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(56) Documents Cited:
GB 2381458 A
US 5996579 A
US 5388571 A
US 5025806 A
US 3814092 A
US 6276363 B1
US 5988162 A
US 5287849 A
US 3945378 A

(58) Field of Search:
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Other: **EPODOC, WPI, JAPIO**

(54) Abstract Title: **Resuscitation apparatus with push-fit connections**

(57) Breathing and/or resuscitation apparatus as described in earlier specification GB 2381459 comprises air bag gas supply means 7, gas delivery means comprising a mask 8, and a nebuliser 3 connected between the supply means 7 and delivery means 8, the apparatus being now adapted to be configured (e.g. by means of markings 10 on a catheter mount tube 1 and a nebuliser 2 respectively, to be collocated) for the mask 8 to face substantially sideways and/or upwards in use. The apparatus is configured by adjustment, e.g. of one or more joints, e.g. that joint 11 formed by the adjacent ends of members 1 and 2 that bear the markings 10. Tube 1 comprises in its middle portion (i.e. the whole tube 1 apart from its ends) a flexible tube concertina section 12 connected between the supply means 7 and delivery means 8, being thus connected between the nebuliser 3 and delivery means 8. The parts of configuration-altering joint means 11 can be loosened or separated and then relatively rotated and then re-joined. Similarly, there may be one rotary push-fit joint 13 between the supply means 7 and the nebuliser 3, one rotary push-fit joint 11 between the nebuliser 3 and the flexible tube 1, and one rotary push-fit joint 14 between the flexible tube 1 and the delivery means 8. The apparatus can be supplied as a kit of parts, and extends to a method of nebulising and administering a drug, using the apparatus with the mask 8 facing sideways and/or upwards.

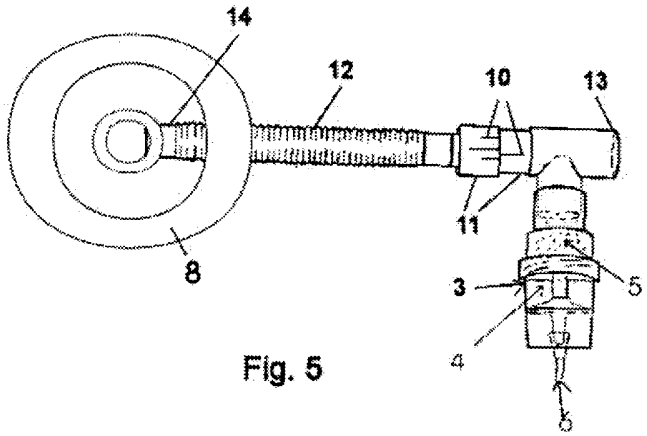


Fig. 5

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

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 2007.

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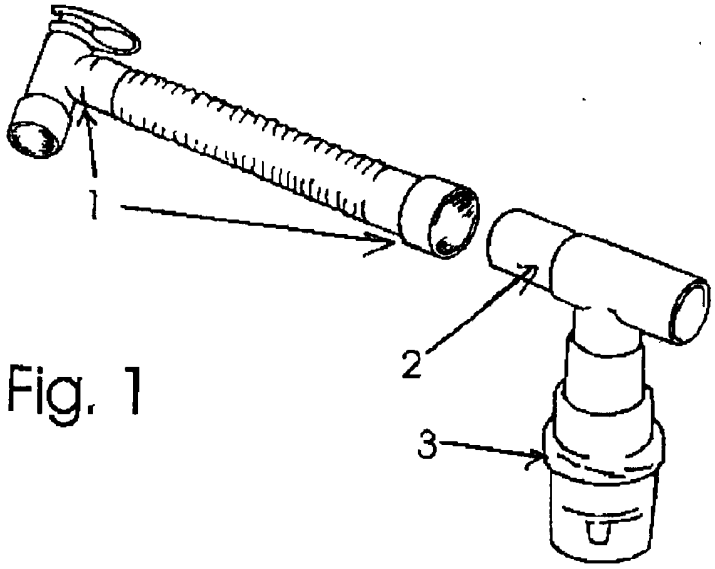


Fig. 1

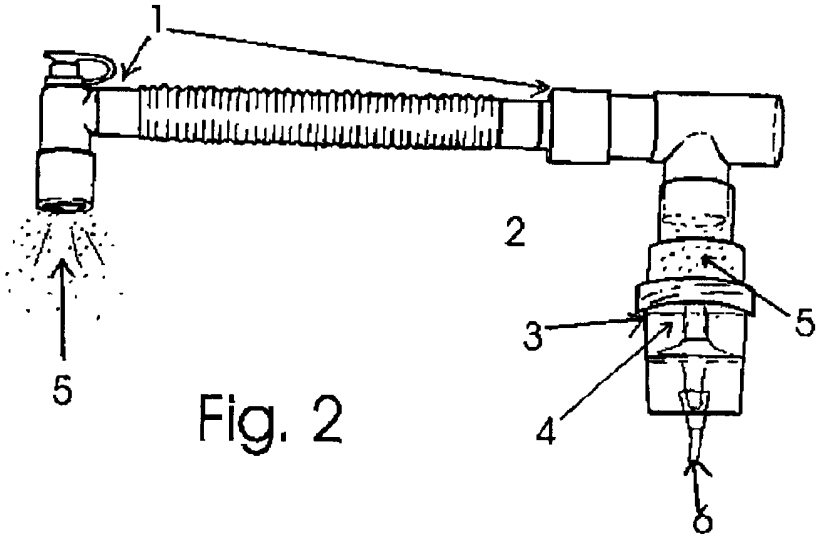


Fig. 2

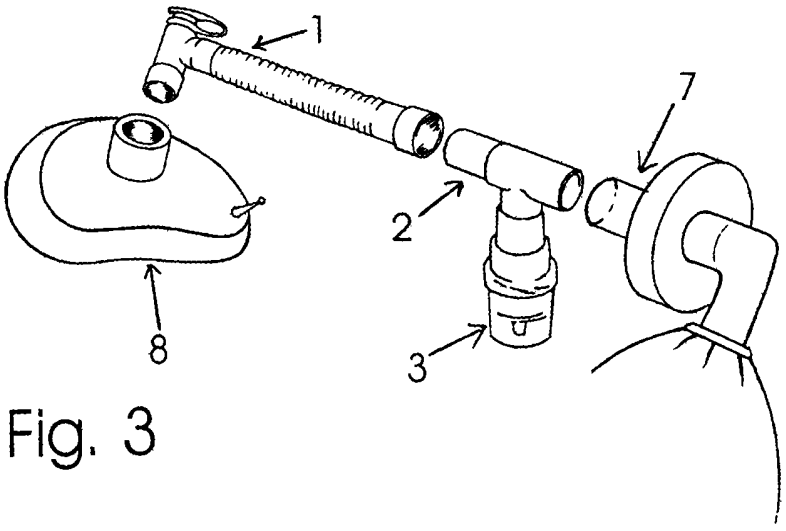


Fig. 3

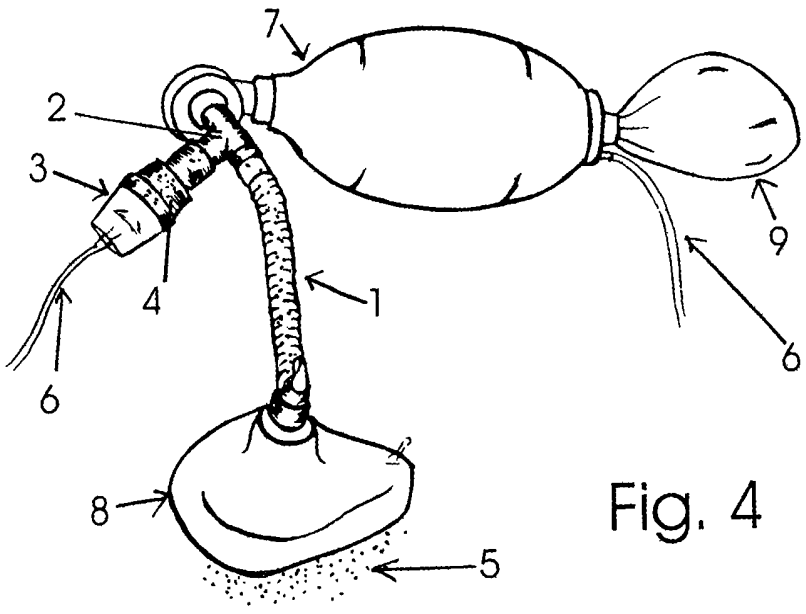


Fig. 4

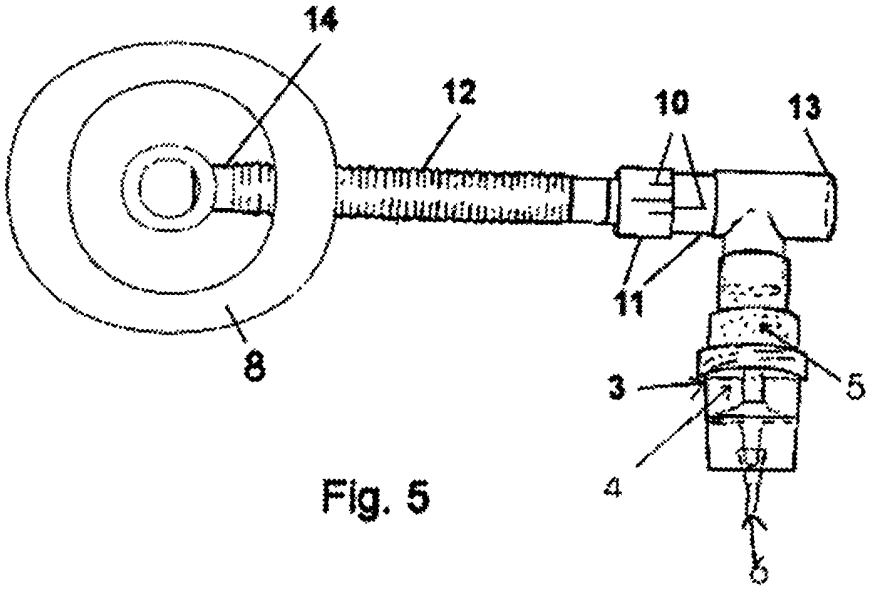


Fig. 5

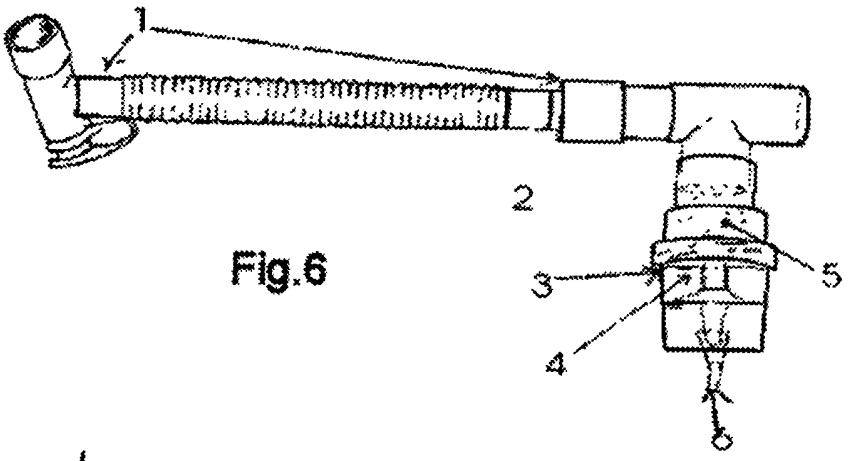


Fig.6

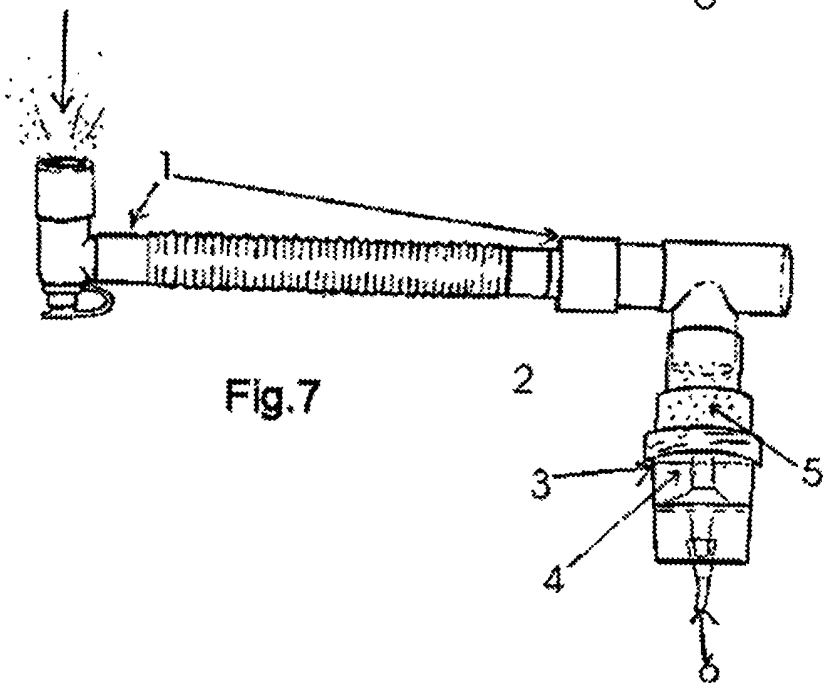


Fig.7

Title: "Resuscitation and Breathing Apparatus"

Field of the Invention

This invention relates to breathing and/or resuscitation apparatus and is an improvement on the invention disclosed in my patent specification GB 2381459 (hereinafter called "my earlier specification").

Background

My earlier specification disclosed a combination of supply means (a breathing bag or an automatic ventilator) to supply a gas, usually oxygen, and delivery means (a mask or intubation catheter) to deliver the gas to a patient's respiratory system, with a nebuliser connected between the supply means and delivery means to supply, e.g., a nebulised mist of a drug in solution to the gas stream from the supply means to the delivery means, and having a flexible tube between the nebuliser and delivery means. The tube used was a standard catheter-mount tube, e.g. as used for an intubation catheter. This is a relatively short tube, of concertina form so that, once the breathing apparatus of which it forms part is positioned, this tube can be contracted to reduce its airway volume in order to increase the amount of fresh oxygen (and in my earlier specification the amount of nebulised drug) that reaches the patient before the patient starts to exhale, for which reason it only flexes very slightly in practice. My earlier specification dealt with collapsed patients in a supine position (e.g. in respiratory and/or cardiac arrest, e.g. due to asthma), the patient's face facing upwards, with the mask facing substantially downwards, i.e. towards the face. As any paramedic would know, the nebuliser has to have its central axis substantially vertical. My earlier specification also referred to the apparatus having removable parts so that the apparatus could be altered to meet a changing situation, e.g. when there is recovery and traditional airway maintenance can be restored, i.e. by removing the nebuliser and flexible tube. My earlier specification illustrated use of a mask that is close-fitting in the sense that the bulk of air fed into the mask will feed into the respiratory system of the patient, as opposed to a loose-fitting mask (or a nearby mask) that simply provides an atmosphere near the patient's face only a small part of which atmosphere can be voluntarily inhaled by the patient. References in the present specification and my earlier specification to a "mask" mean one of the close-fitting kind.

The Invention

With hindsight, I can see that the apparatus had limited application. Indeed, in the two to three years since my earlier specification was published, neither I (as a paramedic) nor anyone else to my knowledge has thought of other ways of using the apparatus. However, a few weeks ago, it struck me

that the apparatus can be readily adapted for use for a much wider variety of situations, with amazing life-saving possibilities. The joints can be push-fit joints, and the parts of such a joint can be formed so that they can be readily separated, relatively rotated and re-joined. Bearing this in mind, it is then possible, if required, while keeping the nebuliser central axis substantially vertical, to re-arrange the apparatus quite easily for the mask to face sideways (e.g. for application to the face of a victim trapped encapsulated in a crashed car) or even upwards (e.g. for application to the face of a patient in a prone position). These are both cases in which, due to time constraint or positional circumstances or otherwise, it would be difficult or impossible to intubate or cannulate, in either case in order to administer a broncho-dilating drug that might be essential to saving the patient's life. Since thinking of this possibility, I have communicated it in confidence to a number of fellow paramedics, who have all been wildly enthusiastic about its possibilities for saving life.

Additionally, the new form of the apparatus can be used in the cases of Asthmatics, COAD (chronic obstructive airways disease), Diabetics, and at the Start of all CPR collapses (i.e. cardiac arrest requiring cardiopulmonary resuscitation) (not just as a back-up should IV (intravenous) access or intubation fail). The new form of apparatus can be used before the patient is unconscious, e.g. in the case of diabetics to administer glucose or glucagon via the lungs long before intubation or cannulation can be applied, and in circumstances where these cannot be applied, or not conveniently applied.

According to one aspect of the invention, there is provided breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use.

According to another aspect of the invention, there is provided breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use, and comprising guidance means to indicate such configuration.

According to another aspect of the invention, there is provided breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being configured for the mask to face substantially sideways and/or upwards in use.

According to another aspect of the invention, there is provided breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser

connected between the supply means and delivery means, the apparatus being arranged so that the mask faces substantially sideways and/or upwards in use.

According to another aspect of the invention, there is provided a method of adjusting breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, in which method the apparatus is configured to a configuration for the mask to face substantially sideways and/or upwards in use.

According to another aspect of the invention, there is provided a method of setting up breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising the mask, and a nebuliser connected between the supply means and delivery means, in which method the apparatus is configured to a configuration for the mask to face substantially sideways and/or upwards in use.

In either of these last two aspects, the configuring (but only for some positions) could be simply by substantial flexing (substantially more than 30 degrees, e.g. at least 45 degrees) of a member, e.g. a tube, but, preferably, the apparatus is configured by adjustment, e.g. of one or more adjustable joints (which can be made much more cheaply and simply and suitably than a purpose-built adjustable member which is not a joint). For most cases, the apparatus requires means to provide a rotational adjustment, e.g. a rotary joint, preferably of the push-fit kind. This embodiment will be one in which two parts fit together as a push-fit, and one can be withdrawn from the other, relatively rotated, and then refitted to the other.

According to another aspect of the invention, there is provided breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus having been adjusted by such a method

In any such apparatus, there is preferably provided a flexible tube connected between the supply means and delivery means, preferably between the nebuliser and delivery means. This tube may be a standard catheter-mount tube, e.g. as used for an intubation catheter.

Thus, while the configuration could be altered by twisting part of a tubular member relative to another part of the member, about a long axis of the member, it is preferred to alter the configuration by having at least one push-fit joint the parts of which can be relatively rotated, more preferably such that the parts can be loosened or separated and then relatively rotated and then re-joined. (Alternatively, a very long tubular member could be flexed sufficiently to configure the apparatus for the mask to face

in the desired direction, but in practice this would provide such a large volume of tubing airway between the nebuliser and mask that much of the nebulised drug present in this volume would not reach the patient before the patient starts to exhale.) For preference, there is used a combination of the first-mentioned flexible tube and the rotary push-fit joints. Preferably, there is at least one rotary push-fit joint between the supply means and the nebuliser, at least one rotary push-fit joint between the nebuliser and the flexible tube, and at least one rotary push-fit joint between the flexible tube and the delivery means; though, in particular circumstances, it may be sufficient to have such joints only at any one, or any two, of these three locations. In a practical embodiment, only one such push-fit joint is used at each of the three locations; this embodiment is thus relatively easy to use and adjust, and can be made quite cheaply. The relatively short flexible tube used allows a small degree of configuring of the apparatus, while the rotary joints allow the main adjustment of the apparatus.

Thus, the apparatus should preferably comprise at least one rotary means, i.e. means to allow relative rotation of parts of the apparatus about the axis of gas flow, more preferably a rotary joint, more preferably a rotary push-fit joint, i.e. a push-joint, parts of which can be separated, rotated and re-fitted together.

According to another aspect of the invention, there is provided a kit of parts comprising a nebuliser, a mask and a flexible tube to interconnect the nebuliser and mask, the kit comprising at least one adjustable joint and adapted to be able to be fitted together with the mask facing sideways and/or upwards when the nebuliser is substantially upright.

According to another aspect of the invention, there is provided a method of nebulising a drug, in which there is used any such apparatus with the mask facing sideways and/or upwards.

According to another aspect of the invention, there is provided a method of administering a drug to a patient in which the drug is nebulised using any such apparatus with the mask facing sideways and/or upwards and applied to the patient.

According to another aspect of the invention, there is provided apparatus for administering a drug or other substance comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use. The apparatus may be used to nebulise said substance in the nebuliser and then administer said substance in nebulised form via said mask.

Particular Description Relating to the Drawings

Reference will now be made by way of example to the accompanying drawings, in which:

Figures 1 to 4 are copied from my earlier specification, and all relate to a single arrangement, which is clearest in Figure 2 and is an embodiment of the invention of my earlier specification;

Figure 1 is a perspective view of a catheter mount tube and a nebuliser before these are connected together to form the Figure 2 arrangement;

Figure 2 is a side view of the same when connected together in the said embodiment of my earlier invention;

Figure 3 is a view like Figure 1, showing additionally a mask and breathing bag before these and the catheter mount tube and the nebuliser are connected together;

Figure 4 is a perspective view of the four parts shown in Figure 3 (and also an oxygen reservoir bag attached to the breathing bag) when connected together to form the said embodiment of my earlier invention shown in Figure 2 so that the mask-mounting arm of the catheter mount tube and the nebuliser are parallel and point in a direction going obliquely into the plane of the drawing so that the mask can face in a downwards direction suitable for application to a supine patient;

Figures 5 to 7 illustrate respective embodiments of the present invention. For clarity, the mask is shown only in Figure 5, and the breathing bag is not shown in any of these Figures;

Figure 5 is a diagrammatic representation of the apparatus adjusted for application to an upright patient, with the mask facing sideways,

Figure 6 is a diagrammatic representation of the apparatus adjusted for application to a patient in prone position, their face facing downwards and sideways, with the mask facing sideways and upwards; and

Figure 7 is a diagrammatic representation of the apparatus adjusted for application to a patient in prone position, their face facing downwards, with the mask facing upwards.

Referring to the drawings, breathing and/or resuscitation apparatus as described above and in my earlier specification comprises gas supply means 7, gas delivery means comprising a mask 8, and a

nebuliser 3 connected between the supply means 7 and delivery means 8, the apparatus being adapted to be configured (e.g. by means of markings 10 on a catheter mount tube 1and a nebuliser 2 respectively, to be collocated) for the mask 8 to face substantially sideways and/or upwards in use. The apparatus will thereby be arranged so that the mask 8 faces substantially sideways and/or upwards in use. The markings 10 constitute guidance means to indicate such configuration. Thus, in a method of setting up or adjusting the apparatus, this is configured to a configuration for the mask to face substantially sideways and/or upwards in use. Preferably, the apparatus is configured by adjustment, e.g. of one or more joints, e.g. that joint 11 formed by the adjacent ends of members 1 and 2 that bear the markings 10.

Standard catheter-mount tube 1 comprises in its middle portion (i.e. the whole tube 1 apart from its ends) a concertina section 12 which constitutes a flexible tube 12 connected between the supply means 7 and delivery means 8, and in fact is connected between the nebuliser 3 and delivery means 8.

The joint 11constitutes means 11 to alter the aforesaid configuration, such means 11 comprising a push-fit joint 11, the parts push-fitted together of which can be relatively rotated, by pulling the joint 11 apart, relatively rotating the resulting separated parts thereof, and then re-fitting them together with the aid of matching together a different pair of markings 10. Thus, the configuration-altering means 11 are such that said parts thereof can be loosened or separated and then relatively rotated and then re-joined, in fact comprising a combination of the flexible tube 1 and the rotary push-fit joint 11. Similarly, there may be one rotary push-fit joint 13 between the supply means 7 and the nebuliser 3, one rotary push-fit joint 11 between the nebuliser 3 and the flexible tube 1, and one rotary push-fit joint 14 between the flexible tube 1 and the delivery means 8.

The apparatus can be supplied as a kit of parts comprising a nebuliser 3, a mask 8 and a flexible tube 1 to interconnect the nebuliser 3 and mask 8, the kit comprising at least one adjustable joint 11 and adapted to be able to be fitted together with the mask 8 facing sideways and/or upwards when the nebuliser 3 is substantially upright.

The air bag 7 is operated to provide a method of nebulising a drug, using the apparatus with the mask 8 facing sideways and/or upwards, and thus is used to administer a drug nebulised using such apparatus with the mask 8 facing sideways and/or upwards.

It will be apparent to one skilled in the art, that features of the different embodiments disclosed herein may be omitted, selected, combined or exchanged and the invention is considered to extend to any new and inventive combination thus formed. Where a preference or particularisation is stated, there

is implied the possibility of its negative, i.e. a case in which that preference or particularisation is absent.

Many variations of the invention and embodiments hereinbefore described will be apparent to people skilled in the art and all such variations are to be considered as falling within the scope of the invention.

CLAIMS

1. Breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use.

2. Breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being configured for the mask to face substantially sideways and/or upwards in use.

3. Breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use, and comprising guidance means to indicate such configuration.

4. Breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being arranged so that the mask will face substantially sideways and/or upwards in use.

5. Apparatus as claimed in any one of claims 1 to 4, comprising a flexible tube connected between the supply means and delivery means

6. Apparatus as claimed in claim 5, in which the flexible tube is connected between the nebuliser and delivery means.

7. Apparatus as claimed in claim 6, in which the flexible tube is a standard catheter-mount tube.

8. Apparatus as claimed in any one of claims 1 to 7, comprising means to alter the configuration, such means comprising at least one push-fit joint the parts push-fitted together of which can be relatively rotated.

9. Apparatus as claimed in claim 8, in which the configuration-altering means are such that said parts thereof can be loosened or separated and then relatively rotated and then re-joined.

10. Apparatus as claimed in claim 8 or 9, when appendant to claim or 5, 6 or 7, in which the configuration-altering means comprise a combination of the flexible tube and the rotary push-fit joint or joints.

11. Apparatus as claimed in claim 10, in which there is at least one rotary push-fit joint between the supply means and the nebuliser, at least one rotary push-fit joint between the nebuliser and the flexible tube, and at least one rotary push-fit joint between the flexible tube and the delivery means.

12. Apparatus as claimed in claim 11, in which there is just one rotary push-fit joint between the supply means and the nebuliser, just one rotary push-fit joint between the nebuliser and the flexible tube, and just one rotary push-fit joint between the flexible tube and the delivery means.

13. Apparatus as claimed in claim 1, 2, 3 or 4 and substantially according to any example hereinbefore described.

14. Apparatus as claimed in claim 1, 2, 3 or 4 and substantially according to any example hereinbefore described with reference to the accompanying drawings.

15. A kit of parts comprising a nebuliser, a mask and a flexible tube to interconnect the nebuliser and mask, the kit comprising at least one adjustable joint and adapted to be able to be fitted together with the mask facing sideways and/or upwards when the nebuliser is substantially upright.

16. In the form of a kit of parts, apparatus as claimed in any one of claims 1 to 4, or any one of claims 5 to 15 when appendant to any one of claims 1 to 4.

17. A method of adjusting breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, in which method the apparatus is configured to a configuration for the mask to face substantially sideways and/or upwards in use.

18. A method of setting up breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising the mask, and a nebuliser connected between the supply means and delivery means, in which method the apparatus is configured to a configuration for the mask to face substantially sideways and/or upwards in use.

19. A method as claimed in claim 18, in which the apparatus is configured by adjustment.

20. A method as claimed in claim 19, in which the apparatus is configured by adjustment of one or more joints.

21. A method of adjusting breathing and/or resuscitation apparatus substantially according to any example hereinbefore described.

22. A method of adjusting breathing and/or resuscitation apparatus substantially according to any example hereinbefore described with reference to the accompanying drawings.

23. Breathing and/or resuscitation apparatus comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus having been adjusted by a method as claimed in any one of claims 16 to 20.

24. Apparatus as claimed in any one of claims 1 to 14, the apparatus having been adjusted or set up by a method as claimed in any one of claims 17 to 21.

25. A method of nebulising a drug, in which there is used apparatus as claimed in any one of claims 1 to 14 or 23 or 24, with a mask facing sideways and/or upwards.

26. A method of administering a drug to a patient, in which the drug is nebulised using apparatus as claimed in any one of claims 1 to 14 or 23 or 24, with a mask facing sideways and/or upwards applied to the patient.

27. Apparatus for administering a drug or other substance comprising gas supply means, gas delivery means comprising a mask, and a nebuliser connected between the supply means and delivery means, the apparatus being adapted to be configured for the mask to face substantially sideways and/or upwards in use.

28. A method of administering a substance in which apparatus as claimed in claim 27 is used to nebulise said substance in the nebuliser and then administer said substance in nebulised form via said mask.

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11

Application No:	GB0607167.4	**Examiner:**	Dr Matthew Parker
Claims searched:	1-16, 27, 28	**Date of search:**	24 September 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-16,27,28	GB2381458 A (BYRNE), whole document relevant
X	1-16,27,28	US6276363 B1 (GRAY), whole documengt relevant
X	1-16,27,28	US5996579 A (COATES), whole document relevant
X	1-16,27,28	US5988162 A (REALLICK), whole document relevant
X	1-16,27,28	US5388571 A (ROBERTS), whole document relevant
X	1-16,27,28	US5287849 A (PIPER), whole document relevant
X	1-16,27,28	US5025806 A (PALMER), whole document relevant
X	1-16,27,28	US3945378 A (PALUCH), whole document relevant
X	1-16,27,28	US3814092 A (SIMIONESCU), whole document relevant

Categories:

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

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

A5T

Worldwide search of patent documents classified in the following areas of the IPC

A61M

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI, JAPIO

International Classification:

Subclass	Subgroup	Valid From
A61M	0016/08	01/01/2006
A61M	0016/00	01/01/2006