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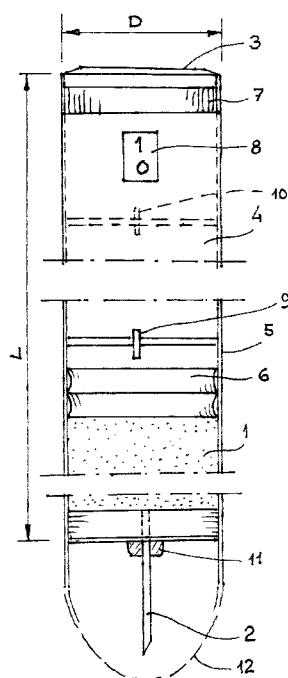
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
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(54) Title: INSULIN PEN



(57) Abstract: The invention relates to an insulin pen comprising an insulin reservoir (1) and an injection needle (2), and at the opposite end of the insulin pen, a press-button (3), by means of which an insulin dose is injected into the patient's body. The insulin pen comprises a pressure reservoir (4) which is filled with propellant gas and can be opened by pressing the press-button so that the propellant gas presses an insulin dose through the injection needle (2) into the patient's body.

Insulin pen

This invention relates to an insulin pen, comprising an insulin reservoir
5 and an injection needle, and at the opposite end of the insulin pen a press-button, by
means of which an insulin dose is injected in the patient's body.

Previously a pharmaceutical was injected in the body of an individual by
human power by means of a mechanically operating pen device, such as for instance
10 NovoRapid, FlexPen, Lantus Solostar, and other models.

Injections are difficult to carry out regarding patients with physical
disabilities and elderly people. It has also been noted that the waste percentage of
prefilled insulin pens is app. 10 units.

The purpose of the invention is to eliminate the disadvantages
mentioned above. The insulin pen in accordance with the invention is characterised
by the fact that the insulin pen comprises a pressure reservoir filled with propellant
gas, the pressure reservoir being opened by pressing a press-button so that the
20 propellant gas presses the insulin dose through the injection needle into the patient's
body.

Various embodiments of the invention are described in the dependent
claims of the set of claims.

The injection moment always lasts 10 seconds, during which the patient
receives a maximally uniform insulin dose regardless of the number of units to be
injected. This ensures a well balanced treatment of the patient. The prefilled pressure
cartridge of the insulin pen is emptied to 100%. Prefilled insulin pens known *per se*,
30 such as e.g. NovoRapid, FlexPen and Lantus Solostar will contain a remainder of
drug liquid of 10 units, even if the pen is in zero position. The cut in insulin will thus
be considerable. The pen is safe and easy to use. The insulin pen emits distinct and
audible clicks at regular intervals. At the moment of injection, the pen emits a weak
sound over the entire injection duration for the user to internalise the injection time.

Assuming a consumption of 30 prefilled insulin pens with each of them leaving 10
units in the cartridge, the insulin pen in accordance with the invention achieves a
reduction of $30 \times 10 = 300$ units, equalling 3 ml. This economisation corresponds to

one prefilled insulin pen. On a global scale this is a remarkable gain. The worldwide number of users exceeds 300 millions. Anybody can conclude the amount of insulin and the number of insulin pens economised with the insulin pen in accordance with the invention. Persons with a physical disability learn how to use the insulin pen exceptionally well. It is easy for a blind person to internalise the injection process. The pen is safe for injections in persons suffering from other medical conditions and for the elderly. No physical force is required for carrying out the injection under the skin into the body.

10 A pressure-operated prefilled insulin pen can also be converted for use with a removable cartridge. The pressure chamber can be converted into a pressure cylinder. Although this invention relates to an insulin pen, the pen in accordance with the invention is evidently appropriate for other pharmaceuticals to be injected as well.

15 The invention is explained below by means of an example and with reference to the accompanying drawing, which illustrates the insulin pen in partial section.

The insulin pen comprises an insulin reservoir 1 and an injection needle 2, and at the opposite end of the insulin pen, a press-button 3, by means of which an insulin dose is injected into the patient's body. The insulin pen comprises a pressure reservoir 4 filled with propellant gas, and the pressure reservoir can be opened with the press-button 3 so that the propellant gas presses an insulin dose through the injection needle 2 into the patient's body. A piston 6 pressed by propellant gas is provided between the pressure reservoir 4 and the insulin reservoir and moves within the body 5 of the insulin pen, thus pressing the total insulin dose into the patient's body.

If a smaller dose than the entire dose provided in the pen is desired, a control knob 7 for the number of insulin units is located in connection with the press-button 3 for control of the insulin dosage. A reading of the number of units to be controlled and the one desired is shown in the dose window 8. A pressure nozzle 9 is provided between the pressure reservoir 4 and the piston 6 for choking the amount of propellant gas so as to set the specific injection duration, preferably 10 seconds. The present embodiment comprises a cylindrical insulin reservoir within the body, which, however, can be replaced with a removable cartridge. If necessary, a refilling valve 10 may be provided in the upper part of the pressure reservoir 4 for cases when the user refills the pressure reservoir personally. The injection needle 2 is supported with a rubber stopper 11 and protected with a pen casing 12. The length L of the injection needle may be e.g. app. 140 mm and the diameter D app. 15 mm. The dimensions of a potential cartridge used in the injection needle are; length 67 mm and diameter 11

mm. A dosage control system operating with a plastic cogwheel known *per se* is located between the control knob and the pressure reservoir for controlling the dosage (not shown in the figure).

Claims

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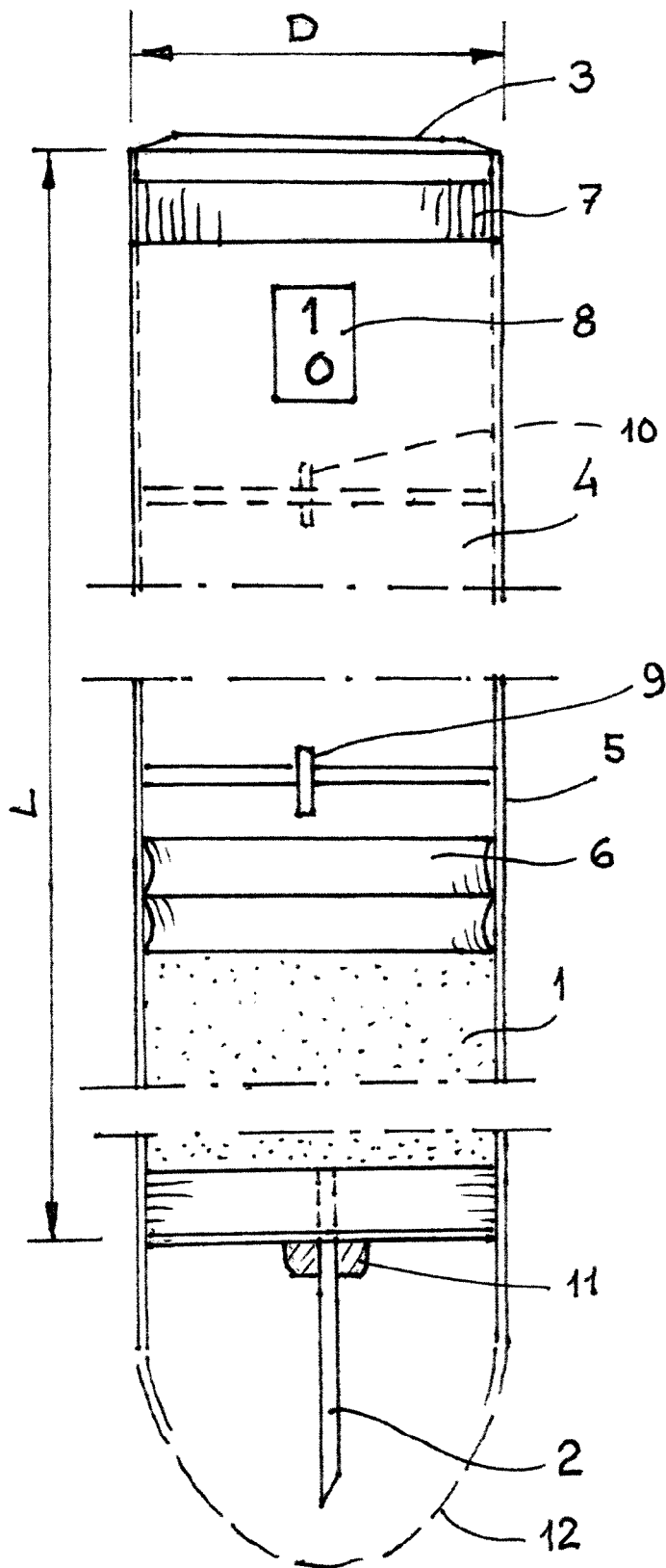
1. an insulin pen comprising an insulin reservoir (1) and an injection needle (2), and at the opposite end of the insulin pen, a press-button (3), by means of which an insulin dose is injected into the patient's body, **characterised** in that the insulin pen comprises a pressure reservoir (4) which is filled with propellant gas and
10 can be opened by pressing the press-button so that the propellant gas presses the insulin dose through the injection needle (2) into the patient's body.

2. An insulin pen as defined in claim 1, **characterised** in that a piston (6) pressed by propellant gas and moving within the body (5) of the insulin pen is
15 provided between the pressure reservoir (4) and the insulin reservoir (1), the piston pressing the entire insulin dose into the patient's body. .

3. An insulin pen as defined in claim 1 or 2, **characterised** in that a control knob (7) of the number of insulin units is provided in connection with the
20 press-button (3) for controlling the insulin dosage.

4. An insulin pen as defined in claim 1, 2 or 3, **characterised** in that a pressure nozzle (9) is provided between the pressure reservoir (4) and the piston (6) for choking the amount of propellant gas so as to set the specific injection duration,
25 preferably 10 seconds.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2017/000014

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base, and, where practicable, search terms used)

EPODOC, EPO-Internal full-text databases, Full-text translation databases from Asian languages, WPIAP, PRH-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3977401 A (PIKE WILLIAM FLOYD) 31 August 1976 (31.08.1976) column 3, lines 1-5; column 4, line 50 – column 6, line 63; figures 1-3	1-4
X	US 6045534 A (JACOBSEN STEPHEN C [US] et al.) 04 April 2000 (04.04.2000) column 1, lines 9-13, 20-24; column 4, lines 30-52; column 5, lines 8-11, 30-40; column 7, lines 16-24, 55-67; claims 14, 15; figures 2A, 2B, 5, 8	1-3
X	US 2011092906 A1 (BOETTGER FRANK [DE] et al.) 21 April 2011 (21.04.2011) paragraphs [0010], [0013], [0026], [0030], [0038], [0040], [0044]; figures 1-3	1-3

☐ Further documents are listed in the continuation of Box C.
☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

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INTERNATIONAL SEARCH REPORT
Information on Patent Family Members

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Patent document cited in search report	Publication date	Patent family members(s)	Publication date
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CLASSIFICATION OF SUBJECT MATTER

IPC

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