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**(71) Applicant** *(for all designated States except US):* **BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED** [GB/GB]; Globe House, 1 Water Street, London WC2R 3LA (GB).

**(72) Inventors; and**
**(75) Inventors/Applicants** *(for US only):* **OGLESBY, Alfred, Peter** [GB/IE]; Castlehill, Carlingford, County Louth, (IE). GRIFFIN, Michael, **John** [GB/IE]; Craanluskey, Milford, Carlow, County Carlow, (IE). STOREY, John, **Joseph** [IE/IE]; Hazelwood Cottage, Eyne, Portlaoise, County Loais, (IE). OGLESBY, John, **Paul** [GB/IE]; Anneville, Shrule, County Carlow (IE). BRERETON, Patrick, **Joseph** [IE/IE]; The Granite Cottage, Palatine, County Carlow (IE). TOWNSEND, John, **Barry** [IE/IE]; Raheendoran, Carlow, County Carlow (IE).

**(74) Agents:** PERKINS, **Dawn** et al; Venner Shipley LLP, 20 Little Britain, London EClA 7DH (GB).

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**(54) Title:** A VAPORISING DEVICE

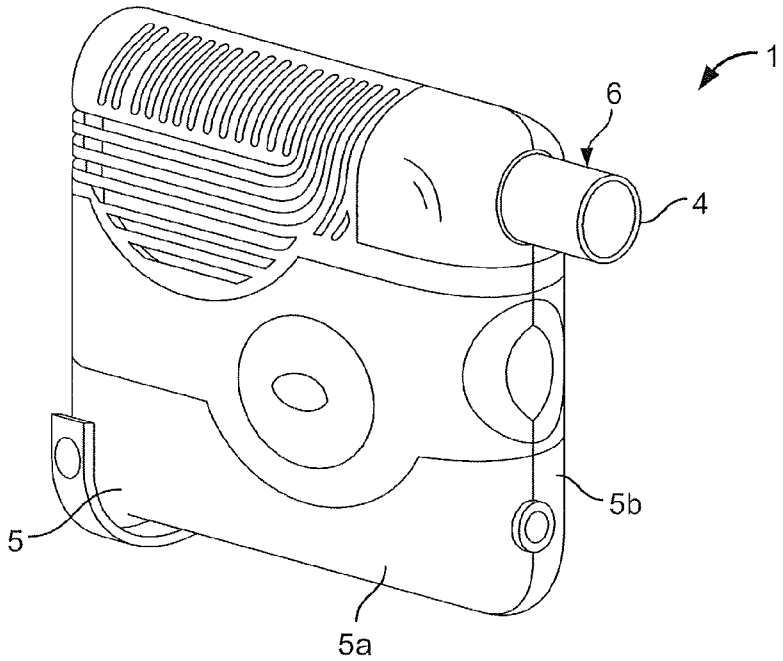


FIG. 1

*[Continued on next page]*

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**(57) Abstract:** A vaporising device (1) comprises a heatable housing (8) that defines a vaporisation chamber (10) for holding a vaporisable material (2), an inlet (46) for a carrier fluid, an outlet (41) for a carrier fluid, and a fluid flow path from the inlet (46) to the outlet (41) that passes through the vaporisation chamber (10). A part of the fluid flow path upstream of the vaporisation chamber (10) is in heat exchange relationship with the housing (8).

# A Vaporising Device

## Field of the Invention

The present invention relates to a vaporising device for vaporising vaporisable constituents of vaporisable matter in order to produce an aerosol for inhaling.

## Background to the Invention

Vaporising devices for producing an aerosol of a vaporisable constituent of vaporisable matter, such as herbs, plant matter and the like from which aerosols of flavour constituents, medicinal constituents and psychoactive constituents can be produced are known. For example, heating devices for vaporising vaporisable constituents from tobacco, mullein, passion flower, cloves, yohimbe, mint, tea, eucalyptus, camomile and other such herbs and plant matter are known. Typically, such devices comprise a vaporisation chamber in which the matter to be vaporised is placed, and heat from a heat source, for example, a gas powered heat source or an electrically powered heat source, is transferred to the vaporisation chamber for heating the vaporisable matter contained therein to an appropriate temperature for vaporising the vaporisable constituent or constituents thereof for in turn forming the aerosol. In general, the vaporisation chamber of such devices are suitable for receiving the matter to be vaporised in loose form, although some heating devices for heating tobacco for vaporising the vaporisable constituents therein are adapted for receiving the tobacco in the form of a cigarette. Such heating devices heat the vaporisable matter to a temperature below its combustion temperature in order to avoid combustion of the vaporisable matter, but to a temperature which is sufficient to cause certain constituents in the matter to be vaporised. In devices for vaporising desirable constituents in tobacco, the tobacco is heated to a temperature generally in the range of $130^0$C to $230^0$C, and while such temperatures are sufficient for vaporising certain vaporisable constituents, they are insufficient to raise the tobacco to its combustion temperature.

One such device for producing an aerosol of a vaporisable constituent of vaporisable matter is disclosed in PCT published Application Specification No. WO 2006/082571 Al. Alternative constructions of the vaporising device disclosed

in PCT Specification No. WO 2006/082571 A1 are disclosed in PCT published Application Specification No. WO 2008/029381.

The present invention is directed towards improvements to the vaporising devices disclosed in these two PCT published Application specifications.

**Summaty of the Invention**

According to the invention there is provided a vaporising device comprising a heatable housing that defines:

- a vaporisation chamber for holding a vaporisable material,
- an inlet for a carrier fluid,
- an outlet for a carrier fluid, and
- a fluid flow path from the inlet to the outlet that passes through the vaporisation chamber,

wherein a part of the fluid flow path upstream of the vaporisation chamber is in heat exchange relationship with the housing.

In one embodiment of the invention the fluid flow path directs fluid through the upstream part in one direction and through the chamber in the opposite direction.

In another embodiment of the invention the upstream part of the fluid flow path is formed by a duct extending through the housing, and preferably, an elongated duct. Advantageously, a plurality of ducts are provided, and preferably, the ducts are spaced apart from each other.

In another embodiment of the invention the housing comprises a side wall extending around the vaporisation chamber, and advantageously, the side wall defines each duct, and preferably, each duct extends within the side wall.

Preferably, the side wall defines the vaporisation chamber, and in one embodiment of the invention the side wall defines the outlet.

Preferably, the side wall defines the inlet.

In one embodiment of the invention the side wall defines an open mouth for facilitating inserting the vaporisable matter into the vaporisation chamber, and preferably the open mouth forms the outlet.

In another embodiment of the invention the side wall extends from a first end wall closing one end of the vaporisation chamber.

In another embodiment of the invention the side wall comprises a first side wall, and a second side wall concentric with and located within the first side wall, and advantageously, each duct is defined by the first and second side walls, and preferably between the first and second side walls.

In one embodiment of the invention the second side wall is a press fit in the first side wall, and in an alternative embodiment of the invention is a relatively tight slideable fit within the first side wall. Preferably, at least one of the inner transverse cross-section of the first side wall and the outer transverse cross-section of the second side wall is shaped to define each duct.

Preferably, the first side wall extends from the first end wall.

In another embodiment of the invention the second side wall extends from a second end wall, and the second end wall defines with the first end wall and at least the second side wall the vaporisation chamber, and preferably, the vaporisation chamber is defined by the first and second end walls and the first and second side walls.

In another embodiment of the invention the outlet is formed in the second end wall.

Ideally, the vaporisation chamber is substantially cylindrical, and advantageously, the side wall is a substantially cylindrical side wall.

In another embodiment of the invention each duct is formed by a groove formed in one of the first and second side walls, and preferably, formed in the second side wall.

In a further embodiment of the invention one of the first and second side walls is provided by a cylindrical side wall, and advantageously, the other of the first and second side walls defines an outer surface having at least one longitudinally extending flat portion which defines with the inner surface of the first side wall one of the ducts. Preferably, the outer surface of the second side wall defines a plurality of longitudinally extending flat portions for defining respective ones of the ducts.

Ideally, the second side wall and the second end wall define a hollow plug for engaging within the first side wall, and preferably, the hollow plug is adapted for holding the vaporisable matter.

In another embodiment of the invention the inlet is located adjacent the second end wall, and preferably, each duct communicates with the vaporisation chamber adjacent the first end wall.

In one embodiment of the invention the outlet for the carrier fluid is adapted for accommodating the carrier fluid with vapours of the vaporisable constituents entrained therein.

In another embodiment of the invention at least one heat exchange element of heat conducting material extends from the housing into the vaporisation chamber for transferring heat to the vaporisable matter contained therein.

In a further embodiment of the invention a heat source is provided for heating the vaporisation chamber.

In one embodiment of the invention the heat source is a gas powered heat source, and preferably, the housing defines a combustion chamber within which fuel gas is converted to heat, and preferably, a gas catalytic combustion element is located in

the combustion chamber for converting the fuel gas to heat.

Alternatively, the heat source is an electrically powered heat source, and preferably, comprises at least one electrical resistive heater element.

## Brief Description of the Drawings

The invention will be more clearly understood from the following description of some embodiments thereof, which are given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a vaporising device according to the invention,

Fig. 2 is a partly cross-sectional side elevational view of the vaporising device of Fig. 1,

Fig. 3 is a side elevational view of a portion of the vaporising device of Fig. 1,

Fig. 4 is a transverse cross-sectional side elevational view of the portion of Fig. 3 of the vaporising device of Fig. 1 on the line IV-IV of Fig. 3,

Fig. 5 is a perspective view of a detail of the vaporising device of Fig. 1,

Fig. 6 is a side elevational view of the detail of Fig. 5,

Fig. 7 is an end elevational view of the detail of Fig. 5,

Fig. 8 is a transverse cross-sectional side elevational view of the detail of Fig. 5 on the line VIII-VIII of Fig. 7,

Fig. 9 is a transverse cross-sectional end elevational view of the detail of Fig. 5 on the line IX-IX of Fig. 6,

Fig. 10 is a transverse cross-sectional side elevational view similar to the view of Fig. 4 illustrating the portion of Fig. 3 of the device of Fig. 1 in use,

Fig. 11 is a schematic transverse cross-sectional side elevational view of a portion of the vaporising device of Fig. 1,

Fig. 12 is a perspective view of a vaporising device according to another embodiment of the invention,

Fig. 13 is a partly transverse cross-sectional side elevational view of the vaporising device of Fig. 12,

Fig. 14 is a side elevational view of a portion of the vaporising device of Fig. 12,

Fig. 15 is a transverse cross-sectional view of the portion of Fig. 14 of the vaporising device of Fig. 12 on the line XV-XV of Fig. 14, and

Fig. 16 is a partly cutaway perspective view of a detail of the vaporising device of Fig. 12.

## Detailed **Description**

Referring to the drawings, and initially to Figs. 1 to 11 thereof, there is illustrated a vaporising device according to the invention, indicated generally by the reference numeral 1, for vaporising vaporisable constituents of vaporisable matter to produce an aerosol for inhaling. In this embodiment of the invention the vaporising device 1 is particularly suitable for vaporising vaporisable constituents of tobacco 2. In this particular embodiment of the invention the tobacco 2 is provided in the general form of a cigarette 6 which comprises a cylindrical tube 3 of paper material within which the tobacco is located, and a filter 4 is provided at one end of the cylindrical tube 3 for filtering out undesirable constituents from the aerosol produced.

The vaporising device 1 is a portable handheld device which comprises a two-part

casing 5 of plastics material, which is formed in two halves 5a and 5b. An elongated heatable housing 8 of a suitable heat conducting metal and of a generally cylindrical construction having a cylindrical side wall 9 is located in the casing 5 and defines a vaporisation chamber 10 within which the vaporisable constituents of the tobacco 2 *ate* vaporised. The housing 8 also defines a combustion chamber 11 which forms a heat source from which heat is transferred through the housing 8 to the vaporisation chamber 10. A first end wall 13 extending transversely across the housing 8 within the side wall 9 separates and isolates the vaporisation chamber 10 from the combustion chamber 11. The first end wall 13 is of material similar to that of the housing 8 and is integrally formed therewith.

A gas catalytic combustion element 12 of cylindrical construction is located in the combustion chamber 11, and a fuel gas/air mixture is delivered to the gas catalytic combustion element 12 from a venturi mixer 14 also located in the housing 8 upstream of the combustion chamber 11. A thermostatically controlled valve 15 located upstream of the venturi mixer 14 delivers fuel gas to the venturi mixer 14 from a fuel gas reservoir 17 located in the casing 5. A flow and pressure controller 18 located adjacent an outlet 19 from the reservoir 17 controls the flow rate and pressure of the fuel gas from the reservoir 17. An on/off switch (not shown) is also located adjacent the outlet 19 of the reservoir 17. A conduit 22 from the flow and pressure controller 18 delivers fuel gas at the desired pressure to the thermostatically controlled valve 15 through a safety isolating valve 25. The vaporisation chamber 10, the combustion chamber 11, the venturi mixer 14, the thermostatically controlled valve 15 and the isolating valve 25 are all located in-line in the housing 8 on a common central axis 27 defined by the housing 8. Additionally, the vaporisation chamber 10, the combustion chamber 11, the venturi mixer 14, the thermostatically controlled valve 15 and the isolating valve 25 are all in heat conducting engagement with each other, so that the temperature of the vaporisation chamber 10 is controllable by the thermostatically controlled valve 15. Furthermore, on the temperature of any part of the housing 8 rising above a predetermined safe operating temperature, the isolating valve 25 isolates the fuel gas from the combustion chamber 11.

A button operated piezoelectric igniter 29 is located in the casing 5 for applying a voltage to an electrode 30 in the combustion chamber 11 for initially igniting fuel gas/air mixture to burn with flame combustion for raising the temperature of the gas catalytic combustion element 12 to its ignition temperature. Once the gas catalytic combustion element 12 has been raised to its ignition temperature, conversion of the fuel gas/air mixture to heat by the catalytic combustion element 12 commences, and the flame is starved of fuel gas/air mixture and thus extinguished. Exhaust gases from the combustion chamber 11 are exhausted through exhaust ports 32 in the housing 8.

Up to this the vaporising device 1 is substantially similar to the vaporising devices disclosed in PCT published Application Specifications Nos. WO 2008/029381 and WO 2006/082571.

Turning now to the vaporisation chamber 10, and referring in particular to Figs. 4 to 11, a portion of the side wall 9 which defines the vaporisation chamber 10 is formed by a first side wall, namely, an outer cylindrical sleeve 34 which is integrally formed with the housing 8 and extends from the first end wall 13, and a second side wall, namely, an inner cylindrical sleeve 35. The inner sleeve 35 is of similar heat conducting metal to that of the outer sleeve 34 and is a press fit in the outer sleeve 34 so that heat conducted through the housing 8 from the combustion chamber 11 is conducted into the vaporisation chamber 10 through the inner sleeve 35.

The inner sleeve 35 is open ended and extends from a downstream end 39 of the vaporisation chamber 10 to an upstream end 38 thereof, and terminates short of the first end wall 13. The inner sleeve 35 with the first end wall 13 defines the vaporisation chamber 10, and the downstream end 39 of the inner sleeve 35 defines an open mouth 41 for accommodating the cigarette 6 into the vaporisation chamber 10. In order to produce the aerosol, a carrier fluid, in this case air, is drawn into the vaporisation chamber 10 and through the tobacco 2 and in turn through the filter 4. Four elongated air accommodating ducts 45 defined between the inner sleeve 35 and the outer sleeve 34 accommodate air into the vaporisation chamber 10 adjacent the upstream end 38 thereof. The air ducts 45 are equi-spaced apart around the

outer and inner side walls 34 and 35, and extend from corresponding air inlets, namely, air intake ports 46 located adjacent the downstream end 39 of the vaporisation chamber 10 to the upstream end 38 thereof. Heat is transferred from the outer and inner side walls 34 and 35 into the air as it passes through the ducts 45 into the vaporisation chamber 10 when the filter 4 of the cigarette 6 is drawn on. Accordingly, the air ducts 45 and the vaporisation chamber 10 define a fluid flow path from the air intake ports 46 to the open mouth 41 through which air passes when the filter 4 of the cigarette 6 is drawn on. The fluid flow path is indicated by the arrows A of Fig. 12. The upstream part of the fluid flow path is formed by the *ait* ducts 45, and thus, the upstream part of the fluid flow path is in heat exchange relationship with the outer and inner sleeves 34 and 35. Accordingly, air drawn through the air ducts 45 is heated prior to entering the vaporisation chamber 10. Furthermore, the fluid flow path indicated by the arrows A is configured so that the upstream part thereof which is formed by the air ducts 45 directs air along the fluid flow path in one direction, namely, from the downstream end 39 to the upstream end 38 of the outer and inner side walls 34 and 35, while the air is directed through the vaporisation chamber 10 in the opposite direction, namely, from the upstream end 38 of the vaporisation chamber 10 to the downstream end 39 thereof. Accordingly, the configuration of the fluid flow path which is formed by the ducts 45 and the vaporisation chamber 10 provides for pre-heating of the air prior to being drawn into the vaporisation chamber 10, without any increase in the overall length of the vaporisation chamber 10, and in particular, without any increase in the overall length of the housing 8.

A permeable partition element 40 formed by a disc of metal mesh material is located in the vaporisation chamber 10 spaced apart from the first end wall 13 for abutting the cigarette 6 when inserted in the vaporisation chamber 10, and for diffusing air from the air ducts 45 into the tobacco 2 in the cigarette 6.

The air accommodating ducts 45 are equi-spaced apart around the vaporisation chamber 10, and in this embodiment of the invention are formed by longitudinally extending parallel grooves formed in the outer surface of the inner sleeve 35 prior to press fitting of the inner sleeve 35 into the outer sleeve 34.

The cigarette 6 is of diameter which would typically be greater than that of a standard cigarette, and of length which would be shorter than that of a standard cigarette. In this embodiment of the invention the cylindrical tube 3 of the cigarette 6 which contains the tobacco 2 is of similar diameter and length to that of the internal diameter and length of the inner sleeve 35 for maximising heat transfer from the inner sleeve 35 to the tobacco 2. Thus, when the cigarette 6 is inserted into the vaporisation chamber 10, the cylindrical tube 3 of the cigarette 6 which contains the tobacco 2 is located entirely within the vaporisation chamber 10, and the filter 4 extends outwardly from the vaporisation chamber 10.

In use, with the cigarette 6 located in the combustion chamber 11 and the on/off switch (not shown) operated into the on state, the piezoelectric igniter 25 is operated to ignite the fuel gas/air mixture to burn with a flame in the combustion chamber 11. As it is raised to its ignition temperature, the gas catalytic combustion element 12 commences to convert the fuel gas/air mixture to heat, thus extinguishing the flame, and the vaporising device continues to operate with heat provided by catalytic conversion by the gas catalytic combustion element 12. Heat from the gas catalytic combustion element 12 is conducted through the housing 8, and in turn through the outer sleeve 34 and the inner sleeve 35 to the vaporisation chamber 10 where it is in turn transferred to the tobacco 2. The heat transferred to the tobacco 2 results in vapours being released from the vaporisable constituents of the tobacco. By drawing on the filter 4, air is drawn through the air ducts 45 into the vaporisation chamber 10, where it is mixed with the vapours to form an aerosol, which in turn is drawn through the filter 4 for inhaling thereof.

The thermostatically controlled valve 15 maintains the temperature in the vaporisation chamber in the range of 120°C to 230°C.

Referring now to Figs. 12 to 16, there is illustrated a vaporising device according to another embodiment of the invention, indicated generally by the reference numeral 60. The vaporising device 60 is substantially similar to the vaporising device 1 and similar components are identified by the same reference numerals. The main

difference between the vaporising device 60 and the vaporising device 1 is in the vaporisation chamber 10. In this embodiment of the invention the vaporisation chamber 10 is adapted for receiving either loose tobacco or a sachet of tobacco for vaporising therein. A hollow plug element 61 is formed by the inner sleeve 35 which extends from a second end wall 63, and defines with the second end wall 63 a tobacco receiving chamber 62 within which the loose tobacco or sachet of tobacco is located. The plug 61 is then plugged into the vaporisation chamber 10. In this case the inner sleeve 35 is a relatively tight sliding fit within the outer sleeve 34. A downstream outlet 64 from the vaporisation chamber 10 is formed in the plug 61 for accommodating the aerosol from the vaporisation chamber 10, and a tube 65 terminating in a mouthpiece 66 extends from the downstream outlet 64 for facilitating drawing of the aerosol from the vaporisation chamber 10. An elongated heat exchange element 68 extends into the vaporisation chamber 10 from the combustion chamber 11 through the first end wall 13 for further enhancing heat transfer into the vaporisable material. Otherwise, the vaporising device 60 and its use is similar to that of the vaporising device 1 described with reference to Figs. 1 to 11.

The advantages of the invention are many. A particularly important advantage of the invention is achieved by the provision of the heat exchange means in the form of the air accommodating ducts 45 which facilitate heating of air being drawn into the vaporisation chamber, so that when the air reaches the air inlet 43 of the vaporisation chamber 10, the temperature of the air has been significantly raised, and in general, is raised to a temperature at or just below the vaporising temperature of the vaporisable constituents in the vaporisable matter. This, thus, avoids any danger of air being drawn into the vaporisation chamber which would otherwise have a cooling effect on the tobacco or other vaporisable material, and would thus inhibit or reduce the release of vapours from the vaporisable constituents. A further advantage of providing the heat exchange means in the form of air ducts which are located between the upstream and downstream ends of the vaporisation chamber is that it permits the overall length of the housing to be minimised. An additional advantage of the invention is that by locating the air intake ports adjacent the downstream end of the vaporisation chamber, the air intake ports are spaced

apart from the exhaust gas outlet, thereby avoiding contamination of the air drawn into the vaporisation chamber.

It is envisaged that in the vaporising device 60 the grooves on the inner sleeve 35 may be dispensed with and replaced by flats which would extend longitudinally along the length of the outer surface of the inner sleeve 35. For example, the inner sleeve may be machined or shaped so that the outer transverse cross-section of the inner sleeve would define a hexagon, an octagon, or any other suitably shaped outer cross-section to define with the inner surface of the outer sleeve 34 the air accommodating ducts 45. Additionally, the grooves which are formed on the outer surface of the inner sleeve could instead be formed on the inner surface of the outer sleeve, or alternatively, grooves could be formed on both the outer surface of the inner sleeve and the inner surface of the outer sleeve. Further, it is envisaged that longitudinally extending flats could be formed on the inner surface of the outer sleeve.

While the heat exchange means has been described as comprising longitudinally extending air accommodating ducts extending between the upstream and downstream end of the vaporisation chamber, other suitable arrangements of heat exchange means located between the upstream and downstream ends of the vaporisation chamber could be provided, for example, the heat exchange means may be provided by one or more air accommodating ducts extending helically around the vaporisation chamber, or the inner sleeve may be located within the outer sleeve to form an annular air accommodating duct between the inner and outer sleeves. Additionally, while the air accommodating ducts have been described as being formed by grooves, they may be formed by any other suitable means, for example, by the provision of flats on the inner cylindrical sleeve. It will also be appreciated that heat exchange fins may be provided to extend into the air accommodating ducts.

While the heat source for heating the vaporising device has been described as being a gas powered heat source, any suitable heat source may be provided, and in certain cases it is envisaged that the heat source may be an electrically powered heat source.

Where the heat source is provided as a gas powered heat source, any other suitable converting means for converting fuel gas to heat besides a gas catalytic combustion element may be provided.

While the vaporising devices of Figs. 1 to 11 and Figs. 12 to 16 have been described as comprising the fuel gas/air reservoir extending substantially parallel to the housing which houses the vaporisation chamber, the combustion chamber, the venturi mixer, the thermostatically controlled valve and the isolating valve, it is envisaged in certain cases that the reservoir may be also located in-line with the housing, which would accommodate the vaporisation chamber, the combustion chamber, the venturi mixer, the thermostatically controlled valve and the isolating valve, and furthermore, it is envisaged that the reservoir may be of cylindrical construction, and would share a common central axis with the common central axis of the housing.

It is also envisaged that an elongated heat exchange element similar to the heat exchange element 68 of the vaporising device of Figs. 12 to 16 may be provided in the vaporisation chamber of the vaporising device of Figs. 1 to 11. Indeed, it is envisaged that in the vaporising device of Figs. 12 to 16, more than one elongated heat exchange element may be provided extending into the vaporisation chamber, and similarly, more than one heat exchange element may be provided to extend into the vaporisation chamber of the vaporising device of Figs. 1 to 11.

The invention is not limited to the embodiments hereinbefore described, which may be varied in construction and detail.

Claims

1. A vaporising device comprising a heatable housing that defines:

- a vaporisation chamber for holding a vaporisable material,
- an inlet for a carrier fluid,
- an outlet for a carrier fluid, and
- a fluid flow path from the inlet to the outlet that passes through the vaporisation chamber,

wherein a part of the fluid flow path upstream of the vaporisation chamber is in heat exchange relationship with the housing.

2. A vaporising device according to claim 1, wherein the fluid flow path directs fluid through the upstream part in one direction and through the chamber in the opposite direction.

3. A vaporising device according to claim 1 or 2, wherein the fluid flow path comprises a duct extending through the housing.

4. A vaporising device according to claim 3, wherein the fluid flow path comprises a plurality of ducts which are spaced apart from each other.

5. A vaporising device according to claim 3 or 4, wherein the housing comprises a side wall extending around the vaporisation chamber, and the side wall defines each duct.

6. A vaporising device according to claim 5, wherein the or each duct extends within the side wall.

7. A vaporising device according to claim 5 or 6, wherein the side wall defines the vaporisation chamber, the outlet and the inlet.

8. A vaporising device according to claim 5, 6 or 7, wherein the side wall defines an open mouth for facilitating inserting the vaporisable matter into the

vaporisation chamber, and the open mouth forms the outlet.

9. A vaporising device according to any one of claims 5 to 8, wherein the side wall extends from a first end wall closing one end of the vaporisation chamber.

10. A vaporising device according to any one of claims 5 to 9, wherein the side wall comprises a first side wall, and a second side wall concentric with and located within the first side wall, wherein the or each duct is defined between the first and second side walls.

11. A vaporising device according to claim 10, wherein at least one of the inner transverse cross-section of the first side wall and the outer transverse cross-section of the second side wall is shaped to define each duct.

12. A vaporising device according to claim 10 or 11, wherein the first side wall extends from a first end wall, the second side wall extends from a second end wall, and the second end wall defines with the first end wall and at least the second side wall the vaporisation chamber.

13. A vaporising device according to claim 12, wherein the outlet is formed in the second end wall.

14. A vaporising device according to claim 12 or 13, wherein the inlet is located adjacent the second end wall, and preferably, the or each duct communicates with the vaporisation chamber adjacent the first end wall.

15. A vaporising device according to any one of claims 12 to 14, wherein the second side wall and the second end wall define a hollow plug for engaging with the first side wall, the hollow plug being adapted for holding the vaporisable matter.

16. A vaporising device according to any one of claims 12 to 15, wherein the second side wall is a relatively tight slideable fit within the first side wall.

17. A vaporising device according to claim 10, wherein the second side wall is a press fit in the first side wall.

18. A vaporising device according to any one of claims 10 to 17, wherein the or each duct is formed by a groove formed in one of the first and second side walls, and preferably, formed in the second side wall.

19. A vaporising device according to any one of claims 5 to 18, wherein the vaporisation chamber is substantially cylindrical, and advantageously, the side wall is a substantially cylindrical side wall.

20. A vaporising device according to claim 10, wherein one of the first and second side walls is provided by a cylindrical side wall, and the other of the first and second side walls defines an outer surface having at least one longitudinally extending flat portion which defines with the inner surface of the first side wall one of the ducts.

21. A vaporising device according to any one of the preceding claims, wherein the outlet for the carrier fluid is adapted for accommodating the carrier fluid with vapours of the vaporisable constituents entrained therein.

22. A vaporising device according to any one of the preceding claims, comprising at least one heat exchange element of heat conducting material which extends from the housing into the vaporisation chamber for transferring heat to the vaporisable matter contained therein.

23. A vaporising device according to any one of the preceding claims, comprising a heat source configured to heat the vaporisation chamber.

24. A vaporising device according to claim 23, wherein the heat source is a gas powered heat source, and the housing defines a combustion chamber within which fuel gas is converted to heat,

25. A vaporising device according to claim 24, further comprising a gas catalytic combustion element located in the combustion chamber for converting the fuel gas to heat.

26. A vaporising device according to claim 25, wherein the heat source is an electrically powered heat source, and comprises at least one electrical resistive heater element.

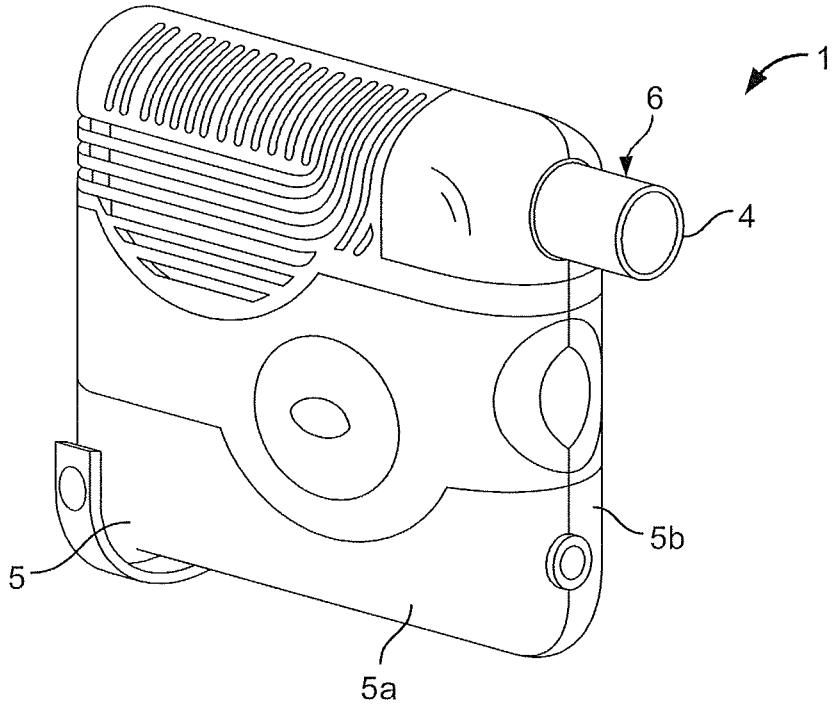


FIG. 1

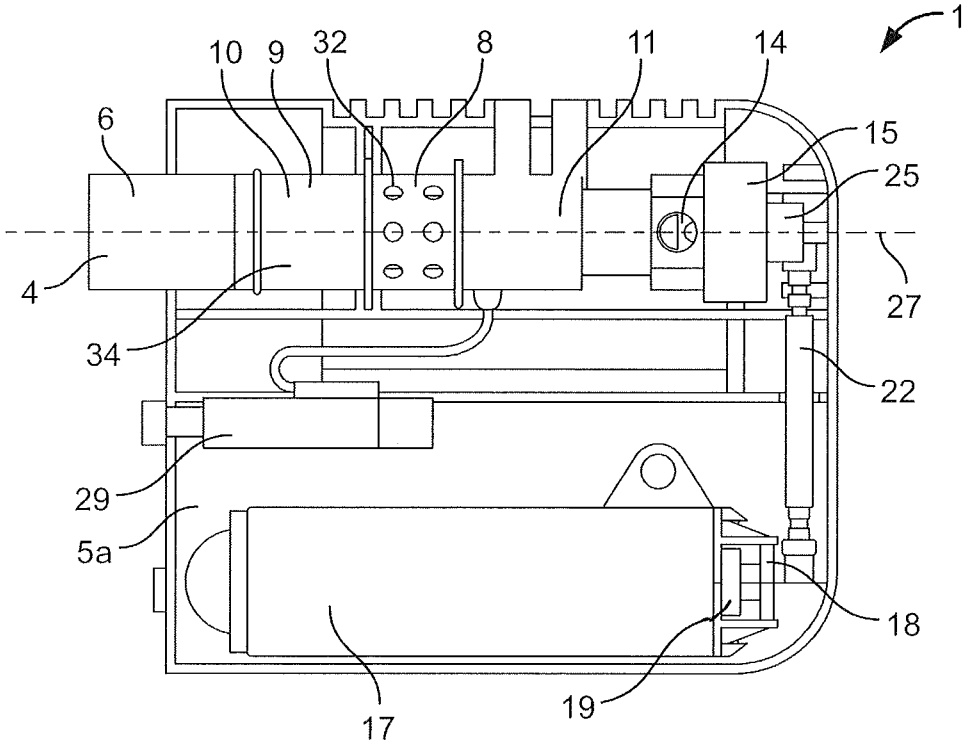


FIG. 2

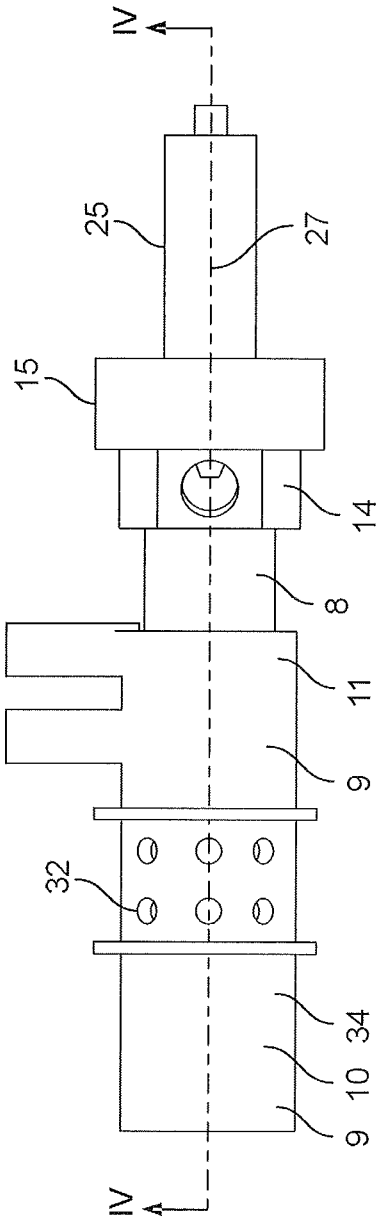
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FIG. 3

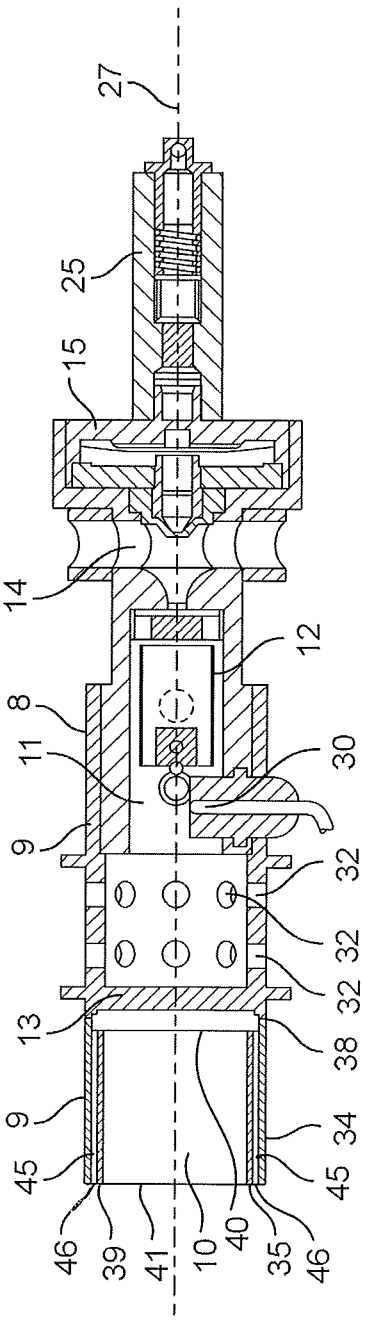
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FIG. 4

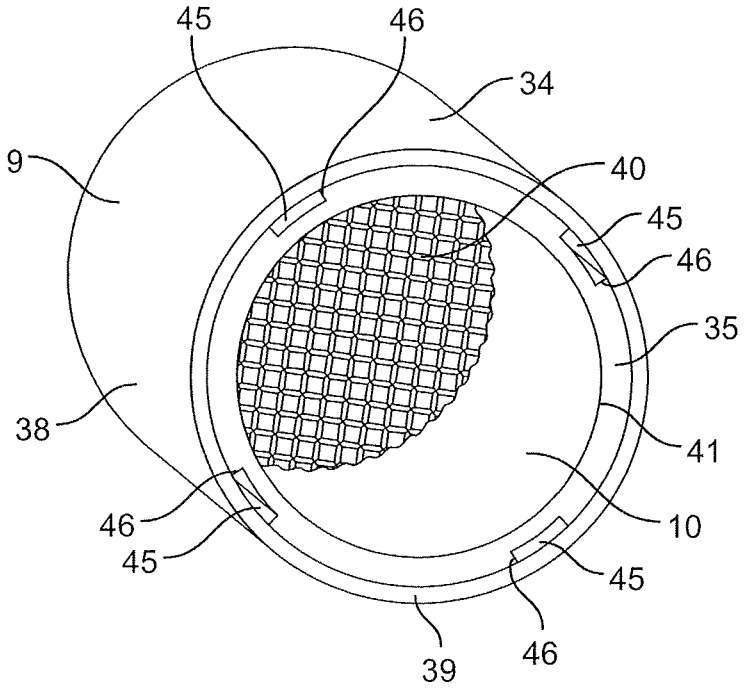


FIG. 5

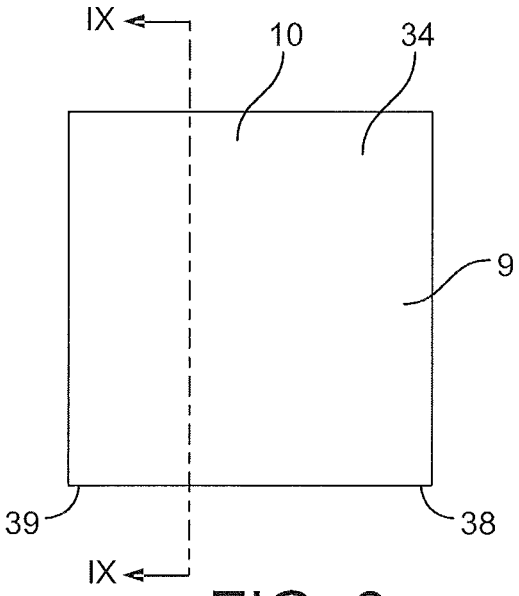


FIG. 6

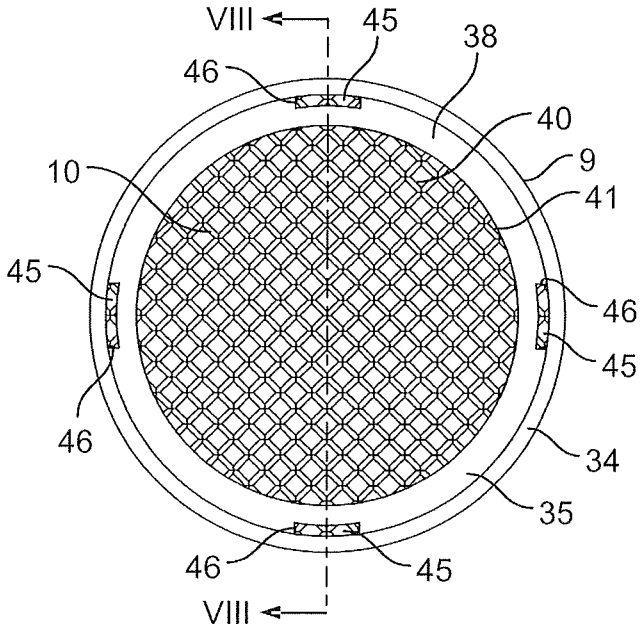


FIG. 7

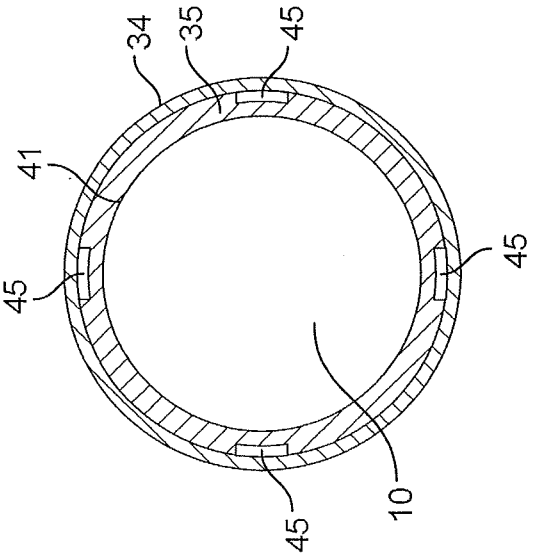


FIG. 9

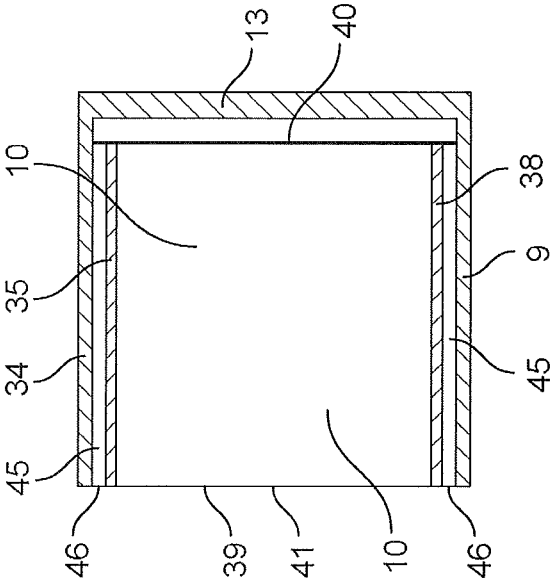


FIG. 8

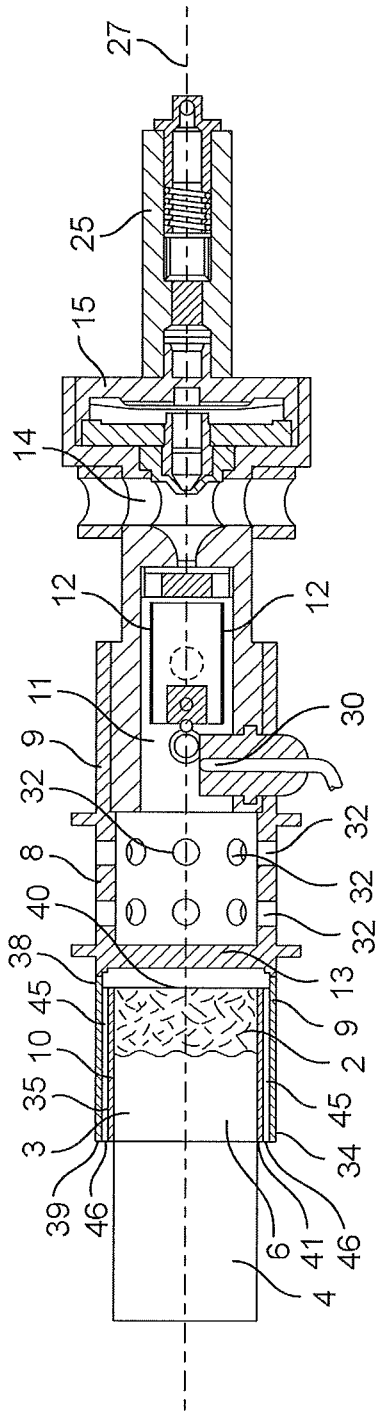


FIG. 10

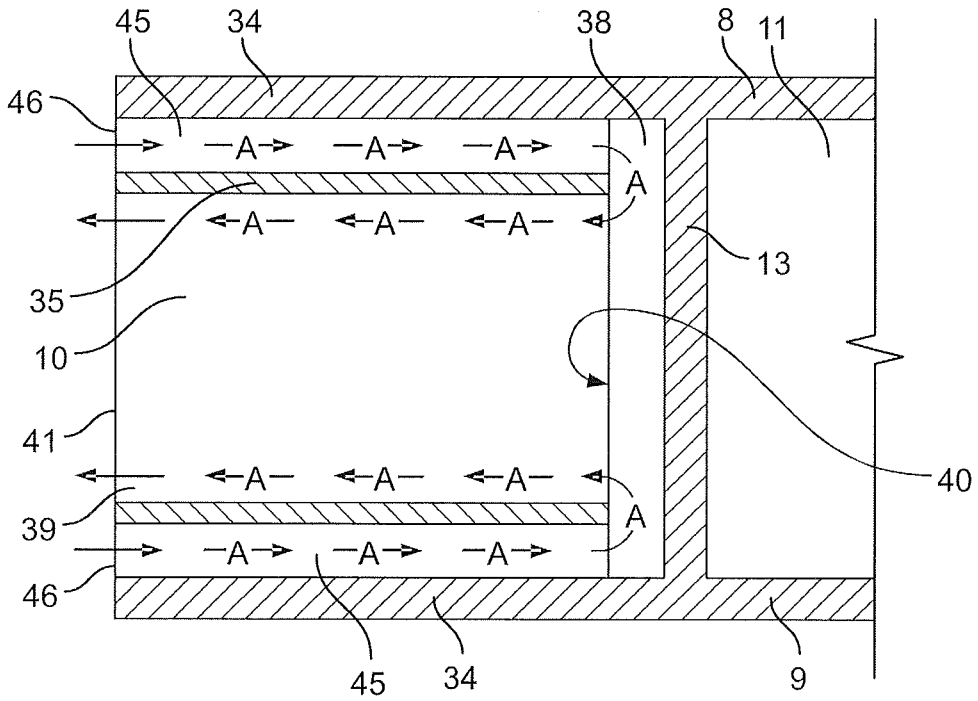


FIG. 11

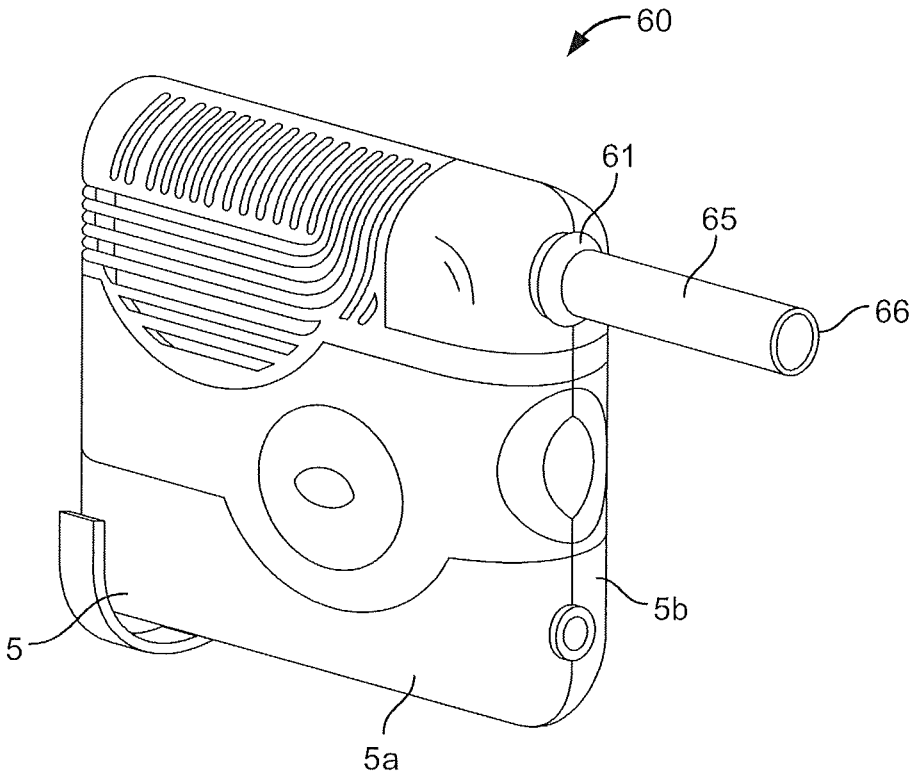


FIG. 12

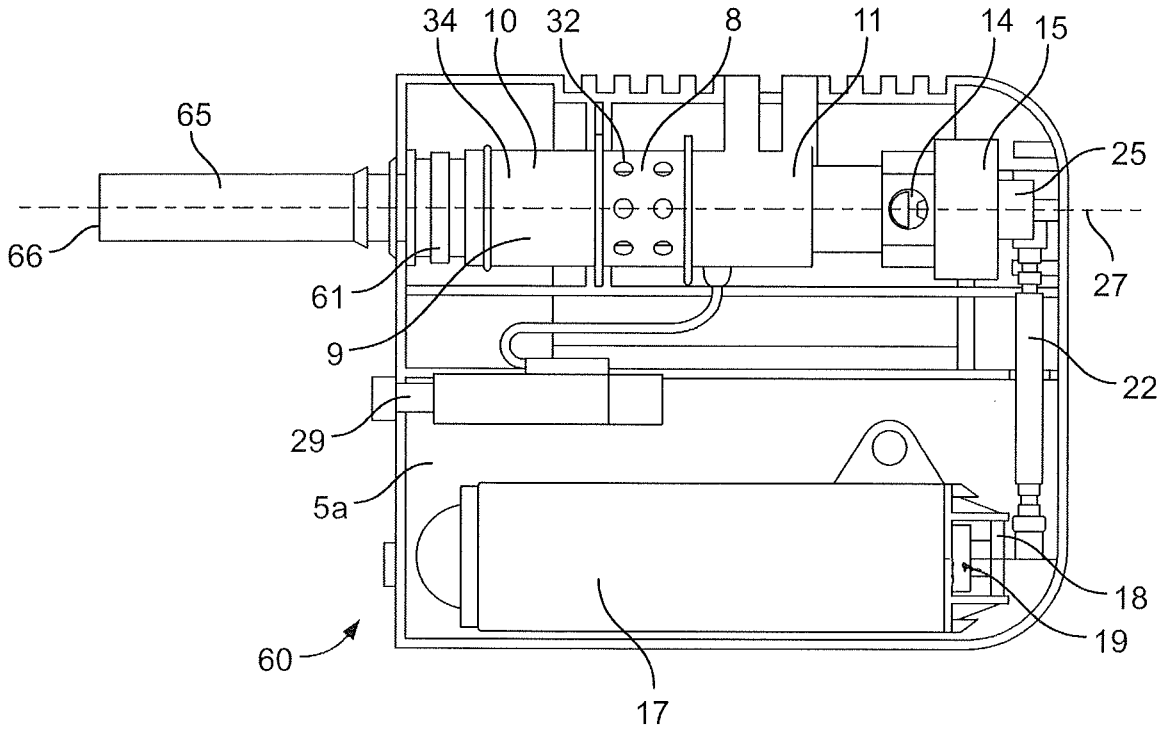
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FIG. 13

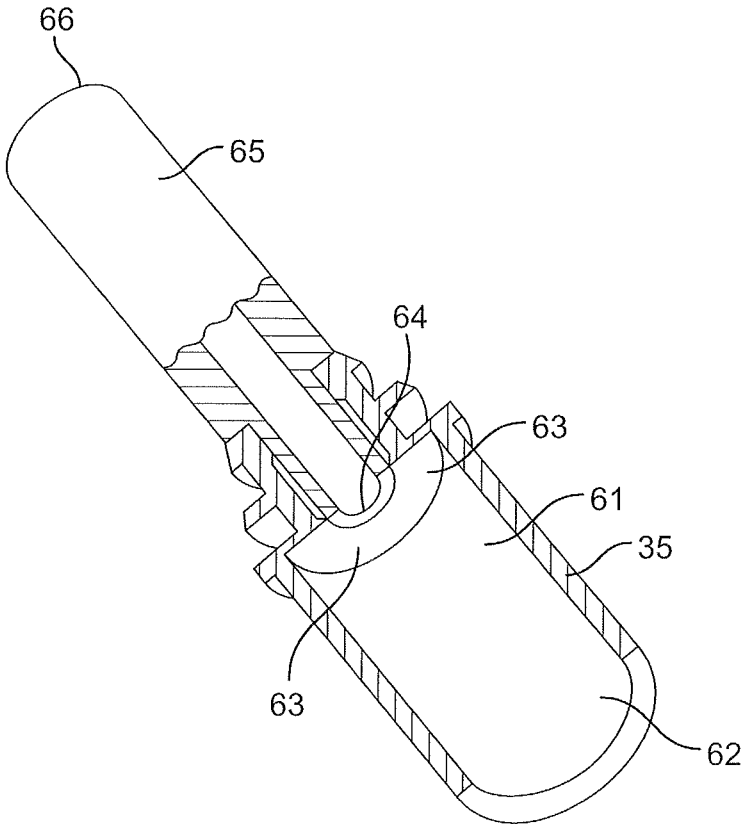
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FIG. 16

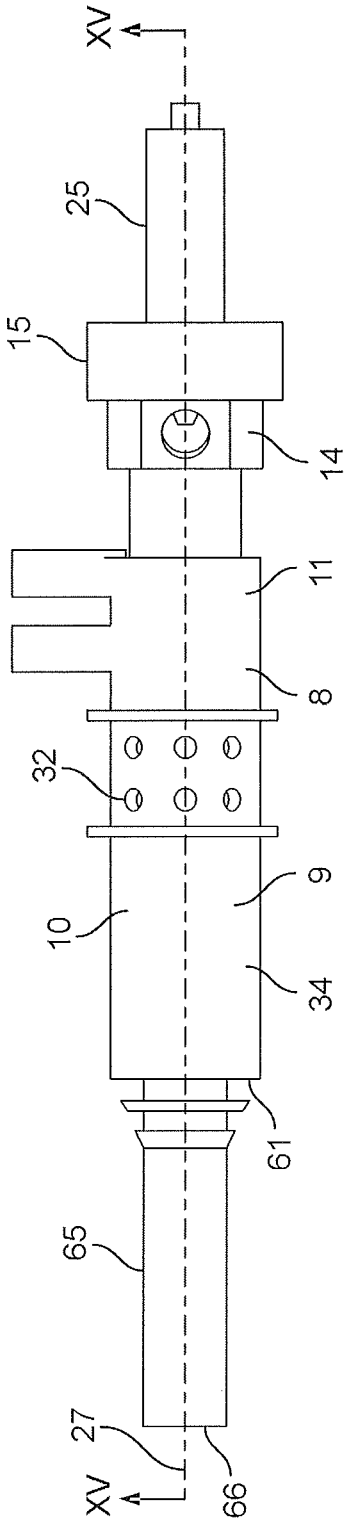
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FIG. 14

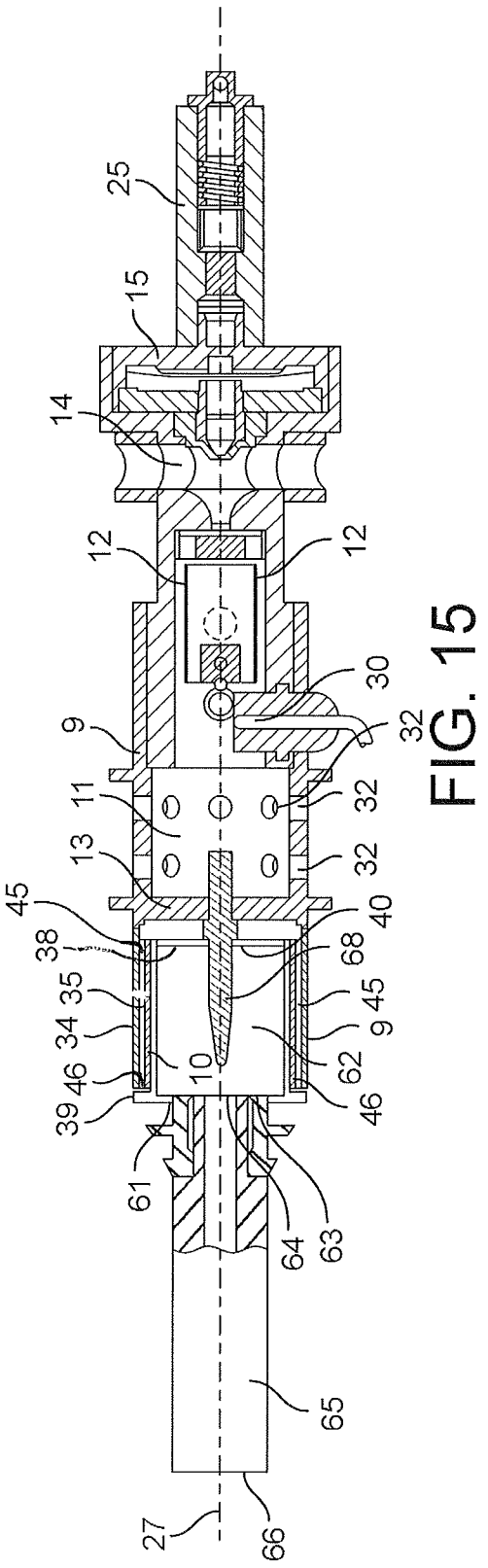
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FIG. 15

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/060663

**A. CLASSIFICATION OF SUBJECT MATTER**
INV. A24F47/00 A61M15/06
ADD. A61M11/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
A61M A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal , WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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-/-

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex:

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 30 October 2009 | 11/11/2009 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL- 2280 HV RijsWijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Schi aug , Marti n |

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/060663

C(Continuation). QOCUMENTS CONSIDERED TO BE RELEVANT

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