

Examiners' Report Paper A 2013 (Electricity/Mechanics)

1. General considerations

1.1. Introduction

This year's paper relates to respiratory devices for generating air pressure pulses for removing lung secretions. In [01] it is explained that pulmonary diseases, such as asthma, cause lung secretions.

1.2. Prior Art

In his letter (see [01]), the client refers to a prior art drumming treatment for removing lung secretions. However, this treatment has the disadvantage that it cannot be administered by a patient themselves. In [02], the client refers to a prior art document D1 which addresses the issue of dislodging lung secretions. However it requires the administration of a drug that sometimes has unwanted side-effects.

Finally, in [30] the client refers to a prior art document D2. D2 discloses a device for removing lung secretions by generating air-pressure pulses and which enables a patient to administer a treatment themselves. The device has a blocking element 203, which is caused to move by a motor 218 in and out of a blocking position in which air is prevented from flowing through a conduit 202. Furthermore, when the motor is not energised the blocking element 203 is retained in the blocking position by the gravitational force acting on it.

1.3. Challenges of the Paper

The client describes six examples of the invention in conjunction with Figs.1-6.

In a first example (Figs. 1a, 1b), the device comprises a conduit having a funnel shaped portion and a blocking element in the form of a ball, which is retained in the funnel shaped portion by gravity. It generates air pressure pulses when air is exhaled into it.

In a second example (Fig. 2), the device is similar to the first example but additionally has a perforated wall for preventing the ball from leaving the conduit and a rubber layer for exerting a frictional force on the ball when it is in the blocking position.

In a third example (Fig. 3), the device comprises a conduit having a funnel shaped portion wherein the blocking element is a ball, which is retained in the funnel shaped portion by gravity and by the magnetic force exerted by an annular magnet. The ball is attached to the funnel shaped portion of the conduit by an elastic string. The device generates air pressure pulses when air is inhaled from it.

Fourth (Fig. 4), fifth (Fig. 5) and sixth (Fig. 6) examples of the invention have a blocking element in the form of a flap retained in the blocking position by a magnet. The device of the fourth example generates air pressure pulses when air is exhaled through the device. The device of the fifth example generates air pressure pulses when the patient inhales. The device of the sixth example generates air pressure pulses when inhaling and when exhaling.

A challenge of the paper is therefore to draft an independent claim that covers all of these various examples of the invention. Furthermore the claim must be novel with respect to the prior art. D2 in particular has many elements in common with the invention.

In all the examples of the invention the device comprises a mouthpiece, a conduit and a blocking element. The blocking element can adopt a blocking position in the conduit in which it prevents air from flowing between the mouthpiece and the exterior of the device via the conduit. The blocking element is retained in the blocking position by a force acting on it. The retaining force can be a gravitational force, a frictional force or a magnetic force.

In the blocking position, a portion of the blocking element is exposed to the air pressure in the mouthpiece and another portion of the blocking element is exposed to ambient air pressure.

When a patient causes the air pressure in the mouthpiece to reach a threshold pressure (by exhaling into the device or inhaling out of the device), the resultant air pressure force acting on the blocking element overcomes the force retaining it in the blocking position. The blocking element thereby moves out of the blocking position and an air pressure pulse is generated.

1.4. The Marking Scheme

Answer papers are awarded marks on a scale of 0 to 100 marks:
up to **50 marks** are available for the independent claim,
up to **35 marks** are available for a set of dependent claims, and
up to **15 marks** are available for the introductory part of a description.

2. Independent claim (up to 50 marks available)

Generally it is noted that the marks awarded for an independent claim reflect the degree to which the claim achieves protection for the client's invention in its broadest possible scope.

This year, the only independent claim expected was a device category claim to a respiratory device for dislodging lung secretions.

Where an answer paper has an additional independent claim in a different category, e.g. a method of generating air pressure pulses, 50 marks are available for the independent device claim and **no marks** are available for the independent method/use claim.

Answer papers having multiple independent claims in the device category which attempt to cover different examples of the invention can achieve **up to 35 marks** for the independent claims in total, because it is considered that the invention can be appropriately claimed with a single independent device category claim (see example under 2.3.2). This may also apply to a single independent claim in the device category defining alternatives (see examples under 2.3.2 and 2.6.2, example E1 and E2).

Other cases are considered on a case-by-case basis.

This year, separate applications are not expected and no marks are foreseen for them.

2.1. Example Solution

Example feature set as a basis for an independent claim:

- (a) A respiratory device for dislodging lung secretions,
device comprising:
- (b) a mouthpiece;
- (c) a conduit connecting the mouthpiece to the exterior of the device;
- (d) a blocking element arranged in the conduit;
- (e) the device being arranged so that in a blocking position the blocking element is retained by a retaining force and prevents air from flowing through the conduit,
- (f) whereby the device is further arranged so that, when an air pressure force acting on the blocking element overcomes the retaining force, the air pressure force moves the blocking element out of the blocking position, thereby generating an air pressure pulse.

2.2. Equivalent/Non-equivalent wording of example solution

In the following notes, remarks are made to features of the example solution claim. “Equivalent” indicates a different wording for a given feature that can achieve the same number of marks as the wording given in the example solution. It is not intended to indicate that the wording itself necessarily has exactly the same meaning as the wording of the example solution. “Non-equivalent” indicates a different wording for a given feature that does not achieve the same number of marks as the wording given in the sample solution.

Remarks to feature (a): *A respiratory device for dislodging lung secretions*

Equivalents:

- “Device for dislodging lung secretions by generating an air pressure pulse”.
- “Device for dislodging lung secretions by generating air pressure pulses”.
- “Device for dislodging lung secretions when exhaling or (and/or) inhaling through the device”.
- “Device for generating an air pressure pulse”.
- “Device for generating air pressure pulses”.
- “Device for generating air pressure pulses propagating into the lungs of a user exhaling or (and/or) inhaling through the device”.
- “Respiratory device”.

Non equivalents:

- “Device for dislodging lung secretions when exhaling and inhaling through the device” risks excluding the devices of Figs. 1-5 (see 2.3.1, example C).
- claiming a device in use, e.g. “Device dislodging lung secretions” or “Device generating an air pressure pulse”: see lack of clarity, 2.6.3.

Remarks to feature (b): *a mouthpiece*

A claim not defining a mouthpiece risks lacking clarity in defining how air can be prevented from flowing through the device. However, the term mouthpiece per se is not essential to the claim.

Equivalents:

- instead of a “mouthpiece”, defining “a breathing tube”.
- “a mouthpiece through which a patient can exhale / inhale / exhale and inhale”
- “user side portion of conduit”.

Remarks to feature (c): *a conduit connecting the mouthpiece to the exterior of the device*

A claim not defining a conduit risks lacking clarity in defining how air can be prevented from flowing through the device.

Equivalents:

- a claim defining: features (a), (b), a blocking element, the device being arranged so that in a blocking position the blocking element is retained by a retaining force and prevents air from flowing between the mouthpiece and the exterior of the device, feature (f).

Non equivalents:

- instead of a conduit, “a funnel shaped conduit”.

Remarks to feature (d): *a blocking element arranged in the conduit;*

Equivalents:

- instead of a “blocking element”, a “moveable element” or “an element” can be defined.

Non equivalents:

- instead of “a blocking element”, “a ball”, “a flap” or “a ball or flap”: these restrict the blocking element to having one or more particular forms.

Remarks to feature (e): *the device being arranged so that in a blocking position the blocking element is retained by a retaining force and prevents air from flowing through the conduit,*

Defining that the retaining force is exerted by retaining means risks excluding the example of Fig.1 in which the retaining force is the gravitational force acting on the blocking element; see 2.3.1, example E.

Equivalents:

- "closed position" instead of "blocking position".
- "holding force", "maintaining force" or "biasing force" instead of "retaining force".
- a retaining force can be defined in feature (f) rather than in feature (e).
- additionally defining that "in the blocking position an air pressure force acts on the blocking element due to its exposure to the air pressure in the mouthpiece and a further air pressure force acts on the blocking element due to its exposure to ambient air pressure".

Non equivalents:

- defining "a blocking position" without further defining that in that position the blocking element prevents air from flowing through the conduit may result in a lack of clarity: see 2.6.2, example A.

Remarks to feature (f): *whereby the device is further arranged so that, when an air pressure force acting on the blocking element overcomes the retaining force, the air pressure force moves the blocking element out of the blocking position, thereby generating an air pressure pulse.*

Equivalents:

- defining an air pressure threshold additionally to a retaining force, e.g. "whereby the device is further arranged so that, when the air pressure in the mouthpiece reaches a threshold, the air pressure force acting on the blocking element moves the blocking element out of the blocking position, thereby generating an air pressure pulse"
- if defined, an air pressure threshold can be an absolute air pressure (as in the example just above) or a relative air pressure, i.e. a difference between an absolute air pressure and an ambient air pressure.
- "pressure pulse" instead of "air pressure pulse".
- no explicit reference to an air pressure pulse is needed, as long as the claim defines - at least implicitly, as it is the case with "retaining force" in the example solution claim - that the device is suitable for generating an air pressure pulse, e.g. "whereby the device is further arranged so that, when an air pressure force acting on the blocking element overcomes the retaining force, the air pressure force moves the blocking element out of the blocking position".

- "value" or "pressure value" or "air pressure value" can be used for expressing the concept of threshold.

- feature (f) according to the example solution where the movement of the blocking element is qualified as being a "sudden movement".

- "resultant air pressure force" instead of "air pressure force".

Non equivalents:

- If the claim defines a threshold, not using the term "reaches" risks excluding one or more examples shown in the figures of the client's letter, e.g. "being greater" or "becoming greater" instead of "reaches": see 2.3.1, example A.

- feature (f) limited by a specific direction of movement of the blocking element risks excluding one or more examples shown in the figures of the client's letter, e.g. the blocking element is moved towards the mouthpiece: see 2.3.1, example A.

- feature (f) replaced with "the device being configured to generate an air pressure pulse when the blocking element moves out of the blocking position" risks lacking novelty over D2: see 2.4.2.

- a claim defining neither a "retaining force" nor an "air pressure threshold" risks lacking clarity, as the claim may fail to define - at least implicitly - that an air pressure pulse can be generated or how the pulse is generated: 2.6.1, examples B and C.

2.3. Unnecessary Limitations (up to -50 marks)

Unnecessary limitations in an independent claim are considered to be features that: a) are unnecessary for defining the client's invention in its broadest possible scope; and b) disadvantage the client by limiting the scope of the claim.

An unnecessary limitation may for example result in the exclusion of protection for one of the examples of the invention described in the client's letter.

If a feature of a claim is unclear so that it is ambiguous as to whether or not the claim is unnecessarily limited by that feature, then this is considered in the section lack of clarity and not in this section.

2.3.1 Generally, where a claim is unnecessarily limited to the extent that one of the six examples specifically illustrated in Figs.1-6 of the client's letter is not covered by the claim, **15 marks** are deducted for each example which is not covered.

Examples:

A. Limitation to a device working when the patient exhales (excluding the devices of Figs. 3 and 5): **-30 marks**

Example: example solution claim in which feature (f) is replaced with: "whereby the device is further arranged so that, when the air pressure in the mouthpiece is greater than an air pressure threshold, the air pressure force acting on the blocking element overcomes the retaining force, so that the blocking element moves out of the blocking position, thereby generating the air pressure pulse." : **-30 marks**.

Note: However, the term "exceed" is marked under lack of clarity (see 2.6.2, example B).

Other examples:

- a claim defining a device arranged so that the blocking element is moved out of the blocking position towards the exterior of the device: **-30 marks**.

- a claim defining a device arranged so that air flows out of the mouthpiece: **-30 marks**.

B. Limitation to a device working when the patient inhales (excluding the devices of Figs. 1, 2 and 4): **-45 marks**

C. Limitation to a device working both when the patient exhales and when the patient inhales (excluding the devices of Figs. 1-5): **-50 marks**

D. Limitation with a feature clearly excluding all devices of Figs.1-6: **-50 marks**

Example: Features (a)-(e) of the example solution claim further defining that the device is further arranged so that, when the air pressure in the mouthpiece reaches a threshold, the air pressure force acting on the blocking element moves the blocking element out of the blocking position, thereby generating an air pressure pulse and so that, when the air pressure in the mouthpiece reaches the threshold again, the air pressure force acting on the blocking element moves the blocking element back to the blocking position.

Note: In Figs.1-6, the blocking element is not exposed to the same forces in the blocking position and in another position.

E. A claim defining that the retaining force is exerted by retaining means risks excluding the example of Fig.1 in which the retaining force is the gravitational force acting on the blocking element.

Example: features (a)-(f) of the example solution claim further defining that the retaining force is exerted by retaining means: **-15 marks**.

F. A claim defining returning means risks excluding the example of Fig.1.

Example: features (a)-(f) of the example solution claim further defining that the device comprises returning means for exerting a force acting on the blocking element for returning it to the blocking position: **-15 marks**.

2.3.2 Multiple independent claims in the device category attempting to cover different examples of the invention can only achieve **up to 35 marks** for the independent claims as a whole if these claims as a whole lead to a gap in protection.

Example: Claim 1 defining features (a)-(f) of the example solution claim and further defining that the blocking element is a ball; Claim 2 defining features (a)-(f) of the example solution claim and further defining that the blocking element is a flap: **35 marks**.

Similarly, a single independent claim in the device category attempting to cover different examples of the invention can achieve **up to 35 marks** if the claim leads to a gap in protection.

Example: Claim defining features (a)-(f) of the example solution claim and further defining that the blocking element is a ball or a flap: **35 marks**.

2.3.3 The following claims based on the example solution and further defining an additional feature do not lose marks:

- A claim defining “A respiratory device for dislodging lung secretions by generating air pressure pulses” further comprising features (b)-(f) of the example solution claim.
- The example solution claim wherein “suddenly” is inserted before “moves out” in feature (f).

2.4 Lack of Novelty (-30 marks)

An independent claim that is considered to lack novelty against any of the available prior art loses 30 marks.

2.4.1 The following is noted regarding the document D1:

D1 describes a respiratory device for dislodging lung secretions (see [01]). In use, the respiratory device of D1 generates air pressure pulses having the effect of dislodging lung secretions (see [04]). The device of D1 has a mouthpiece 101, an air conduit 102 connecting the mouthpiece to the exterior of the device and a moveable element in the form of the ball 103. The ball 103 is arranged in a whistle 109 and not in the conduit 102.

The ball 103 is not a blocking element. The ball 103 cannot be in a blocking position in which the ball 103 prevents air from flowing between the mouthpiece 101 and the exterior of the device via the conduit 102.

As a consequence, D1 shows features (a)-(c) of the example solution claim. D1 does not show features (d)-(f) of the example solution claim.

2.4.2 The following is noted regarding the document D2:

D2 describes a respiratory device for dislodging lung secretions (see [01]). In use, the respiratory device of D2 dislodges lung secretions by generating air pressure pulses (see [07]). The device of D2 has a mouthpiece 201, an air conduit 202 connecting the mouthpiece to the exterior of the device and a blocking element in the form of a disc 203 arranged in the conduit 202. The disc 203 can be in a blocking position in which the blocking element 203 is retained by a retaining force (the

gravitational force acting on the disc 203) and prevents air from flowing between the mouthpiece 201 and the exterior of the device via the conduit 202 (see [03]).

In the blocking position an air pressure force acts on the blocking element 203 due to its exposure to the air pressure in the mouthpiece 201 and a further air pressure force acts on the blocking element 203 due to its exposure to ambient air pressure (see [04]).

When the air pressure in the mouthpiece 201 reaches a threshold (which is above ambient air pressure), an electric motor 218 moves the blocking element 201 out of the blocking position, thereby generating an air pressure pulse (see [05] and [06]). Therefore, the device of D2 is arranged so that, when an air pressure force acts on the blocking element, a force (exerted by the motor 218) moves the blocking element out of the blocking position, thereby generating an air pressure pulse.

In D2, an air pressure force acts on the blocking element. However, this force does not move the blocking element out of the blocking position.

The device of D2 is not arranged so that, when an air pressure force acting on the blocking element overcomes the retaining force, the air pressure force moves the blocking element out of the blocking position, thereby generating an air pressure pulse.

The device of D2 is not arranged so that when the air pressure in the mouthpiece 201 reaches a threshold, the resultant air pressure force acting on the blocking element 203 overcomes the retaining force, so that it moves out of the blocking position.

As a result, D2 anticipates the combination of features (a)-(e) of the example solution claim. D2 does not show feature (f) of the example solution claim.

Example:

-A claim having features (a)-(e) of the example solution and additionally defining that “the device is further arranged so that, when the air pressure in the mouthpiece reaches a threshold (or a threshold above ambient air pressure), the blocking element is moved out of the blocking position, thereby generating an air pressure pulse” lacks novelty over D2: **- 30 marks**.

2.4.3 If, due to an unclear formulation, there are doubts as to whether or not the wording of a claim could be read onto a piece of the prior art, then such a claim is considered under lack of clarity, not under lack of novelty.

Claims which are novel over the available prior art, but do not comprise all the features of the example solution are assessed on a case-by-case basis, and are typically considered under the section “Inferior Solutions”.

2.5 Lack of Inventive Step (up to -25 marks)

An answer paper having a single independent claim whose subject-matter is considered to lack an inventive step in the light of the available prior art loses **25 marks**.

Example:

- A claim having features (a)-(e) and additionally defining that "the device is further arranged so that, when the air pressure in the mouthpiece reaches a threshold below ambient air pressure, the blocking element is moved out of the blocking position, thereby generating the air pressure pulse" is considered to lack inventive step over D2: **-25 marks**.

2.6 Lack of Clarity (up to -30 marks)

Up to 30 marks in total can be lost in this section. A full deduction of 30 marks is applicable where the sum of all clarity issue deductions adds up to 30 marks or more.

Lack of novelty or inventive step takes precedence over lack of clarity.

2.6.1 Claims defined in terms of a result to be achieved (up to -30 marks)

A claim which attempts to define the invention in terms of a result to be achieved loses marks under lack of clarity irrespective of whether or not the claim additionally loses marks due to unnecessary limitation or lack of novelty.

Examples:

- A. The example solution claim in which feature (f) is replaced with "the device is further arranged so that the blocking element can move out of the blocking position without needing electrical energy, thereby generating the air pressure pulse": **-30 marks**
- B. A claim which does not define - at least implicitly - that the device is arranged so that an air pressure pulse is generated when the blocking element leaves the blocking position risks lacking clarity, e.g.:

The example solution claim in which feature (f) is replaced with "whereby the device is further arranged so that an air pressure force acting on the blocking element can move the blocking element out of the blocking position": **-20 marks**

- C. A claim which does not define - at least implicitly - how the device is arranged so that an air pressure pulse is generated when the blocking element leaves the blocking position (e.g. by an air pressure force overcoming the retaining force or the air pressure in the mouthpiece reaching a threshold) risks lacking clarity, e.g.:

The example solution claim in which feature (f) is replaced with "whereby the device is further arranged so that an air pressure force acting on the blocking element can move the blocking element out of the blocking position, thereby generating an air pressure pulse": **-10 marks**

2.6.2 Other Clarity Issues

In the context of the present invention, the expression "ambient air pressure" is considered clear as such.

Clarity issues that may lead to a deduction of marks are:

- A. Not clearly defining the blocking position, e.g. the example solution claim in which feature (e) is replaced with "the device being arranged so that the blocking element is retained in a blocking position by a retaining force": **-15 marks.**
- B. A claim defining an air pressure threshold risks being unclear as to whether it excludes examples shown in the figures of the client's letter.

Example: example solution claim in which feature (f) is replaced with "whereby the device is further arranged so that, when an air pressure threshold is exceeded, the air pressure force acting on the blocking element overcomes the retaining force, so that the blocking element moves out of the blocking position, thereby generating the air pressure pulse.": **-10 marks.**

- C. A claim defining that several air pressure pulses are generated when the blocking elements is moved out of the blocking position risks excluding examples of the client's letter.

Example: example solution claim wherein in feature (f) " , thereby generating the air pressure pulse" is replaced with " , thereby generating air pressure pulses": **-10 marks.**

- D. Defining a second position of the blocking element additionally to the blocking position does not *per se* imply an unnecessary limitation. However, a wording implying that the blocking element moves out of the blocking position to the second position and comes back to the blocking position risks excluding the example of Fig.1.

Example: example solution claim further defining that the device is arranged so that the blocking element is moved back to the blocking position (by a returning force): **-5 marks.**

Example: example solution claim further defining that the blocking element is reciprocally moveable from the blocking position to another position (or between the blocking position and another position): **-10 marks.** However, defining that the second position is always the very same position risks excluding the examples of Figs.1-3.

- E1. Defining two thresholds in an attempt to cover a device operating when a patient exhales or inhales risks being unclear as to whether the claim requires that the device generates an air pressure pulse at both thresholds.

Example: The example solution claim, whereby feature (f) is replaced with "whereby the device is further arranged so that, when the air pressure in the mouthpiece **gets greater than a first air pressure threshold or smaller than a second air pressure threshold**, the air pressure force acting on the blocking element overcomes the retaining force, so that the blocking element moves out of the blocking position, thereby generating the air pressure pulse.": **-15 marks**.

- E2. However, if it is clear that the claim does not require that the device generates an air pressure pulse at two thresholds, **up to 5 marks** can be deducted for lack of conciseness.

Example: The example solution claim, whereby feature (f) is replaced with "whereby the device is further arranged so that, when the air pressure in the mouthpiece **becomes greater than a first air pressure threshold**, the air pressure force acting on the blocking element overcomes the retaining force, so that the blocking element moves out of the blocking position, thereby generating the air pressure pulse, or the device is further arranged so that, when the air pressure in the mouthpiece **becomes smaller than a second air pressure threshold**, the air pressure force acting on the blocking element overcomes the retaining force, so that the blocking element moves out of the blocking position, thereby generating the air pressure pulse.": **-5 marks**.

2.6.3 Other minor issues of lack of clarity lose up to 5 marks per feature.

Examples:

Claiming the device in use (e.g. missing "arranged for"): **-5 marks**;

- The example solution claim, wherein "the device being arranged" in features (e) and/or (f) is replaced with "the blocking element being arranged": **-5 marks**;

2.7 Formal Matters (up to -5 marks)

2.7.1 For the example solution claim it is considered appropriate to use a two-part form of claim over D2. An incorrect two-part form with respect to any of the items of prior art mentioned in the client's letter leads to a deduction of 3 marks.

2.7.2 The total absence of reference signs in the independent claim or claims results in a deduction of 2 marks.

Partially incorrect or very incomplete reference signs in the independent claim or claims results in a deduction of 1 mark.

2.8 Inferior Solutions (up to 30 marks available)

An independent claim which is considered to be an inferior solution is a claim which:

- offers a less favourable scope of protection for the client than the example solution claim, for example because it is contrary to the client's wishes;

- misses at least one feature of the example independent claim;
- has at least one feature that is not in the example independent claim; and
- is new and arguably not obvious with respect to the available prior art.

3. Dependent claims (up to 35 marks available)

Generally it is noted that the marks awarded for a dependent claim reflect the degree to which the claim offers a fall-back position for the client, taking into consideration the independent claim or claims and the prior art available. No marks are awarded for any claims subsequent to a 15th claim, since the client states that claim fees will not be paid.

3.1 Structure

3.1.1 Important requirements for awarding full marks are:

- **clarity**, e.g. consistency of terminology with the independent claim;
- claim **structure**, a set of dependent claims having a structure which gives the client an appropriate set of fall-back options whilst at the same time being concise and having claims with correct back-references is considered to have a good structure.

3.1.2 As a general rule, where a feature A is unnecessarily limited in a set of dependent claims, by grouping it together with a feature B, the full potential of a fall-back position for features A and B is not achieved. The number of marks available for a claim combining features A and B corresponds to the number of marks achieved either by a claim to feature A or a claim to feature B, whichever is lower.

Example:

Dependent claims 2 and 3 depending on the example solution independent claim, and having the wording:

"2. A device according to claim 1, further characterised by feature X" (2 marks).

"3. A device according to claim 1 (and/or claim 2), further characterised by feature Y" (1 mark).

In this case the total obtained for the two features in claims 2 and 3 is 3 marks. However, the above features claimed together in a single claim and not claimed as options, give the client a more limited fall-back position:

"2. A device according to claim 1, having features X and Y" (1 mark)

3.1.3 Where an answer paper has an independent claim that differs from that of the example solution claim, the dependent claims may differ from the example dependent claims. This is considered on a case-by-case basis, considering the value of the dependent claims in the light of the independent claim.

3.2 Example feature set

In this section, an example feature set is defined which could have been used to formulate good dependent claims for an independent claim corresponding to the example solution discussed above. In the example feature set, groups of features for

dependent claims are defined, each relating to a specific aspect of the invention. The mark available for each of these groups is indicated. It is however noted that there are different ways of grouping features in dependent claims whilst still achieving the full number of available marks. Dependent claims in small font below correspond to further examples potentially achieving the same number of marks as (or less marks than) the example feature set in large font. An example set of claims is attached in annex (see 5).

Returning means (up to 10 marks)

- ... returning means for returning the blocking element towards/in the blocking position (after it has been moved out of the blocking position) (up to 4 marks)
- (perforated deflecting) wall against which the blocking element can bounce (up to 2 marks)
- (resilient) string attached to the blocking element (up to 2 marks)
- (resilient) pad against which the blocking element can bounce (up to 2 marks)

Retaining force (up to 9 marks)

- ... the retaining force is at least partly constituted by a gravitational force (up to 3 marks)
- ... magnet and retaining force is at least partly constituted by a magnetic force (up to 3 marks)
- ... the retaining force is exerted by retaining means comprising a magnet (up to 3 marks)
- ... device comprises a magnet (0 mark)
- ... rubber layer on the blocking element or the conduit and retaining force is at least partly constituted by a frictional force (up to 3 marks)
- ... the retaining force is exerted by retaining means comprising a rubber layer (up to 3 marks)
- ... device comprises a rubber layer (0 marks)

Funnel and ball (up to 4 marks)

- ... the blocking element is/comprises a ball and the conduit comprises a funnel shaped portion (whose smallest diameter is less than the diameter of the ball) (up to 3 marks)
- ... the blocking element is a ball (up to 2 marks)
- ... the ball is made of metal (or steel) (up to 1 mark)

Wall and flap (up to 3 marks)

- ... the blocking element is/comprises a pivoted/pivotable flap (up to 3 marks)
- ... the blocking element is a pivoted/pivotable flap and the conduit comprises a wall with an opening, the flap being arranged so that the opening is closed by the flap in the blocking position (up to 3 marks)

Exhaling OR inhaling (up to 4 marks)

- ... the air pressure force overcomes the retaining force when the air pressure in the mouthpiece reaches an air pressure threshold above ambient air pressure (up to 2 marks)
- ... the air pressure force overcomes the retaining force when the air pressure in the mouthpiece reaches an air pressure threshold below ambient air pressure (up to 2 marks)
- ... the air pressure force overcomes the retaining force when the air pressure in the mouthpiece reaches an air pressure threshold (up to 1 mark)

Exhaling AND inhaling (up to 5 marks)

- ... the air pressure threshold being above ambient air pressure, the device being further configured such that, when the blocking element is in the blocking position and the air pressure in the mouthpiece reaches a further air pressure threshold below ambient air pressure, the air pressure force acting on the blocking element moves the blocking element out of the blocking position, thereby generating a further air pressure pulse (up to 4 marks)
- ... the blocking element is a pivoted flap that is pivotally mounted in the conduit such that the flap can move out of the blocking position by pivoting towards the mouthpiece and towards the exterior of the device (up to 1 mark)

3.3 Other dependent claims offering a useful fall-back (up to 5 marks)

3.3.1 Claims considered to offer a useful fall-back position (up to 5 marks)

Up to 5 marks in total are available for one or more additional dependent claims which offer a useful fall-back position or positions, provided the total of **35 marks** for the dependent claims is not exceeded. The dependent claims appropriate for achieving fall-back positions may depend on the independent claim. For example, if an answer paper has an independent claim that is considered to lack novelty with respect to one of the prior art documents, a feature of a dependent claim, which would have rendered the claim the same as or equivalent to the example solution, is an important fall-back position for the applicant (**5 marks**).

3.3.2 Claims considered as not offering a useful fall-back position

Dependent claims which are considered not to offer a useful fall-back position for the client are not awarded marks.

Examples for the example solution independent claim:

... mouthpiece or conduit made of plastic.

4. Description (15 marks available)

4.1 For an acknowledgement of prior art, **5 marks** are available. Full marks in this section are available for citing a single piece of prior art and explaining it. When the independent claim is constructed in the two-part form, full marks are available for a brief explanation of the cited prior art. When the independent claim is constructed in the one-part form, full marks are only awarded in this section for a citation of a piece of prior art and explanations from which it is derivable which of the features claimed in the independent claim are known from the cited prior art.

Defining that a prior art document is closest prior art is not expected and does not per se attract any mark. Arguing why a prior art document is closest prior art is not expected and does not per se attract any mark.

4.1.1 For the example solution independent claim, D2 is considered more relevant than D1. The devices of D2 and the client's letter use the same therapeutic effect, namely the propagation of air pressure pulses into the lungs of a patient for dislodging secretions. The device of D1 is designed to administer a drug for dislodging lung secretions. The air pressure pulses generated by the device of D1 have only a small therapeutic effect (see D1, [04]).

4.1.2 For a claim according to the example solution independent claim it is appropriate to cite **D2 (2 marks)** and explain its content (**up to 3 marks**).

The discussion can be as follows:

Prior document D2 discloses a respiratory device for generating air pressure pulse for dislodging lung secretions. The device comprises a mouthpiece, a conduit, a rotatable disc with a slot, a control unit and an electric motor. When the electric motor is not energised, the disc is retained in a blocking position in which it prevents air from flowing through the conduit.

To use the device, the patient exhales into the mouthpiece. When the difference between the air pressure in the mouthpiece and the ambient air pressure reaches 0.1 bar, the control unit turns on the electric motor which then exerts a force on the disc, causing it to rotate. When the slot comes into alignment with the mouthpiece, air suddenly flows from the mouthpiece. This causes the air pressure in the mouthpiece to rapidly decrease and an air pressure pulse is thus generated.

4.1.3 For the example solution independent claim, merely citing **D2** without describing its technical content receives **2 marks**.

4.1.4 For the example solution independent claim, a citation of **D1** and explanation of its content receives up to **3 marks**.

4.1.5 For the example solution independent claim, a mere citation of **D1** without describing its technical contents receives **1 mark**.

4.2 A total of **6 marks** are available for a discussion of a problem. To receive all the marks available, the problem should be consistent with the prior art acknowledged and with the independent claim of the answer paper.

4.2.1 For the example solution independent claim, the discussion can be as follows:

The device of D2 comprises an electric motor powered by a battery. The battery is necessary to generate an air pressure pulse. Therefore, a drawback of the device of D2 is that it comprises at least one electrical component (the motor) that needs to be powered by an external source of electrical energy such as a battery.

General problems such as making a device 'more practical' or 'more simple' or 'easier to use' or 'less expensive' should not receive more than **4 marks**.

For the example solution claim, problems associated to a sequence of air pressure pulses (e.g. rate at which air pressure pulses are generated by the device of D2, the intensity of the pulses or the predetermined lapse of time during which pulses are generated) should not attract more than **2 marks**.

4.3 A total of **4 marks** are available for a discussion of a solution to the problem provided by the invention. To receive all the marks available, the solution has to be consistent with the independent claim of the answer paper.

Other arguments pertaining to problems that are not solved by the independent claim of an answer paper are not awarded marks.

4.3.1 For the example solution independent claim, a solution to the above problem could be discussed as follows:

According to claim 1 and in D2, an air pressure pulse is generated by a blocking element being moved out of the blocking position. In D2, this is a force generated by the electric motor that overcomes the gravitational force retaining the blocking element in the blocking position. According to claim 1, it is an air pressure force acting on the blocking element that overcomes the force retaining the blocking element in the blocking position. The air pressure force can result from a patient exhaling or inhaling through the device according to claim 1. Therefore, the device of claim 1 does not need any air pressure sensor, electric motor, control unit or external source of electrical energy, such as a battery, in order to generate an air pressure pulse.

5. Annex - Example set of claims

1. A respiratory device for dislodging lung secretions, the device comprising:
a mouthpiece (1);
a conduit (2, 32, 42, 62) connecting the mouthpiece to the exterior of the device;
a blocking element (3, 43, 63) arranged in the conduit;
the device being arranged so that in a blocking position the blocking element is retained by a retaining force and prevents air from flowing through the conduit,
the device being characterised in that it is further arranged so that, when an air pressure force acting on the blocking element overcomes the retaining force, the air pressure force moves the blocking element out of the blocking position, thereby generating an air pressure pulse.
2. Respiratory device according to claim 1, further comprising a returning means (24, 34, 44, 64) for returning the blocking element towards the blocking position after it has been moved out of the blocking position.
3. Respiratory device according to claim 2, whereby the returning means comprises a perforated deflecting wall (24) against which the blocking element can bounce.
4. Respiratory device according to claim 2, whereby the returning means comprises a resilient string (34) attached to the blocking element.
5. Respiratory device according to claim 2, whereby the returning means comprises a resilient pad (44, 64a) against which the blocking element can bounce.
6. Respiratory device according to one of the preceding claims, wherein the retaining force is at least partly constituted by a gravity force.
7. Respiratory device according to any of the preceding claims, further comprising a magnet (35, 45, 65) and wherein the retaining force is at least partly constituted by a magnetic force.
8. Respiratory device according to any of the preceding claims, further comprising a rubber layer (25) on the blocking element or the conduit and wherein the retaining force is at least partly constituted by a frictional force.
9. Respiratory device according to one of the preceding claims, wherein the blocking element is a ball (3) and the conduit comprises a funnel shaped portion (2a) whose smallest diameter is less than the diameter of the ball.
10. Respiratory device according to claim 9, wherein the ball is made of metal.
11. Respiratory device according to any of claims 1-8, wherein the blocking element is a pivoted flap (43).
12. Respiratory device according to any of the preceding claims, wherein the air pressure force overcomes the retaining force when the air pressure in the mouthpiece reaches an air pressure threshold above ambient air pressure.

13. Respiratory device according to any of claims 1-11, wherein the air pressure force overcomes the retaining force when the air pressure in the mouthpiece reaches an air pressure threshold below ambient air pressure.
14. Respiratory device according to claim 12, the device being further configured such that, when the blocking element is in the blocking position and the air pressure in the mouthpiece reaches a further air pressure threshold below ambient air pressure, the resultant air pressure force acting on the blocking element moves the blocking element out of the blocking position, thereby generating a further air pressure pulse.
15. Respiratory device according to claim 14, wherein the blocking element is a pivoted flap (63) that is pivotally mounted in the conduit such that the flap can move out of the blocking position by pivoting towards the mouthpiece and towards the exterior of the device.

EXAMINATION COMMITTEE I

Candidate No. _____

Paper A (Electricity/Mechanics) 2013 - Marking Sheet

Category	Maximum possible	Marks awarded	
Independent claim	50		
Dependent claims	35		
Description	15		
Total	100		

Examination Committee I agrees on marks and recommends the following grade to the Examination Board:

☐ PASS
(50-100)

☐ COMPENSABLE FAIL
(45-49)

☐ FAIL
(0-44)

27 June 2013

Chairman of Examination Committee I