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(12) # EUROPEAN PATENT APPLICATION

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(54) **HAIR BEAUTY DEVICE.**

(57) Hair beauty device which curls hair using a combustible gas as a heat source. A tank (3) storing the gas and a pressure regulator (4) regulating the pressure of the gas are integrated. A gas inlet (46) and a gas outlet (47) of the regulator (4) are directed substantially at right angles to each other to burn the gas safely under constant gas pressure, and the entire structure is rationalized.

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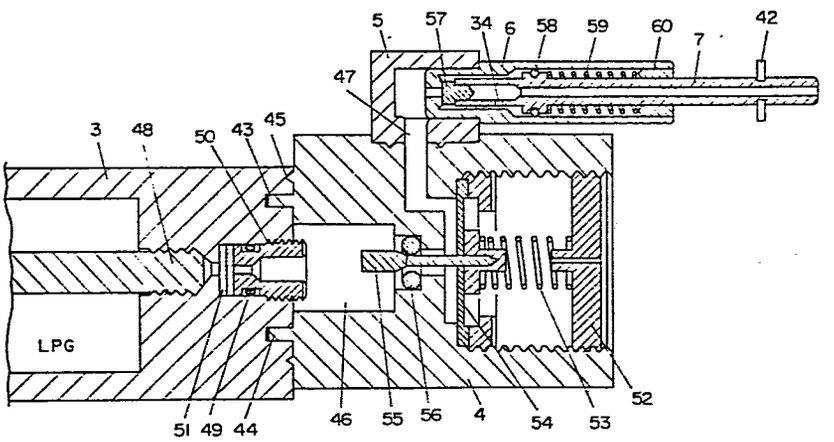
FIG. 4



S P E C I F I C A T I O N

TITLE OF THE INVENTION:

Hair Styling Appliance

FIELD OF TECHNOLOGY:

This invention relates to a portable hair styling appliance utilizing an inflammable gas as a source of heat for curling hair, which is effective to accomplish safe and stabilized combustion and which is reduced in size by rationalizing the construction.

BACKGROUND ART:

Hitherto, in portable appliances necessitating a source of heat, most of them are primarily of electric type or of a type utilizing a fuel such as gas or petroleum. However, the electric type is inconvenient in that it requires a cord whereas, in the cordless type such as gas or petroleum, it is difficult to achieve the supply of a stabilized amount of fuel because the vapor pressure of the gas tends to vary remarkedly with temperature. For this reason, the use of a regulator can be contemplated, but it tends to lead to the increased size and also to the increased price. Accordingly, no sufficient measures have been taken at present despite the fact that the pressure regulation is necessary in portable, compact appliances such as a hair styling appliance.

DISCLOSURE OF THE INVENTION:

Accordingly, this invention is such that, by integrating a storage tank for an inflammable gas together with a regulator for adjusting the gas pressure and also by providing gas inlet and outlet so as to orient generally at right angles to each other, the gas pressure is rendered constant irrespective of change in temperature thereby to achieve a safety and stabilized combustion and, at the same time, the whole construction can be rendered compact even though the regulator is used.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1 is a perspective view showing the outer appearance of a gas cylinder and a hair styling appliance according to one embodiment of the invention; Fig. 2 is a sectional view of the hair styling appliance of Fig. 2; Fig 3 is a perspective view showing an associated construction between a tank and a pressure regulator; Fig. 4 is a sectional view, on an enlarged scale, of an essential portion of Fig. 3; Figs. 5 and 6 are sectional views, on an enlarged scale, of a burner unit in a normal condition and an abnormal condition; Fig. 7 is a perspective view showing an essential portion of the burner in sectional representation; Fig. 8 is a perspective view of a safety metal; Fig. 9 is a sectional view showing the relationship between an igniter heater and catalysts; Fig. 10 is an exploded view showing connector areas for the igniter; Fig.

11 is a perspective view showing the burner unit and a combustion display area in sectional representation; and Fig. 12 is a perspective view of a curler cap.

BEST MODE FOR CARRYING OUT THE INVENTION:

A hair styling appliance according to one embodiment of this invention is shown in Fig. 1, and its basic construction comprises a body accommodating function elements and a principal portion positioned at the tip thereof and a curler unit having a burner therein for styling hair, the combustion control of the burner being carried out through a switch manipulating unit provided in the body. While Fig. 2 show the construction thereof, a body casing 1 constituting the body is covered by a body cover 2 and, within the interior of the body defined by them, there is accommodated a tank 3 for the storage of an inflammable gas and a pressure regulator 4 for adjusting the gas pressure. The pressure regulator 4 is fitted with a nozzle support 5 having a nozzle 7 mounted thereon through a nozzle holder 6 so as to extend in parallel to the pressure regulator 4. The nozzle 7 is in turn connected to a burner 9 through a piping 8. The burner 9 has an air intake port 10 defined therein for the introduction of air thereinto from the outside. In the body casing 1, a switch knob 12 mounted in a switch support 11 is provided in a manner biased in one direction by a spring 13, thereby constituting a switch manipulating unit. A switch terminal 14 movable to

and fro in response to the forward and backward movement of the switch knob 12 is also mounted on the switch support 11. The switch terminal 14 has a contact area 15 at the tip thereof which faces a conductor area 17 on a switch board 16.

In the above described construction, an inflammable gas emerging from the tank 3 flows through the pressure regulator 4 and, after having passed in a pressure controlled manner through the nozzle support 5 and the nozzle holder 6, is discharged from the nozzle 7. It is so designed that the supply of the inflammable gas can be effected by moving the switch support 11 forwards to pull the nozzle 7 forwards thereby to allow a valve to open. The inflammable gas emerging from the nozzle 7 then enters the burner 9 through the piping 8 and is, after having drawn an air through the air intake port 10 by the venturi effect, jetted in the form of a mixed gas of air and inflammable gas from the burner 9.

The tip of the burner 9 is located inside a heater holder 18 of electrically insulating material provided at one end of the body casing 1. Accordingly, the mixed gas flows through the inside of the heater holder 18 and then impinges upon a first catalyst 20 at the tip of the heater holder 18. The first catalyst 20 and a second catalyst 21 are retained by a catalyst retainer 22 and a heater 19 is positioned sandwiched therebetween. The heater 19 is that,

when the switch support 11 is moved forwards to pull the nozzle 7 operatable to open and close the inflammable gas and the switch knob 12 is then depressed, the contact area 15 of the switch terminal 14 moves downwards and then contacts the conductor area 17 of the switch board 16 to establish a closed circuit through connectors 23 and 26 and lead wire 27 whereby the mixed gas is heated by the heater 19 to a temperature at which it undergoes a catalytic combustion. The mixed gas is catalytically burned by the first and second catalysts 20 and 21, the temperature of each of which has been raised, and generates heat energies which in turn increase the temperature of a curling pipe 24 positioned exteriorly thereof thereby increasing the temperature of a brush 25 exteriorly of the pipe to a value suitable for hair styling. Exhaust gases after the combustion are discharged to the outside through a clearance 29 in the curler cap 28 of the curling pipe 24 and are guided towards the brush 25. It is to be noted that the curling pipe 24 is removably mounted on the body casing 1 by means of screws or the like and constitutes a curler unit.

Within the body cover 2, there is arranged batteries 30 between terminals 31 and 32 and positioned in recesses defined in the tank 3 in parallel relation to the tank 3. The terminal 32 is connected to a heater circuit through a lead wire 33. A cap 36 is removably mounted on one end of the body cover 2 and is formed with a plug-in

aperture 37 in alignment with an inflammable gas injection port 35. The cap 36 can be selectively removed from and mounted on the body cover 2 by compressing a gripping area 39 to manipulate a fitting area 38. The gas cylinder 40 is used to inject the gas into the tank 3 with its nozzle 41 inserted through the plug-in aperture 37. It is to be noted that the inflammable gas stored in the tank 3 may be an LP gas including butane or propane as its main component. This is because the storage in the form of liquid makes it possible to minimize the capacity of the tank 3 and, since the vapor pressure is not so high relatively at a normal temperature, the design of the structure and the strength of the tank 3 can be carried out with no difficulty. Moreover, it is because of the ready availability in respect of the initability, the stability and the amount of heat energies during the combustion.

And, as shown in Figs. 3 and 4, the tank 3 and the pressure regulator 4 are made of resin and are integrally connected together by fusing at a weld area 45 while engagement indents 43 are engaged with positioning area 44 for the engagement indents in a non-rotatable manner. Because of this, no piping between the tank 3 and the regulator 4 is required, thereby making it possible to minimize the size with the increased reliability and strength of the sealed interface. In this embodiment, the welding at the weld area 45 is carried out by the use of an

ultrasonic wave. Alternatively, it is possible to form the weld area by the utilization of the area of the engagement indents 43. Moreover, as is the case with the welding between the tank 3 and the regulator 4, the nozzle support 5 is also fusion bonded to the regulator 4 by the use of an ultrasonic wave.

The gas outlet 47 is provided on a side face of the regulator 4 so as to face in a direction substantially at right angles to the gas inlet 46 of the regulator 4. This is for the purpose of minimizing the longitudinal dimension so that the appliance can be rendered compact when the nozzle 7 is pulled by the switch support 11 through a ring 42.

The pressure regulation will now be described. The LP gas enters the gas inle 46 in the form as gasified through a cotton wick 48 after the pressure has been reduced by an urethane 51 compressed by an urethane retaining screw 50 sealed by an O-ring 49. The pressure adjustment is such that a diaphragm 54 adapted to receive a pressure from front by the action of a pressure adjusting spring 53 compressed by a pressure adjusting screw 52 and also to receive a gas pressure from rear is displaced to and fro by the difference between the gas pressure and the spring force whereby, when the gas pressure is high, a pressure adjusting pin 55 reduces a clearance between it and a pressure adjusting packing 56 to reduce the gas pressure in the gas outlet 47,

whereas when the pressure in the gas inlet 46 is low, the diaphragm 54 is displaced rearwards and, therefore, the action reverse to that described above takes place to increase the gas pressure in the gas outlet 47, wherefore the gas pressure in the gas outlet 47 can be kept constant. 57 is a nozzle packing for interrupting and establishing the flow of the gas towards the nozzle 7, and the nozzle 7 is sealed by a nozzle O-ring 58 and applied with a force by a nozzle spring 59, non-removably set in position by a nozzle spring retainer 60, in a direction necessary to interrupt the flow of the gas. On one side adjacent the nozzle packing 57, the nozzle 7 is formed with a gas passage 34 through which the inflammable gas flows into the nozzle 7.

Fig. 5 illustrates an interior structure of the burner 9. The gas supplied througn the piping 8 flows int the burner 9 through an inlet portion 62 in a burner inlet piece 61. Within the burner 9, there is, fitted a rinf 64 having a fine aperture 63 (10 to 200 μm in diameter was appropriate.) forming an orifice necessary to accelerate the flow of the gas in an amount necessary to achieve combustion and to draw the air through the air intake port 10 by the venturi effect. This fitting is carried out by threading a rinf retainer 66, having a filter 65 of sintered metal alloy built therein, to seal so that the gas can be swept off. In addition, within the burner inlet piece 61 sealed by a burner piece O-ring 67, a safety valve 69 having a T-shaped

packing 68 of a T-shaped configuration at the tip thereof is positioned as shown in Fig. 7. The safety valve 69 is, while applied with a pressure by a safety valve spring 70, inserted in a safety metal 71 having a gas passage 72 of a shape as shown in Fig. 8, and the safety metal 71 pressure-fitted into the burner inlet piece 61. This is for the purpose that, in the event that a large amount of the gas flows to the burner unit with the combustion temperature consequently increased abnormally by reason of the occurrence of any accident, the heat thereof is transmitted to the burner 9 to melt the safety metal 71, which is a metal of low melting point, so that the safety valve 9 can be pushed forwards by the safety valve spring 70 as shown in Fig. 6 thereby allowing the T-shaped packing 68 to abut a rinf retainer inlet 73 in the rinf retainer 66 to interrupt the flow of the gas from the burner 9, said rinf retainer inlet 73 having a shape similar to a crater and capable of giving a sealing effect.

A unit portion of the heater holder 18 is shown in Fig. 9 while a structure with the catalysts 20 and 21 removed is shown in Fig. 10. This unit is featured in that, since the life time of each of the heater 19 and the catalysts 20 and 21 is approximately 100 hours, the connectors 23 supporting the heater 19 and the connectors 26 secured in the body casing 1 are releaseably engaged to each other in readiness for the replacement and in that the

heater holder 18 is provided with support steps 80 and 81 for holding the catalysts so that the heater 19 and the catalysts 20 and 21 can be kept assuredly in predetermined contact with each other to achieve an assured ignition. Within the heater holder 18, there is fitted a rectifier plate 74 for causing the flow of the gas to be directed towards the entire surfaces of the catalysts 20 and 21.

Fig. 11 illustrates a structure for facilitating the confirmation of an ignited condition and the detection of the combustion temperature. The previously mentioned curler cap 28 is provided with a spiral bimetal 6 having a portion connected to the curler cap 28 and the other end secured to a bimetal shaft 75 as shown. This serves in such a manner that, when the heater 16 is heated to a red hot condition to initiate combustion with the gas starting combustion at the catalysts 20 and 21, the temperature thereof is immediately detected and the bimetal 76 exerts a rotational force with which the bimetal shaft 75 is rotated with a rotary member 77 at the tip thereof consequently rotated so that the ignited condition can be acknowledged by the position of a display indicia 82 thereof and the fact that the heater 19 need not be supplied with an electric current can be acknowledged for the ultimate purpose of saving the life time of the heater 19 and that of the batteries.

In addition, since the angle of rotation varies depending on the combustion temperature, the combustion temperature at a particular time can also be ascertained. Although the outer appearance of the curler cap 28 is shown in Fig. 12, the exhaust gases are adapted to flow through the clearance 29. Moreover, in order for the exhaust gases to escape downwards, a skirt 78 is so provided to avoid a danger due to the forward flow of the exhaust gases. Furthermore, the water vapor of the exhaust gases is adapted to be guided by the skirt 78 towards the brush 25 and then towards the hair to facilitate the hair styling.

In addition, in this embodiment, the body cover 2 is, as shown in Fig. 1, provided with a slit 79 so that the tank 3 can be viewed from the outside to check the liquidized gas remaining in the tank 3. Moreover, by providing this slit 79 at two locations diagonal with each other, light is allowed to pass so that the amount of the liquidized gas remaining in the tank 3 can more easily be checked.

Further, as shown in Fig. 3, the tank 3 has generally cylindrical recesses at its upper portion for accommodating batteries 30 shown by the chain lines. Therefore, the various elements can be accommodated within the cylindrical body, thereby rendering it compact.

INDUSTRIAL APPLICABILITY:

As hereinbefore described, the hair styling appliance of this invention has its entire structure rationalized and rendered compact even though the pressure regulator is used, because the use is made of the pressure regulator for adjusting the gas pressure at a constant value irrespective of change in temperature so that safety and steady combustion can be attained and because the tank for the storage of the inflammable gas and the pressure regulator are integrated together with the gas outlet arranged substantially at right angles to the gas inlet.

SCOPE OF CLAIM

1. A hair styling appliance characterized in that it comprises a body portion accommodating function elements therein, a curling unit positioned at a front end thereof and having a burner therein for hair styling, and a switch manipulating portion provided in the body portion for controlling the combustion at the burner, said body portion including a tank for the storage of inflammable gas to be supplied to the burner, a pressure regulator for adjusting the gas pressure, a battery providing an electric power source for the heater to ignite the inflammable gas and a nozzle coupled with the switch manipulating portion, said curling unit being provided with catalysts in face-to-face relation to the burner therein and a brush exteriorly thereof, said tank and gas regulator in the body portion being integrated together while a gas outlet leading to the nozzle is oriented substantially at right angles to a gas inlet in the pressure regulator extending from the tank with the nozzle consequently extending in parallel to the pressure regulator.

2. A hair styling appliance as defined in Claim 1, wherein the tank and the regulator are made of resin and are fusion-bonded together after having been positioned with each other by means of engagement indents.

3. A hair styling appliance as defined in Claim 1, wherein the nozzle is moved to supply the inflammable gas to the nozzle by the slite operation of the switch manipulating portion in the body portion.

4. A hair styling appliance as defined in Claim 1, wherein the heater is sandwiched between the catalysts.

5. A hair styling appliance as defined in Claim 1, wherein connectors supporting the heater are releaseably coupled to connectors secured in the body portion.

6. A hair styling appliance as defined in Claim 1, wherein the curling unit is provided therein with a bimetal deformable under the influence of combustion heat, said bimetal being provided with a member for visually displaying to the outside the deformation of the bimetal.

7 A hair styling appliance as defined in Claim 1, wherein the curling unit is provided at its front end with a curler cap for guiding combustion exhaust gases towards the brush.

8. A hair styling appliance as defined in Claim 1, wherein the battery is accommodated in a recess in the tank so as to extend in parallel relation thereto.

9. A hair styling appliance as defined in Claim 1, wherein the body portion is provided with a slit through which the amount of the gas in the tank can be checked.

10. A hair styling appliance as defined in Claim 9, wherein the slits are provided in substantially diagonally spaced positions.

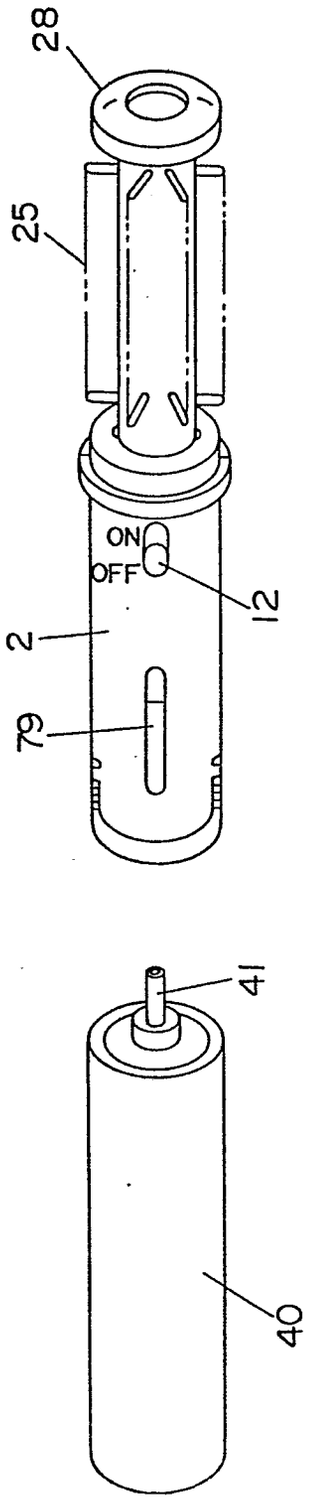


FIG. 1

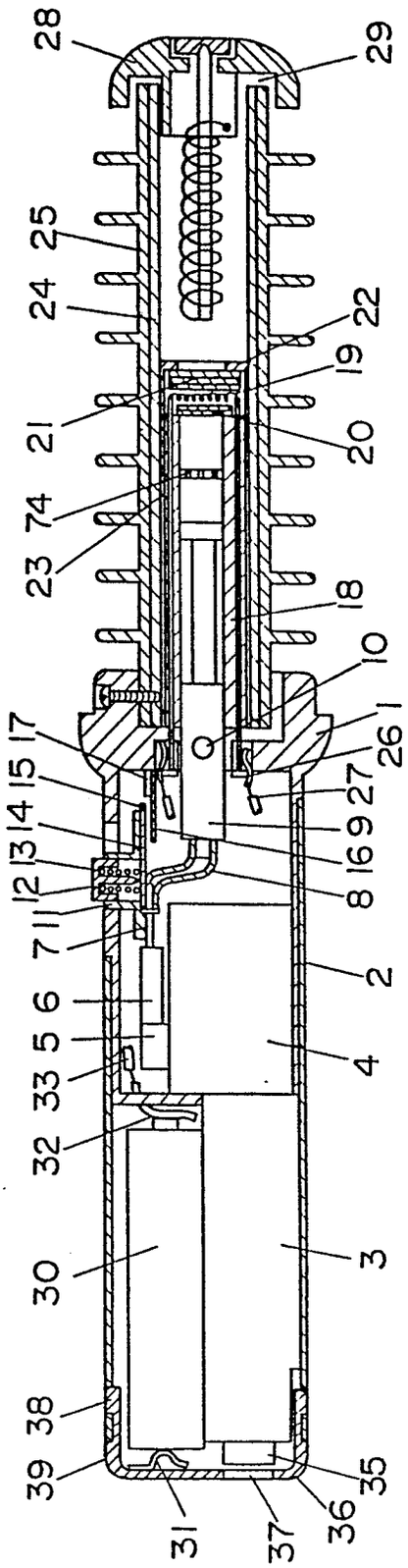

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FIG. 2

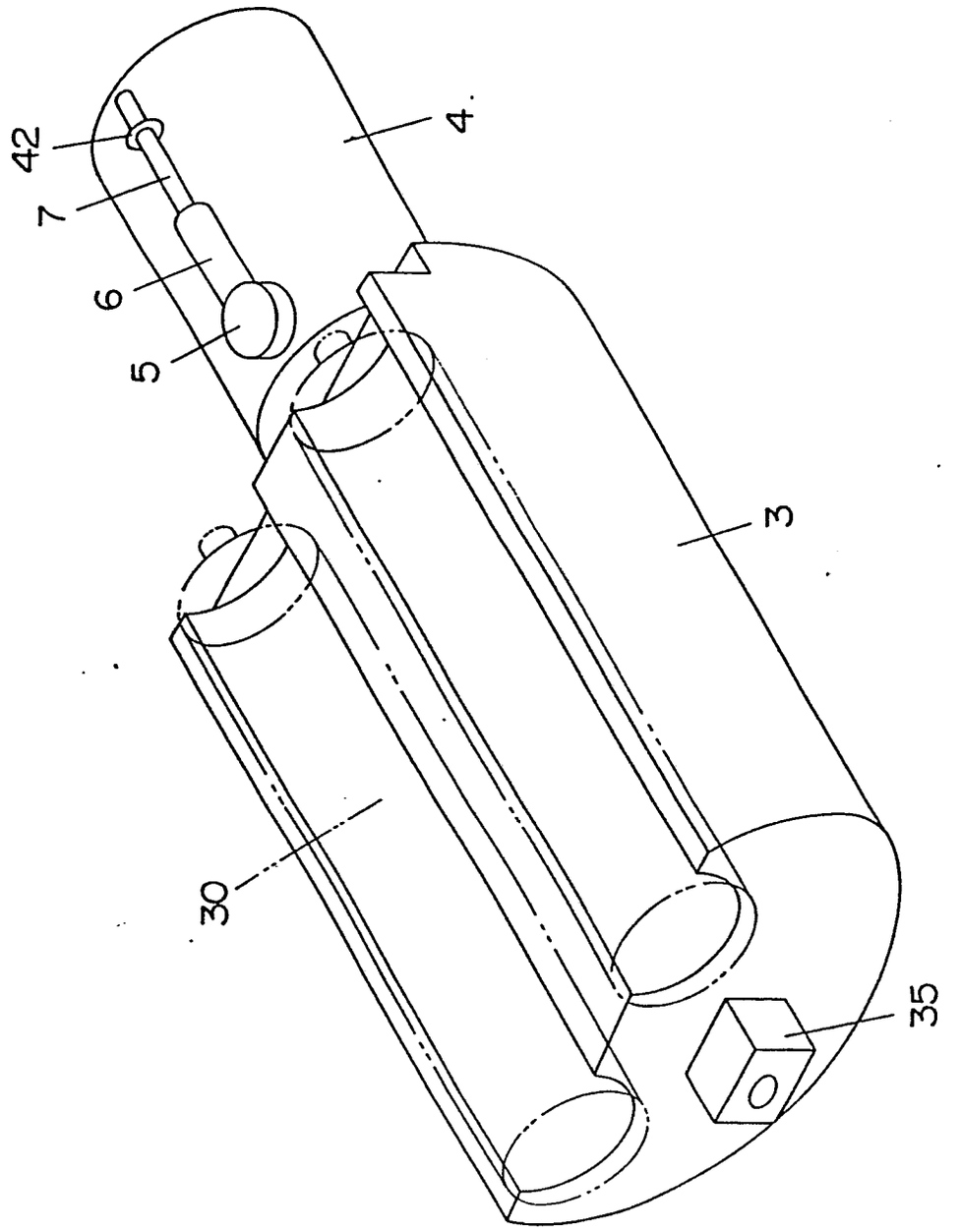


FIG. 3

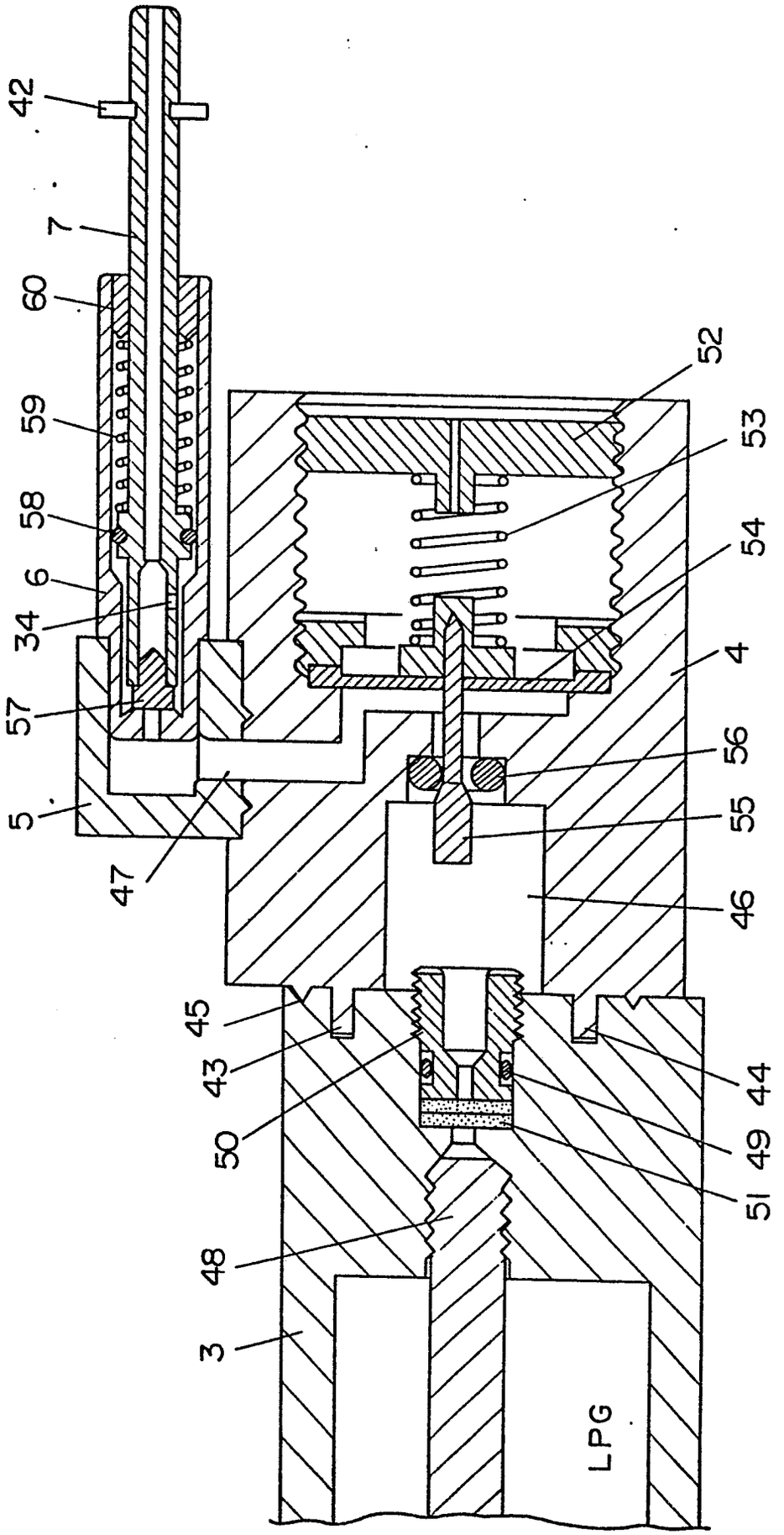


FIG.4

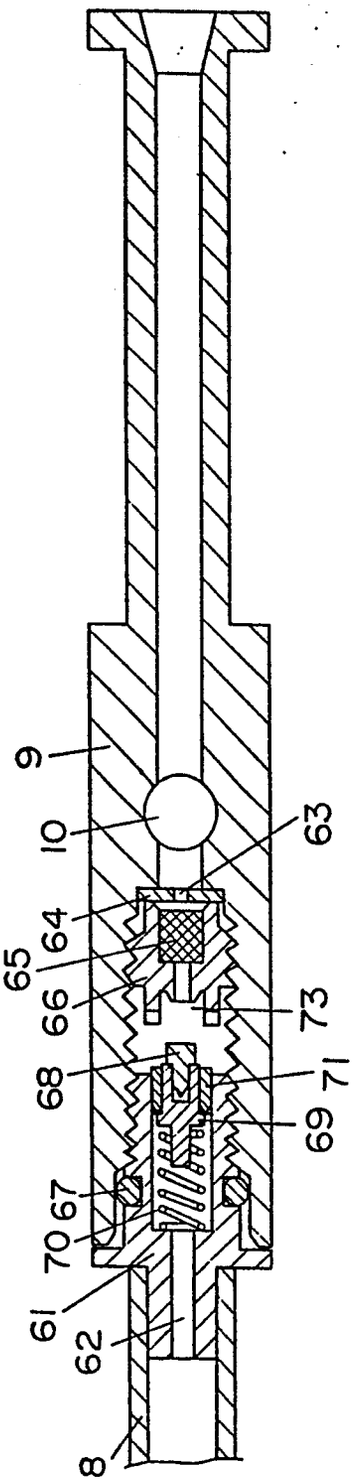


FIG 5

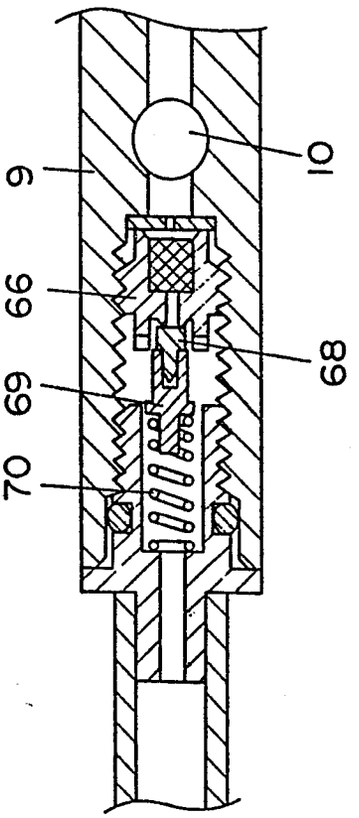


FIG 6

FIG. 7

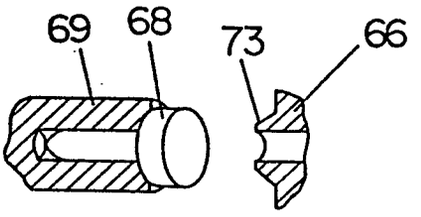


FIG. 8

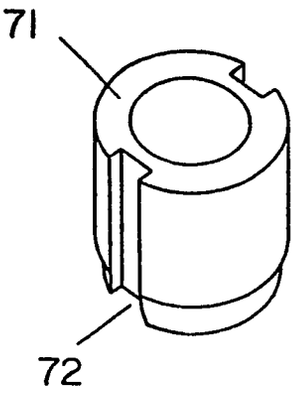


FIG.9

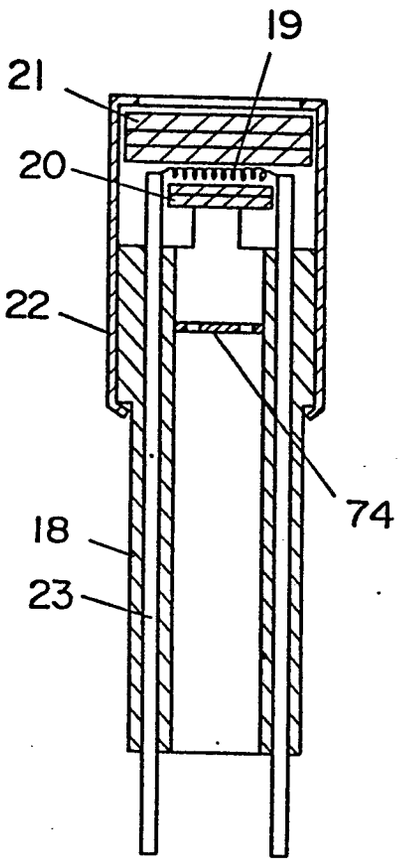


FIG. 10

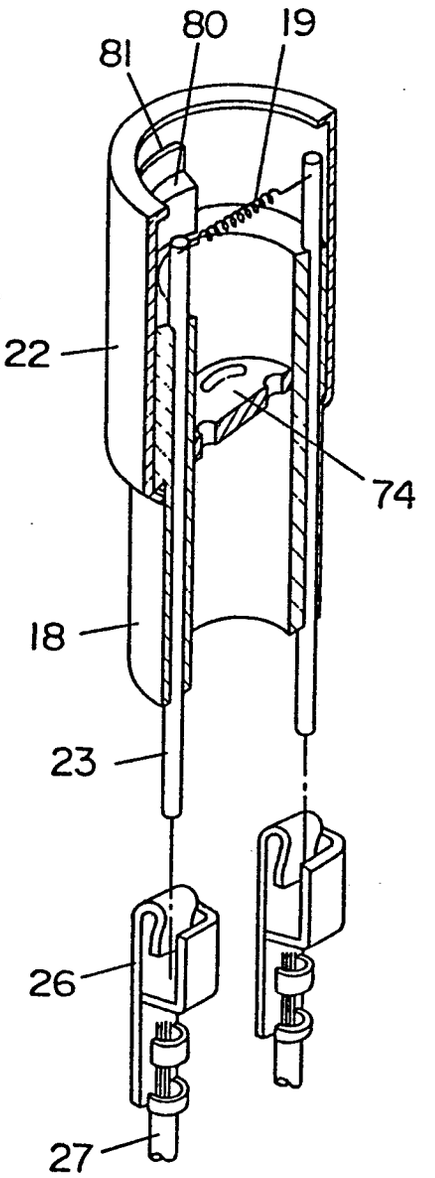


FIG 11

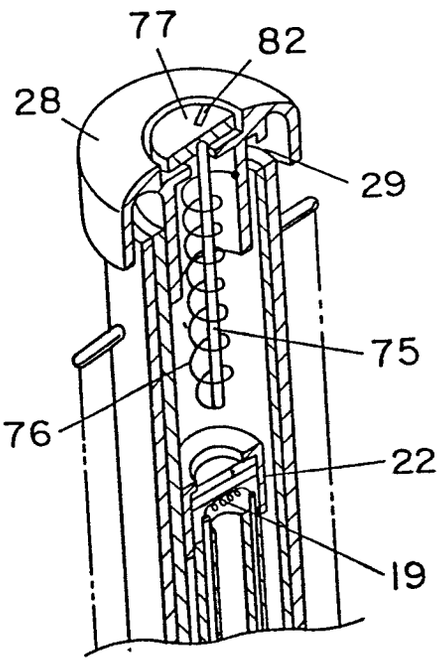
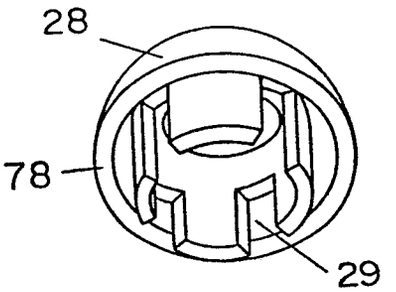


FIG 12



A LIST OF REFERENCE NUMERALS USED IN DRAWINGS:

1 ..... Body casing

2 ..... Body cover

3 ..... Tank

4 ..... Pressure regulator

5 ..... Nozzle support

6 ..... Nozzle holder

7 ..... Nozzle

8 ..... Piping

9 ..... Burner

10 ..... Air intake port

11 ..... Switch support

12 ..... Switch knob

13 ..... Spring

14 ..... Switch terminal

15 ..... Contact area

16 ..... Switch board

17 ..... Conductor area

18 ..... Heater holder

19 ..... Heater

20 ..... First catalyst

21 ..... Second catalyst

22 ..... Catalyst retainer

23 ..... Connector

24 ..... Curling pipe

25 ..... Brush

26 ..... Connectors

27 ..... Lead wire

28 ..... Curler cap

29 ..... Clearance

30 ..... Batteries

31 ..... Terminal

32 ..... Terminal

33 ..... Lead wire

34 ..... Gas passage

35 ..... Inflammable gas inject

36 ..... Cap

37 ..... Plug-in aperture

38 ..... Fitting area

39 ..... Gripping area

40 ..... Gas cylinder

41 ..... Nozzle

42 ..... Ring

43 ..... Engagement indents

44 ..... Positioning areas

45 ..... Weld area

46 ..... Gas inlet

47 ..... Gas outlet

48 ..... Cotton wick

49 ..... O-ring

50 ..... Urethane retaining screw

51 ..... Urethane

52 ..... Pressure adjusting screw

53 ..... Pressure adjusting spring

54 ..... Diaphragm

55 ..... Pressure adjusting pin

56 ..... Pressure adjusting packing

57 ..... Nozzle packing

58 ..... Nozzle O-ring

59 ..... Nozzle spring

60 ..... Nozzle spring retainer

61 ..... Burner inlet piece

62 ..... Inlet portion

63 ..... Fine aperture

64 ..... Rinf

65 ..... Filter

66 ..... Rinf retainer

67 ..... Burner piece O-ring

68 ..... T-shaped packing

69 ..... Safety valve

70 ..... Safety valve spring

71 ..... Safety metal

72 ..... Gas passage

73 ..... Rinf retainer inlet

74 ..... Rectifier plate

75 ..... Bimetal shaft

76 ..... Bimetal

77 ..... Rotary member

78 ..... Skirt

79 ..... Slit

80 ..... Support step

81 ..... Support step

82 ..... Display indicia

INTERNATIONAL SEARCH REPORT 0083658

International Application No. PCT/JP82/00258

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] A45D 1/02

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
I P C	A45D 1/00 - 1/28, A45D 2/00 - 2/44 A45D 20/04 - 20/12, 20/48 - 20/52

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

Kokoku Jitsuyo Shinan Koho 1925 - 1982

Kokai Tokkyo Koho 1972-1982, Kokai Jitsuyo Shinan Koho 1972-1982

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	JP,U, 56-48301 (Onaka Tateo) 30. April, 1956 (30.04.56)	1 - 10
Y	JP,Y1, 45-28331 (Nichiei Denki Sangyo Kabushiki Kaisha) 31. October. 1945 (31.10.45)	1 - 10
Y	JP,B1, 42-5378 (S.T. Du Pont) 4. March. 1942 (4.03.42) Fig. 1	1 - 10
Y	JP,A, 52-118377 (Matsushita Electric Industrial Co., Ltd.) 4. October. 1952 (4.10.52)	1 - 10
Y	JP,A, 50-34679 (Nakagami Nobuyuki) 3. April. 1950 (3.04.50)	2
Y	JP,Y1, 43-6042 (Matsushita Electric Industrial Co., Ltd.) 16. March. 1943 (16.03.43)	4
Y	JP,Y1, 42-4436 (Hitachi, Ltd.) 10. March. 1942 (10.03.42) Koho column 2, lines 17 to 33	5

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
September 13, 1982 (13.09.82)	October 4, 1982 (04.10.82)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Japanese Patent Office	

International Application No. PCT/JP82/00258

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

Y	JP,U, 54-37570 (Nakamura Koji) 12. March. 1954 (12.03.54)	6
Y	JP,Y1, 39-17450 (Yoshino Zensaburo) 23. June. 1936 (23.06.39)	8
Y	JP,Y1, 39-16866 (Monzaki Yasuyuki) 16. June. 1939 (16.06.39), Fig. 13	9, 10

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE[10]

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers_____ because they relate to subject matter[12] not required to be searched by this Authority, namely:

2. ☐ Claim numbers_____ because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out[13], specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING[11]

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☐ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.