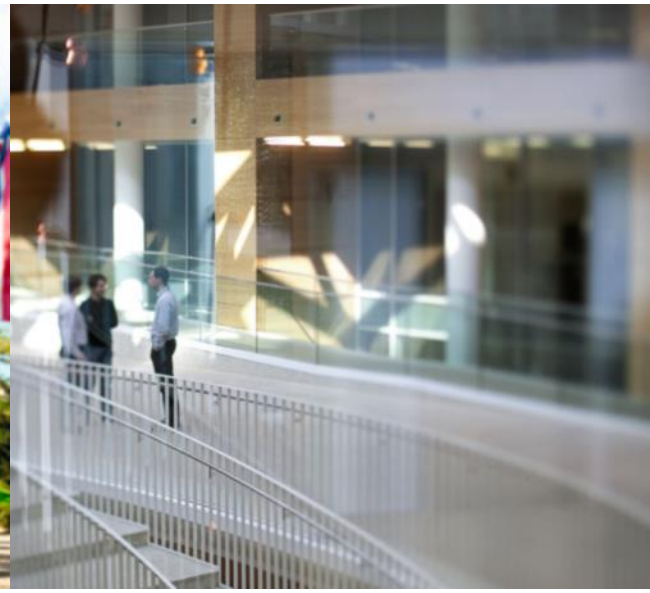
Europäisches Patentamt
European Patent Office
Office européen des brevets

The European Patent Office

An introduction to the EPO
and the search activities for the Patent Office of the Republic of Latvia





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Director Applied Physics 1557 / Liaison officer NPO
Last update: October 2016

Contents

Our mission

As the patent office for Europe, we support innovation, competitiveness and economic growth across Europe through a commitment to high quality and efficient services delivered under the European Patent Convention.

Today....

38 European member states

Belgium • Germany • France • Luxembourg
Netherlands • Switzerland • United Kingdom
Sweden • Italy • Austria • Liechtenstein
Greece • Spain • Denmark • Monaco
Portugal • Ireland • Finland • Cyprus
Turkey • Bulgaria • Czech Republic
Estonia • Slovakia • Slovenia • Hungary
Romania • Poland • Iceland • Lithuania
Latvia • Malta • Croatia • Norway
Former Yugoslav Rep. of Macedonia
San Marino • Albania • Serbia

2 European extension states

Bosnia-Herzegovina • Montenegro

2 Validation states

Morocco
Republic of Moldova

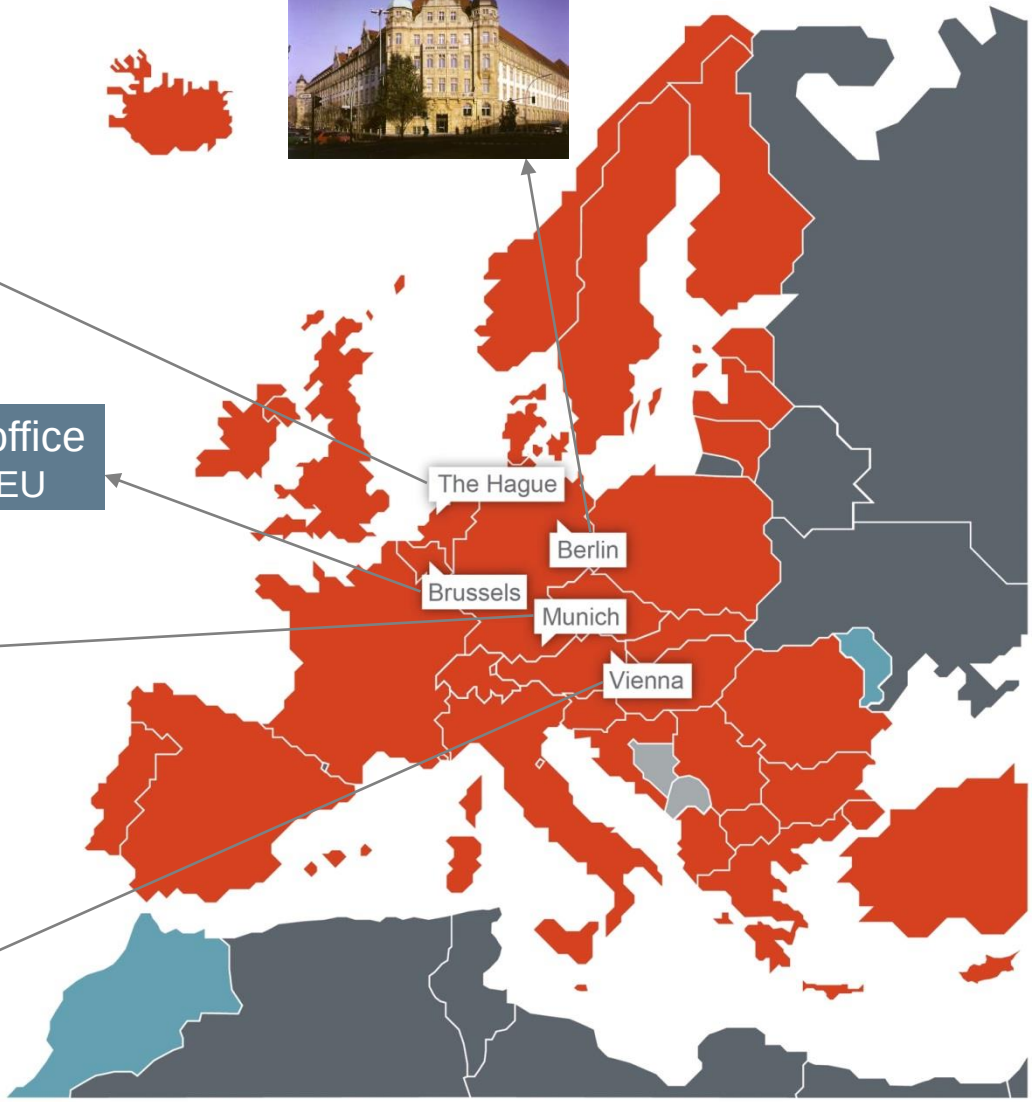
Our status

- Second-largest intergovernmental institution in Europe
- Not an EU institution
- Self-financing, i.e. revenue from fees covers operating and capital expenditure

Our five locations in Europe

Headquarters

Liaison office with the EU



Our staff

Munich	3 784
The Hague	2 659
Berlin	266
Vienna	102
Brussels	4
Total	6 815

Around 60% are patent examiners

Source: EPO data on 31.12.2015

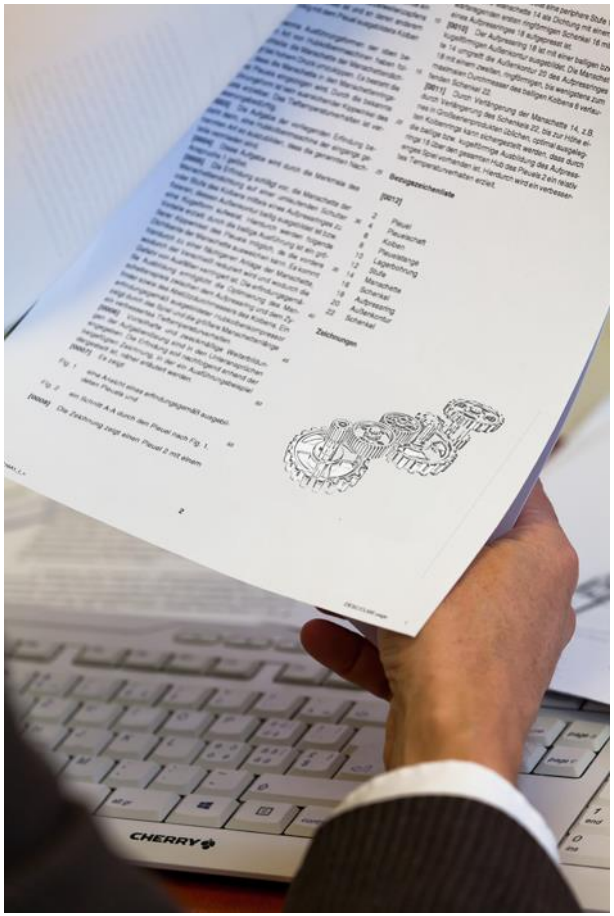
A multicultural working environment

- Over 30 different nationalities

- Three languages for working in and for communicating with applicants:
  - English
  - French
  - German

Contents

Filing



- Bibliographic data (Title of the invention, name of the inventor...)
- A detailed description of the invention, one or more claims and (optional) drawings.
- The patent office checks the documentation for compliance.
- A date of filing is allocated.

The application

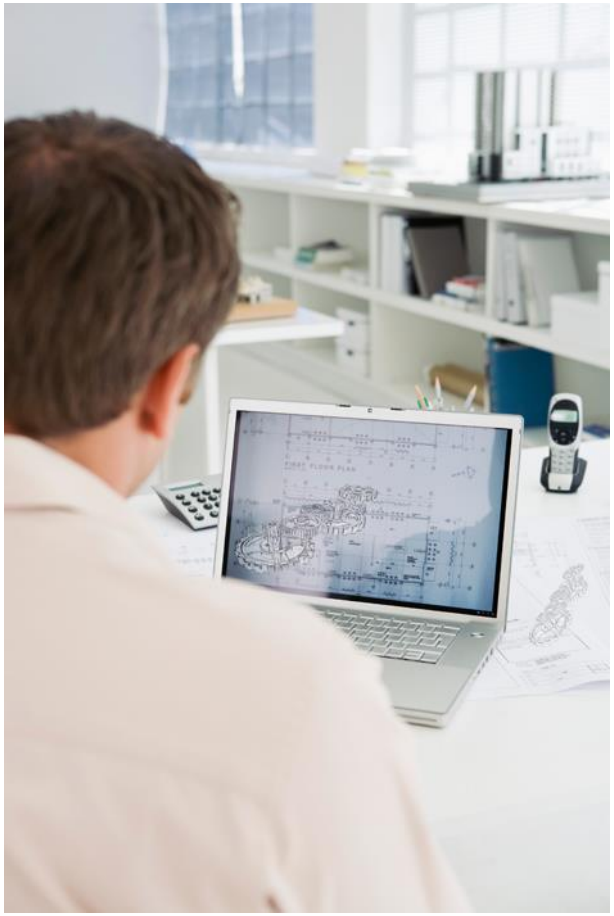
- For National Patent Offices not having an official language the documents have to be provided in English (for search) in addition to the national language
- The documents have to fulfil strict quality criteria
- The documents have to arrive in time if the search has to be carried out in time (maximum 5 months after national filing)

Contents

Searches for national applications under working agreements approved by the Administrative Council

- EPO carries out searches for national applications filed in 13 Member States of the Organisation
- With each of these countries a similar working agreement was signed
- The quality of the national searches is the same as for an EP application
- The search results for NPO's comprise a search report and a written opinion about patentability
- the searches for NPO's first filings have the highest priority among the tasks of DG1

The search



- Highly qualified examiners search for the state of the art at the date of filing.
- They search in databases containing millions of patent and non-patent documents.
- They use the results of the search to determine whether an invention is new and involves an inventive step.
- They then issue a search report and a preliminary opinion on patentability.

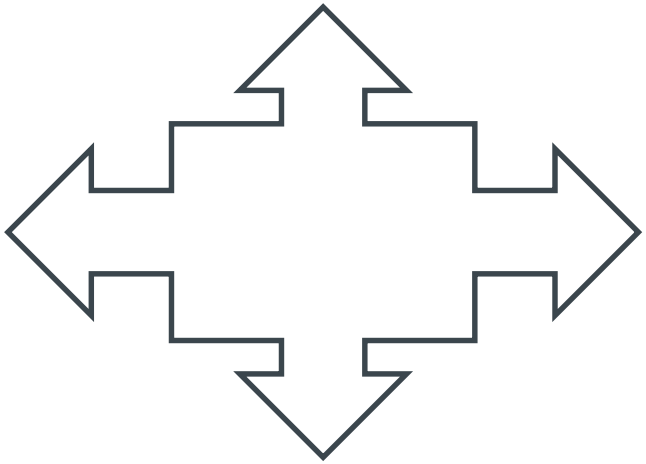
What is the "state of the art"?

Everything made available to the public by means of ...

written description

... before the filing date of the application

oral description



by use

or in any other way

State-of-the-art searches

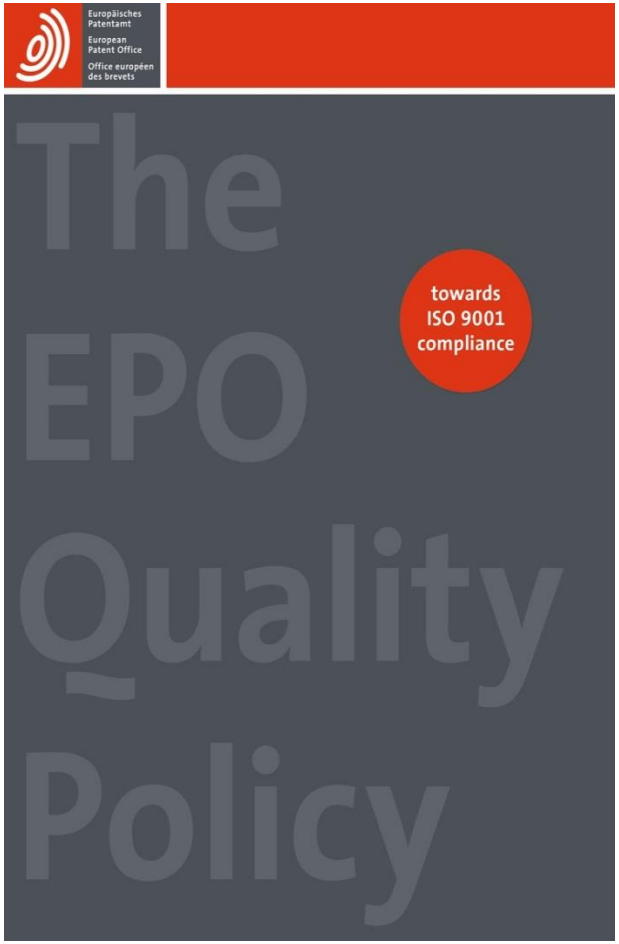
- World's largest collection of documents
  - 1 billion records of patent, non-patent literature and other sources incl. 40 million records from Asia
  - databases updated daily

- High-performance EPOQUE search tool
  - used by examiners
  - a worldwide benchmark
  - used by 47 patent offices, including Australia, Brazil and China

- Machine translation to extend the range of easily accessible information

Key components of the EPO's patent quality policy

- Highly skilled examiners
- Sophisticated search engine
- Thorough procedures and review processes
- Quality controls and an ongoing commitment to improvement



Contents

Novelty

- The search report shall mention the novelty destroying documents
- The category X will indicate the relevance of a document in the SR
- The written opinion will contain an explicit and detailed statement about novelty (positive or negative) for each claim

Inventive step

- The examiner will search for prior art allowing him to assess Inventive step

- For the examiner an invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art.

- EPO applies the Problem-Solution Approach

Problem-Solution Approach

1. What is the closest prior art?

2. What is the difference, in terms of the claimed technical features, between the claimed invention and the closest prior art?

3. What technical effect is caused by this difference?

4. What, therefore, is the objective technical problem underlying the claimed invention?

5. Would the skilled person solve this problem in the manner indicated on the basis of the totality of the prior art, without at any stage employing any inventive skill?

Inventive step

- The search report shall mention the documents causing lack of an inventive step
- The category Y (exceptionally X) will indicate the relevance of a document in the SR
- The written opinion will contain an explicit and detailed statement about inventive step (positive or negative) for each independent claim, and further indicate the deficiencies of dependent claims.

The report

- EPO will address clarity and industrial applicability
  - clarity assessed (only) if it has an impact on novelty or I.S assessment
  - Industrial applicability sometimes not explicitly mentioned if evident
- EPO will not carry out more than one search for one application (requirement of Unity) : no possibility to pay for additional search fees for a full search
- EPO will not search non patentable subject-matter

Contents

EPO will deliver in Time

- *Time limits under the working agreement*

- (1) If the patent application is a first filing (i.e. does not claim priority), the EPO shall draw up the search report, accompanied by the written opinion, within nine months of the date of filing of the application, provided the search request is received no later than five months after the date of filing. If the search request is received later than five months after the said date, the EPO shall endeavour to draw up the search report before the priority period expires.
- (2) If the patent application is not a first filing (i.e. claims the priority of at least one earlier application), the EPO shall draw up the search report, accompanied by the written opinion, as rapidly as possible, having regard to the time limits generally applied when drawing up search reports on national patent applications which are not first filings and which are entrusted to the EPO under working agreements.

The search - How will EPO deliver?

- EPO will deliver the search result to the NPO not to the applicant

- Direct contact between the applicant/representative and the examiner is excluded by the working agreement

- Contact in both directions can/will take place but it has to be via a liaison team and the national patent office

The search report

Europäisches Patentamt
European Patent Office
Office européen des brevets

SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KELLEHER K S ET AL: "ELECTRONIC SCANNING FOR SATELLITES", PROCEEDINGS OF THE NATIONAL ELECTRONICS CONFERENCE,, vol. 17, 1 January 1961 (1961-01-01), pages 290-300, XP001387797,	1,6-13	INV. H01Q1/28 H01Q1/12 H01Q19/04
Y	* page 292, paragraph 7 - page 293, paragraph 1; figures 4-8 * * page 293, paragraph 4 *	2-5	
X	J. COSTANTINE ET AL: "Deployable antennas for CubeSat and space communications", 2012 6TH EUROPEAN CONFERENCE ON ANTENNAS AND PROPAGATION (EUCAP), 1 March 2012 (2012-03-01), pages 837-840, XP055250476, DOI: 10.1109/EuCAP.2012.6206124 ISBN: 978-1-4577-0919-7 * figure 4 *	1-13	
X	JP 2014 019238 A (UNIV KAGAWA) 3 February 2014 (2014-02-03)	1	TECHNICAL FIELDS SEARCHED (IPC)
Y	* figures 1,4 *	2-5	H01Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague		Šípal, Vít

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EPO FORM 1503 11.06 (P04C06)

The written opinion

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 MINSHENG WANG ET AL: "A 120 dB Dynamic Range 400 mW Class-D Speaker Driver With Fourth-Order PWM Modulator", IEEE JOURNAL OF SOLID-STATE CIRCUITS, IEEE SERVICE CENTER, PISCATAWAY, NJ, USA, vol. 45, no. 8, 1 August 2010 (2010-08-01), pages 1427-1435, XP011314247, ISSN: 0018-9200, DOI: 10.1109/JSSC.2010.2047426

D2 MARCO BERKHOUT ET AL: "Class-D Audio Amplifiers in Mobile Applications", IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS I: REGULAR PAPERS, IEEE, US, vol. 57, no. 5, 1 May 2010 (2010-05-01), pages 992-1002, XP011333671, ISSN: 1549-8328, DOI: 10.1109/TCSI.2010.2046200

1. Claim 1: the subject matter of independent claim 1, once properly clarified (reasons are given in point 1 of the separate sheet regarding Item VIII) is neither known from, nor rendered obvious by, the available prior art, reasons as follows.

Document D1, which is cited on page 2, lines 8-12 of the description of the present application, is regarded as being the closest prior art to the subject-matter of independent apparatus claim 1, so far as claim 1 can be understood (see point 1 of the separate sheet regarding Item VIII).

D1 discloses in Fig.5 (the references in parentheses applying to this document): a digital class D amplifier comprising a pulse width modulator comprising a digital loop filter (Digital Loop Filter) having first input (+) adapted to receive an input signal (Digital input) and a second input (-) adapted to receive a feedback signal, the digital loop filter (Digital Loop Filter) being adapted to process, at a clock frequency (fs, and read also page 1430, left-hand column, lines 24-26) the input (Digital input) and feedback signals for providing as output a filtered digital signal; a PWM conversion module (block having comparator symbol) having an input for receiving the filtered digital signal and having a first output connected to the second input (-) of the digital loop filter (Digital Loop Filter), the PWM conversion module (block having comparator symbol) being adapted for processing the filtered digital signal and providing at said first output the feedback signal; wherein the PWM conversion module (block having comparator symbol) comprises a first comparator adapted to compare the filtered digital signal with a first reference triangular waveform (block with digital triangle waveform symbol) for providing as output a first PWM signal, the frequency (fosc) of the first reference triangular waveform (block with digital triangle waveform symbol) being much lower than the clock frequency (fs, and read also page 1430, left-hand column, lines 14-15).

The subject matter of claim 1 therefore differs from this known digital class D amplifier in that the following features are present: a second comparator adapted to compare the filtered digital signal with a second reference triangular waveform for providing as output a second PWM signal, the second reference triangular waveform being the inverse of the first triangular waveform; an algebraic adder adapted to receive as inputs said first and said second PWM signals for providing as output said feedback signal, the first and second PWM output signals in their combination representing a differential output pulse width modulated signal.

Therefore the subject matter of independent claim 1 is new, so far as it can be understood (see point 1 of the separate sheet regarding Item VIII).

The problem to be solved by the present invention may be regarded as providing a digital class D amplifier with spike free outputs and loop stability (read also the description of the present application, page 3, lines 9-11).

The problem is well known in the field and hence cannot lend an inventive step of its own. The introduction of a differential architecture based on feedback constitutes a well known technique for solving this known problem (see for instance document D2, the embodiment of Fig.17), however the distinguishing features of claim 1 are neither disclosed nor suggested by the available prior art. These distinguish features actually increase the stability and spike immunity of the digital class D amplifier, being based on two separate comparators having a common feedback signal and two different reference triangular waveforms as inputs. Therefore the subject matter of independent apparatus claim 1, once properly clarified (see point 1 of the separate sheet regarding Item VIII) constitutes an alternative solution to said known problem, i.e. the subject-matter of claim 1 involves an inventive step over the documents which are cited in the search report.

2. Claim 10: the subject matter of independent claim 10 constitutes the digital signal processing method implementation of the apparatus defined in claim 1. Hence the same reasoning of point 1 above applies, *mutatis mutandis*, to the subject-matter of the corresponding independent method claim 10, which therefore is also considered to be novel and inventive over the available prior art, once properly clarified (see point 1 of the separate sheet regarding Item VIII).

3. Dependent claims 2-9 and 11 are dependent on claims 1 and 10, respectively, and they are considered to be new and inventive over the documents which are cited in the search report, once claims 1 and 10 properly clarified (see point 1 of the separate sheet regarding Item VIII).

Re Item VII

Certain defects in the application

1. The relevant background art disclosed in document D2 is not mentioned in the description, nor is this document identified therein.

2. Independent claims 1 and 10 are not correctly split in the two-part form with respect to the closest prior art (see the features which are present in the embodiment of Fig.5 of document D1 and what has been stated in point 1 of the separate sheets regarding Item V).

Re Item VIII

Certain observations on the application

1. Claims 1 and 10 are not clear, reasons as follows.

It is clear from the description from page 2, line 22, to page 3, line 1, from page 5, lines 6-7, from page 7, lines 11-14, from page 8, lines 8-11 and 20-22, that the following features are essential to the definition of the invention:

(a) the digital loop filter (Loop_F) being adapted to process, at a clock frequency (f_s), the input (x[n]) and feedback (fb[n]) signals.

(b) the frequency (f_osc) of the first reference triangular waveform (VTn[n]) being much lower than the clock frequency (f_s);

(c) the first (yn [n]) and second (yp [n]) PWM output signals in their combination representing a differential output pulse width modulated signal;

Since independent apparatus claim 1 does not contain these features (a), (b) and (c) above and independent method claim 10 is missing at least these features (a) and (b) above as corresponding method steps, claims 1 and 10 do not meet the requirement of clarity that any independent claim must contain all the technical features essential to the definition of the invention.

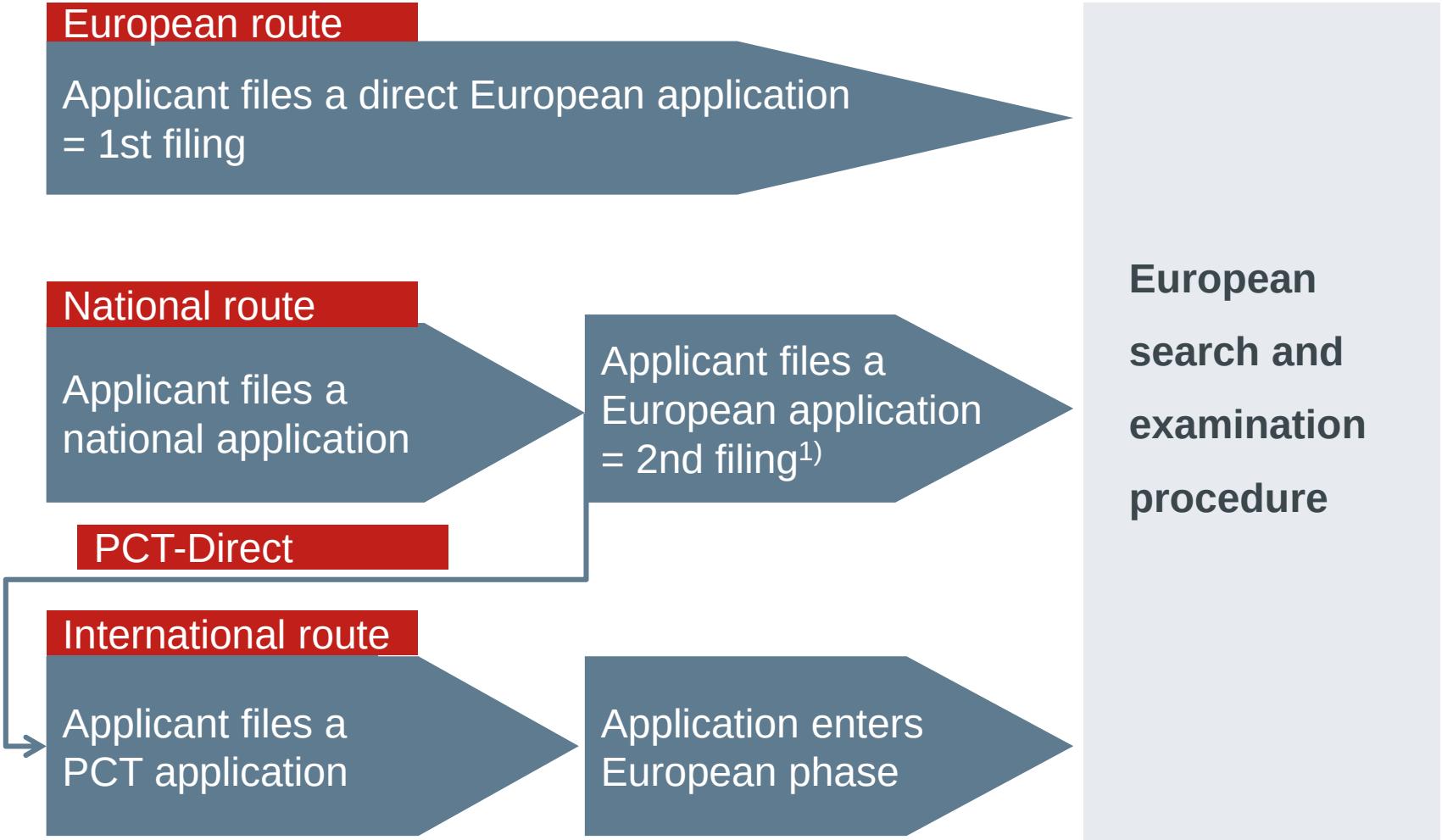
However, for the sake of examination with respect to novelty and inventive step (see the separate sheets regarding Item V), said features (a), (b) and (c) above have been considered as being part of the subject matter of said claims 1 and 10.

Quality controls and commitment to improvement

- Guidelines and instructions for examiners 
- Spot-checks on search reports and examination quality 
- Internal quality audits 
- ISO 9001 certified Quality Management System for the entire patent process 

Contents

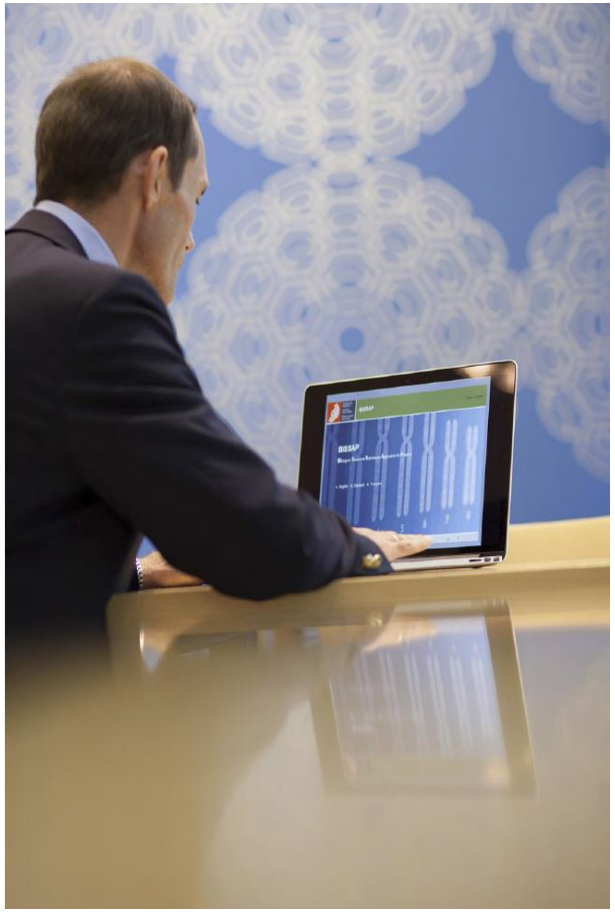
Three ways to start the European procedure



1) By claiming priority of an earlier application filed with a national office within 12 months.

Contents

Training organised by the European Patent Academy



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