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(54) A new plastic lighter.

(57) This disclosure is an improvement for the conventional lighter in parts thereof such as the gas reservoir, the gas control valve, the gas nozzle, and the pressing plate; the prime feature is that two opposite sub-walls are provided in the gas reservoir, being perpendicular to the inner wall thereof; the two opposite sub-walls form a capillary groove to enable a liquid gas to flow upwards by means of capillary effect.

The gas control valve has a section of outer threads in the lower part thereof, a seal ring mounted around the neck portion thereof, and a disc portion on the upper part thereof; the disc portion has a ratchet gear, and a round flange which is furnished with a cut of 90 degrees upon the gas control valve being fixedly mounted in a valve seat and the flame adjustment being done. The cap of lighter has a salient piece formed with a punching machine to extend into the cut of the round flange; the salient piece is used to prevent the round flange from rotation. The gas control valve has a cylindrical hole for receiving a gas nozzle, and the lower end of the gas control valve has a valve hole to receive a part of a bi-nail member so as to control the flow of gas.

The aforesaid gas nozzle has a neck portion, of which the center has a nozzle outlet; the lower part of the gas nozzle has a smaller diameter to form into a pin portion with a longitudinal groove. The bottom of the pin portion is inserted with a plastic nail; since the plastic nail is shorter than the longitudinal groove, a space is left in the longitudinal groove so as to facilitate a gas to flow into the nozzle outlet. The gas nozzle is inserted in the gas control valve to control the ON/OFF of gas.

Under the pressing plate, there is a leaf spring made of plastic material to be molded integrally with the pressing plate; the leaf spring extends into a cylindrical reservoir beside the flint base so as to push the pressing plate upwards and to cause the clamp fork on the front end of the pressing plate to push the gas nozzle downwards in order to have the gas nozzle closed normally. On both sides of the clamp fork, two plastic walls are provided to cover the fire-striking wheel and the gas nozzle within in a given space.

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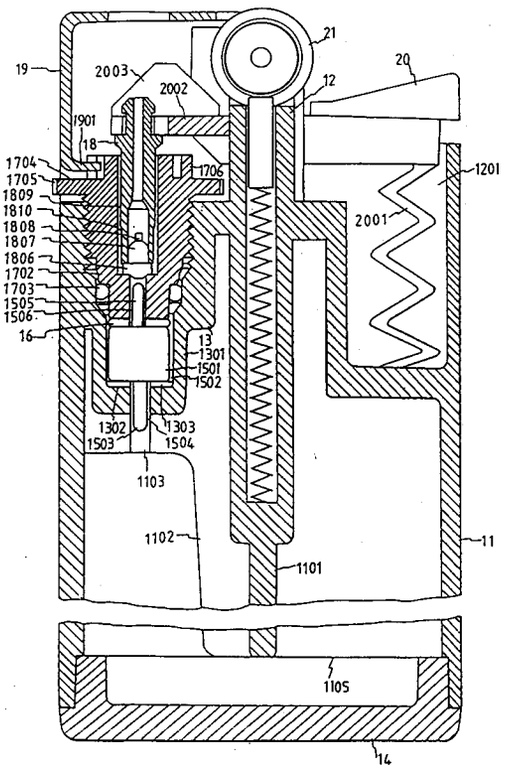
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F I G 3

BACKGROUND OF THE INVENTION:

In the current and conventional plastic lighter, a sponge rod is usually mounted in a transparent gas reservoir to form a gas-flow passage to connect the gas flow system and the gas regulating system. The gas regulating system includes a flame adjuster with inner ratchet teeth to be mounted around a valve member; whenever the flame adjuster is turned, the valve member will be moved upwards or downwards so as to control the flow of gas. The gas ignition system includes a pressing plate to control the ON/OFF of gas. A fire-striking wheel can be rotated to ignite the gas gushed out. The aforesaid structure has been used for over ten years without any major change; however , it has some drawbacks, such as complicated structure, having more parts, being assembled through complicated steps, having no complete functions desired and having poor ignition efficiency, etc. In view of the aforesaid drawbacks, the lighter according to the present invention has been improved in the following systems, i.e., (1)to simplify the gas flow system,(2) to simplify the gas regulating system for function improvement, better nt, and (3)to improve the gas ignition system with better ignition efficiency. Since the parts of the present invention have been reduced, the assembling operation for the lighter will be improved considerably.

SUMMARY OF THE INVENTION:

This invention relates to an improvement of a plastic lighter in (1) the gas flow system,(2) the gas regulating system,and the gas ignition system , of which the structures thereof are described as follows:

(1). The gas flow system:

In a conventional lighter, the gas reservoir has a reinforced inner wall, and a sponge rod to guide the gas to flow out.

In the present invention , the inner wall has been replaced with a capillary groove extended to the outlet of the gas reservoir so as to guide the gas to flow out of the gas reservoir; the capillary groove not only can save the conventional sponge rod, but also can reduce the assembling cost of the lighter; in the transparent reservoir of a lighter, there is no parts but a clean liquid gas.

(2) The gas regulating system:

In a conventional plastic lighter, the gas control valve usually includes three parts, i.e., a valve member, a gas nozzle, and a bottom cap. In the present invention, the valve member and the bottom cap are molded integrally into one piece, i.e., a gas control valve. The gas control valve has a round flange, which is cut into an aperture having a suitable width by means of an ultra-sonic machine; by means of the aperture (or cut) and a salient piece, the flame of the lighter can be adjusted exactly.

In the conventional lighter, the ratchet gear of the valve member is usually unable to mate each other exactly, and therefore the flame of the lighter can not be adjusted accurately.

This invention has further simplified the parts of a lighter so as to make the assembly operation of a lighter simplified as well.

(3) The gas ignition system:

In the conventional lighter, a metal spring is usually mounted in the valve member, while the present invention is mounted with a plastic leaf spring to replace that metal spring; the plastic leaf spring is molded integrally with the pressing plate; moreover, one end of the pressing plate is furnished with two plastic walls so as to have the sparks of flint converged to the gas nozzle to improve the ignition function.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG.1 is a disassembled view of an embodiment according to a conventional lighter.

FIG.2 is a sectional view of a conventional lighter.

FIG.3 is a sectional view of an embodiment according to the present invention.

FIG.4 is a cross sectional view of a lighter according to the pressent invention.

FIG.5 is a cross sectional view of the cylindrical reservoir of the valve seat according to the present invention.

FIG.7 is a side view of a cap according to the present invention.

FIG.8 is a perspective view of a pressing plate of the present invention.

DESCTIPTION OF THE PREFERRED EMBODIMENT:

A conventional plastic lighter as shown in FIGs. 1 and 2 usually has a complicated structure, in which a valve base 1 and a gas reservoir 2 are welded together with an ultra-sonic welding method along a welding line; the prime structure of the lighter comprises a sponge rod 3, of which a flange 301 is mounted in a metal cylinder 4; the flange portion 401 of the metal cylinder has a cut 402, through which gas can pass. The metal cylinder 4 is mounted in a round recess 101 of the valve base

1. The top of the metal cylinder 4 is mounted with a nail-shaped member 5, on which a regulating washer 6 is mounted. The outer diameters of the nail-shaped member 5 and the regulating washer 6 are slightly smaller than the inner diameter of the round recess 101 so as to provide a suitable gap 102 between them and to let a liquid gas go upwards through the sponge rod 3, the cut 402 of the metal cylinder 4 and the gap 102 until reaching the regulating washer 6 made of sponge; then, and soon as the outlet 902 of the bottom cap is opened, the liquid gas will be vaporized out of a nozzle. this is general gas a passage in a conventional lighter.

The round recess of the valve base 1 has inner threads 103 for mounting a valve member 7 that has outer threads 701. A plastic nail 802 is mounted in a bottom portion 801 of a gas nozzle 8; a seal spring 803 is mounted around the gas nozzle 8. An 0-shaped seal ring 805 is mounted on the upper end of the nozzle 8; then, all the aforesaid parts assembled together are plugged in the bottom cap 9 before the same being plugged into the valve member 7. One end of the bottom cap 9 is mounted with an 0-shaped seal ring 901.

Referring to Flg.1 again, the flame regulating method of a conventional lighter is done by means of a flame adjuster 702, of which the inner ratchet teeth 703 is mated with and around the ratchet gear 704 of the valve member 7. When the flame adjuster 702 is turned by a user, the valve member can move back and forth to drive the bottom cap 9 to press the regulating washer 6 made of sponge. Whenever the thickness of the regulating washer 6 is varied, the flow of the gas can be controlled. When the fire-striking wheel is driven to rotate by a user, a flint in the lighter will be struck to produce sparks; simultaneously, the finger that drives the fire-sticking wheel would press the pressing plate 10 to cause a clamp fork 1002 to lift the neck of the gas nozzle 8 as a result of a pivot 1001 which provides a fulcrum; in that case, the outlet 902 of the bottom cap 9 will be opened with the plastic nail 802, and then the liquid gas will be gasified to gush out of the gas nozzle 8 and to produce a fire by the sparks.

The aforesaid conventional lighter has a complicated structure because of including a plurality of parts, which cause a higher cost for assembling work, i.e., it is impossible to assemble such a lighter through an automatic production line. the lighter according to the present invention has a simple structure with less parts, and therefore it can be assembled through an automatic production line; some parts thereof can be made with injection molding, and the manufacturing and parts costs can be lowered considerably.

The structure of the present invention is described in detail with three systems as follows:

(1) Gas flow system:

In the present invention, a sponge rod as used in a conventional lighter has been removed so as to reduce the parts cost and assembling cost.

as shown in fig.4, two opposite sub-walls 1102 on an inner wall 1101 in the plastic gas reservoir 11 are provided; the two opposite sub-walls 1102 extend from the bottom of the gas reservoir to a gas outlet 1103 to form a capillary groove 1104. The width of the capillary groove 1104 is designed as such that it can have the liquid gas flowed upwards to the gas outlet 1103 as a result of the surface tension thereof.

According to the present invention, the capillary groove 1104 is a self-contained parts without any assembling operation, being free from trouble. So far as an invention is concerned, that capillary groove can provide a new function, and simplify the parts of a lighter; therefore, it can reduce the assembling cost of a lighter, and is deemed a patentable disclosure.

(2) Gas regulating system: It includes (A) a gas regulating mechanism and (B) a gas control valve, which are described as folloovs:(A) Gas regulating mechanism:

As shown in FIG.3, the gas reservoir 11, the flint base 12 and the valve seat 13 of the present invention are molded into one plastic piece. An opening 1105 is provided at the bottom of the gas reservoir 11; as soon as a liquid gas is filled in the reservoir, a bottom lid 14 is to be welded thereon by means of an ultra-sonic welding method.

The gas outlet 1103 of the gas reservoir 11 is in communication with a cylindrical chamber 1301 of the valve seat 13; the bottom portion 1302 of the cylindrical chamber 1301 has a groove 1303 (as shown in FIG.6), which penetrates the gas outlet 1103 horizontally. A bi-nail member 15 is mounted in the bottom portion 1302 of the chamber 1301. The diameter of the body portion 1501 of the bi-nail member 15 is slightly less than the inner diameter of the cylindrical reservoir so as to provide a gap 1502 between them. The lower tip 1503 of the bi-nail member extends into the gas outlet 1103 to form a suitable gap 1504 between them; the upper tip 1505 of the bi-nail member extend through a sponge pad 16 and a valve hole of the gas control valve 17. There is a gap 1506 between the upper tip 1505 and the inner wall of the valve hole. The sizes of the aforesaid gaps have to be such that a liquid gas is able to flow upwards to the gas nozzle by means of a capillary effect as a result of the surface tension of a liquid gas.

By means of the aforesaid structure, a liquid gas is able to flow upwards as a result of capillary effect to the gas outlet 1103 along the capillary groove 1104, and then to flow through gap 1504, the groove 1303, the gap 1502, the sponge pad 16 and the gap 1506; as soon as the gas nozzle is opened, the liquid gas will be gasified and gushed out. In accordance with the aforesaid gas regulating system, the present invention has been much simplified in parts than a conventional lighter.

(B). Gas control valve:

In the present invention, the gas control valve 17 is equal to the valve member 7 and the bottom cap 9 of a conventional lighter for simplification purpose; as shown in FIg.5, the lower portion of the gas control valve 17 is furnished with outer threads 1701; the neck portion 1702 of the control valve 17 is mounted with a seal ring 1703, while the upper portion thereof has a disc portion 1704 with a plurality of ratchet teeth 1705. The disc portion 1704 has a round flange 1706; the center of the gas control valve 17 has a cylindrical hole 1707 for inserting a gas nozzle 18; the lower end of the cylindrical hole has a valve hole 1708.

The outer threads 1701 of the control valve 17 are used for fixing the control valve 17 in the valve seat 13. When the ratchet teeth 1705 are turned, the control valve 17 will press the sponge pad 16 so as to set a given flowing volume of the gas.

In a conventional lighter, when the flame adjustment is done, the gas control valve 17 must be stopped to turn, i.e., the flame has been set at a high or low condition. In the conventional plastic lighters, the valve members thereof usually have a slight tolerance in the thread portion thereof; in other words, the ratchet gears might not be set at the same position or angle, though the gas volume may be set at the same flow volume; therefore, when the flame adjuster 702 is mounted around the ratchet gear 704, the inner ratchet teeth 703 might not be mated with teeth of the ratchet gear 704 proportionally and exactly, and usually they might have a tolerance of about 20 degrees, which would cause a considerable difficulty in adjusting the flame of a lighter.

In order to eliminate the aforesaid drawback of a conventional lighter, the flame adjuster according to the present invention is replaced with a ratchet gear 1705 around the disc portion 1704 of the gas control value 17, i.e., the flame of a lighter can be adjusted by turning the ratchet gear 1705 directly. A round flange 1706 is provided on the disc portion; as soon as the flame adjustment is done, the round flange 1706 is provided with a cut 1709 at an angle of 90 degrees by means of an ultrasonic cutter; then, a salient piece 1901 on the cap 19 and opposite the cut 1709 is furnished by means of a punching machine; the salient piece 1901 is to be inserted into the cut 1709 upon the cap 19 being mounted over the flint base 12 as shown in FIg.7 so as to let the salient piece 1901 cover the cut 1709 to prevent the gas control valve 17 from rotating unintentionally; in that case, the flame of a lighter can be set at a height desired without tolerance.

As shown in FIGs. 3 and 5, the gas nozzle 18 has a neck portion 1801 and a nozzle outlet 1802 in the center thereof. The lower end of the body portion 1803 has a pin portion 1805 with a reduced diameter, on which a longitudinal groove 1804 is provided. A plastic nail 1806 is mounted in the pin portion 1805. The length of the nail portion 1807 of the plastic nail 1806 is shorter than that of the longitudinal groove 1804 so as to provide a space 1808 in the groove 1804 to let a gas enter the nozzle outlet 1802.

After the gas nozzle 18 is inserted in the cylindrical hole 1707 of the gas control valve 17, there is a small gap 1809 left between the two parts because of the body portion 1803 having a smaller diameter than that of the cylindrical hole 1707, while there is a big gap 1810 left between the pin portion 1805 and the cylindrical hole 1707. The plastic nail 1806 is normally mounted in place to close the valve hole 1708 at the lower end of the cylindrical hole 1707. A plastic leaf spring 2001 according to the present invention is used instead of the metal spring as in a conventional lighter, and is molded integrally with the pressing plate 20. The spring 2001 under the pressing plate 20 can raise the plate 20 so as to have the clamp fork 2002 around the neck portion 1801 of the gas nozzle 18 pushed downwards to turn off the gas.

In the present invention, the gasified gas will enter the big gap 1810 from the valve hole 1708 by means of venturi tube theory upon the gas nozzle 18 being pulled upwards to let the plastic nail 1806 open the valve hole 1708; in that case, the gas is unable to enter the small gap 1809 as a result of the atmosphere pressure; instead, the, gas would, through the space 1808 of the longitudinal groove 1804, enter the nozzle outlet 1802 to gush out.

(3). Gas ignition system:

In the present invention, a plastic leaf spring 2001 molded integrally with the pressing plate 20 is used for controlling the gas nozzle instead of a metal spring as being used in the conventional lighter; the plastic leaf spring 2001 under the pressing plate 20 extends into a cylindrical reservoir 1201 beside the flint base 12, and the spring 2001 is used for raising the pressing plate 20 so as to let the clamp fork 2002 on the front of the plate

20 push the neck portion 1801 of the gas nozzle 18 downwards to close the nozzle 18.

As shown in FIG.8, both sides of the clamp fork 2002 of the pressing plate 20 are furnished with two plastic walls 2003 respectively, which are used for covering a space above the fire-striking wheel 21 and the gas nozzle 18 so as to have the sparks produced with the fire-striking wheel concentrated into a beam to dash to the gas nozzle to strike a fire surely.

By means of the aforesaid three improvements, the lighter according to the present invention is deemed patentable because of simplifying the parts and lowering the manufacturing cost of a lighter.

Claims

1. A new plastic lighter in which a gas reservoir, a valve seat and a flint base being molded integrally with a plastic material, and said plastic lighter comprising:

said gas reservoir and a bottom cap, and said bottom cap being welded by means of an ultra-sonic welding method to bottom of said gas reservoir, and two opposite sub-walls being provided and perpendicular to an inner wall inside said gas reservoir so as to form into a capillary groove, of which the width being just able to have a liquid gas flowed upwards, and the laugh of said opposite sub-walls being extended from the bottom of said gas reservoir to a gas outlet on the upper portion of said gas reservoir;

said valve seat being molded integrally with said gas reservoir and on the upper portion of said gas reservoir, and one side of said valve seat having a cylindrical chamber with threads therein, and bottom of said cylindrical chamber being in communication with a gas outlet, and having a groove intersected with said gas outlet;

a bi-nail member made of metal and having an upper tip and a lower tip, and said bi-nail member being mounted in said cylindrical chamber of said valve seat, and since body portion of said cylindrical chamber being slightly smaller than the diameter of said cylindrical chamber, a gap being formed between them; and said upper tip of said bi-nail member extended into a valve hole of a gas valve, and a gap being formed between said upper tip and said valve hole because of said upper tip having a smaller diameter than that of said valve hole; and said lower tip of said bi-nail member extended into said gas outlet of said gas reservoir; and since diameter of said lower tip being smaller than that of said gas outlet, a gap being formed between them, and the aforesaid three gaps having a width being able to have a liquid gas flowed upwards as a result of the surface tension of said liquid gas and a capillary effect;

a sponge pad having a diameter equal to that of said body portion of said bi-nail member, and having a small hole in the center thereof so as to have said upper tip of said bi-nail member mounted through;

a gas control valve having outer threads on the lower part thereof, a neck portion being mounted with a seal ring, a disc portion on the upper part thereof, a ratchet gear formed around said disc portion, and a round flange on said disc portion; and after said gas control valve being mounted in said valve seat and a given flame being adjusted, said round flange being furnished with a cut about 90 degrees; and said gas control valve having a cylindrical hole in the center thereof for receiving a gas nozzle, and a valve hole being provided under said cylindrical hole;

said gas nozzle including a neck portion on the upper part thereof, a nozzle outlet in the center thereof, a body portion and a pin portion with a longitudinal groove; and said pin portion having a smaller diameter than that of said body portion; a plastic nail being inserted in the bottom of said pin portion; and since the length of said plastic nail being shorter then that of said longitudinal groove, a space being left in said longitudinal groove so as to let a gas enter said nozzle outlet freely;

said flint base being molded integrally with said valve seat, and having a cylindrical reservoir on the upper right side thereof;

a pressing plate with a leaf spring being molded integrally, and said leaf spring extending into said cylindrical reservoir on the upper right side of said flint base for pushing said pressing plate upwards so as to let a clamp fork on the front end of said pressing plate push said neck portion of said gas nozzle downwards to close said gas nozzle; and tow plastic walls being furnished on both sides of said clamp fork respectively for covering a space over a fire-striking wheel and said gas nozzle; and

a cap having a salient piece being formed with a punching machine in a position opposite to said round flange, and said salient piece being inserted in said cut of said round flange after said cap being mounted on said flint seat; and

by means of the aforesaid feature parts such as said gas reservoir, said valve seat, said flint base, said gas nozzle, said gas con-

trol valve, said bi-nail member made of a metal, said sponge pad, said pressing plate, said sponge pad, said pressing plate, said cap and a conventional fire-striking wheel, flint, and spring, a lighter according to the present invention being assembled.

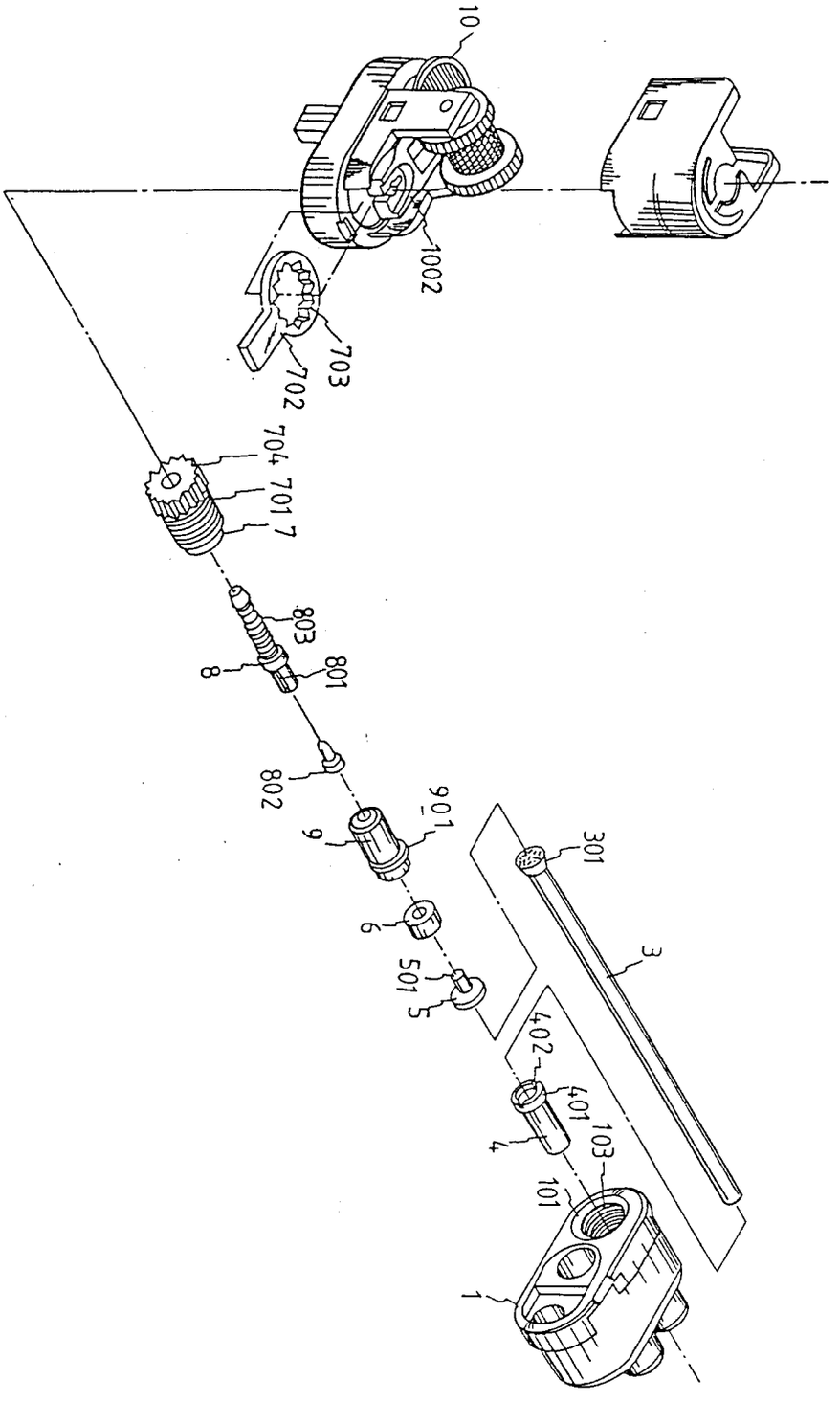
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FIG 1

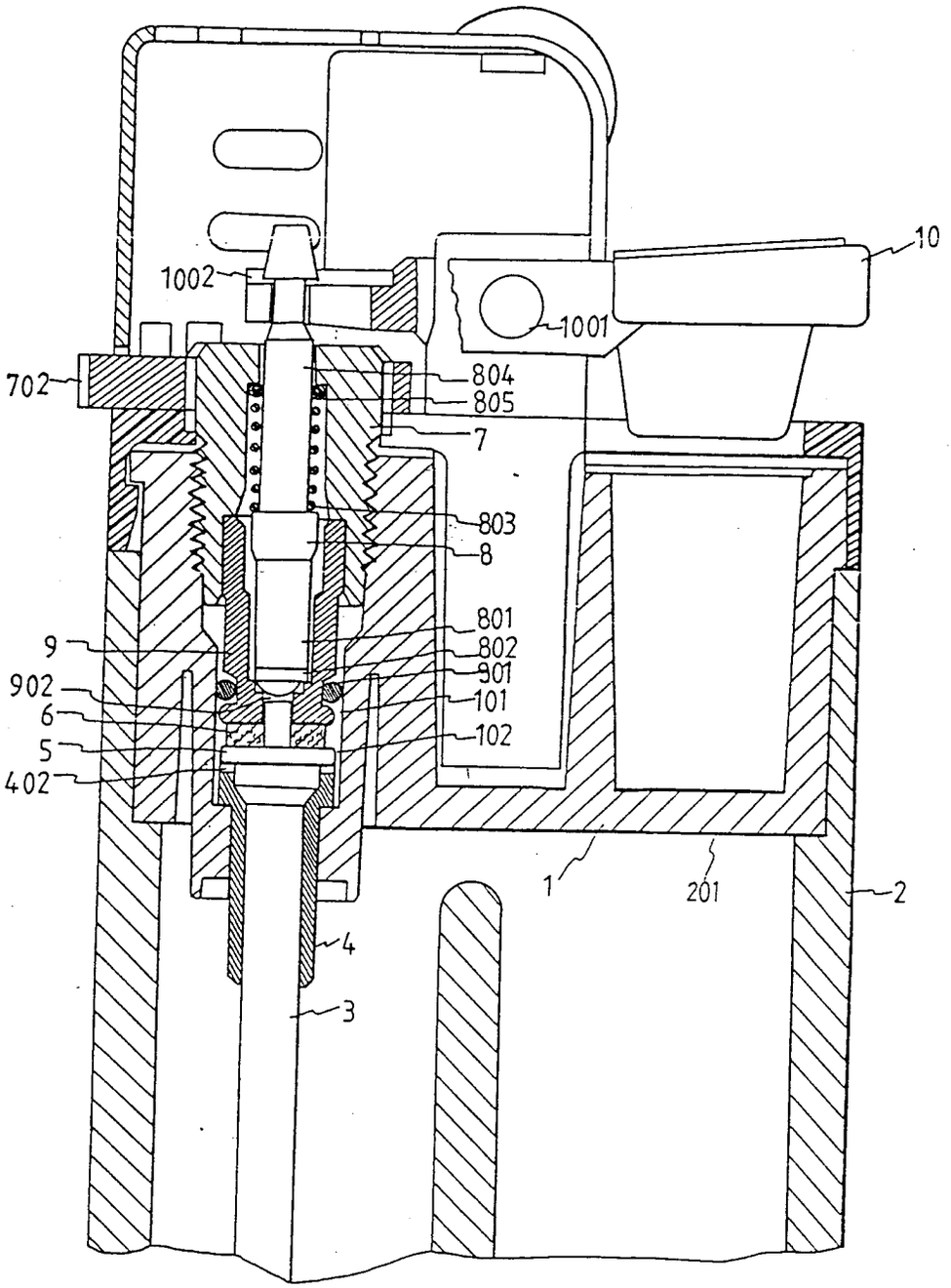
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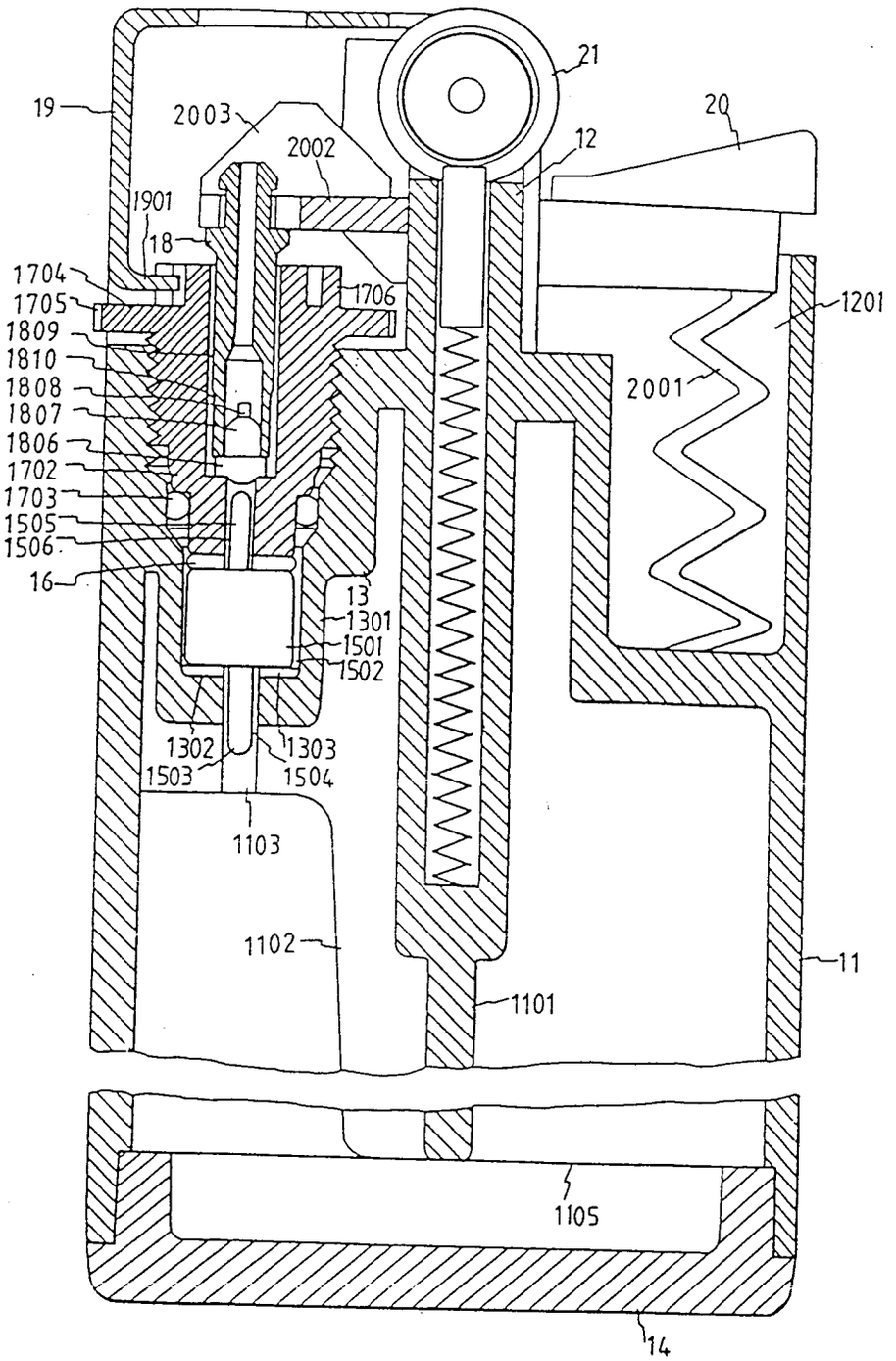
FIG 2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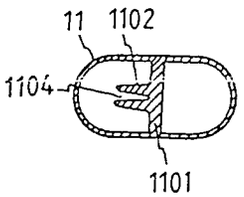
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FIG 4

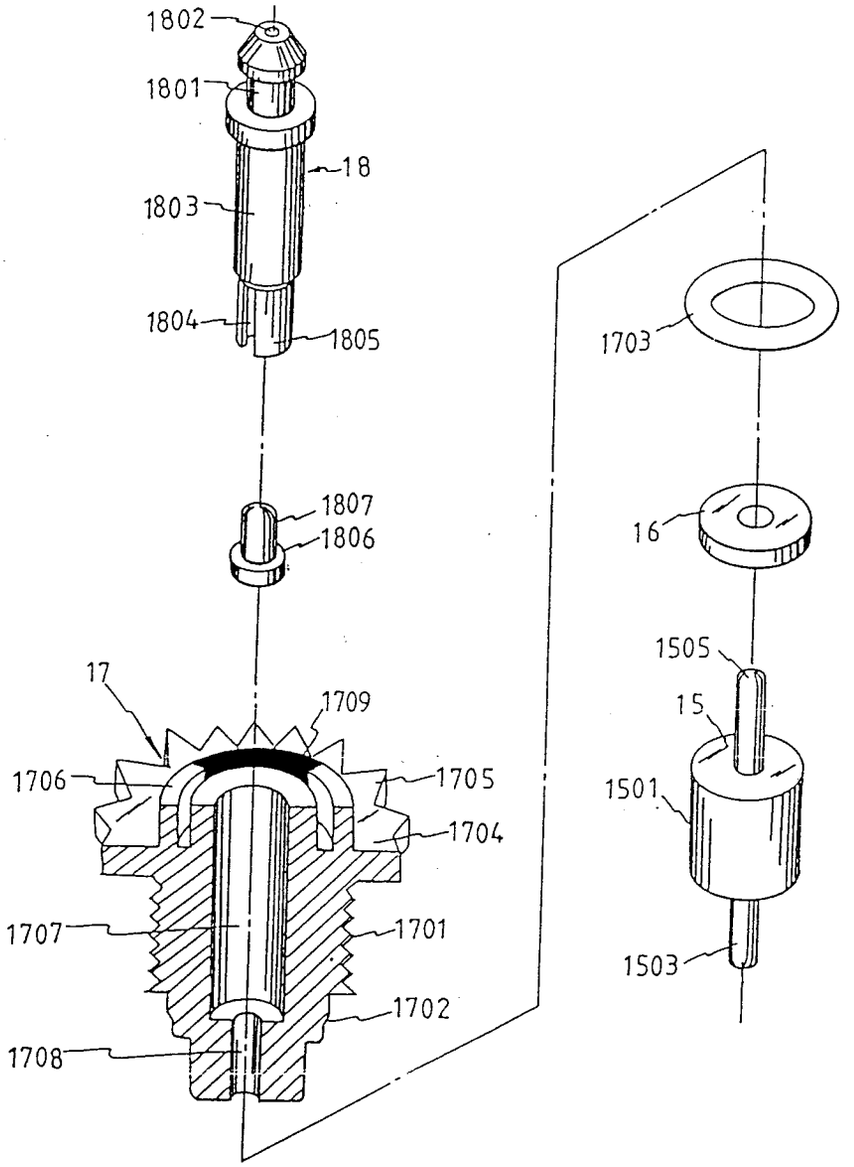
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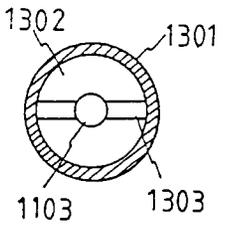
FIG 5



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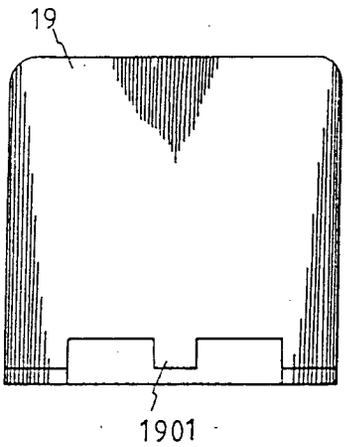

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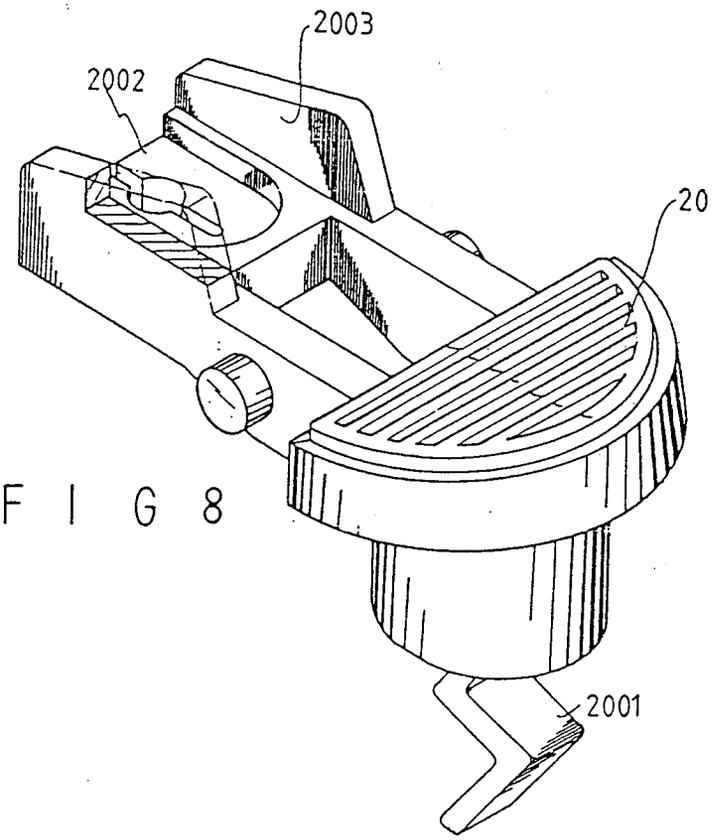

FIG 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 10 5892

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 280 029 (S.I.F.A.) * the whole document *	1	F23Q2/16
A	US-A-3 895 905 (NISSEN) * abstract *	1	
A	FR-A-2 446 991 (CRICKET) * page 3, line 1 - line 11; figure 1 *	1	
A	FR-A-2 222 611 (UNIFLAM)		
A	FR-A-2 598 784 (FEUDOR)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F23Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 MARCH 1992	VANHEUSDEN J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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