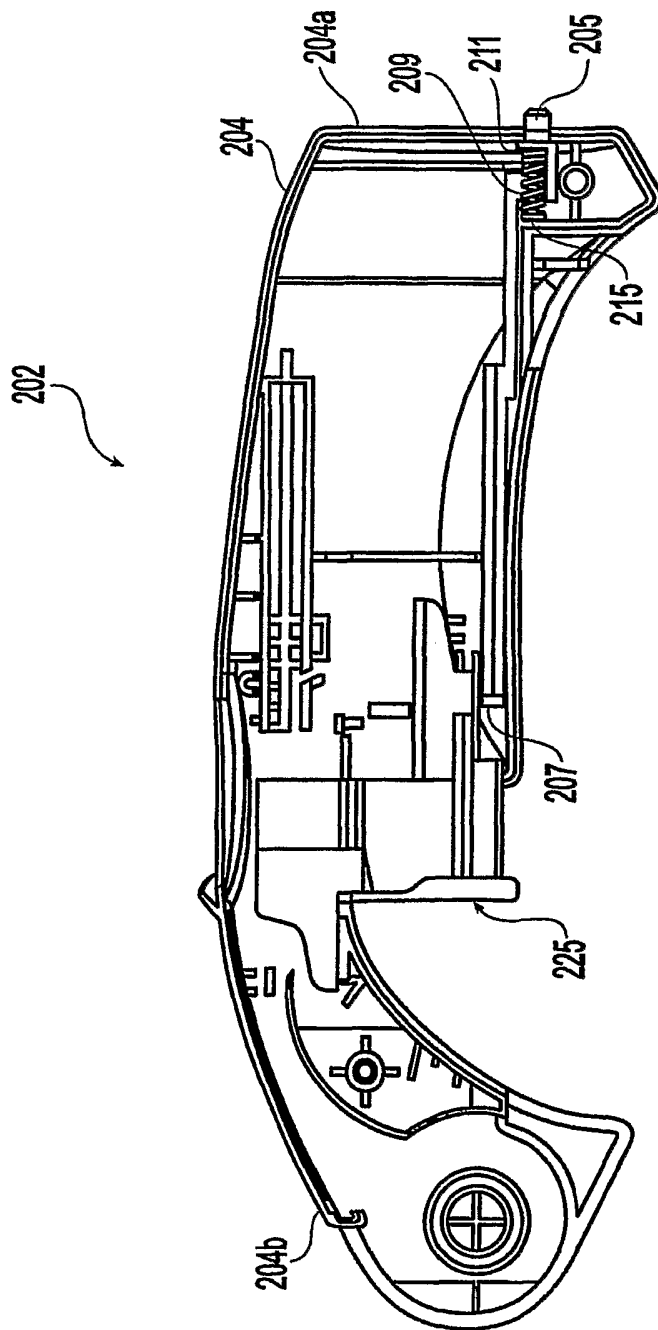


Fig. 19

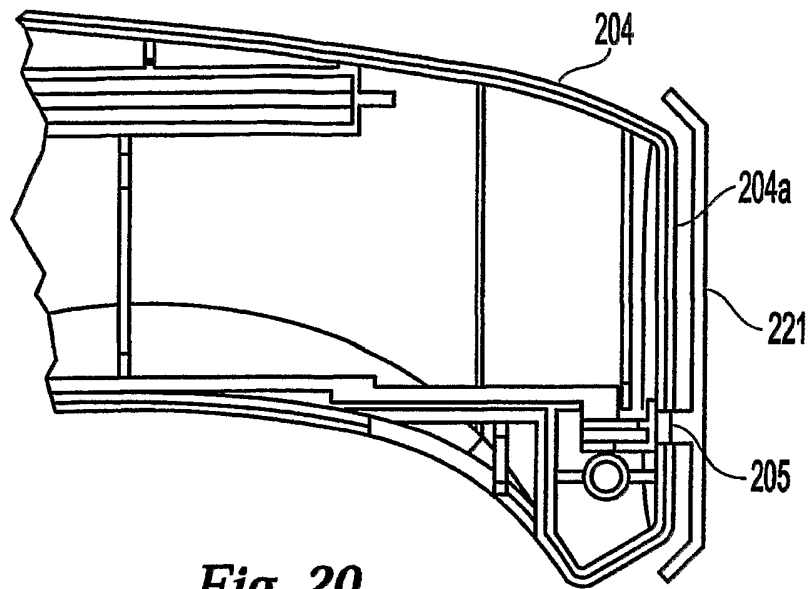


Fig. 20

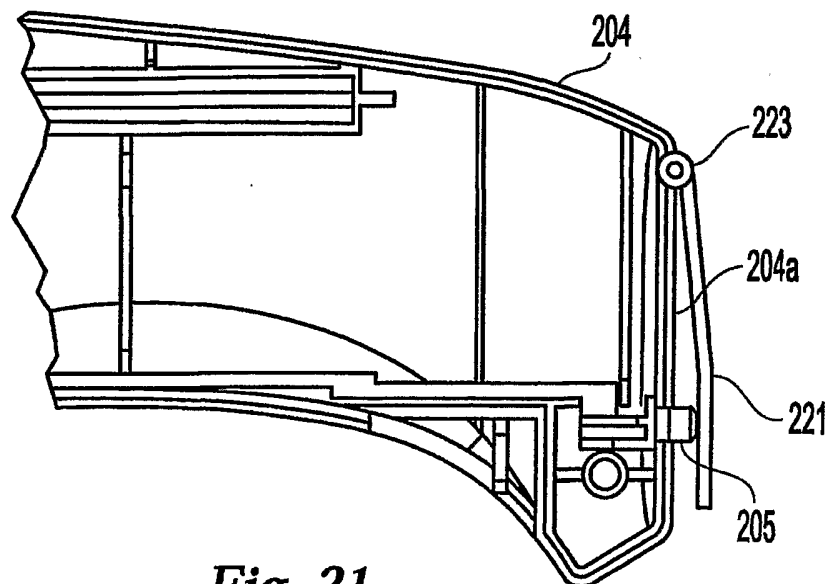


Fig. 21

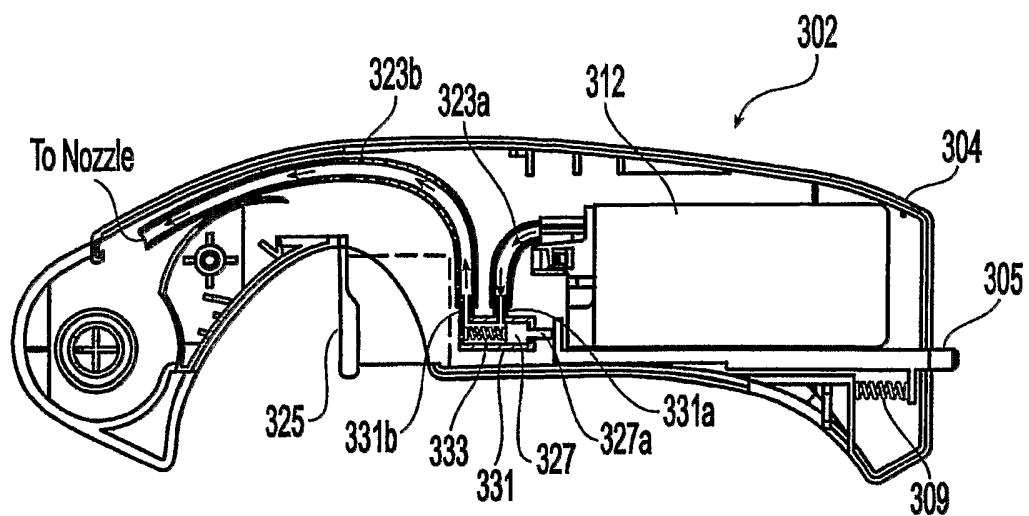


Fig. 22

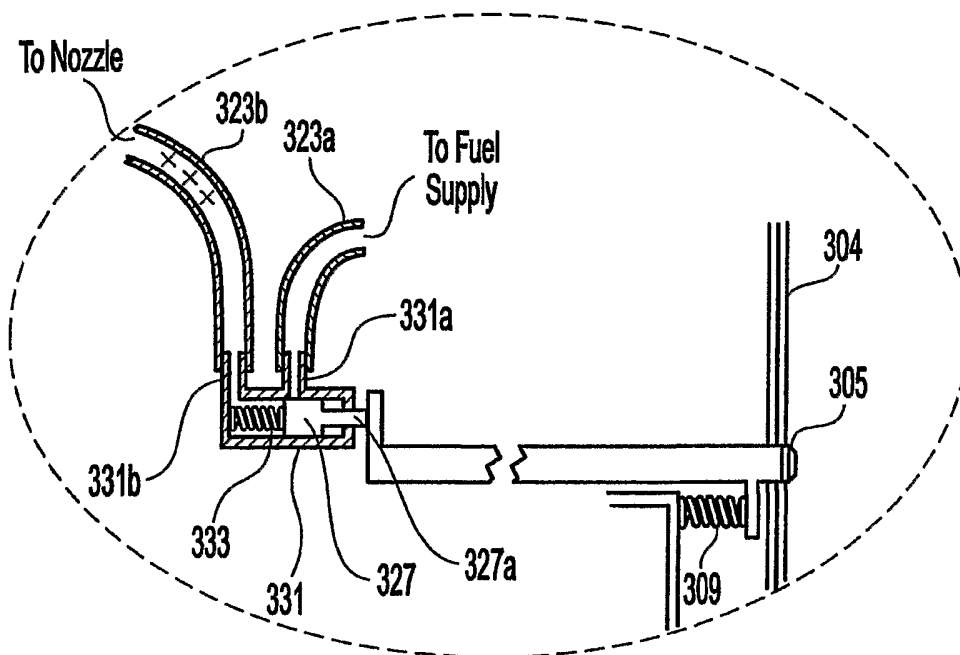


Fig. 22A

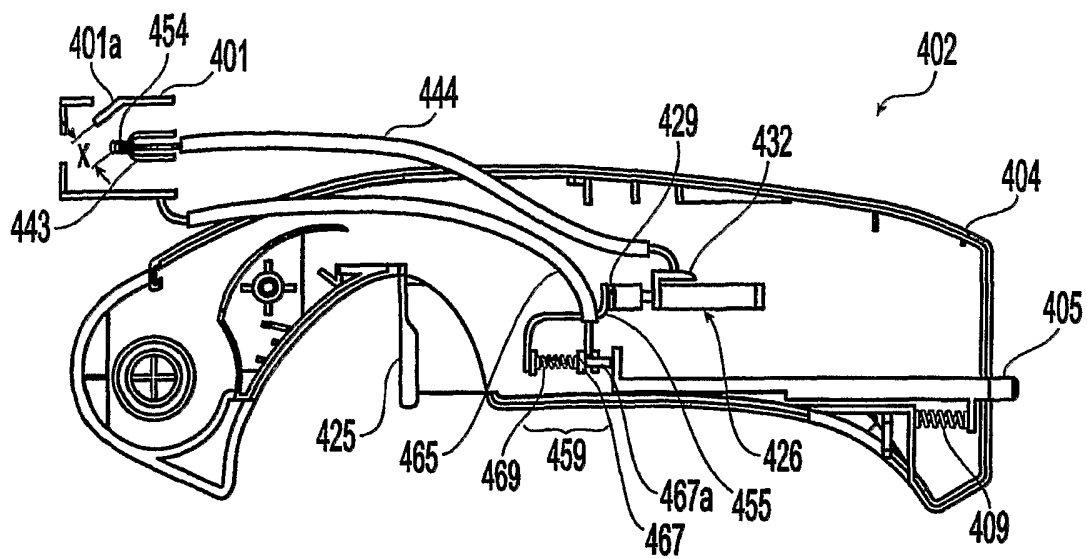


Fig. 23

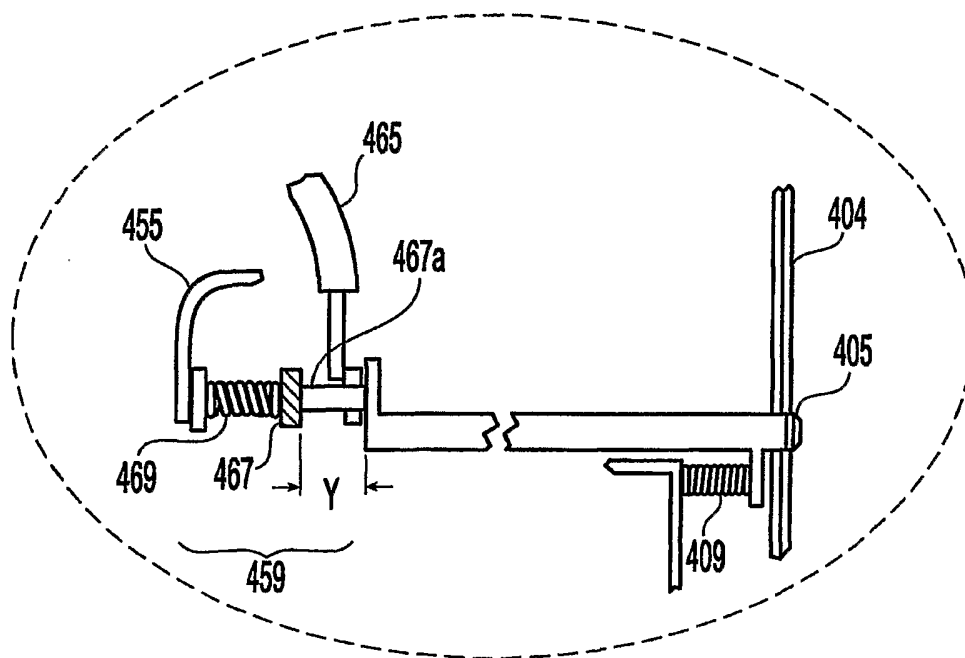


Fig. 23A

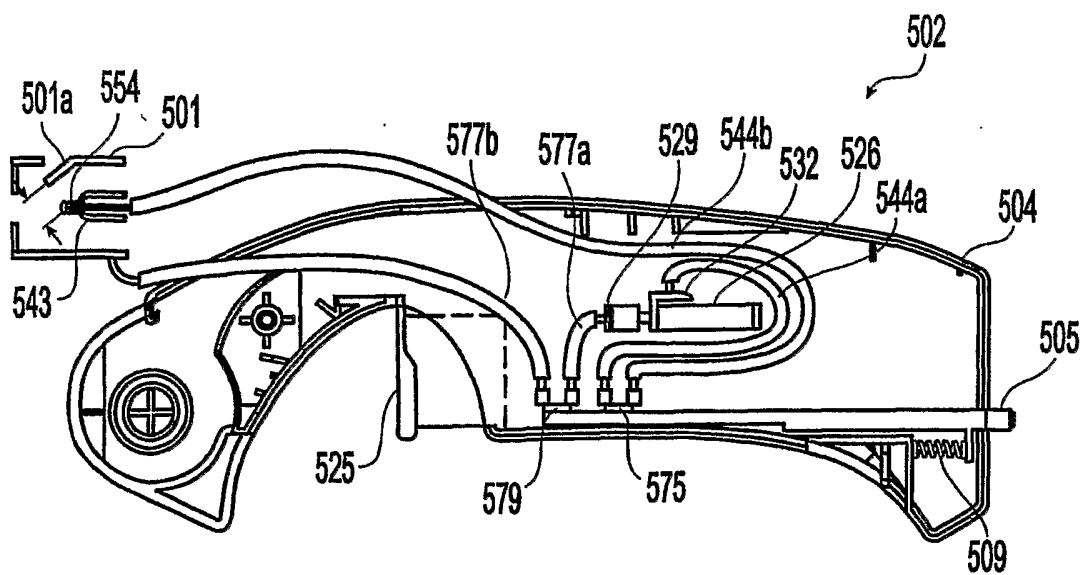


Fig. 24

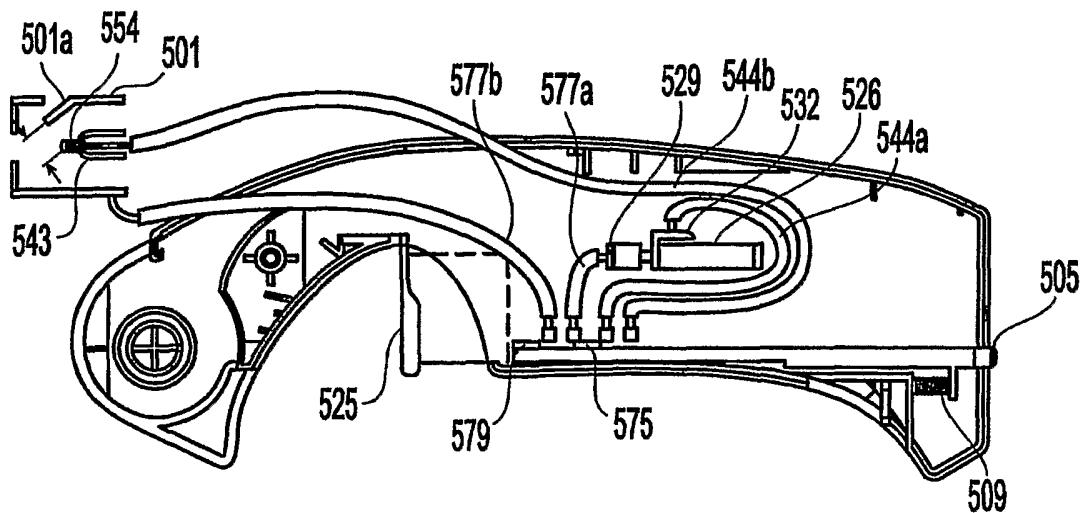


Fig. 24A

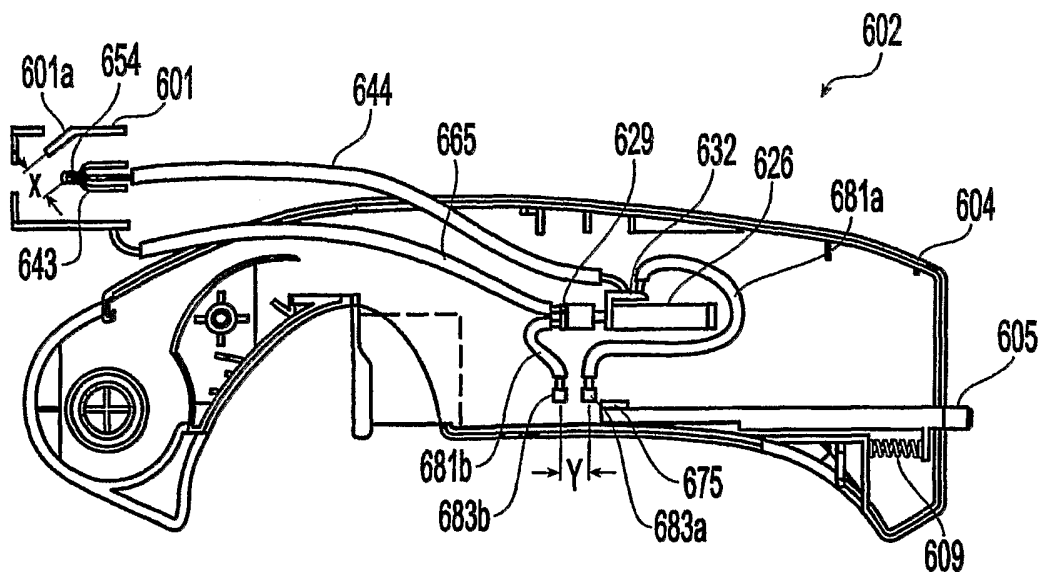


Fig. 25

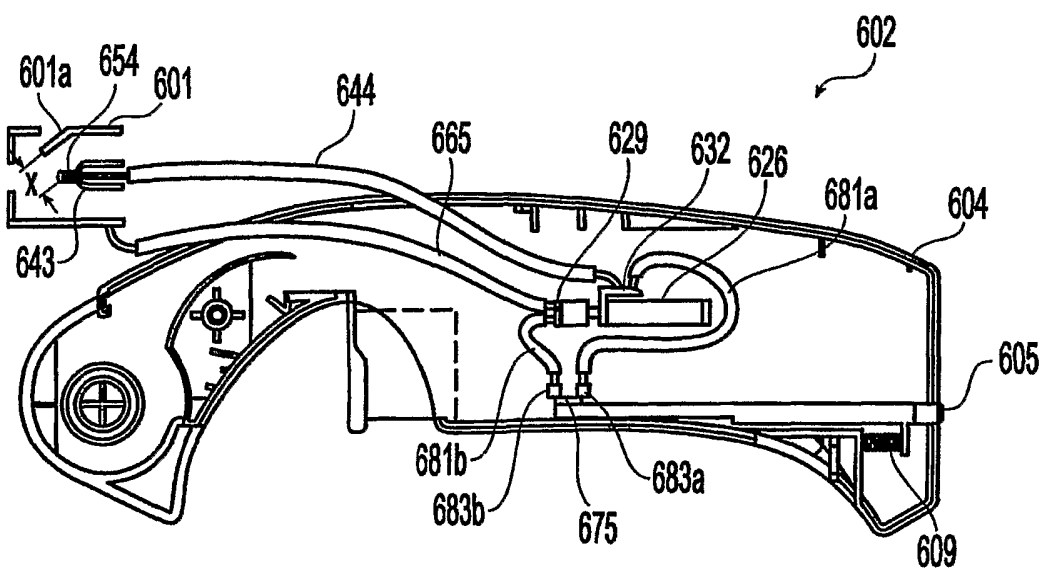


Fig. 25A