Examiners' report Paper A 2023

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1. GENERAL CONSIDERATIONS

The Examiners' report sets out the expected solution, explains why this solution was expected, and shows how the marks were distributed. In addition, it highlights the most common mistakes and explains which deductions were made for these mistakes.
The purpose of the Examiners' report is to enable candidates to prepare for future examinations (cf. Article 6(6) of the Regulation on the European qualifying examination for professional representatives).

1.1. Introduction

This year's paper related to wearable devices for applying an electric field to the skin. The letter disclosed several embodiments of the device, e.g. in the form of a plaster or of a bandage, and described medical (wound healing) and non-medical (skin smoothing) uses of the device.

1.2. Prior art

In the letter, the client first introduces the known principle of accelerating the healing of wounds by applying an electric field to the wounded skin. Document D1, a granted patent of the client, is referred to, which discloses a wearable device in the form of a plaster containing two copper sheets, electrodes connected to these sheets and a battery, held between the copper sheets, generating the necessary voltage for obtaining the electric field. When the plaster of D1 is worn on the skin with the electrodes in proximity of the wound, the electric field provided by the battery accelerates healing of the wound. The client wishes to overcome the disadvantages of D1 due to the battery.
The client additionally describes the known "tribo-electric effect", i.e. the generation of an electric field upon friction between two objects, and provides the example of a Teflon layer adhering to and separating from a copper sheet. Because Teflon has the tendency to capture electrons, the electrons from the surface of the copper sheet are captured by the Teflon layer when this layer adheres to the sheet. When the Teflon layer separates from the copper sheet, the captured electric charges remain attached to Teflon, generating a voltage. The client cites the publication D2 relating to a wearable device using the tribo-electric effect for sensing muscular activity. D2, however, still requires a battery.

1.3. Challenges of the paper

1.3.1. The device claim

Candidates were expected to draft a single independent device claim covering all the examples of the invention shown in the letter.

The first example (Fig. 2) is a plaster in which the electric field is generated not by a battery but rather, due to the tribo-electric effect, induced by movements of the body wearing the device. It includes a substrate made of PET and two copper sheets attached to the top face of the substrate. A Teflon layer is attached to one copper sheet so that one end of the other copper sheet overlays this Teflon layer and is able to adhere and separate from the Teflon layer when the plaster is deformed. The opposite face of the substrate includes copper layers acting as electrodes, each electrically connected to a respective copper sheet by wires. Muscle contractions or body movements make the plaster deform so that the copper sheet adheres and separates from the Teflon layer, generating a voltage between the two copper sheets and thus an electric field between the electrodes.

In the alternative embodiment of Fig. 3 the electrodes are not additional copper layers connected by wires but the function of electrodes is carried out by the ends of the copper sheets which are folded around the substrate and extend along its bottom face. In the context of this example, it is explained that any pair of electrically conductive elements separated by a gap have the effect of electrodes generating an electric field in the gap when subject to a voltage.

The example of Fig. 4 has the form of a bandage and is particularly suited to be worn around arms or wrists. It may be held in place by elastic force without adhesives. Unlike the previous examples, the copper sheets are attached to opposite faces of the substrate. A Teflon layer is attached to one end of one copper sheet so that an end of the other copper sheet overlays the Teflon layer. Upon deformation of the substrate, the overlaying copper sheet adheres to and separates from the Teflon layer causing the tribo-electric effect. An electrical field is thus applied to the skin by electrodes connected to the copper sheets.

The challenges in drafting claim 1 related mainly to the identification of those features that are essential for the purpose of the invention, without unduly restricting the scope of protection and whilst making sure that the claim is new, in particular with respect to D2.
The client's letter in pars. [012] and [013] indicates other possible variations of the invention and sets certain conditions on the materials that may be used as functional definitions, instead of limiting the claim to the materials of the examples.
Claim 1 of D1 may provide a starting point for drafting the claim. Certain features of this claim, e.g. the copper sheets attached to the same face of the substrate and the electrodes connected by wires, should be generalized to cover all the examples of the invention. In particular, certain limitations to particular materials (PET, copper), should be broadened to encompass the modifications in par. [012] and [013] of the letter. Instead of requiring that a battery can be held in a space between the two sheets, the claim should define a tribo-electric material attached to one of the sheets so that the other sheet may adhere to and separate from this material upon deformation of the substrate. This feature achieved novelty over D1.
D2 discloses a wearable device using the tribo-electric effect. This device has several features in common with the invention, including electrodes electrically connected to respective conductive sheets, since two respective parts of the sheets 2a,2b can be regarded as being "electrodes" (see the client's letter par. [009]). However, these electrodes are not "arranged so as to apply an electric field to the skin", since the device of D2 provides "a full electrical shield between the skin and the electrical parts". This feature provides novelty over D2.

1.3.2. The use/method claim

Furthermore, the client also requests patent protection with regard to the uses of the device. In fact, par. [015] of the letter suggests that the device is not only effective for healing wounds, but also for smoothing skin wrinkles when worn on wrinkled but otherwise intact skin. A use claim should thus exclude the use of the device for healing wounds, which has to be considered as a method of therapy in the sense of Art. 53(c) EPC.

1.3.3. The dependent claims

The dependent claims should provide useful fall-back positions. In particular, specific claims were expected for each of the examples in Figs. 2,3,4. Furthermore, limitations to the preferred materials and combination of materials in pars. [013], [014] would also be considered as useful dependent claims.
The “inter-digitated electrodes” of Fig. 5 also provide a valuable fall-back position, particularly in combination with the use on intact skin.

1.3.4. Description

The candidates were expected to draft the introductory part of the application, including the citation of prior art according to the requirements of Rule 42(1)(b) EPC, an indication of the problem to be solved, and an explanation of how the invention solves the technical problem.

1.4. The marking scheme

Answer papers were awarded marks on a scale of 0 to 100 marks:
up to **40 marks** were available for an independent device claim,
up to **10 marks** were available for an independent use claim,
up to **35 marks** were available for a set of dependent claims, and
up to **15 marks** were available for the introductory part of a description.

2. INDEPENDENT DEVICE CLAIM (up to 40 marks available)

Generally it is noted that the marks awarded for an independent claim reflected the degree to which the claim achieved protection for the client's invention in its broadest possible scope.
This year, one independent claim for a wearable device was expected.

2.1. Example solution

Example feature set as a basis for an independent device claim:

a) *A device (14,16,17) wearable on the skin, comprising:*
b) *a flexible substrate (1) of electrically insulating material,*
c) *first (2a) and second (2b) electrically conductive sheets attached to the flexible substrate (1),*
d) *first (4a) and second (4b) electrodes electrically connected respectively to the first (2a) and second (2b) electrically conductive sheets,*
d1) *and arranged so as to apply an electric field to the skin (11) when the device is worn on the skin,*
characterised in:
e) *a tribo-electric layer (15) attached to the second electrically conductive sheet (2b),*
f) *wherein the first electrically conductive sheet (2a) can adhere to and separate from the tribo-electric layer (15) upon deformation of the flexible substrate (1).*

2.2. Equivalent/non-equivalent wording of example solution

In the following notes, remarks are made on features of the example solution claim. "Equivalent" indicates a different wording for a given feature that could 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. Note also that the "equivalent" features should not be seen as absolute equivalents but may require that a certain limitation is present in other features. "Non-equivalent" indicates a different wording for a given feature that did not achieve the same number of marks as the wording given in the sample solution.

- **Remarks on feature (a): "***A device wearable on the skin"*

Equivalents:

- *"A wearable device",*
- *"A device/article/product/system for applying an electric field to the skin"*

Non-equivalents :

- *"A plaster "*
- *" A bandage"*
- *"a plaster or a bandage"*

are unnecessary limitations, see 2.3.1 and 2.3.3 below.

- **Remarks on feature (b): "***a flexible substrate (1) of electrically insulating material"*

The substrate made of PET of the examples and of D1 should be generalized based on the indication in par. [013].

Equivalents:

- *"a flexible/deformable substrate preventing a short circuit between the conductive sheets";* see also below feature c)

Non-equivalents:

- *"a substrate made of/including PET";* unnecessary limitation, see 2.3.2 below*;*

- **Remarks on feature (c):** *"first (2a) and second (2b) electrically conductive sheets attached to the flexible substrate (1)"*

Equivalents:

- adding *"so that there is no electrical contact/short circuit between the (first and second electrically conductive) sheets",* as from par. [013]. This feature is implied by the fact that the substrate is electrically insulating and that an electric field is generated by the electrodes electrically connected to the sheets. If the sheets would be in electrical contact with each other, no field could be generated.

Non-equivalents

- *"first and second electrodes";* lack of clarity, "sheets" are essential, see [013]: "for reasons of compactness and flexibility, must be in the form of sheets"; also risks confusion with the electrodes that should be "arranged to apply an electric field to the skin";
- "*…attached to one/a top/an upper face of the substrate*"; unnecessary limitation,

excludes the embodiment of Fig. 4 where the sheets are attached to opposite faces;

- "*…attached to one/a top/an upper/an inner face or on a bottom/outer of the substrate*"; attempt to cover both main embodiments with an "or" combination, unnecessary limitation, see 2.3.3 below;
- "*so that one end of one conductive sheet is not attached to the substrate*"; unnecessary limitation, excludes embodiment of Fig. 4.

- **Remarks on feature (d):** ***"****first (4a) and second (4b) electrodes electrically connected respectively to the first (2a) and second (2b) electrically conductive sheets"*

Equivalents:

- "*first and second electrically conductive elements/layers electrically connected respectively to the first (2a) and second (2b) electrically conductive sheets"* see [009];
- adding *forming a gap/separated by a gap";* a gap is considered to be implied by the fact that the electrodes generate an electric field (see point 2.3.5 below);

Non equivalents:

- *"copper layers/electrodes";* excludes other suitable materials ([009]: "any pair of electrically conductive elements"), such as the advantageous silver electrodes (*[014]*);
- ***"****first (4a) and second (4b) electrodes"* with no electrical connection to the first and second electrically conductive sheets (lack of essential features, see below point 2.6.1).

- **Remarks on feature d1):** ***"****and arranged so as to apply an electric field to the skin (11) when the device is worn on the skin"*

This feature ensures novelty over D2, which provides instead "a full electrical shield between the skin and the electrical parts."

Equivalents:

- *"generating an electric field in the gap which is applicable to the skin"* or *"when the skin is in proximity of the gap"*;
- *"located on one face of the substrate (proximate to the skin) so as to apply an*

electric field to the skin";

- omitting *"when the device is worn on the skin"*, if it is clear from the rest of the claim that the device is wearable on the skin and that the field is applied to the skin while the device is worn.

Non-equivalent:

- *"located on a bottom/inner face of the substrate"* without the functional definition of applying an electric field to the skin; may indeed make the claim new over D2 but does not necessarily imply that the electric field is applied to the skin. A lack of essential features arises (see 2.6.1 below).

- **Remarks on feature (e): *"a tribo-electric layer (15) attached to the second electrically conductive sheet (2b)"***

This feature achieves novelty over D1.

Equivalents:

- *"a tribo-electric material"* instead of *"tribo-electric layer";*
- *"an insulating material capturing electrons"* instead of *"tribo-electric layer";*
- a different wording implying that the triboelectric layer is at least in persistent physical contact with the second electrically conductive sheet.

Non equivalents:

- any particular material: unnecessary limitation, see [013] and [014] where a plurality of examples of triboelectric materials is given;
- *"…attached to one end of the […] electrically conductive sheet"*, unnecessary limitation, see [012]: "the Teflon layer 15 may be attached to other parts of the second copper sheet 2b";
- *"A triboelectric layer included between the first and second electrically conductive sheets",* no attachment: minor clarity issue (see below point 2.6.2).

- **Remarks on feature (f): *"wherein the first electrically conductive sheet (2a) can adhere to and separate from the tribo-electric layer (15) upon deformation of the flexible substrate (1)"***

This feature achieves novelty over D1.

Equivalents:

- additionally defining that "*the first electrically conductive sheet overlays the triboelectric layer*";
- additionally defining an electrical charge or a voltage generated between the sheets (see point 2.3.5 below).

Non equivalents:

- "*one end of the first electrically conductive sheet (2a) can adhere to and separate*", unnecessary limitation, see [012]: "In slight modifications of the examples shown above, it is not one end 3a of the first copper sheet 2a that adheres to and separates from the Teflon layer 15 but another part of the first copper sheet 2a."
- a more generic definition of the generation of the triboelectric effect without the "*adhere to… and separate*" condition, would amount to a lack of essential features or result-to-be achieved (see 2.6.1 below).

2.3. Unnecessary limitations (up to -40 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. Exclusion of described examples

Generally, where a claim was unnecessarily limited to the extent that one of the two "main" forms of the invention (plaster as in Figs. 2,3 or bandage as in Fig. 4) was excluded from the scope of protection, **20 marks** were deducted. This limitation may result from defining the first and second sheets as being attached to the same face of the substrate (excluding Fig. 4), or to opposite faces (excluding Figs. 2 and 3), or including adhesive layers (excluding Fig. 4). The definition of one end or part of one of the electrically conductive sheets not being fixed to the substrate excludes Fig. 4, because this feature is disclosed only for the "plaster" embodiments (par. [007] of the client's letter).

The limitation to the presence of wires for at least one of the electrodes, which excludes the embodiment of Fig. 3, was also penalized with a deduction of **20 marks**.
A claim which did not make any distinction between sheets and electrodes was in fact strictly limited to the embodiment of Fig. 3, excluding the embodiments of Fig. 2 and Fig. 4. This was considered as a more severe limitation than the one discussed above and was thus penalized with up to **30 marks**.

2.3.2. Limitation to a particular material

Up to **10 marks** were deducted for each unnecessary limitation to a particular material or group of materials for the substrate, triboelectric layer, electrically conductive sheets or the electrodes. The client's letter provides functional definitions for these materials (e.g. flexible and insulating, triboelectric, electrically conductive, see [013]) and there is no need to limit the claims to particular materials.
Should the best example (copper/Kapton) be excluded, **20 marks** were deducted.

2.3.3. Further unnecessary limitations

The client's letter suggests that certain features may be modified within the scope of the invention, even if a complete example of these modifications is not provided (see mainly [012]). A limitation to these features, for instance to the fact that the triboelectric layer is attached to one end of the second sheet or that one end of the first sheet adheres to and separates from the triboelectric layer, lost **5 marks** each.
A limitation to a "wearable device in the form of a plaster or bandage" without further limitations was penalized with a deduction of **10 mark**, because the devices of the invention "may be made in shapes other than a plaster or a bandage" ([012]).
Other attempts to cover the two main embodiments with an "or" combination, e.g. defining sheets attached to a top/inner or bottom/outer surface, also lost **10 marks** for the same reason.

2.3.4. Multiple independent device claims

One of the challenges of the paper was to draft a single independent claim protecting all the example devices of the invention presented in the client's letter. For this reason, when multiple independent claims were drafted in an attempt to cover the invention in all its

scope, only the least valuable claim was marked.

For instance, answers containing two independent claims, one directed to the plaster (Figs. 2,3) and one to the bandage (Fig. 4), lost a minimum of **20 marks** because each of the claims inevitably excluded the other embodiment (see point 2.3.1 above).

2.3.5. Additional features not incurring in a loss of marks

Explicitly mentioning certain features that are implicit in the example solution was not penalized, for example:

- electrodes forming a gap;
- electrodes located on one face of the substrate (provided that the function of applying an electric field to the skin is present, else see 2.6.1 below);
- the electrically conductive sheets being electrically isolated from each other/ no short circuit;
- the first electrically conductive sheet overlays the triboelectric layer;
- the generation of a voltage/electric field by the adhesion and separation;
- the device not comprising or requiring a battery (in addition to the features of the example solution, else see 2.4.1, 2.4.2 or 2.6.1 below).

For claims limited to a plaster, the presence of adhesive layers is implicit (no penalization).

2.4. Lack of novelty (up to -40 marks)

An independent claim that was considered to lack novelty against any of the available prior art attracted **0 marks**.

2.4.1. The disclosure of D1

D1 discloses the following features of the example solution (references pointing to D1):

a) *A device (18) wearable on the skin, comprising:*

b) *a flexible substrate (1) of electrically insulating material ("PET"),*

c) *first (2a) and second (2b) electrically conductive ("copper") sheets attached to the flexible substrate (1),*

d) *first (4a) and second (4b) electrodes electrically connected ("via wires") respectively to the first (2a) and second (2b) electrically conductive sheets,*

d1) *and arranged so as to apply an electric field to the skin (11) when the device is worn on the skin ([002], claim 1).*

Therefore, a claim as in the example solution but lacking features e) and f) is not new over D1.

A claim lacking features e) and f) but attempting to achieve novelty over D1 by a negative feature such as:

"wherein the device does not comprise a battery"

was also not new, because the battery of D1 is removable ([001]: *"a button-shaped battery 6 can be held in a space between the two copper sheets by the elastic force of the first copper sheet 2a"*, *"When the battery is inserted"*, [003] of client's letter: "*the battery can fall off*").

2.4.2. The disclosure of D2

D2 discloses the following features of the example solution (references pointing to D2):

a) *A device wearable on the skin ([002]: "*The sensor can be worn on the skin using an armband or a sock*"), comprising:*

b) *a flexible substrate of electrically insulating material ([001]: "elastic and electrically insulating substrate"),*

c) *first (2a) and second (2b) electrically conductive ([001]: "aluminium") sheets attached to the flexible substrate (1),*

d) *first and second electrodes (two parts of the respective sheets separated by the gap 8, see [009] of the client's letter) electrically connected respectively to the first (2a) and second (2b) electrically conductive sheets,*

e) *a tribo-electric layer ("a layer 3 of Kapton") attached to the second electrically conductive sheet (2b),*

f) *wherein the first electrically conductive sheet (2a) can adhere to (Fig. 2) and separate from the tribo-electric layer (15) (Fig. 3) upon deformation of the flexible substrate (1, see [002]).*

However, since the sensor of D2 contains the "special rubber pad" which is ([002]) "thick enough to avoid the skin coming into contact or proximity with the metallic sheets 2a, 2b and the substrate 1" and moreover provides "a full electrical shield between the skin and the electrical parts", the sheets of D2, even if they are considered to be "electrodes"

cannot apply an electric field to the skin as in feature d1).
Therefore, a claim as in the example solution but lacking feature d1) is not new over D2.
A disclaimer of the battery as in point 2.4.1 above would not obtain novelty either, because the battery of D2 is also removable ([001]: *"replaceable battery"*).

2.5. Lack of inventive step (up to -35 marks)

A single independent claim whose subject-matter was considered to lack an inventive step in the light of the available prior art lost **35 marks**. For example, a claim as in the example solution, without feature d1) and being novel over D2 only because it defined Teflon instead of Kapton as the triboelectric material, would have been considered obvious.

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. This means, a claim as in the example solution but lacking feature d1) was penalized for lack of novelty rather than possibly for lack of clarity due to missing essential features.

2.6.1. Claims defined in terms of a result to be achieved or lacking essential features

An objection of lack of clarity due to a "result to be achieved" arises when the claim merely defines the underlying technical problem (Guidelines F-IV 4.10). For instance, since the technical problem faced by the invention is how to avoid the requirement of a battery, a claim not defining the triboelectric effect as in features e) and f) but instead defining that:

- *"the device is able to apply an electric field to the skin without requiring a battery"*

incurred in a deduction of **30 marks** as entirely relying on the result to be achieved.
Smaller deductions were applied for claims that specified some but not all the features essential for solving the technical problem. For example, a claim without features e) and f) but instead reciting:

- *"the device is able to apply an electric field to the skin using the triboelectric effect"*

lost **20 marks**.

Other features that appear essential from the client's letter and should have been present in the claim are:

- the flexible and electrically insulating substrate (see client's letter par. [013])
- the "*electrically conductive sheets*" ([013]: "must be in the form of sheets");

The absence of each of these features in the claim was penalized with a deduction of **10 marks**.

Similarly, a claim as in the example solution wherein feature d1) read:

- "*the device is configured to apply an electric field to the skin*"

without mentioning electrodes for this purpose, was still new over D2 but lost **10 marks** due to the absence of the electrodes as an essential feature.

Likewise, a claim in which the position of the electrodes on one face of the substrate is defined without specifying their function of applying an electric field to the skin lost **10 marks**.

By the same token, if electrodes are present and defined as being arranged for applying the electric field to the skin, but they are not "electrically connected to the first and second electrically conductive sheets", **10 marks** were deducted.

It is equally essential for the working of the device that the "electrically conductive sheets" are "attached to the substrate". For answers lacking this feature, **10 marks** were deducted.

2.6.2. Other clarity/conciseness issues

Further clarity problems were evaluated on a case-by-case basis, and mostly incurred in a penalization of **5 marks**. For instance, claims defining a "gap" for applying an electric field to the skin without specifying that it is defined by electrodes lost **5 marks**. Similarly, claims wherein the tribo-electric layer is not "attached" (or at least in persistent physical contact) with the second electrically conductive sheet lost **5 marks**.

A device claim as in the example solution with an additional definition related to its use (e.g. "for treating skin wounds") was penalized with **5 marks** because it was not clear whether said definition implied further limitations or contradicted other possible uses of the device like the cosmetic one.

Contradictions with the disclosure of the invention, for instance the definition of non-working embodiments, could make the claim not clear and were thus penalized on a case-

by-case basis.

Other claims based on “or” combinations of alternatives, even if they did not imply a loss in the scope of protection, could be penalized with **5 marks** for lack of conciseness because, it was possible to define the subject-matter of the invention without reciting alternatives.

2.7. Formal matters (up to -4 marks)

The example solution claim could be drafted in the two-part form based on either D1 (characterizing features e) and f)) or D2 (characterizing feature d1)). However, using a one-part form was not penalised.

Instead, an incorrect two-part form with respect to any of D1 or D2 led to a deduction of **2 marks**.

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

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

3. INDEPENDENT USE CLAIM (up to 10 marks available)

In his letter, the client expresses the wish that that the invention is protected ("also with regard to its uses", see [016]). Candidates were thus expected to draft an independent use or method claim.

3.1. Example solution

a') *Cosmetic use*
b') of the device (14,16,17) according to any one of the preceding claims
c') for smoothing skin wrinkles,
d') wherein the device is worn on intact wrinkled skin.

3.2. Equivalent/non-equivalent wording of example solution

- **Remarks on feature (a')**

Equivalents

- *"Cosmetic method";*
- *"Non-therapeutic use/method"*
- *"Method/use for smoothing skin (wrinkles)"*

Non-equivalents:

- "*Use … for healing wounds*": explicitly defines a method of therapy excluded from patentability under Art. 53(c) EPC (see 3.3 below);
- "*Use of the device (or method) (for applying an electric field to the skin)/ for treating skin problems*" does not exclude the therapeutic effect (see below).

- **Remarks on feature (b')**

Equivalents:

- "*of the device according to claim 1*" (see however the last bullet point of 4.2 below);

Non-equivalents:

- "*of a wearable device (generating an electric field)*": without reference to the device claims, not inventive in view of the combination of D1 with common knowledge (see 3.4 below).

- **Remarks on feature (c')**

Equivalents:

- *"For smoothing the skin"*

Non-equivalents:

- any definition concerning or not excluding the effect of healing wounds (see above the remarks on feature (a')

- **Remarks on feature (d')**

Equivalents:

- *"wherein the device is worn on wrinkled skin without wounds"*;
- "*use […] on intact wrinkled skin*", i.e. without explicitly stating "wearing"; it is implicit that the use of a wearable device on the skin implies wearing the device on the skin.

Non-equivalents:

- "*wherein the device is worn on wrinkled skin",* without the term "intact", the claim does not exclude that a wound is present as well and thus that it is implicitly healed, although the claim may be defined by a "cosmetic" or "non-therapeutic use" (see 3.3 below).

3.3. Exception to patentability under Art. 53(c) EPC

The challenge was to draft a use or method claim that avoided the exception to patentability under Art. 53(c) EPC. The letter discloses two uses of the wearable device: healing of wounds ([006]) and smoothing wrinkled skin ([015]). However, healing a wound is seen as a case of "bringing the body from a pathological state back into its normal, healthy state", i.e. as therapy (Guidelines G-II 4.2.1.2). Therefore, the use of the device of the invention for healing wounds -or equivalently a method of healing wounds using the device of the invention- which certainly implies a functional relationship between the working of the device and the effect of healing wounds, are not patentable in the sense of Art. 53(c) EPC as they are methods for treatment the human or animal body by therapy. A claim to a cosmetic method involving the device of the invention is, however, patentable (Guidelines G-II 4.2.1).

However, in order to avoid said exception to patentability, it is not enough that the purpose

of healing wounds is not recited in the claim, but it must explicitly be excluded from the scope of the claim (Guidelines G-II 4.2.1.2, par. 4: "The non-patentable subject-matter must be removed from the scope of the claim"). Indeed, a method claim including a generic "wearing the device [of claim 1] on the skin" implicitly has a therapeutic effect in case a wound is present on the skin where the device is worn. Instead, the client's letter recites on par. [015] that: "When worn on intact wrinkled skin, the device has no therapeutic effect but only the cosmetic effect of smoothing out the wrinkles". It is thus necessary to limit the claim to the use of the device on intact, wrinkled skin.

Answers containing a claim excluded from patentability under Art. 53(c) EPC were not awarded any marks for the use/method claim (**10 marks** deduction out of the 10 available), even if the answer contained a further patentable use claim. For instance, the claim:

"Use of the device of claim 1 for treating skin problems,
wherein the device is worn on the skin"

which attempts to cover both the therapeutic and cosmetic use, would not have attracted any marks even if a further (even dependent) claim limited to the cosmetic use were present.

Answers containing a single use claim in an attempt to claim only the cosmetic use but missing features necessary to exclude an implicit therapeutic effect (such as the example solution without feature (d') or without the term "intact"), were awarded a maximum of 5 marks in this part (**5 marks** of deduction). Defining the claim as a "cosmetic use" does not exclude that a wound is present where the device is worn and thus that it is implicitly healed due to the effect of the device.

3.4. Lack of novelty or inventive step

The client's letter acknowledges that (*[015]*): "for smoothing skin wrinkles, […] the effect of an electric field is known". Therefore, a claim limited only to the use of the electric field for smoothing the skin without reference to any device would not be new.

A claim not referring to the device of the invention but to a more generic "wearable device" including D1, would not be inventive, insofar it would be obvious for the skilled person to

use the device of D1 applying an electric field to the skin for the known effect of smoothing wrinkles.
Claims that were not new or not inventive did not attract any marks (**10 marks** deduction).

3.5. Lack of clarity or unnecessary limitations

Other deficiencies were evaluated on a case-by-case basis.

3.6. Avoidance of double penalization

A use claim referring to the device of claim 1 did not lose further marks due to possible deficiencies in claim 1, even if claim 1 was not new.

3.7. Further method/use claims

Methods for manufacturing the device were not expected and did not attract marks.

4. DEPENDENT CLAIMS (up to 35 marks available)

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

4.1. Structure

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.

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 for feature A or a claim for feature B, whichever is lower.

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.

4.2. 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. It is however noted that there are different ways of grouping features in dependent claims whilst still achieving the full number of available marks. For instance, the marks available for one of the (sets) of features listed below could be achieved by one dependent claim or by a combination of

dependent claims. Care should however be taken of the correct dependencies, not to combine claims with alternative or incompatible features. An example set of claims is attached in annex (see 6).

- **Electrodes distinct from the sheets**
  - "*at least one of the first and second electrodes (4a,4b) is formed by an electrically conductive layer connected to the respective first or second conductive sheets (2a,2b) by wires (5a,5b).*" (**2 marks**)
  - *" wherein the electrically conductive layer is made of silver"* (**2 marks**) Advantageous for its anti-bacterial properties ([014])

- **Electrodes formed by the ends of the sheets**
  - "at least one of the first and second electrodes (4a,4b) is formed by an end of the first (2a) or second (2b) electrically conductive sheet." (**4 marks**) directed in particular to Fig. 3. (**-1 mark** if limited to both electrodes, **-1 mark** if "end" not mentioned)

- **Adhesive layer**
  - "including at least one adhesive layer (7) to attach the device to the skin." **(2 marks)**

- **Device in the form of a plaster**
  - *"having the form of a plaster (**1 mark**), wherein the first and second conductive sheets (2a,2b) are attached to the same face of the substrate (1) (**1 mark**), and one end (3a) of the first electrically conductive sheet (2a) is free to move/not fixed to the substrate (**1 mark**) so that it overlays the tribo-electric layer (15) (**1 mark**)"* **(4 marks in total)**, mainly directed to the embodiments of Figs. 2 and 3.

- **Device in the form of a bandage**
  - *"having the form of a bandage (**1 mark**), wherein the first and second conductive sheets (2a,2b) are attached to opposite faces of the substrate (1) (**1 mark**) and the substrate is bent on itself (**1 mark**) so that one end (3a) of the first conductive*

*sheet (2a) overlays the tribo-electric layer (15) (**1 marks**)"* **(4 marks in total),** mainly directed to the embodiment of Fig. 4.

- **Materials**

The Table in [014] provided advantageous combination of materials:

- *"the electrically conductive sheets (2a,2b) are made of copper or zinc"* **(2 marks)**
- *"the tribo-electric layer (15) is made of PTFE or poly 4,4'-oxydiphenylene-pyromellitimide"* **(2 marks)**;
- *"the electrically conductive sheets (2a,2b) are made of copper and the tribo-electric layer (15) is made of poly 4,4'-oxydiphenylene-pyromellitimide"* **(3 marks)**

From [013]:

- "the flexible and electrically insulating substrate (1) is made of PET" **(2 marks)**

The use of trade names (in particular "Kapton") lost **1 mark** , because chemical names were available in the letter (PET,PTFE and PDMS) are abbreviations or chemical names and were not penalized)

- **Interdigitated electrodes**
  - "the electrodes (4a,4b) have an interdigitated shape" **(3 marks)**

- **Antibacterial composition**
  - *"the electrodes (4a,4b) are coated with an anti-bacterial composition"*. **(2 marks)**

- **Cosmetic use of device with interdigitated electrodes**
  - "*The use of the preceding claim, wherein the electrodes of the device have an interdigitated shape*" **(3 marks)**

  1 mark could be allocated if this use was covered not by a separate dependent use claim but by a reference of the independent use claim to the whole set of dependent device claims, including the one defining the interdigitated electrodes.

4.3. Other claims considered to offer a useful fall-back position (up to 5 marks)

Up to **5 marks** in total were 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.

A claim defining an electrically conductive sheet folded around the substrate could receive an extra **2 marks** (when referring to the claim defining electrodes provided by one end of the sheet). A claim defining electrically conductive sheets and electrodes of different materials, provided that no conflicting dependency was present, could collect and extra **1 mark**.

4.4. Claims considered as not offering a useful fall-back position

A device claim reciting: "*A device as in any preceding claim, for use in healing wounds*" was not considered useful because the effect is implicit in the device of claim 1 and the provisions of Art. 54(4) or (5) EPC cannot be invoked (and are not even necessary insofar the device of claim 1 is already new).

5. DESCRIPTION (15 marks available)

5.1. Acknowledgement of prior art (Rule 42(1)(b) EPC)

For an acknowledgement of prior art, **5 marks** were available. When the independent claim was drafted in the two-part form, full marks were available for a brief explanation of the prior art indicated, e.g. an indication that a certain prior art disclosed the preamble of claim 1. When the independent claim was drafted in the one-part form, full marks are only awarded in this section for an indication of a piece of prior art and explanations from which it is derivable which of the features defining the independent claim are known, in combination, from the prior art (see Guidelines F-IV, 2.3.2).
This year, D1 was considered the most pertinent prior art since it had the same nature and purpose as the present invention (wearable devices for treating skin problems). **2 marks** were available for the mere citation of D1. **3 marks** were available for the further explanation of the relevant features.

The discussion of D1 could be as follows (using as far as possible the text of D1):

- *"EP11071982 discloses a device wearable on the skin, having the shape of a plaster and capable of applying an electric field to a skin wound for accelerating the healing of the wound. It comprises a substrate of PET, a first copper sheet and a second copper sheet, both attached to a top face of the substrate. One end of the first copper sheet is not fixed to the substrate so that a button-shaped battery can be held in a space between the two copper sheets. The bottom face of the substrate comprises two copper layers acting as first and second electrodes and forming a gap. The first and second electrodes are electrically connected respectively to the first and second copper sheets via wires extending through the substrate. In use, this device is attached to the wounded skin by the adhesive layers so that the wound is located in proximity to the gap. Therefore, when the device is worn on the skin, the electrodes are arranged so as to apply an electric field to the skin*."

A description where only D2 was cited gained a maximum of **3 marks** in this section. The discussion of D2 could be as follows (using as far as possible the text of D2):

- "*The publication "Muscular activity sensor" discloses a sensor comprising a rubber pad that can be worn on the skin. Inside the rubber pad, an elastic and electrically insulating substrate supports two thin aluminium sheets. These sheets forming a gap in a cavity, wherein a layer of Kapton is attached to the sheet. Kapton is a material with triboelectric properties. The aluminium sheets are connected to a microchip capable of transmitting a radio-frequency signal, powered by a replaceable battery. During exercise, a muscular contraction causes the compression of the rubber pad and of the substrate so that the aluminium sheet adheres to the triboelectric layer. Upon relaxation, the aluminium sheet separates from the triboelectric layer and becomes electrically charged due to the triboelectric effect so that a small voltage arises between the sheets. When the microchip detects this voltage between the sheets, it transmits a radio-frequency signal to a smartphone via Bluetooth. The rubber pad provides an electrical shield between the sheets and the skin, so that no electric field is applied to the skin*."

An incomplete explanation of the contents of D1 did not get more marks for the additional citation of D2.

5.2. Discussion of the technical problem (Rule 42(1)(c) EPC)

A total of **4 marks** were available for a discussion of a problem. Accordingly, it was expected to base the technical problem on D1, e.g.:

- *"The device of EP11071982 is effective, yet it presents problems in so far as the battery can fall off if the plaster becomes deformed due to body movement. Furthermore, the battery makes the plaster bulky and difficult to use on curved skin surfaces. The present invention provides a device wearable on the skin which does not rely on a battery for applying an electric field to the skin"*

as in the client's letter ([003]).

A problem formulated over D2 was less pertinent and thus gained only **2 marks**.

5.3. Solution of the technical problem (Rule 42(1)(c) EPC)

A total of **6 marks** were available for a discussion of the 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.

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

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

- "*The invention exploits the deformations of the plaster to generate the electric field, based on the known "tribo-electric effect". The device of the invention contains a first and second electrically conductive sheets attached to a flexible and electrically insulating sheet. A layer of triboelectric material is attached to the second sheet so that, upon deformation of the substrate due to body movement, the first sheet adheres to and separates from the triboelectric layer. The triboelectric effect generates a voltage between the two sheets as if a battery were present. This voltage is also present between two electrodes, electrically connected to the first and second sheet, and arranged to apply an electric field to the skin. The triboelectric effect induced in the device of the invention by movement of the body wearing the device generates an electric field sufficient for treating the skin without requiring a battery*."

6. ANNEX - EXAMPLE SET OF CLAIMS

1. A device (14,16,17) wearable on the skin, comprising:
a flexible substrate (1) of electrically insulating material,
first (2a) and second (2b) electrically conductive sheets attached to the flexible substrate (1),
first (4a) and second (4b) electrodes electrically connected respectively to the first (2a) and second (2b) electrically conductive sheets, and arranged so as to apply an electric field to the skin (11) when the device is worn on the skin,
characterised in:
a tribo-electric layer (15) attached to the second electrically conductive sheet (2b), wherein the first electrically conductive sheet (2a) can adhere to and separate from the tribo-electric layer (15) upon deformation of the flexible substrate (1).

2. A device (14,17) according to claim 1, wherein at least one of the first and second electrodes (4a,4b) is formed by an electrically conductive layer connected to the respective first or second electrically conductive sheets (2a,2b) by wires (5a,5b).

3. A device (14,17) according to claim 2, wherein the electrically conductive layer is made of silver.

4. A device (16,17) according to claim 1, wherein at least one of the first and second electrodes (4a,4b) is formed by an end of the first (2a) or second (2b) electrically conductive sheet.

5. A device (14,16) according to any one of the preceding claims, further including at least one adhesive layer (7) to attach the device to the skin.

6. A device (14,16,17) according to any one of the preceding claims and having the form of a plaster, wherein the first and second electrically conductive sheets (2a,2b) are attached to the same face of the substrate (1), and one end (3a) of the first electrically conductive sheet (2a) *is not fixed to the substrate so that it* overlays the tribo-electric layer (15).

7. A device (14,16,17) according to any one of claims 1-4 and having the form of a bandage, wherein the first and second electrically conductive sheets (2a,2b) are attached to opposite faces of the substrate (1) and the substrate is bent on itself so that one end (3a) of the first conductive sheet (2a) overlays the tribo-electric layer (15).

8. A device (14,16,17) according to any one of the preceding claims, wherein the electrically conductive sheets (2a,2b) are made of copper or zinc.

9. A device (14,16,17) according to any one of the preceding claims, wherein the tribo-electric layer (15) is made of PTFE or poly 4,4'-oxydiphenylene-pyromellitimide.

10. A device (14,16,17) according to claims 8 or 9, wherein the electrically conductive sheets (2a,2b) are made of copper and the tribo-electric layer (15) is made of poly 4,4'-oxydiphenylene-pyromellitimide.

11. A device (14,16,17) according to any one of the preceding claims, wherein the flexible substrate (1) is made of PET.

12. A device (14,16,17) according to any one of the preceding claims, wherein the electrodes (4a,4b) have an interdigitated shape.

13. A device (14,16,17) according to any one of the preceding claims, wherein the electrodes (4a,4b) are coated with an anti-bacterial composition.

14. Cosmetic use of the device (14,16,17) according to any one of the claims 1 to 13 for smoothing skin wrinkles, wherein the device is worn on intact wrinkled skin.

15. The use of claim 14, wherein the device (14,16,17) is defined as in claim 12.