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(56) Documents Cited

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US 5653223 A	US 5170782 A	US 5099833 A
US 5020530 A	US 4657007 A	US 4429835 A
US 4333450 A	US 4054622 A	US 3581742 A

(58) Field of Search
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(54) Abstract Title
NEBULISER

(57) An appliance for the direct passage of a medicament aerosol from a constant atomiser (2) to a mouth-piece, (26) wherein the appliance includes a vented reservoir (26) in which excess aerosol from the atomiser is temporarily storeable at atmospheric pressure prior to inhalation, is described. The reservoir is able to store the constantly formed excess aerosol during periods of non-inhalation of the user. Because the reservoir is vented to atmosphere, the stored aerosol is maintained at atmospheric pressure, ensuring that such aerosol is not pressurised.

A nebuliser including a pressure control valve located in the supply passage of carrier gas between the gas pump or pumps and the atomisation portion of the nebuliser is also described (Fig 3-not shown). The valve can be used to alter the pressure of the carrier gas. Thus, the user can determine when atomisation should occur, generally at or just before each inhalation, and reduce or stop atomisation when not desired or required.

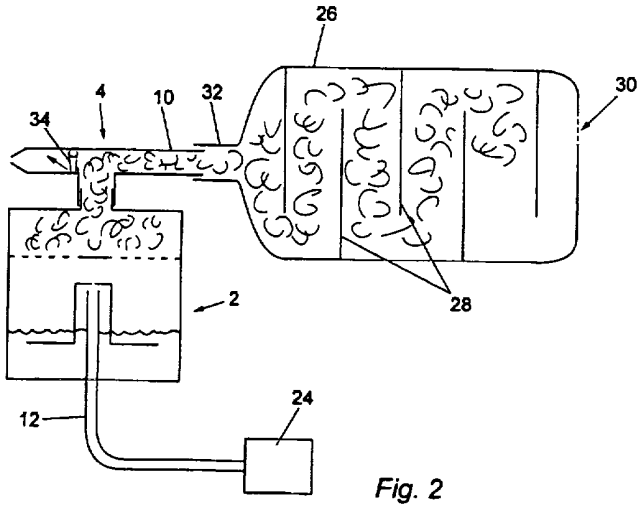

Fig. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

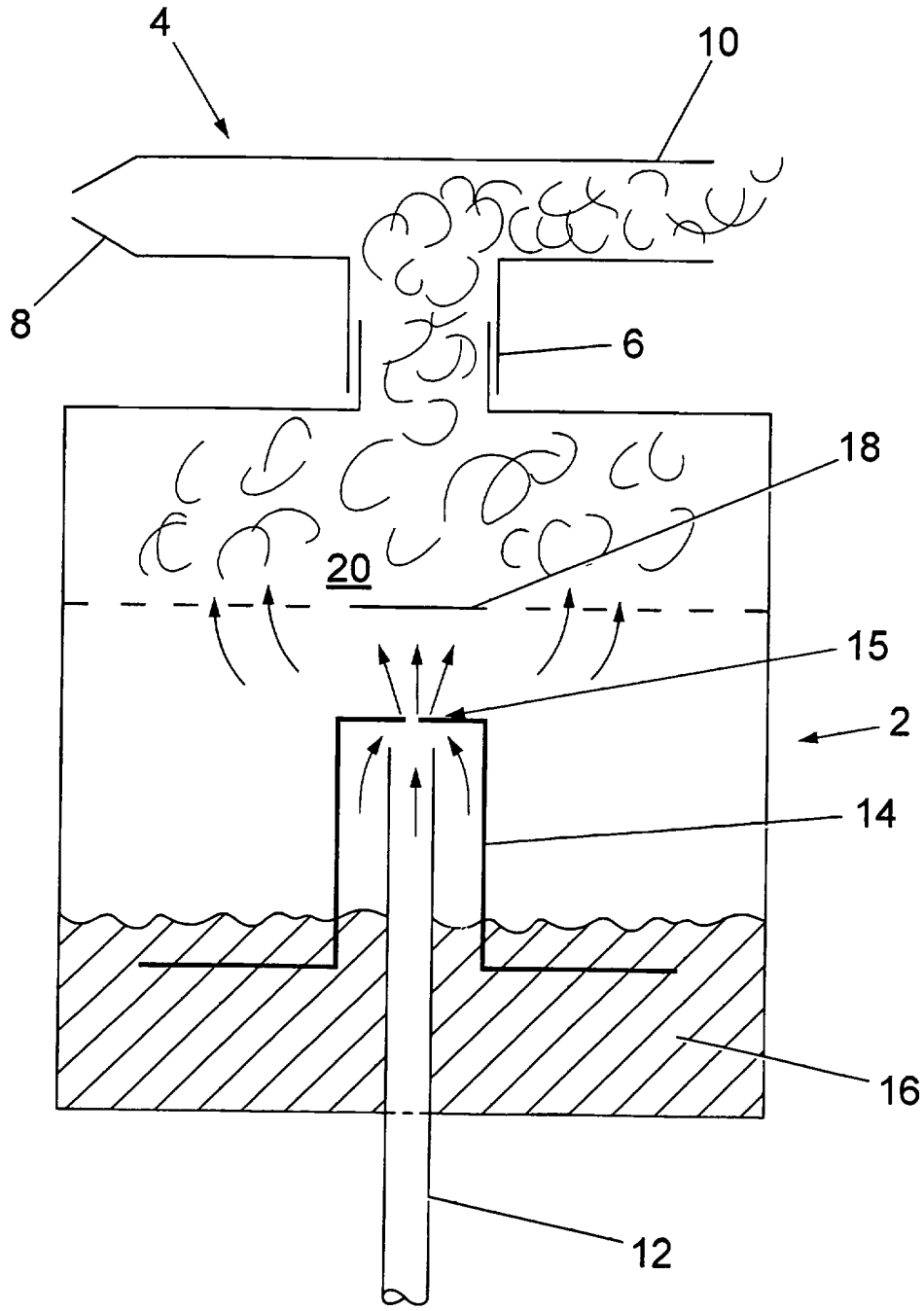

Fig. 1

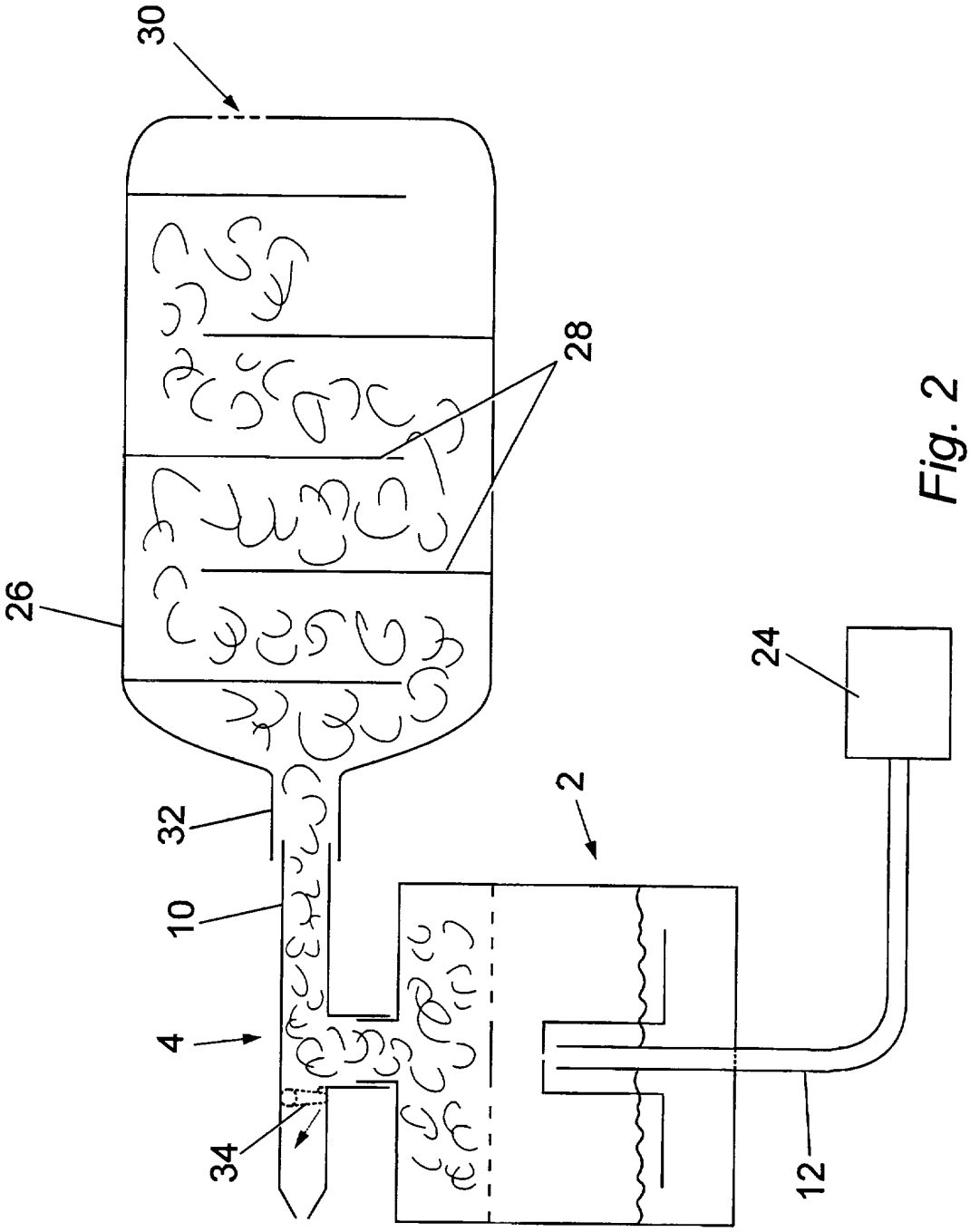

Fig. 2

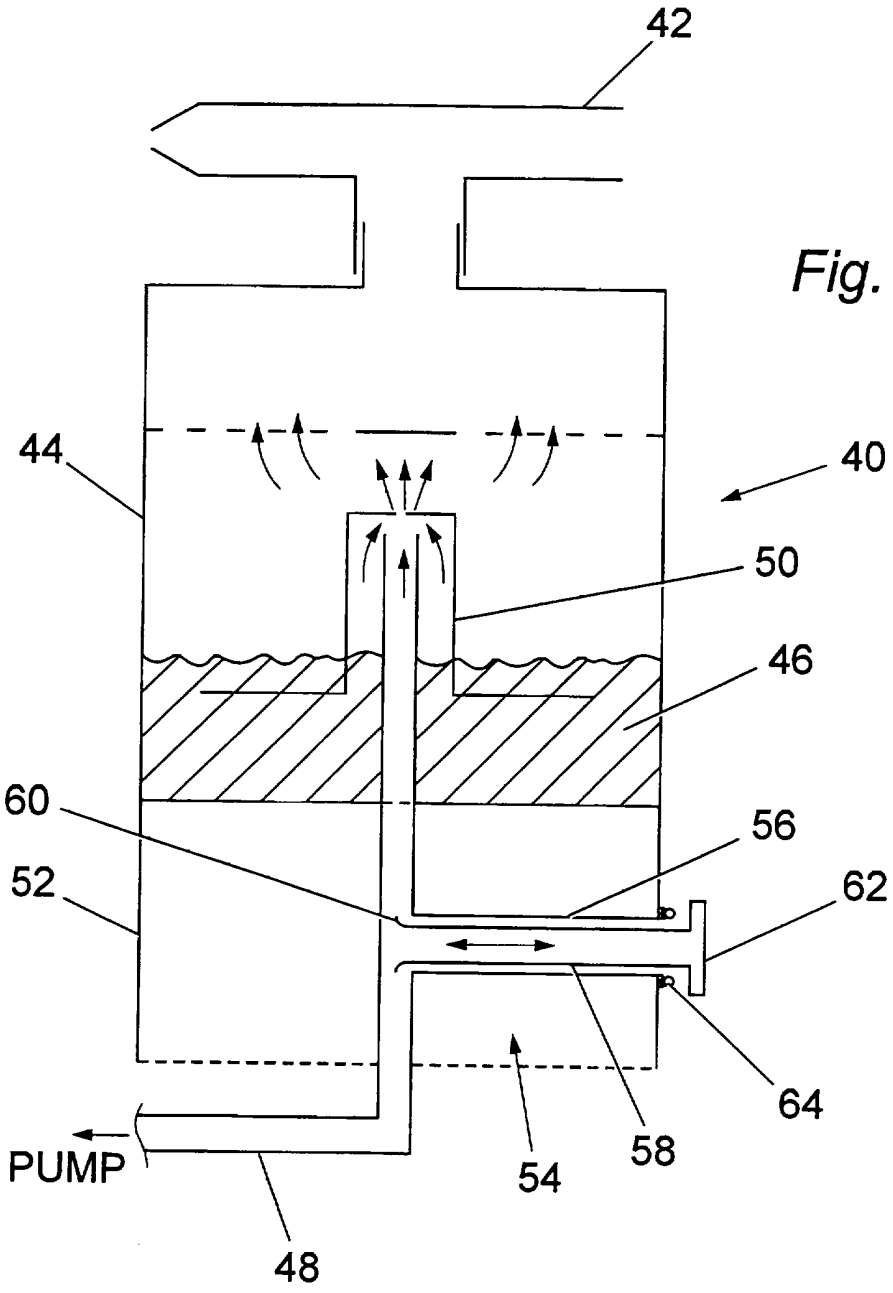

Fig. 3

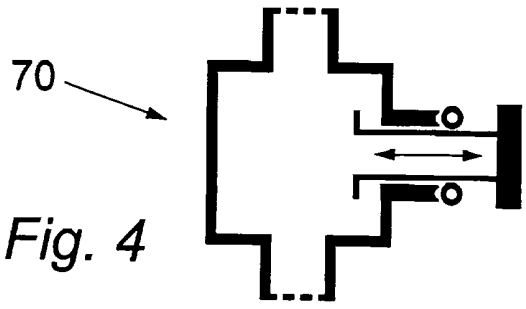

Fig. 4

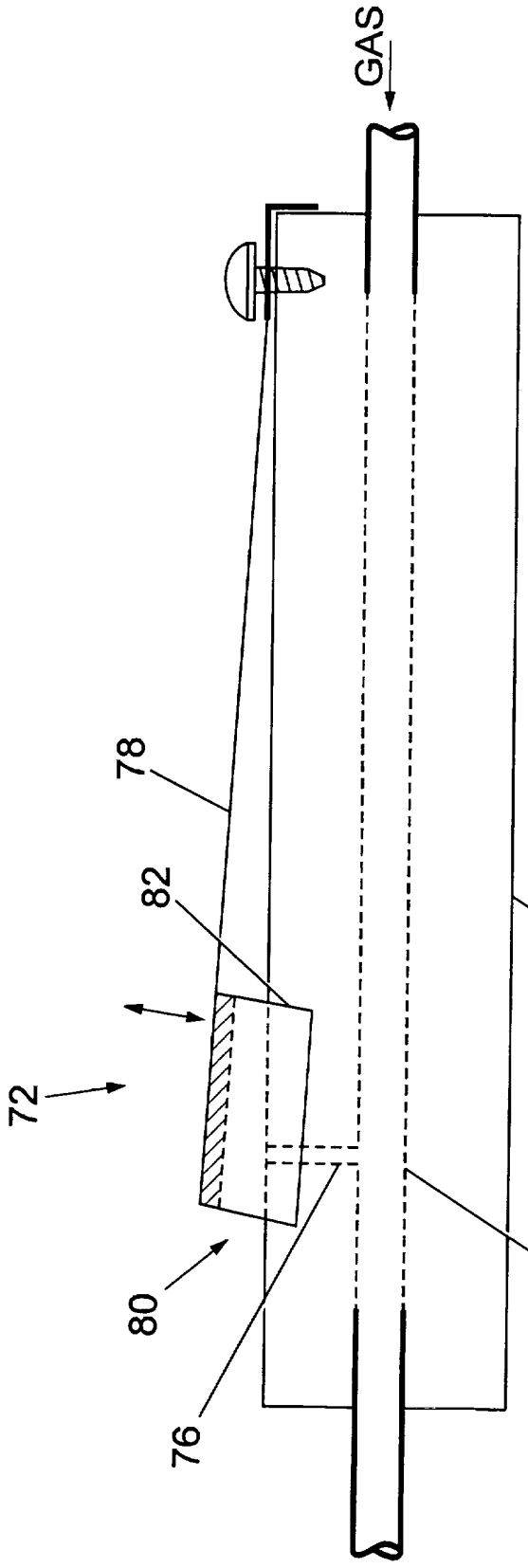

Fig. 5

MEDICAL APPLIANCES

This invention relates to medical appliances, particularly but not exclusively for use with a nebuliser.

Respiratory inhaling devices, such as inhalers and atomisers, are a common method of administering respiratory medicaments to the lungs for the treatment of various conditions such as asthma and bronchitis. Mild dosages for non-chronic sufferers can be delivered by hand-held inhalers, in which a small controlled dose of medicament is converted into an aerosol spray and propelled into the user's mouth.

For more chronic and serious sufferers who require higher dosages with faster and better delivery to the lungs, a constant atomiser can be used. One common constant atomiser is a nebuliser. A nebuliser has one or two pumps constantly pumping a carrier gas at a positive pressure through restricted apertures and baffle plates in a sealed vessel which also contains liquid medicament. The result of the gas flowpath is to atomise the medicament, and the so-formed aerosol is then ready for inhalation as part of the normal

breathing pattern of the user. The aerosol is usually inhaled through a mouthpiece appliance located on top of the nebuliser, and the mouthpiece includes an open port to provide the atmospheric air to the mouthpiece for the bulk of each inhalation.

For a serious asthma sufferer at least, a nebuliser is run constantly primarily to ensure that there is always aerosol available for inhalation should the user have a sudden or rapid successive requirement for medicament, commonly termed an "attack". In such circumstances, the continuity of aerosol availability is paramount.

However, because the nebuliser is run constantly, the aerosol is constantly being formed even when the user is not inhaling, i.e. when the user's lungs are at rest or the user is exhaling, leading to a potential build up of gas pressure in the nebuliser and mouthpiece appliance. It is stressed that the weakness of the lungs of a chronic or serious sufferer of e.g. asthma is such that it is important to avoid any disturbance to the normal lung function, and to ensure there is minimal resistance to inhalation. Hence, any pressure build up should be avoided. Pressure build up would also hinder or stop the atomisation operation.

In order to prevent any such pressure build up in the nebuliser and mouthpiece appliance, aerosol which is created but not inhalated, herein termed "excess aerosol", is vented to atmosphere through the open port in the mouthpiece appliance. As the user is not inhaling about 50% of the time, about 50% of the atomised medicament is therefore wasted. Indeed, it is currently advised that nebulisers should be only used in large or well-ventilated rooms to prevent unwanted atmospheric build up of the vented excess aerosol.

US 4885027 shows a respiratory apparatus using a sealed collapsible chamber which serves to hold aerosol between a nebuliser and an inhalation face mask. However, a sealed chamber could lead to pressure build-up within it, and once the flexible material of the chamber is torn, the whole apparatus is useless. Also, during an "attack" a user may require one or more inhalations of medicament as fast as possible, whilst the chamber's need for re-inflation may prevent rapid successive inhalations. The chamber also increases the distance, and thus direct availability, of aerosol between the nebuliser and the face mask. Such features hinder rather than help sudden and rapid successive inhalations.

One object of the present invention is to obviate or mitigate these disadvantages.

According to one aspect of the present invention, there is provided an appliance for the direct passage of a medicament aerosol from a constant atomiser to a mouth-piece, wherein the appliance includes a vented reservoir in which excess aerosol from the atomiser is temporarily storable at atmospheric pressure prior to inhalation.

The reservoir is able to store the constantly formed excess aerosol during periods of non-inhalation of the user. Because the reservoir is vented to atmosphere, the stored aerosol is maintained at atmospheric pressure, ensuring that such aerosol is not pressurised.

Preferably the normal direct action of the constant atomiser is not affected. Also preferably, the stored aerosol is inhaleable simultaneously with aerosol

inhaled by the user directly from the nebuliser. In this way, the user is therefore receiving two dosages of medicament per inhalation.

The present invention results in all or substantially all of the medicament being inhaled, rather than about 50% currently, such that the user should only need half the present amount of medicament. This should lead to significant cost savings.

The venting of the reservoir may be through one or a number of apertures. The apertures may have tapered, elongate or otherwise shaped surrounds to try and minimise the escape of aerosol. Preferably, the venting is far or furthest away from the aerosol receiving area. Also preferably, the reservoir includes one or more internal baffles to help create a serpentine flowpath within the reservoir between the aerosol receiving area and the venting.

The reservoir may be integral with or separable from the remaining part of the appliance. A separable reservoir may assist storage and/or transportation of the reservoir or the whole appliance.

The reservoir may be of any suitable shape, size or design, and may be rigid-walled or collapsible. Although some stored aerosol may escape to atmosphere and be lost through the venting, the reservoir is preferably designed to retain the aerosol therein for as long as possible between inhalations to minimise such waste. The reservoir may be transparent to allow a user to see its operation, and/or include a flow meter. The reservoir may be adaptable for use with different nebuliser mouthpiece appliances, or it may have an adapter for the same purpose.

One common form of nebuliser mouthpiece appliance is a "T-piece". A T-piece is generally located on top of a nebuliser, with one horizontal arm being or having a mouthpiece, and the other horizontal arm being open to atmosphere.

According to preferred embodiment of the present invention, a vented reservoir as herein described is attached to the atmosphere port of a T-piece appliance.

According to a second aspect of the present invention, there is provided a ventable reservoir attachable to an appliance for the direct passage of medicament aerosol from a constant atomiser to a mouthpiece, wherein the excess aerosol from the constant atomiser is temporarily storable at atmospheric pressure in the reservoir prior to inhalation.

According to a third aspect of the present invention, there is provided a method of temporarily storing excess aerosol from a constant atomiser prior to inhalation, wherein the excess aerosol is stored at atmospheric pressure in a vented reservoir attached to the atomiser mouthpiece appliance.

In other uses for a constant atomiser, e.g. where a nebuliser is more generally used for prophylactic purposes, running the nebuliser constantly may not be absolutely necessary. That is, aerosol may not need to be constantly and immediately available for inhalation. Atomisation of the medicament could be matched to the inhalation pattern of the user. However, as the hosing line supplying the pressurised carrier gas from the pump(s) is connected directly into the nebuliser, the only control over the supply of carrier gas is the power switch of the pump(s). Switching the pumps on

and off for every break is not convenient or efficient.

Thus, according to a fourth aspect of the present invention, there is provided a pressure control valve for use in the supply passage of carrier gas for a nebuliser, and locatable between the gas pump or pumps and the atomisation portion of the nebuliser.

The pressure control valve can be used to alter the pressure of the carrier gas between the pump(s) and the nebuliser and thus control the amount and/or rate of atomisation of the liquid medicament. Thus the user can determine when atomisation should occur, generally at or just before each inhalation, and reduce or stop atomisation when not desired or required. As with the appliance discussed herein before, excess aerosol, i.e. aerosol created but not inhaled, is reduced or substantially avoided, resulting in all or most of the medicament being inhaled, rather than the current 50% figure.

The valve may be controlled automatically. Preferably it is manually controllable by the user, so that the user can control the atomisation in line with their breathing pattern. The valve is preferably next to or otherwise close to the atomisation portion of the nebuliser, such that the atomisation is initiated as soon as possible after the valve opened or closed.

The valve may be any suitable unit, device or apparatus, and may be integrally formed with or separable from the gas hosing or piping, and/or the nebuliser. The valve may be a tap or tap means, or a flap or piston means or a ball-in-cup arrangement.

In one embodiment, the valve is inherently open during

use of the nebuliser, such that positive closing action by a user is required to empower atomisation. The user is then aware of operation of the valve, hopefully thereby minimising excess aerosol production.

In another embodiment, the valve is inherently closed during use of the nebuliser, such that positive opening action is required by a user to inhibit atomisation. The default setting is therefore for atomisation to occur.

Indeed, the valve arrangement provides several clear advantages. Firstly, reduced waste of nebulised medicament. Secondly, the user can see and therefore calculate how much medication he has taken. The user's doctor can therefore be more reliant on the accuracy of the user's statement concerning the amount of inhaled use of the nebuliser, and therefore be more confident that a correct course of treatment is being taken. Thirdly, the valve arrangement is easily manually operatable, and this extends also to low potential manufacturing costs.

Embodiments of the present invention will now be described by way of example only and with reference to the accompanying diagrammatic drawings in which:-

Fig. 1 is a side cross-sectional view of a typical nebuliser and T-piece;

Fig. 2 is a side cross-sectional view of the nebuliser and the appliance of Fig. 1, with a reservoir according to the present invention;

Fig. 3 is a side cross-sectional view of a second nebuliser and integral pump pressure control valve

according to the present invention;

Fig. 4 is a side cross-sectional view of a first separate pressure control valve according to the present invention; and

Fig. 5 is a side cross-sectional view of a second seperate pressure control valve according to the present invention.

Referring to the drawings, Fig. 1 shows a nebuliser 2 and a connected T-piece mouthpiece appliance 4. The T-piece 4 has a nebuliser port 6, a mouthpiece port 8 and an opposing open port 10.

The nebuliser 2 works in a standard and known manner. A carrier gas, e.g. air or an air/oxygen mixture, is constantly pumped into the nebuliser through a line 12 at a positive pressure, possibly up to 35 psi, from two electric pumps in a cam arrangement. Two pumps maintain a more even and constant gas pressure than one pump. The gas is directed towards the top of a "top hat" piece 14 having a small aperture 15 therein. Prior to pumping, a capsule of liquid medicament 16 is poured into the nebuliser 2 to surround the top hat piece 14.

The passage of the pressurised gas through the aperture 15 creates a vacuum within the top hat piece 14, vaporising the liquid medicament 16 therebelow and drawing it with the gas towards an intermediate slotted plate 18 which extends across the nebuliser 2. The slotted plate 18 helps atomise the medicament and form an aerosol 20. The aerosol 20 passes through side apertures in the baffle plate 18, and is then ready for direct and immediate inhalation.

As the amount of air required for a normal adult breath is generally up to one litre, the bulk of the air for each inhalation is drawn from the surrounding atmosphere into the T-piece 4 through the open port 12. The drawing of air by the user across the T-piece 4 also helps increase the rate of aerosol formation and thus the degree of medicament inhalation.

The other main function of the open port 10 is to provide an outlet for the excess aerosol created whilst the user is not inhaling. As mentioned above, the gas is being introduced into the nebuliser 2 at a pressure of up to 35 psi, such that there would be a significant build up of gas and aerosol pressure after a few seconds in any sealed vessel. As users of nebulisers 2 usually have weak or very weak lungs, it is not desired to put such pressure on such lungs. Thus, the result of the use of a nebuliser as shown in Fig. 1 is an approximate 50% wastage of medicament as it escapes during periods of non-inhalation in aerosol form through the open port 10. This level of wastage is presently accepted because of the need to run the pump constantly, and to avoid any pressure build up. A user must therefore be supplied with double the amount of medicament actually required for inhalation.

Fig. 2 shows the nebuliser 2 and T-piece 4 of Fig. 1, along with an attached pumping apparatus 24. However, attached to the open port 10 of the T-piece 4 is a reservoir 26. The reservoir 26 has a number of baffle plates 28 designed to create a serpentine flowpath through the reservoir 26, and a venting aperture 30 at the opposite end of the reservoir 26 to the open port connection 32.

The baffle plates 28 are shown in Fig. 2 extending

substantially but not completely across the reservoir 26, thereby leaving a gap for the passage of air and aerosol. Alternatively, the baffle plates 28 could extend completely across the reservoir 26 and have one or more apertures therein.

The venting aperture 30 ensures that the aerosol in the reservoir 26 is maintained at atmospheric pressure. The aperture 30 also allows air to be drawn into the T-piece 4 (through the reservoir 26) for the bulk of each inhalation, as per the original function of the open port 12 on the T-piece 4.

As shown in Fig. 2, excess aerosol created whilst the user is not inhaling can pass into the reservoir 26 and be stored therein. The serpentine flow created by the baffle plates 28 helps retain the aerosol within the reservoir for as long as possible before the next inhalation, and possibly before it reaches the venting aperture 30. Some aerosol may still escape from the venting aperture 30 prior to inhalation of the remaining aerosol in the reservoir 26, but it should be minimal.

The baffle plates 28 also help retain and concentrate the aerosol towards the front of the reservoir 26, nearest to the connection port 32, and it is the air/aerosol in that part of the reservoir 26 that will be initially inhaled by the user (as air is drawn through the venting aperture 30). As it is the initial part of any inhalation which primarily reaches the alveoli in the lungs, the user will inhale the most concentrated level of aerosol first, increasing the effectiveness of the medicament.

When the user inhales through the mouthpiece port 8,

aerosol is still received directly from the nebuliser 2 as before. Thus, should the user have a sudden or rapid successive need for medicament, the nebuliser 2 and mouthpiece 4 are still able to operate as hitherto. However, along with the aerosol direct from the nebuliser 2, the user will also inhale the aerosol held in the reservoir 26. The user is therefore receiving an approximate double dosage of medicament, and is thus effectively using all the liquid medicament originally placed in the nebuliser 2. Thus, for the same dosage intake as shown in Fig. 1, only half the amount of liquid medicament is required, with natural cost savings.

The reservoir 26 is removable from the T-piece 4 should the user wish to use the nebuliser 2 as hitherto, and also to facilitate storage and transportation of the apparatus. The reservoir 26 could be held at any angle relative to the T-piece with a revised connecting port, or an adapter piece.

The T-piece 4 could include a flap 34 (shown in dotted line) as a one-way valve to prevent escape of excess aerosol through the mouthpiece port 8. Inhalation by the user would be sufficient to raise the flap 34 for the passage of air and aerosol to the mouthpiece port 8.

Fig. 3 shows a second (simplified) nebuliser 40, generally similar to that shown in Fig. 1. The second nebuliser 40 has a T-piece mouthpiece appliance 42, nebuliser container body 44 holding a liquid medicament 46, a carrier gas inflow line 48, a "top hat" piece 50 above and around the top of the gas line 48. The nebuliser 40 works in the same manner as the nebuliser shown in Fig. 1 and described above. The carrier gas

is constantly pumped along the line 48 from a constant pump (not shown).

However, the second nebuliser 40 has an extended lower housing 52 which includes a pressure control valve 54. The valve 54 has an outer sleeve 56 running transversely from the gas line 42 to the atmosphere. The sleeve 56 houses a moveable valve means 58 having a flanged rim 60 at its inner end, and a flanged solid cap 62 at its outer end. The valve means 58 is moveable between a closed position where the solid cap 62 abuts an O-ring 64 seated on the outside of the lower housing 52 and around one end of the sleeve 56, and open position (as shown) where the solid cap 62 is separate from the O-ring 64.

In use, a user, preferably using only one hand, is able to hold the nebuliser 40, especially the lower housing 52, and operate the valve means 58 with a finger or thumb. The valve means 58 is preferably arranged to have a default or open position, either inherently due to the pressure of the carrier gas in the line 48, or possibly due to a biasing means such as a spring between the lower housing 52 and outer cap 62, or both. Because the open valve means 58 provides less flow resistance to the carrier gas than the aperture in the top hat 50, the carrier gas in the line 48 preferably wholly or substantially flows out to atmosphere when the pump is on and the valve means 58 is open.

When the user is ready to inhale, the user closes the valve means 58 to prevent egress of carrier gas through the sleeve 56, such that the nebuliser 40 now operates as before, with the carrier gas atomising the liquid medicament 46 through the hat piece 50. When the user is finished inhaling the aerosol, the valve means 58 is

allowed to open, releasing the gas pressure in the nebuliser and stopping atomisation of the medicament 46.

The user thus has control over the timing of atomisation, whilst the pump runs constantly. Because the valve 54 is directly below the nebuliser container body 44, operation of the valve 54 creates almost simultaneous operation or stopping of the atomisation of the medicament 46. If operation of the valve 54 is in time with the user's inhalation pattern, this lends to the creation of aerosol only when required. The creation of substantial excess aerosol when the user is not inhaling is therefore avoided, and such excess aerosol is not therefore simply wasted as before.

Preferably, there is still sufficient pressure going up to the top hat 50 to circulate the medicament 46 through the atomising part, but not enough to create atomisation. Thus, any increase in pressure by closure of the valve 54 produces instant atomisation of the medicament 46.

The valve 54 is preferably usable only by users able to co-ordinate their inhalation with the valve 54. Some users may prefer or should only have constant atomisation. The valve 54 could include a locking means to maintain it in its closed position when so desired.

The valve 54 of the present invention has a further advantage. Respiratory medicaments generally only work in contact with a user's lungs, such that that part of any medicament inhaled but which stays in the mouth or throat, i.e. the latter portion of any aerosol inhalation, is ineffective (in not being able to

provide any effect). Such "later-inhaled" aerosol is therefore again wasted. However, the user of the second nebuliser 40 in Fig. 3 could time the closing of the valve 54, and thus the provision of aerosol for inhalation, to match only the first part of any inhalation. The second part of the inhalation could then simply be atmospheric air. The user therefore reduces or avoids ineffective aerosol inhalation, increasing the percentage of the medicament used effectively. This again would reduce the amount of medicament needed by the user, and create savings in the cost of the medicament.

Fig. 4 shows a separate pressure control valve 70. The separate valve 70 could be easily added into the line between a nebuliser and pump, and removed if necessary.

Fig. 5 shows a second separate pressure control valve 72. As with the control valve 70 in Fig.4, it could be easily added in to the line between a nebuliser and a pump. The valve block 74 has a main gas line 75 and a side vent 76, above which is located an operating lever 78 attached to the valve block 74 at one end. The operating lever 78 is biased away from the valve block 74. At its distal end, there is a rubber pad 80, and two depending flaps 82 to help keep the operating lever 78 aligned with the valve block 74.

As with the valve means 58 in Fig. 3, when the user is ready to inhale, the user manually presses the operating lever 78 against the valve block 74, such that the rubber pad 80 seals the side vent 76. All of the carrier gas for atomising the liquid mediciment in the nebuliser then runs directly through the main gas line 75 of the valve block 74. Upon release of the operating lever 78 from the valve block 74, the carrier

gas pressure is reduced to the nebuliser by escape of some pressure through the side vent 76, (temporarily) stopping atomisation of the medicament.

In an alternative arrangement, the operating lever 78 could be biased against the side vent 76, and require positive opening action, eg. using a handle, to open the side vent 76 and reduce the carrier gas pressure to the nebuliser. A user could then have control over when to positively inhibit atomisation pro tem.

The present invention therefore provides two methods and arrangements for utilising or reducing previously wasted respiratory medicament, without affecting the operation of a constant atomiser and/or of a constant pump, and without affecting the user in their weakened condition. The reservoir and valve are simple in construction, simple to attach, and do not affect the breathing pattern or mode of a user.

CLAIMS

1. A pressure control valve for use in the supply passage of carrier gas for a nebuliser, and locatable between the gas pump or pumps and the atomisation portion of the nebuliser.

2. A pressure control valve as claimed in Claim 1 wherein the valve is part of the nebuliser.

3. A pressure control valve as claimed in Claim 1 wherein the valve is separate from the nebuliser and locatable in the carrier gas line.

4. A pressure control valve as claimed in any one of Claims 1 to 3 wherein the valve is controlled automatically.

5. A pressure control valve as claimed in any one of Claims 1 to 3 wherein the valve is manually controllable.

6. A pressure control valve as claimed in any one of the preceding Claims wherein the valve is a tap, tap means, flap, piston means or a ball-in-cup arrangement.

7. A pressure control valve as claimed in any one of the preceding Claims wherein the valve requires positive closing action by a user to empower atomisation in the nebuliser.

8. A pressure control valve as claimed in any one of Claims 1 to 7 wherein the valve requires positive opening action by the user to inhibit atomisation in the nebuliser.

9. An appliance for the direct passage of a medicament aerosol from a constant atomiser to a mouth-piece, wherein the appliance includes a vented reservoir in which excess aerosol from the atomiser is temporarily storable at atmospheric pressure prior to inhalation.

10. An appliance as claimed in Claim 9 wherein stored aerosol in the reservoir is inhaleable simultaneously with aerosol inhaled by the user directly from the nebuliser.

11. An appliance as claimed in Claim 9 or Claim 10 wherein the venting of the reservoir is through one or more apertures.

12. An appliance as claimed in Claim 11 wherein the one or more apertures are tapered or elongate.

13. An appliance as claimed in any one of Claims 9 to 12 wherein the venting is remote from the aerosol receiving area of the reservoir.

14. An appliance as claimed in any one of Claims 9 to 13 wherein the reservoir includes one or more internal baffles.

15. An appliance as claimed in any one of Claims 9 to 14 wherein the reservoir is separable from the remaining part of the appliance.

16. An appliance as claimed in any one of Claims 9 to 15 wherein the reservoir is transparent.

17. An appliance as claimed in any one of Claims 9 to 16 which includes a flow meter.

18. An appliance as claimed in any one of Claims 9 to 17 which comprises a T-piece locatable on top of a nebuliser and a vented reservoir.

19. An appliance as claimed in Claim 18 wherein the reservoir is attached to the atmosphere port of the T-piece.

20. A ventable reservoir attachable to a mouthpiece appliance for the direct passage of medicament aerosol from a constant atomiser to a mouthpiece, wherein the excess aerosol from the constant atomiser is temporarily storable at atmospheric pressure in the reservoir prior to inhalation.

21. A method of temporarily storing excess aerosol from a constant atomiser prior to inhalation, wherein the excess aerosol is stored at atmospheric pressure in a vented reservoir attached to the atomiser mouthpiece appliance.

22. A pressure control valve for use in the supply passage of carrier gas for a nebuliser substantially as herein described with reference to Figs. 3 to 5.

23. An appliance for a nebuliser including a vented reservoir substantially as herein described with reference to Fig. 2.

The Patent Office

Application No:	GB 9902941.5	**Examiner:**	Mrs Susan Chalmers
Claims searched:	1-8 and 22	**Date of search:**	22 April 1999

INVESTOR IN PEOPLE

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A5T: TBC TDC

Int Cl (Ed.6): A61M: 11/00 11/06

Other: ONLINE: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 1332382	(HUDSON) see whole document, especially valve 11 and tube 17	1,2,4,6
X	GB 1283988	(PAUL RITZAN) see whole documents, especially button 10 in Figure 1	1,2,5,7
X	GB 1279797	(CHAMPION SPARK PLUG) see whole document especially relief valve 16	1,2,5,7
X	GB 675524	(VERGNE) see Figure 2 and page 2 lines 36-79	1,2,5,6
X	US 5653223	(PRUITT) see valves 16, 32 and 34 in the Figures and column 4 lines 47 to column 5 line 40	1,3,5,6
X	US 5170782	(DEVILBISS) see checkvalve 53 in Figures 2 and 3 and column 4 lines 7 -39	1,2,5
X	US 4657007	(WHITTAKER) see relief ports 32 and 32a in the Figures and column 3 lines 30-63	1,2,5,7
X	US 4429835	(BRUGGER) see valve 19 and slide 22 in Figures 1 and 2 and column 2 line 57 to column 3 line 43	1,2,5,6,7,8
X	US 4333450	(LESTER) see valves 43, 68 and 76 in the Figures	1,2,5,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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INVESTOR IN PEOPLE

Application No: GB 9902941.5
Claims searched: 1-8 and 22

Examiner: Mrs Susan Chalmers
Date of search: 22 April 1999

Category	Identity of document and relevant passage		Relevant to claims
X	US 4054622	(LESTER) see valve assembly 16, column 3 line 61 to column 4 line 15 and column 6 line 44 to column 7 line 42	1,2,5,6
X	US 3581742	(MEDICAL SERVICES) see whole document especially valve body 46	1,3,5,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

The Patent Office

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Application No: GB 9902941.5
Claims searched: 9-21 and 23

Examiner: Mrs Susan Chalmers
Date of search: 9 June 1999

Patents Act 1977
Further Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A5T: TCR, TDC

Int Cl (Ed.6): A61M 11/00, 11/06, 16/08

Other: ONLINE: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2313064 A	(AGLAN) see breathing bag (13) in Figure 2	20
P,A	WO98/07464 A1	(KING) see eg Figure 2	9,10,18
A	US5099833	(BAXTER INTERNATIONAL) see eg Figure 1	9,10 18
A	US5020530	(MILLER) see Figures	9,10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.