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EUROPEAN QUALIFYING EXAMINATION 2023

Paper A

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Content (7 pages „Client‘s letter“) only available on screen during the examination

Contenu (7 pages „Lettre du client“) uniquement visible sue l‘écran pendant l‘examen

Client’s drawings

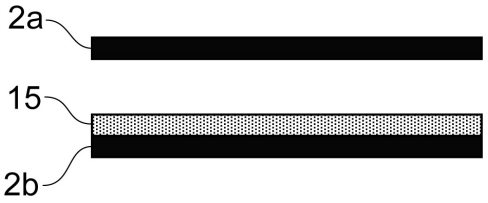

Fig. 1(a)

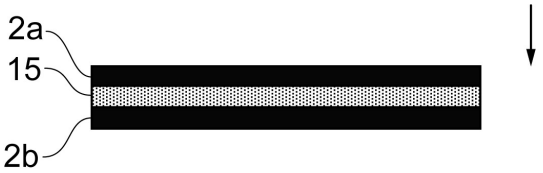

Fig. 1(b)

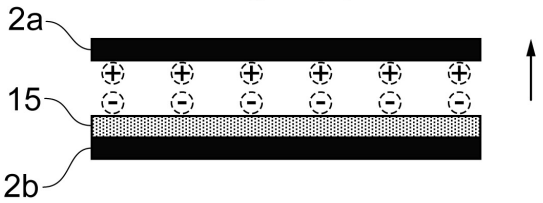

Fig. 1(c)

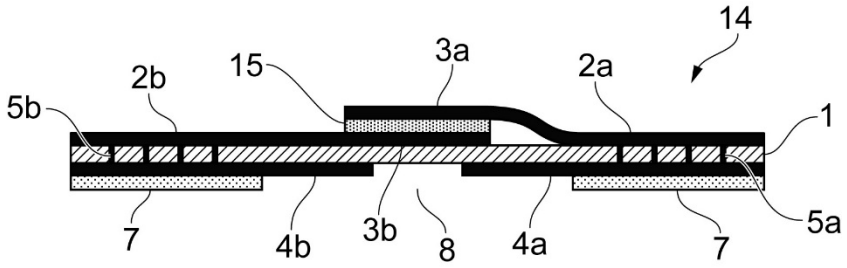

Fig. 2(a)

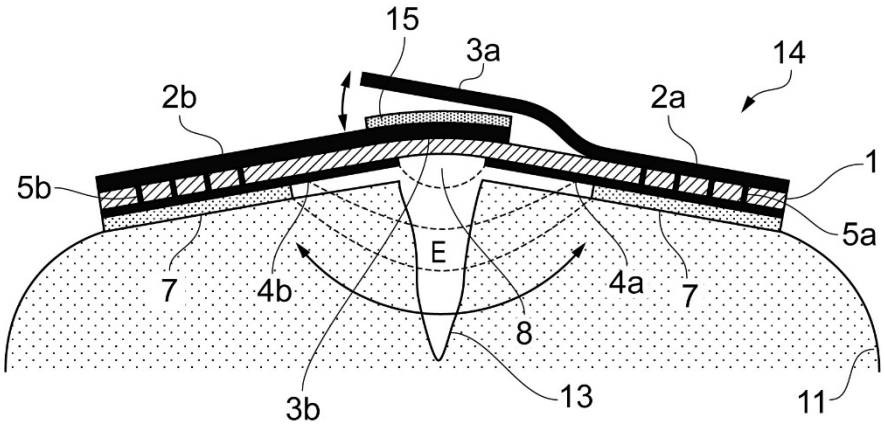

Fig. 2(b)

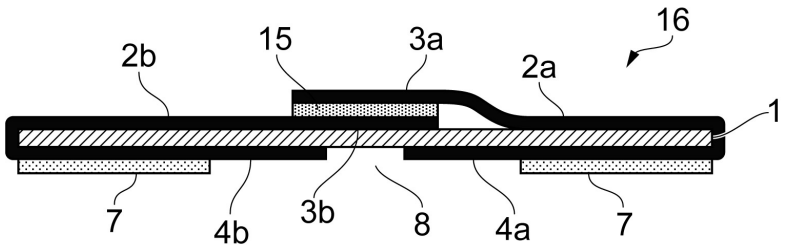

Fig. 3

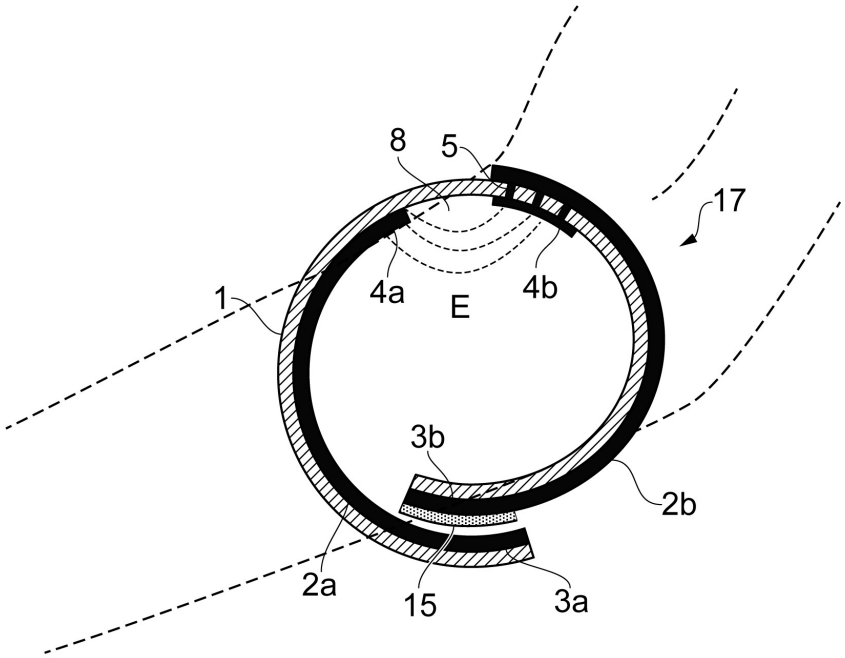

Fig. 4

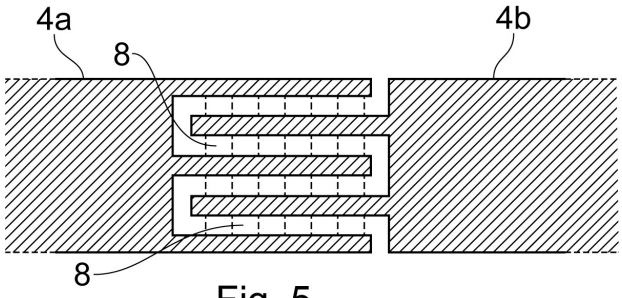

Fig. 5

Document D1: EP11071982 - Electric plaster

[001] The present invention, shown schematically in Fig. 1, is a device 18 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 1 of PET, a flexible and electrically insulating material, a first copper sheet 2a and a second copper sheet 2b, both attached to a top face of the substrate 1. One end 3a of the first copper sheet 2a is not fixed to the substrate 1 so that 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. The bottom face of the substrate 1 comprises two copper layers 4a, 4b acting as first and second electrodes and forming a gap 8. The first and second electrodes 4a, 4b are electrically connected respectively to the first and second copper sheets 2a, 2b via wires 5a, 5b extending through the substrate 1. When the battery 6 is inserted, the voltage of the battery is applied across the copper sheets 2a, 2b and, via the electrical connection, also across the electrodes 4a and 4b. When the voltage of the battery is applied across the electrodes 4a, 4b, an electric field E (dashed lines) is generated in the gap 8. Adhesive layers 7 are also provided underneath the substrate 1.

[002] In use (see Fig. 2), the device 18 of the invention is attached to the wounded skin 11 by the adhesive layers 7 so that the wound 13 is located in proximity to the gap 8. Therefore, when the device 18 is worn on the skin 11, the electrodes 4a, 4b are arranged so as to apply an electric field E (dashed lines) to the skin. This electrical field accelerates the healing of the wound 13.

[003] Claim

1. A device (18) wearable on the skin and having the shape of a plaster, comprising:
a substrate (1) made of PET,
first (2a) and second (2b) copper sheets attached to the top face of the substrate (1) so that a battery (6) can be held in a space between the first (2a) and second (2b) copper sheets, characterised by:
first (4a) and second (4b) electrodes made of copper layers, electrically connected respectively to the first (2a) and second (2b) copper sheets by wires (5a, 5b), and arranged so as to apply an electric field to the skin (11) when the device is worn on the skin.

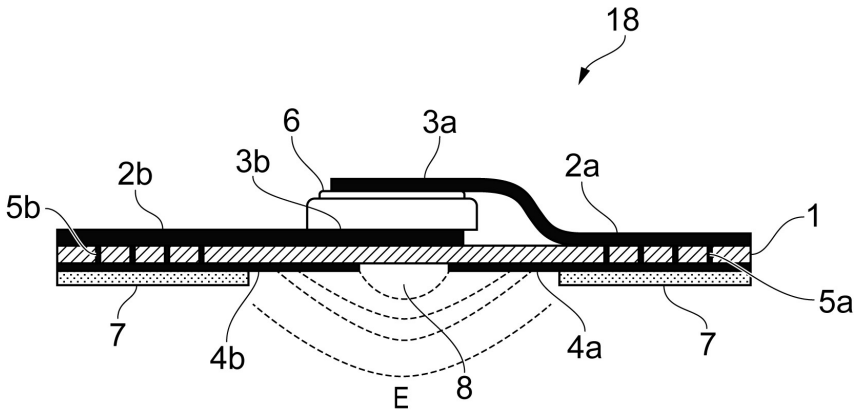
18
6
3a
3b
2b
2a
5b
1
5a
7
4b
4a
7
E
8

Fig. 1

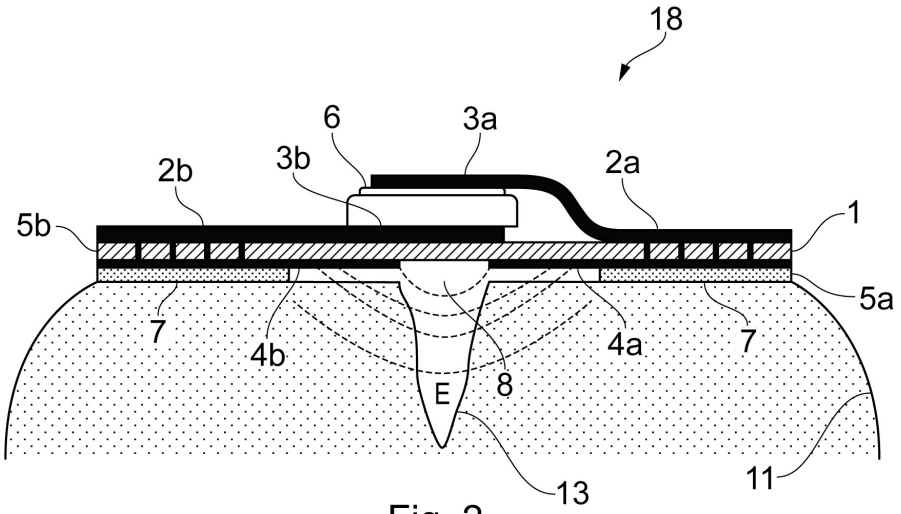
18
6
3a
3b
2b
2a
5b
1
5a
7
4b
4a
7
E
8
13
11

Fig. 2

Document D2: Muscular activity sensor

[001] Record your daily exercise with our new wearable sensor ! Our sensor (Fig. 1) comprises a soft rubber pad 6 that can be worn directly on the skin. Inside the rubber pad, an elastic and electrically insulating substrate 1 supports two thin aluminium sheets 2a and 2b. These sheets are longer than the substrate and extend into cavity 7, forming a gap 8. In the cavity 7, a layer 3 of Kapton is attached to the sheet 2b. Kapton is a material with triboelectric properties. The aluminium sheets are connected by wires 4 to a microchip 5 capable of transmitting a radio-frequency signal. The microchip 5 is powered by a replaceable battery (not shown).

[002] The sensor can be worn on the skin using an armband or a sock. Wearing the sensor is comfortable because the rubber pad is thick enough to avoid the skin coming into contact or proximity with the metallic sheets 2a, 2b and the substrate 1. Our special rubber pad also provides a full electrical shield between the skin and the electrical parts. During exercise, a muscular contraction causes the compression (see the arrow in Fig. 2) of the rubber pad 6 and of the substrate 1 so that the aluminium sheet 2a adheres to the triboelectric layer 3 (Fig. 2). Upon relaxation, the aluminium sheet 2a separates from the triboelectric layer 3 (Fig. 3) and becomes electrically charged due to the triboelectric effect so that a small voltage arises between the sheets 2a and 2b. When the microchip 5 detects this voltage between the sheets 2a and 2b, it transmits a radio-frequency signal to your smartphone via Bluetooth™. A dedicated smartphone app records the received radio-frequency signal and thus determines how much muscular exercise you have had.

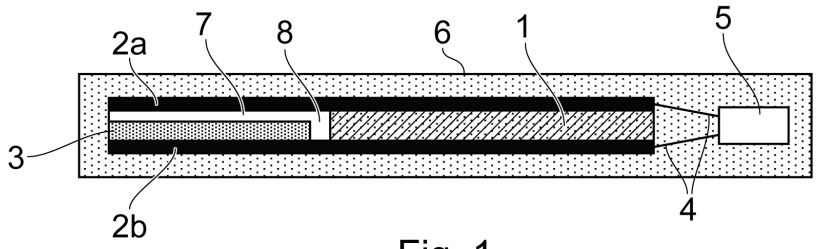

Fig. 1

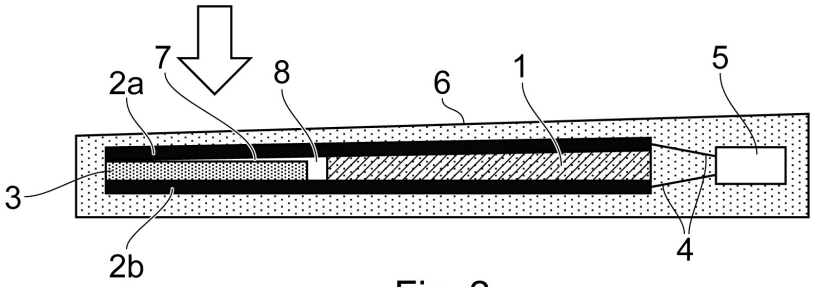

Fig. 2

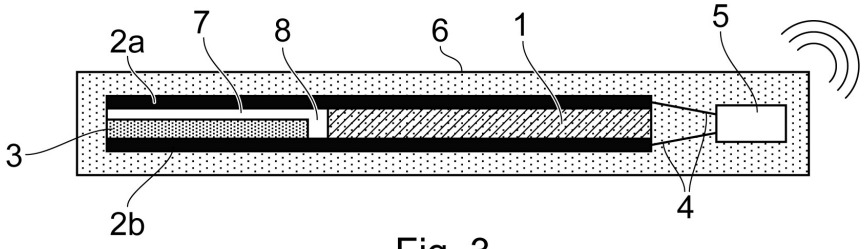

Fig. 3