Metroconsult

DEFENDING CREATIVITY WITH TAILORED PROTECTION

How to write a patent application

The task of the inventor and of the patent attorney since the beginning

PhD+ 2016

Research valorization, innovation, entrepreneurial mindset

UNIVERSITÀ DI PISA

Corrado Borsano

Pisa, March 17th , 2016

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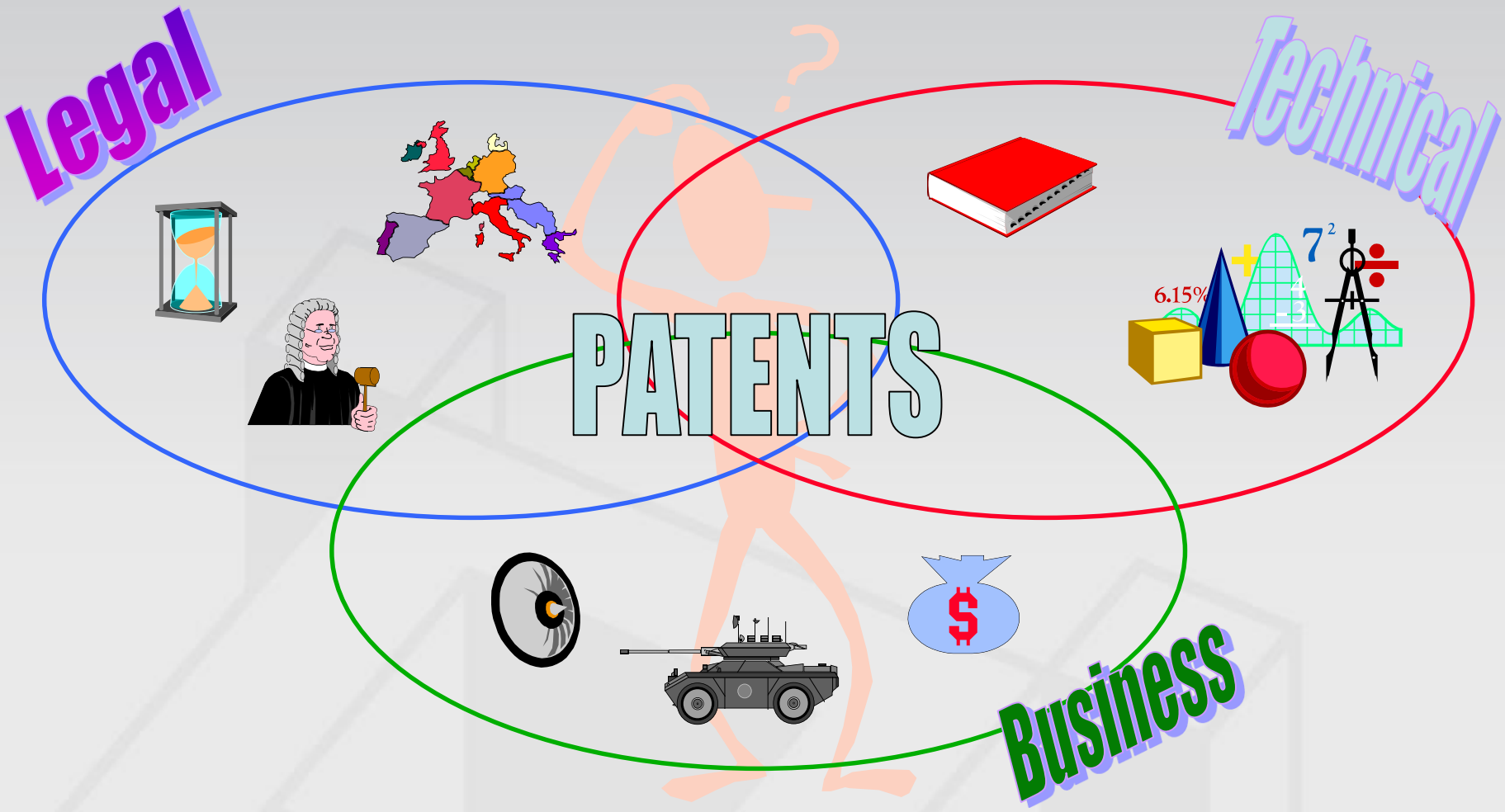

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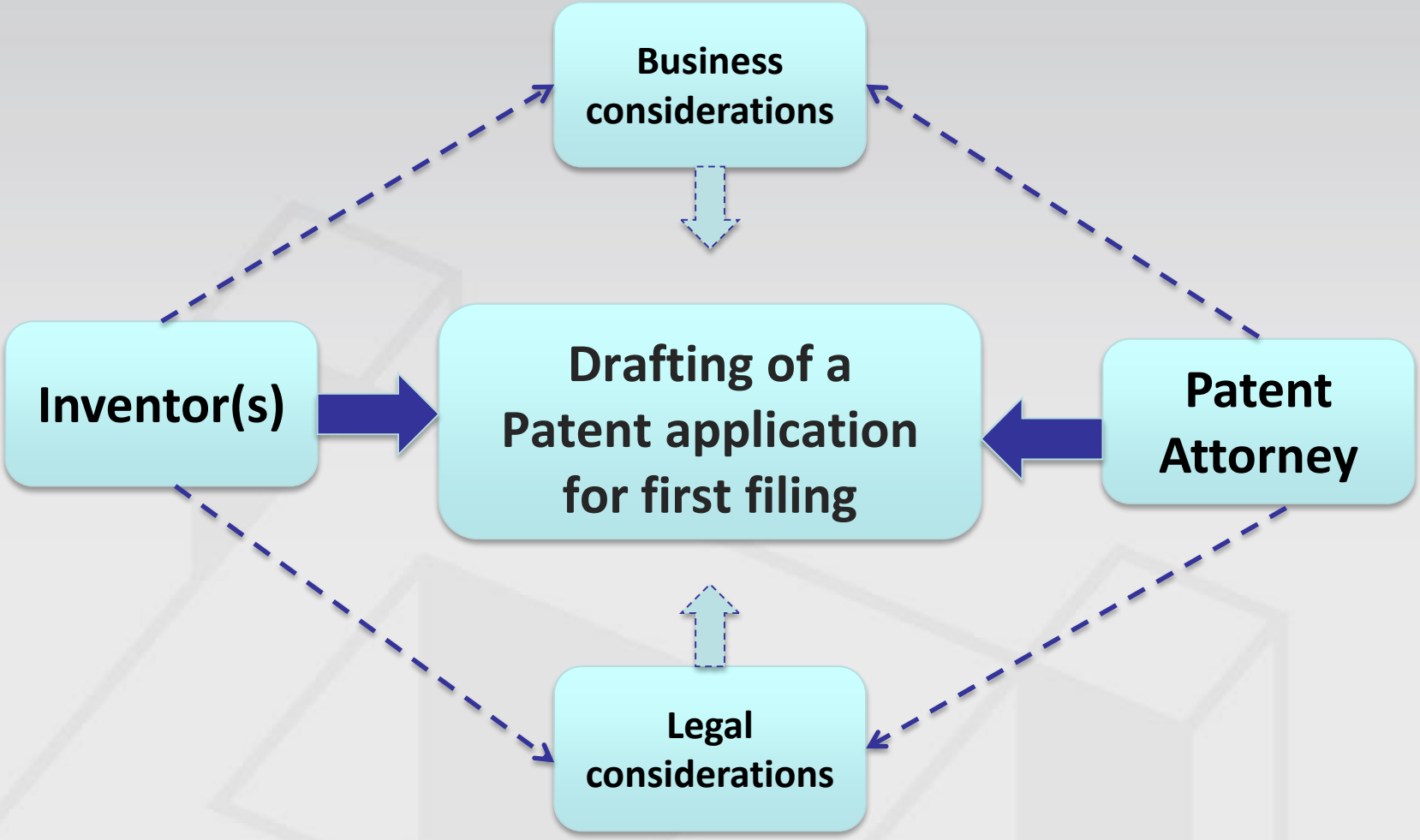

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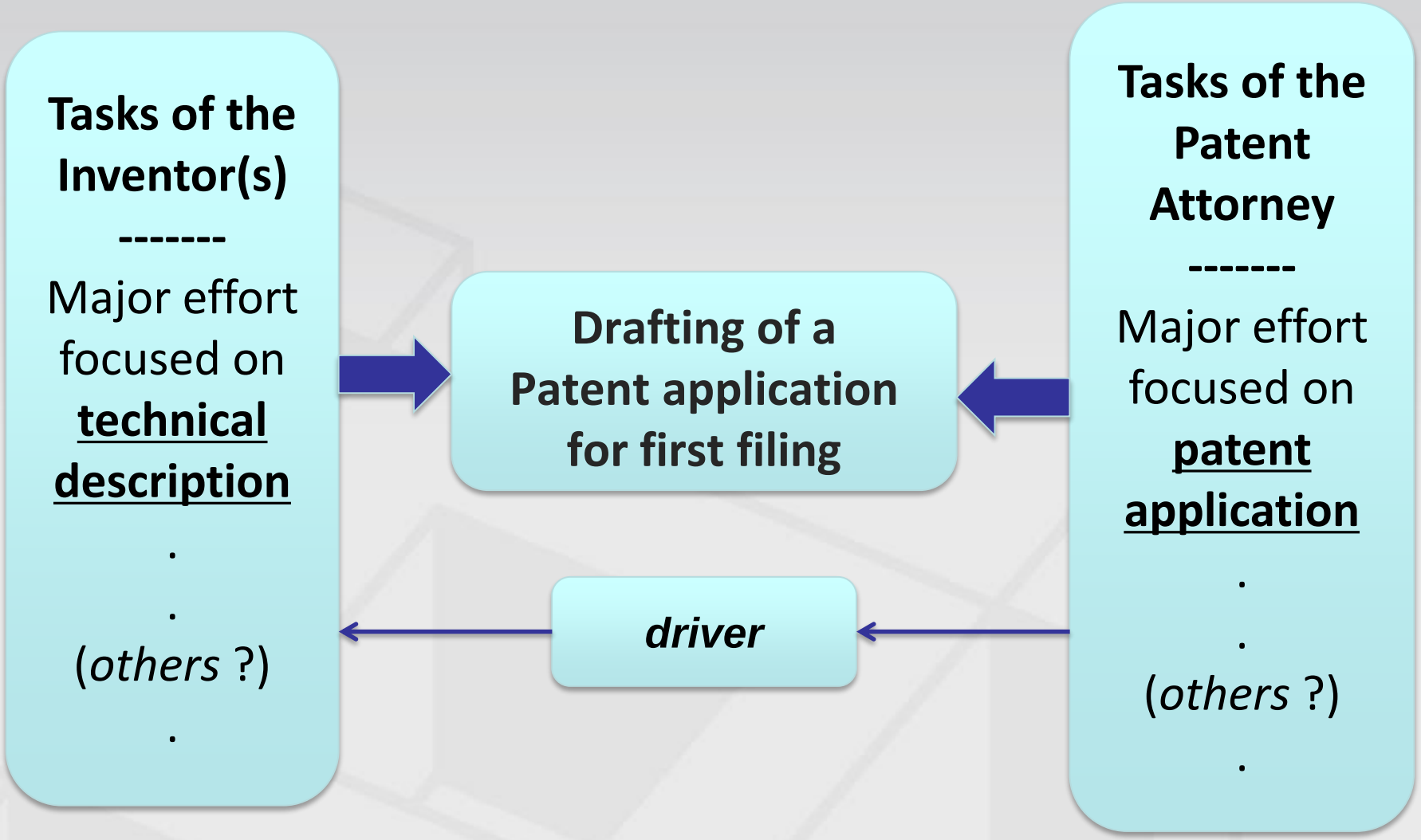
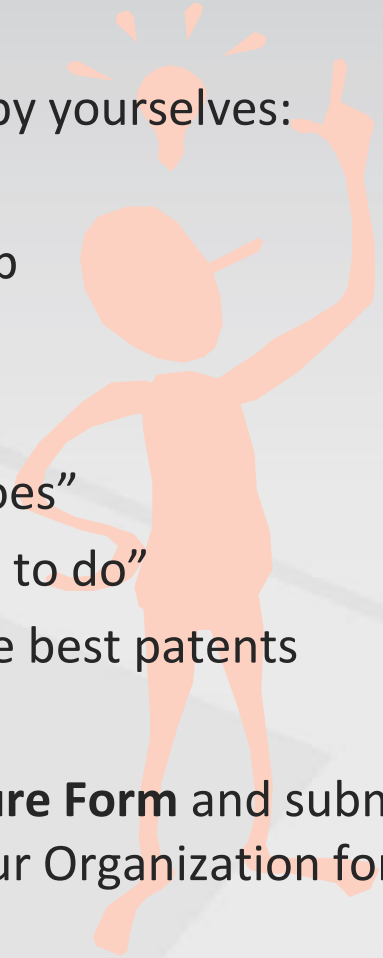

Tasks of the Inventor(s)

Major effort focused on **technical description**
.
.
(*others* ?)
.
Drafting of a Patent application for first filing
driver
Tasks of the Patent Attorney

Major effort focused on **patent application**
.
.
(*others* ?)
.

Criteria for Patentability



- Do not think or believe by yourselves:
  - lack of novelty
  - lack of inventive step

- When somebody says:
  - “What everybody does”
  - “What you just have to do”

  those are sometimes the best patents

Fill in an **Invention Disclosure Form** and submit it to the correct person inside your Organization for evaluation

Criteria for Patentability

1. **Novelty**
   - Not known to the public
   - Small difference is decisive

2. **Non-obviousness (inventive step)**
   - To be judged in comparison with prior art
   - A question for patent experts only
     - you should never decide this question for yourself

3. **Industrial application**

Criteria for Patentability: what cannot be patented

Article 52 - EPC
Patentable inventions

.....

(2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:

(a) discoveries, scientific theories and mathematical methods;

(b) aesthetic creations;

(c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers;

(d) presentations of information.

(3) Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

Article 53 - EPC
Exceptions to patentability

European patents shall not be granted in respect of:

(a) inventions the commercial exploitation of which would be contrary to "ordre public" or morality; such exploitation shall not be deemed to be so contrary merely because it is prohibited by law or regulation in some or all of the Contracting States;

(b) plant or animal varieties or essentially biological processes for the production of plants or animals; this provision shall not apply to microbiological processes or the products thereof;

(c) methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body; this provision shall not apply to products, in particular substances or compositions, for use in any of these methods.

European Patent Convention

Equivalent Provisions in the Italian Patent law

Problem-Solution Approach

Is there a technical problem to be solved?

Is there a deficiency in the known solutions rendering them useless to the purpose?

Is there a basic idea
for solving the technical problem
In a non obvious way vis-à-vis the known solutions ?

TECHNICAL SOLUTION  **TECHNICAL EFFECT**

The simpler the basic idea ⟺ The higher its value

The more the basic idea can be easily identified (with respect to the rest of the project) ⟺ The higher its value

- The same considerations apply to the **SOFTWARE INVENTIONS** when the software can be considered as a means for the embodiment of the invention

- The software is patentable in the technical results and not per se («as such»)

What is «Technical»?

- There is no definition of the term “technical” in the patent law, as it is extremely difficult to find a definition which might be valid for all the technology fields and that might be valid also in the future.

- Thus, reference must be made to the EPO Case Law containing the decisions taken by the Board of Appeals.

- Examples of what is considered technical (software domain):
  - processing physical data in a system which affects the control of an industrial process;
  - processing which affects the way in which a computer operates such as a file compression algorithm;
  - any physical apparatus such as a computer or any of its components are considered to be technical.

What is «not-Technical»?

- Purely abstract concepts are considered as non-technical.

- Examples of what is considered to be non-technical (software domain):
  - sales methods, trading, insurance schemes;
  - business administration acts (choosing a candidate for a job);
  - modeling a system;
  - mathematical methods describing the physical effects of an electronic filter.

- In other words, the activities falling within the frame of the “non inventions” tipically represent abstract concepts devoid of any technical implication.

Software Protection

Types of legal protection for software

- **Copyright**
  - Only the form = the sequence of instructions
  - No protection of idea, procedure, process, system
- **Trade Secret**
  - Disclosure only with confidentiality obligation
- **Patent**
  - Most effective level for protection of software
  - Entire inventive concept is protected

Invention Study
IDF submission

Inventors

Filing Decision

Decision
Organization

First Filing

Inventors,
Patent Attorney

Further Filing

Decision
Organization

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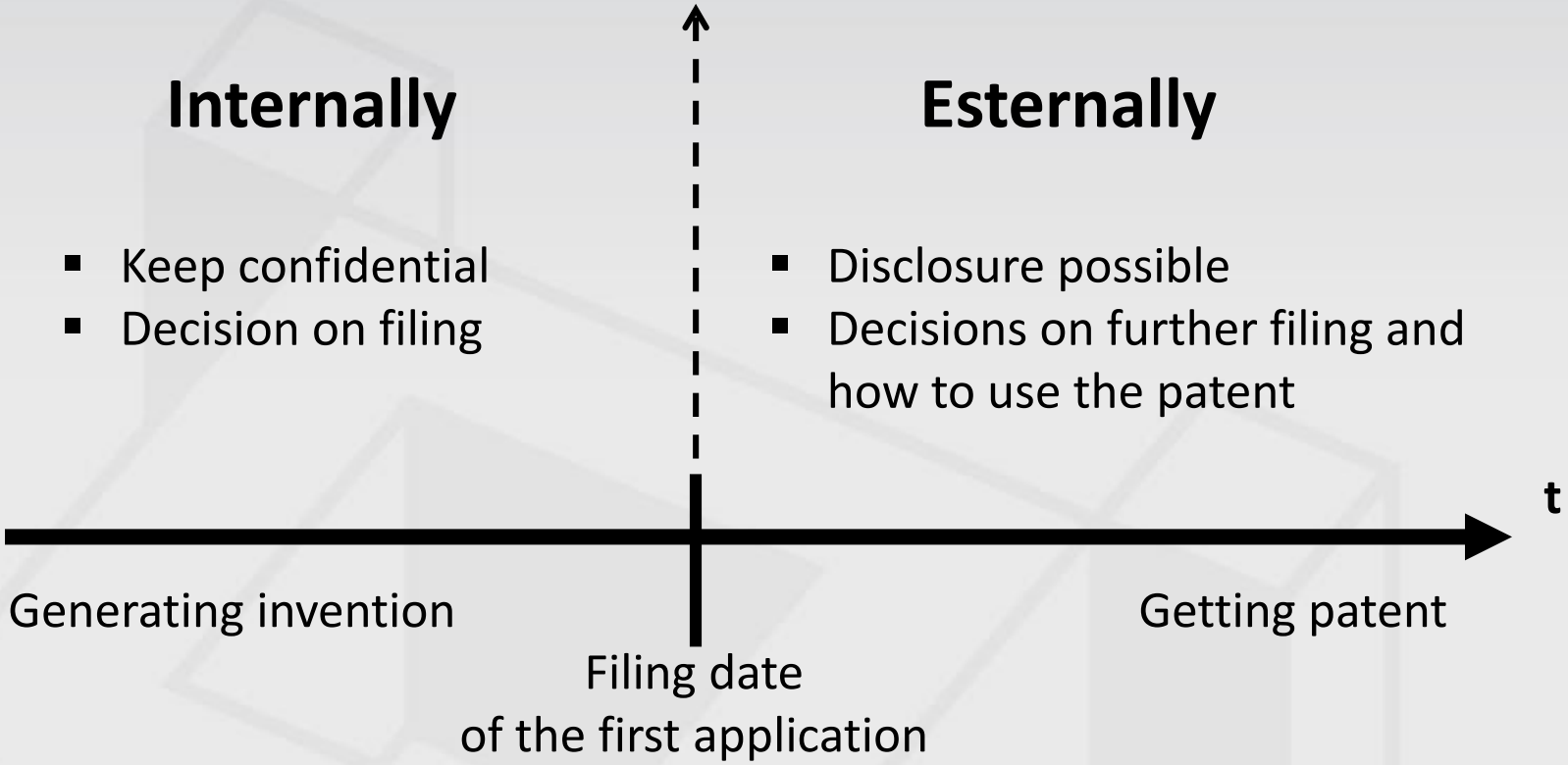
When filing a patent application

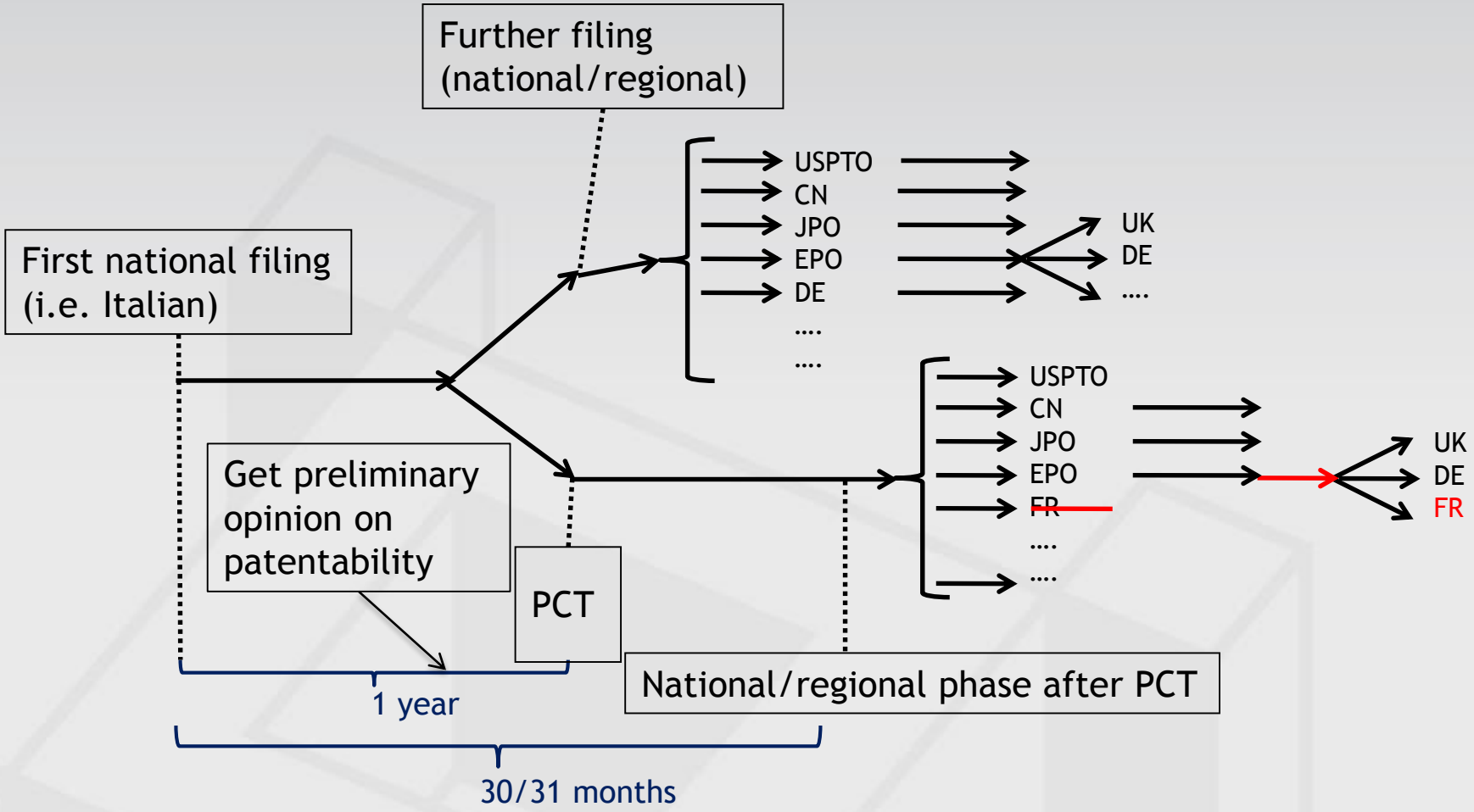
When first filing ?
Before any disclosure



Decision on country coverage

- Countries of manufacturing by the owner or his licensees;
- Countries of manufacturing by the major competitors or their licensees;
- Countries of direct or indirect selling by the owner and/or competitors;
- Countries where licensing opportunities can happen;
- Balance between costs/benefits in each country.

Country coverage decision procedure (example)



Rule 42 EPC

Content of the description

The description shall:

a) specify the technical field to which the invention relates;

b) indicate the background art which, as far as is known to the applicant, can be regarded as useful to understand the invention, draw up the European search report and examine the European patent application, and, preferably, cite the documents reflecting such art;

c) disclose the invention, as claimed, in such terms that the technical problem, even if not expressly stated as such, and its solution can be understood, and state any advantageous effects of the invention with reference to the background art;

d) briefly describe the figures in the drawings, if any;

e) describe in detail at least one way of carrying out the invention claimed, using examples where appropriate and referring to the drawings, if any;

[...]

Invention Disclosure Form – IDS (1)

Technical problem to be solved

- Short description of the core of the technical problem to be solved: for example a drawback in a known product or process, or a new technical need not yet identified.
- Generally if a technical problem cannot be identified, an invention is hard to be patented.

Description of the known state of the art

- Short description of known solution attempts to the problem, or the closest prior art as a background.

Drawbacks in the known prior art

- Short description of the drawbacks in the known solutions which justify the need for the invention.

Invention Disclosure Form – IDS (1)

Short description of the invention

- Short description of the basic idea of solution to the above described problems.
- There are basically two kinds of inventions: new product or new process.
- Often both kinds of inventions are present in the same patent: through a new process a new product can be obtained, or a new product can give rise to a new process for the use of that product.
- Independently of the complexity of the detailed technical solution (to be described in the following para), the basic idea has to be as simple as possible.

Advantages

- Short explanation of the technical and economical advantages obtained by the use of the invention.
- Applicability to the products on the market.
- If available give commercial evaluation hints

Technical Report for a Patent

in addition to the previous invention disclosure form IDS
following decision to proceed for filing

Detailed description

- Detailed description of at least an example of embodiment of the technical solution, in terms of how the product or process is made, and the way of working.
- Normally accompanying drawings are necessary.
  - For the mechanical parts: 2-D figures of sights of the whole product and its parts (exploded view); dimensions are not necessary.
  - For the electronic parts: block circuit diagrams, with a level of circuit details to be decided on a case by case basis.
- The level of technical details to be given is that beyond which the technical expert is able to go ahead alone in implementing the invention, without further explanation.
- The description is made with reference to the drawings, with further information on the materials or circuit components used al least in the new parts. The known parts of the circuit or product can be described more generally with a lower level of details.
- A process can be described with the support of a flow chart of the process steps.

Invention Disclosure Form – IDS - Software Patent (1)

Technical problem to be solved

- Short description of the core of the technical problem to be solved: for example a drawback in a software procedure for processing data or signals, or a new technical need not yet identified.
- The technical problem in the software inventions can be found either inside the computer or computer network, for example in a non efficient way of working (long processing time, or need of manual intervention…), or outside the computer, for example in the way of processing data or signals, or in the way of controlling an industrial process.
- Generally if a technical problem can not be identified, an invention is hard to be patented.

Description of the known state of the art

- Short description of known solution attempts to the problem, or the closest prior art as a background.

Drawbacks in the known prior art

- Short description of the drawbacks in the known solutions which justify the need for the invention.

Invention Disclosure Form – IDS - Software Patent (2)

Short description of the invention

- Short description of the basic idea of solution to the above described problems. For example a key step (or sequence of steps) in the software procedure.
- Independently of the complexity of the detailed technical solution (to be described in the following para), the basic idea has to be as simple as possible, to be defined in terms of a few basic steps.
- Also the technical solution in the software inventions has to be found either inside the computer or computer network, for example in the optimized way of working (for example short processing time, or completely automatic way of working…), or outside the computer, for example in the way of processing data or signals, or a way of controlling an industrial process.

Advantages

- Short explanation of the technical and economical advantages obtained by the use of the invention.
- Applicability to the products on the market.
- If available give commercial evaluation hints.

Technical Report for a Software Patent

in addition to the previous disclosure form IDS
following decision to proceed for filing

Detailed description

- Detailed description of the technical solution, in terms of how the software steps are made, and the way of working.
- It is normally useful to start from the explanation of the logic level, if possible with the help of flow-charts and/or state diagrams.
- Then the phisical level is described, giving an example of some parts (sub-routines) of the software listing, where specifically the invention applies.
- The level of technical details to be given is that beyond which the technical expert is able to go ahead alone in implementing the invention, without further explanation.
- If some parts of the logic level are known per se, the relating description can remain at a high level, with a definition of the relating functions to be performed.
- Instead the description must be focused on the inventive part of the whole software.
- Generally it is also necessary to give an example of hardware architecture in support of the software part.

Invention Disclosure Form – IDS – life science (1)

Technical problem to be solved

- Short description of the core of the technical problem to be solved: for example a drawback in a known product or process, or a new technical need not yet identified.
- Generally if a technical problem cannot be identified, an invention is hard to be patented.

Description of the known state of the art

- Short description of known solution attempts to the problem, or the closest prior art as a background.

Drawbacks in the known prior art

- Short description of the drawbacks in the known solutions which justify the need for the invention.

Invention Disclosure Form – IDS - life science (2)

Short description of the invention

- Short description of the basic idea of solution to the above described problems.
- There are basically two kinds of inventions: a new product or substance (possibly also an intermediate product), or a new process for preparation / isolation / purification of the product (also a second use of a known product).
- Often both kinds of inventions are present in the same patent: through a new process a new product can be obtained, or a new product can give rise to a new process for the use of that product.
- Independently of the complexity of the detailed technical solution (to be described in the following para), the basic idea has to be as simple as possible.
- In the field of life sciences, a product can also be drug, or a chemical composition, also as an intermediate in a production process to achieve a final composition.
- It is also possible to claim a product (drug) already known for a particular therapeutic use, but addressed to a new therapeutic use.
- It is also possible to claim a complex product intended as a "kit of parts".

Invention Disclosure Form – IDS - life science (3)

Short description of the invention (ctd …..)

- At the European level it is not possible to claim a surgical, therapeutic or diagnostic method, for treatment of the human or animal body, especially if it is of invasive type. However, when the invention is mainly directed to the product, it is useful to describe also said process since in other countries it may be claimed (as in the USA), in case it is decided to file the patent application also in these countries. Instead the cosmetic treatment methods are patentable.

Advantages

- Short explanation of the technical and economical advantages obtained by the use of the invention.
- Applicability to the products on the market.
- If available give commercial evaluation hints

Technical Report for a Patent - life science (1)

in addition to the previous invention disclosure form IDS
following decision to proceed for filing

Detailed description

- Detailed description of at least an example of embodiment of the technical solution, in terms of how the product or process is made, and the way of working.
- In the case of product and / or chemical / pharmaceutical / cosmetic composition, etc., it is necessary to describe / identify precisely and completely the products (structure, chemical-physical characteristics, and so on) and at least one process for its production.
- Consequently, the detailed description must also be accompanied by an experimental section describing with accuracy at least one (preferably more than one) of the products / compositions of the invention / formulations and at least one process for the preparation of said one or more products.
- The level of technical details to be given is that beyond which the technical expert is able to go ahead alone in implementing the invention, without further explanation.

Technical Report for a Patent - life science (2)

in addition to the previous invention disclosure form IDS
following decision to proceed for filing

Detailed description (ctd…)

- The description is made with reference to the drawings, with further information on the materials or circuit components used, al least for the new parts. The known parts of the circuit or product can be described more generally with a lower level of details.
- A process can be better described with the support of one or more flow charts of the process steps.
- The part of the procedure is described with reference to equipment / facility, main steps and operating conditions (temperature, pressure, and so on), possibly with more details about the parts of more innovative impact.

Problems

Drafting of a patent application must keep into account, since the beginning, the real targets the granted patent will have:

- at the time of its economic exploitation;
- kinds of potential target users of the invention;
- … other factors (in)dependent of the intrinsic technical value of the invention;

with the purpose to get the best protection vis-à-vis the target users.

The quality of a patent (application) starts with a comprehensive search for prior art

- It is important to perform a prior art search before drafting a patent application
- A prior art document cited in the introductory part of the application is potentially less dangerous with respect to the possibility that this document will be used against the patent (application) in the examination procedure or in a Court litigation.
- In fact citing it in the patent application allows to explain why this document is not pertinent to the invention.

Further advantages of a preliminary search for prior art

This search allows to:

- Avoid using technical solutions subject of valid patents held by competitors;
- Avoid spending useless efforts in the design of technical solutions already known in the relating art.

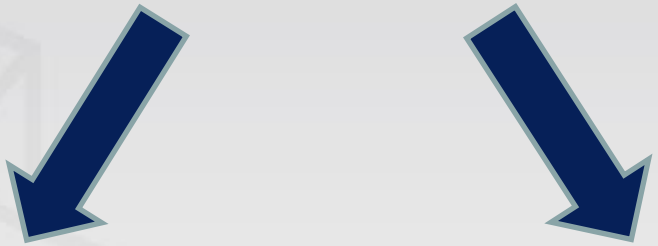
Prior art search

An advantage for the Italian patent applications

- By an agreement with the Italian patent office, the European Patent Office performs a search for prior art and a preliminary opinion on patentability for any new Italian patent applications.
- This is a toll-free tool (payed by the Italian PTO) available before the end of the 1 year priority period, therefore very useful for helping deciding on the further filing of the application abroad.
- In addition it is possible to have a partial reibursement of this fee in case of further filing a European or PCT application, to the extent that this search is also used in those proceedings.

Preliminary evaluation of the state of the art

PRIOR ART SEARCH



1) Generation of own IPRs

Patentability evaluation

2) Use of third parties IPRs

Freedom to operate evaluation

A correct procedure

Designing/ Prototyping: Start - end

Patent state of the art analysis

Market evaluation of existing similar products

Possible patent application

Start selling/using on the market

RISK ASSESSMENT for USE OF THIRD PARTIES IPRs AVAILABLE
TECHNICAL INFORMATION on THIRD PARTIES IPRs AVAILABLE
CORRECT PROTECTION of OWN IPRs
AGREEMENTS WITH THIRD PARTIES IPRS OWNERS

Patent Application

Introduction

- Closest prior art
- Problem
- Object
- Essential feat.
- Effect
- Other features

Description

- Embodiment

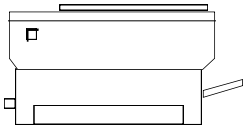
Claims

- Independent
- Dependent

Abstract

- Abstract

Figures



Patent application

Essential elements of a patent application

- **One invention only**

Various aspects of a complex invention linked by a unifying concept

- **Title**

- **Description**

It must allow a technical expert to implement the invention correctly, without performing further undue technical efforts, applying only his technical background knowledge

- **Claims**

Defining the wanted scope of legal patent protection in terms of technical features

- **Drawings**

Generally necessary for the understanding of the description

The function of the description

- The task of the description is to demonstrate that at least one embodiment example of the invention is feasible.
- It is important to include in the part of the description all the necessary details for the correct technical understanding, if necessary with the help of drawings.
- An insufficient description can put the validity of the patent at risk , also after granting, with a possible nullity action, and cannot be recovered after filing, as the application cannot be improved with added matter later.

Criteria in USA

Some differences with respect to Europe

- Usefulness (Utility Patent)
- Enabling disclosure (very detailed embodiment examples needed)
- Best mode description (obligation to not deliberately describe non optimal embodiments)

The function of the claims

The claims must satisfy two requirements:

1. The Owner willingness to include in his exclusive right as much as possible of the contents of the patent;

2. The third party right to understand as much as possible the real «boundaries» of the owner rights granted.

Importance of the claims

- The claim drafting is the most complicated and challenging part of the professional activity of patent application «building up» by the Patent Attorney

- The Patent Attorney must consider not only the level of protection according to the state of the art at the time of drafting, but he must also foresee, as much as possible, the future trends of the related technology, as the patent life can be up to 20 years; the competitors will try to design around for the full patent life possibly using new technologies and knowledges, to avoid using that patent.

Rule 43 EPC

Form and Content of Claims

- The claims shall define the matter for which protection is sought in terms of the technical features of the invention.

Different kinds of claims

Optimization of the protection

Matching patent claims with product features

Different kinds of claims address different kinds of patent users

Typically:

- Apparatus claims address manufacturers / sellers of the whole system or parts of it
- Method claims address the users of the system or parts of it

Guidelines EPO (1)

Kind of claims

The EP Convention refers to different "categories" of claim ("products, process, apparatus or use").

…….

there are only two basic kinds of claim

claims to a physical entity (product, apparatus)

and

claims to an activity (process, use).

Guidelines EPO (2)

Kind of claims

- The first basic kind of claim (**"product claim"**) includes:
  - a substance or compositions (e.g. chemical compound or a mixture of compounds) as well as
  - any physical entity (e.g. object, article, apparatus, machine, or system of co-operating apparatus) which is produced by man's technical skill.

- The second basic kind of claim (**"process claim"**) is applicable to:
  - all kinds of activities in which the use of some material product for effecting the process is implied (also software inventions);
  - the activity may be exercised upon material products, upon energy, upon other processes (as in control processes), (also software inventions).

Different kinds of claims

Kinds of EP claims for software protection

Method ….. (*sequence of steps of the main flow-chart)*

Device or apparatus…… *(list of means for implementing the steps of the method)*

N. Computer program comprising computer program code means adapted to perform all the steps of claim ... when said program is run on a computer.

N+1. A computer readable medium having a program recorded thereon, said computer readable medium comprising computer program code means adapted to perform all the steps of claim ... when said program is run on a computer.

Patent claims

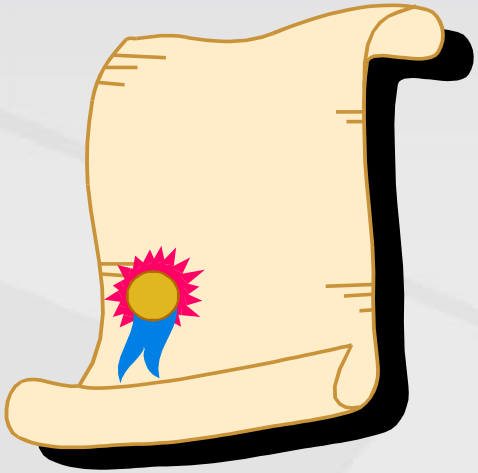
Kinds of claims

- For every invention it is necessary to check if it possible to insert in the patent application claims to:
  - a method
  - a system
  - each part of the system (if it can be divided in sub-systems)
  - each apparatus / device comprised in the system
    - i.e. transmitter and receiver in a transmission system
  - computer program

- Each claim must be related to the potential user / infringer

- The users / infringers may be different for different kinds of claims

PATENT EXAMPLES



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European PATENT granted - EP1573578B1

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a **method for traffic planning** and, more particularly, to a **method for generating and dynamically modifying optimized traffic movement plans**.
The invention also relates to a dynamic optimizing **traffic planning system**, such as a railroad or commuter rail dynamic optimizing traffic planning system.

2. Background Information

A transportation infrastructure consists of a plurality of physical pathways (e. g., without limitation, roads; rails; canals) for vehicles (e. g., without limitation, trucks; trains; ships or boats) within a particular geographic region. Traffic planning is the process of determining, for a particular transportation infrastructure and over a finite period of time, a plurality of routes that a corresponding plurality of vehicles are to follow (i. e. , one route per vehicle), and where those vehicles are planned to be located along their respective routes at specific times. Together, the plural routes constitute a movement plan.

…….
Problems and drawbacks of the known solutions…….
Reference to prior art, US patents…….

Therefore there is room for improvement in methods for traffic planning and in traffic planning systems.

European PATENT granted - EP1573578B1

3. SUMMARY OF THE INVENTION

These needs and others are met by the present invention, which dynamically optimizes the movements, for example, of trains across a railroad network in a dynamically changing environment. For example, computer software generates a plurality of train movement plans, modifies those plans to account for unexpected changes to expected railroad train operations, and selects an optimized train movement plan. This software-based method and system thus re-plans the movements of trains in a dynamic environment, such as a dynamically changing railroad network.

……..……

Reference to the attached claims….

4. BRIEF DESCRIPTION OF THE DRAWINGS

reference to the attached drawing figures ……

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

Long and detailed description of technical features of the embodiments …. Both of the system and the method ……. Reference to attached flow charts ……

[……more than 20 pages, 115 paragraphs…….]

Also description of theory, mathematical formulae, with reference to the block diagrams of the Figures ……..

6. CLAIMS

Method, …….. Apparatus, ……..Trafiic management system……

European PATENT granted - EP1573578B1

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] The present invention will be disclosed in connection with a method and software system generating optimized movement plans for trains across a regional railroad network, although the invention is applicable to a wide range of traffic applications (*e.g.*, without limitation, railroad; commuter rail; canals).

.....

Example 1

[0038] The generation of movement plans observes various limitations (*e.g.*, track speed limits; permanent speed limits; temporary speed limits) and constraints (*e.g.*, train type, such as passenger versus freight; power type: diesel, AC, DC; train height, length, weight, width and other consist characteristics, such as, for example, dangerous goods).

.....

$$R^{train_j} = \bigcup_{i=TrainPosTrack}^{FinalDestTrack} \{R_{track_i}^{train_j}\}, and \qquad \text{(Eq. 2)}$$

$$Plan = \bigcup_{j=1}^{n_{horizon}^{trains}} \{R_{track_i}^{train_j}\}; \qquad \text{(Eq. 3)}$$

European PATENT granted - EP1573578B1

Example 5

[0056] Equation 7 shows a relatively simple example in which the overall objective combines the goals using a linear function, with different weightings assigned to different goals.

$$F(f_1, f_2, \ldots f_n) = \sum_{i=1}^{n} q_i f_i \qquad \text{(Eq. 7)}$$

.....

DOTP

[0060] Continuing to refer to Figure 1, the DOTP 2 includes a plan generator 56, a plan monitor 58 and a plan executive 60. The plan generator 56 receives inputs 62 about the railroad 12 (*e.g.*, track layout; speed limits); receives inputs 64

.....

Plan Generator

[0081] Referring to Figures 3, 4 and 5A-5B, the DOTP 2 receives and processes updates from the field 12 or office (not shown), including, for example, train positions 108, traffic conditions 106, such as track blocks and speed restrictions, train schedules 64 (Figure 1) and train properties added because of the advancing of the planning horizon or changes within the planning horizon.

.....

European PATENT granted - EP1573578B1

Example 7

[0096] Equations 8 and 9 respectively show the determination of two associated functions to determine the count N1 (=f(replanning score)*Pool Size) of solutions to be re-generated and the count N2 (=g(replanning score)*Pool Size) of solutions to be newly generated based upon the re-planning score.

$$f(replanning\ \ score) = k_1 * \frac{replanning\ \ score - replanning\ threshold}{\max(replanning\ \ score) - replanning\ threshold} \qquad \text{(Eq. 8)}$$

.....

[0132] The GapAnalysis module 200 (Figure 6) calculates the re-planning score 214 based on blocks, speed restrictions and the train position gap as shown in Equations 18 and 19.

$$replanning\ score = w_{block} * 10^7 * \sum_{i=1}^{n} \frac{(T - T_i) * n_i^{trains}}{T * n_{horizon}^{trains}} \left(\frac{t_i}{T} * \frac{l_i}{L} \right) +$$

$$+ w_{speedres} * 10^7 * \sum_{i=1}^{m} \frac{(T - T_i)}{T * n_{horizon}^{trains}} \sum_{k=1}^{r} n_k^i \left(\frac{t_i}{T * L} \sum_{j=1}^{p_i} l_j \frac{v_k^i(j) - v_i^{reduced}}{v_k^i(j)} \theta(v_k^i(j) - v_i^{reduced}) \right) +$$

$$+ w_{posgaps} * \sum_{i=1}^{s} \frac{|\Delta t_i| * T_s}{T_c^2} \qquad \text{(Eq. 18)}$$

.....

European PATENT granted - EP1573578B1

Plan Executive

[0141] The plan executive 60 (Figure 3) generates automatic control commands 86 to be executed by the CAD system 14 and/or proposed near-term movement plans, such as 110, to be executed manually (*e.g.*, from requests made by the operator based on the proposed movement plan). The control commands 86 and the proposed near-term movement

.....

Plan Monitor

[0120] The plan monitor 58 provides, at 130 and 118 of Figure 4, the plan generator 56 with a new planning boundary 74 and 74' (Figure 4) for each planning cycle and determines, at 150, the need for re-planning. The planning boundary, such as 74, is defined by analyzing train positions, while the evaluation of re-planning conditions also employs a review of the field changes (current and within the planning horizon) such as, for example, device blocks and speed restrictions.

.....

European PATENT granted - EP1573578B1

FIGURES

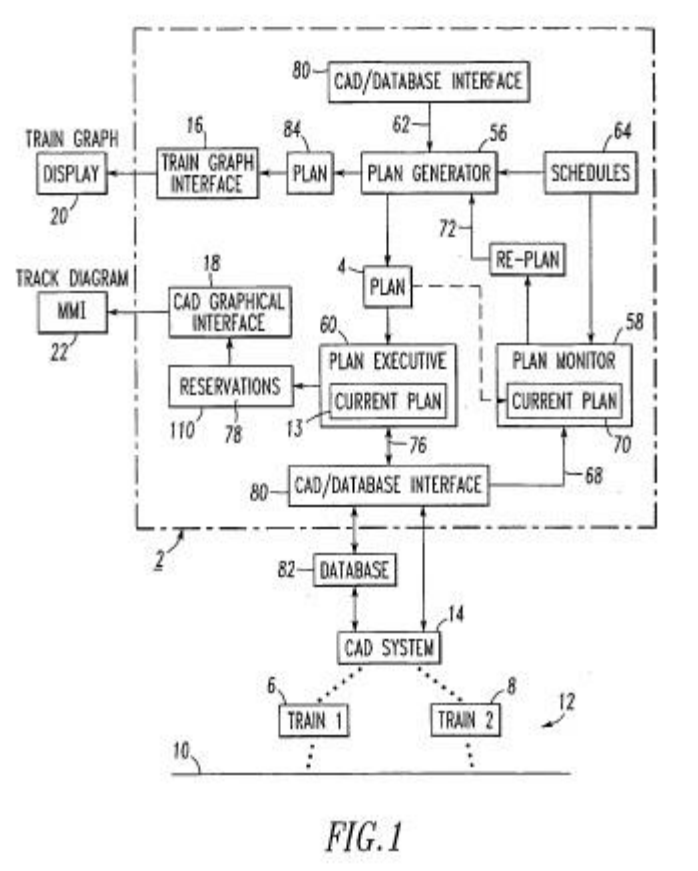


FIG.1

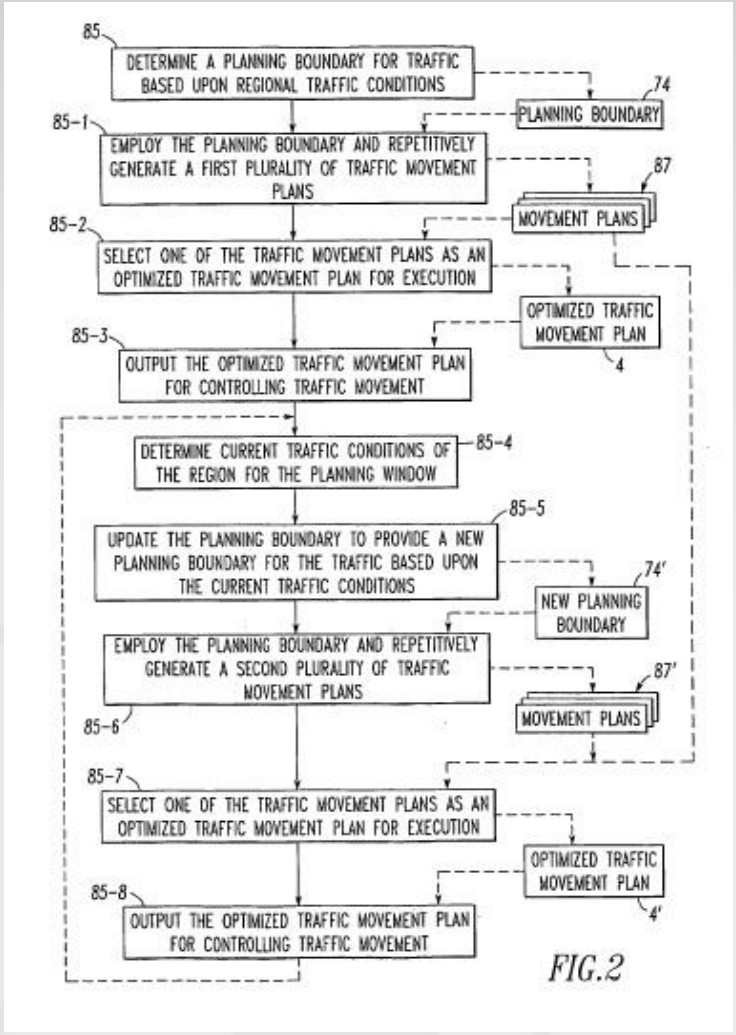


FIG.2

European PATENT granted - EP1573578B1

FIGURES

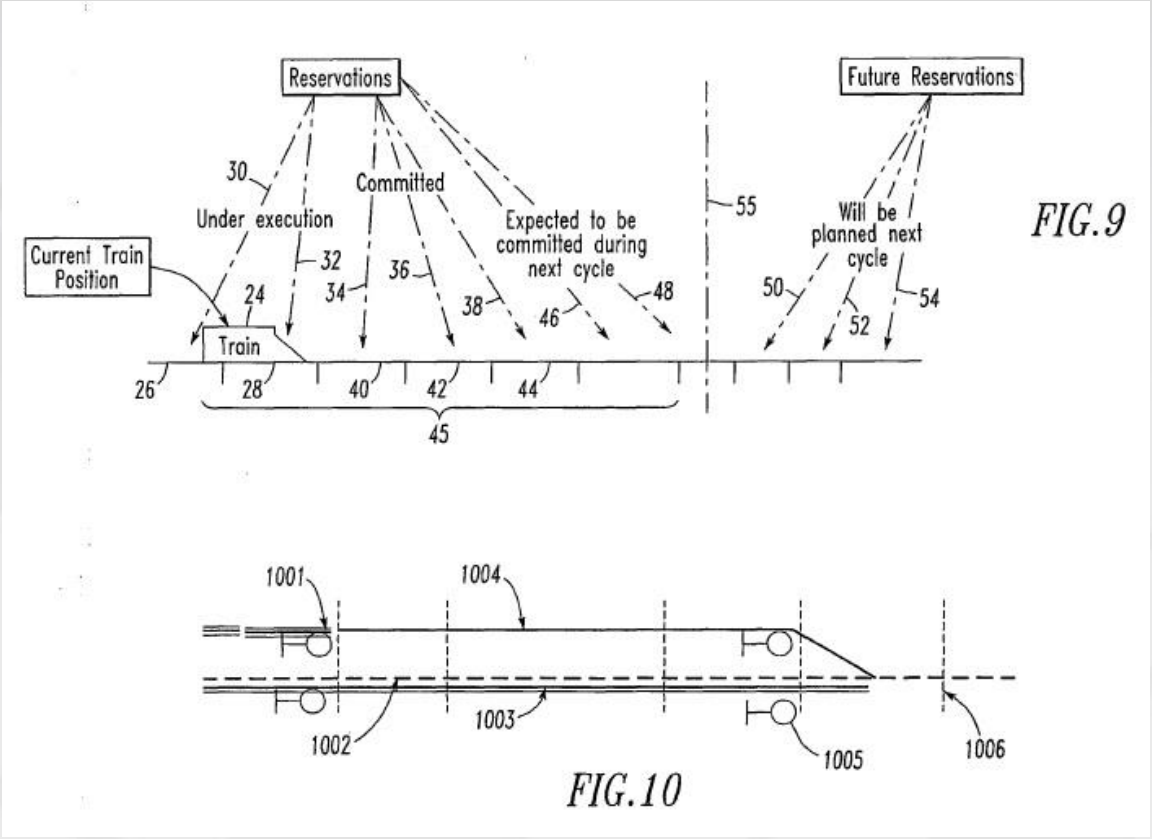


FIG.9

FIG.10

European PATENT granted - claims

1. A method of generating optimized traffic movement plans for a region having a plurality of traffic and a plurality of traffic conditions, said method comprising:

determining a first planning boundary for said traffic based upon the traffic conditions of said region;
employing said first planning boundary and repetitively generating a first plurality of traffic movement plans for the traffic of said region;
selecting one of said first plurality of traffic movement plans as a first optimized traffic movement plan for execution;
outputting said first optimized traffic movement plan for controlling traffic movement in said region;
determining current traffic conditions of said region;
updating said first planning boundary to provide a second planning boundary for said traffic based upon said current traffic conditions;
employing said second planning boundary and repetitively generating a second plurality of traffic movement plans for the traffic of said region;
selecting one of said first and second plurality of traffic movement plans as a second optimized traffic movement plan for execution; and
outputting said second optimized traffic movement plan for controlling traffic movement in said region.

European PATENT granted - claims

6. A dynamic optimizing traffic planning apparatus for a region having a plurality of traffic and a plurality of traffic conditions of said traffic, said apparatus comprising:

means for inputting information representing said traffic conditions; and
means for executing a plurality of routines, said routines comprising:

a plan monitor determining a first planning boundary for said traffic based upon the traffic conditions of said region, determining current traffic conditions of said region, and updating said first planning boundary to provide a second planning boundary for said traffic based upon said current traffic conditions,
a plan generator successively employing said first planning boundary and said second planning boundary and repetitively generating a first plurality of traffic movement plans and a second plurality of traffic movement plans, respectively, for the traffic of said region, selecting one of said first plurality of traffic movement plans as a first optimized traffic movement plan for execution, selecting one of said first and second plurality of traffic movement plans as a second optimized traffic movement plan for execution; and successively outputting said first and second optimized traffic movement plans, and
a plan executive successively converting said first and said second optimized traffic movement plans into a plurality of commands for controlling traffic movement in said region.

European PATENT granted - claims

7. The dynamic optimizing traffic planning apparatus of Claim 6 employed in a traffic management system comprising:

means for executing said commands to control traffic movement in said region.

8. The traffic management system of Claim 7 wherein said region includes a railroad network having a plurality of trains; wherein said information representing said traffic conditions includes dynamic data from said railroad network; wherein said plan generator inputs a plurality of train schedules, train properties and track descriptions for said railroad network and generates as said first and second plurality of traffic movement plans a plurality of optimized meet/pass plans for said trains in said railroad network; wherein said means for executing said commands employs said dynamic data from said railroad network; and wherein said meet/pass plans do not violate any constraints on said train schedules, said train properties and said track descriptions for said railroad network based upon said dynamic data from said railroad network.

European PATENT granted - EP0745254B1

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of converting a series of m-bit information words to a modulated signal,
The invention further relates to a method of providing a record carrier on which a signal is recorded obtained according to said method
The invention further relates to a coding device for performing the method as claimed,
The invention further relates to a recording device in which a coding device of this type is used.
The invention further relates to a signal.
The invention further relates to a record carrier on which the signal is recorded.
The invention further relates to a decoding device for converting the signal to a series of m-bit information words,
Finally, the invention relates to a reading device in which a decoding device of this type is used.
[….***digital CD-DVD recorder/reader ……. and the CD-DVD***]

2. Background Information

Such methods, such devices, such a record carrier and such a signal are published by K.A. Schouhamer Immink in the book entitled "Coding Techniques for Digital Recorders" (ISBN 0-13-140047-9). In said title, for example, the so-called EFM modulation system is described which is used for recording information on so-called Compact Discs.
……
Problems and drawbacks of the known solutions…….
Reference to prior art, …….

European PATENT granted - EP0745254B1

3. SUMMARY OF THE INVENTION

It is an object of the invention to provide means for reducing the number of bit cells per information word and counteracting the reduction of the number of unique bit combinations.
According to a first aspect of the invention this object is achieved with a method of converting as defined in claim 1.
According to a second aspect of the invention, a coding device according to claim 12 is provided.
…….

Reference to the attached claims….

4. BRIEF DESCRIPTION OF THE DRAWINGS

reference to the attached drawing figures (17) ……

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

Long and detailed description of technical features of the embodiments …. Both of the system and the method ……. Reference to attached drawings …….

6. CLAIMS

…… (38 claims granted) …….

European PATENT granted - EP0745254B1

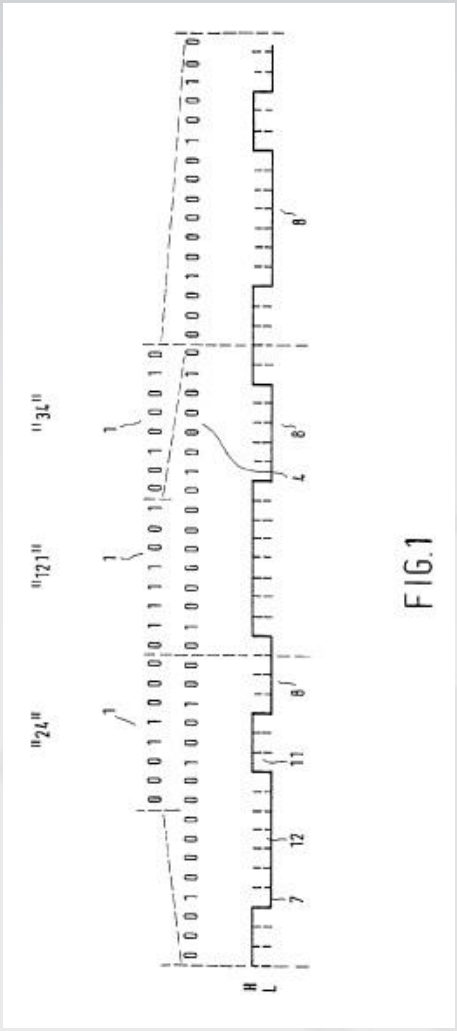


FIG.1

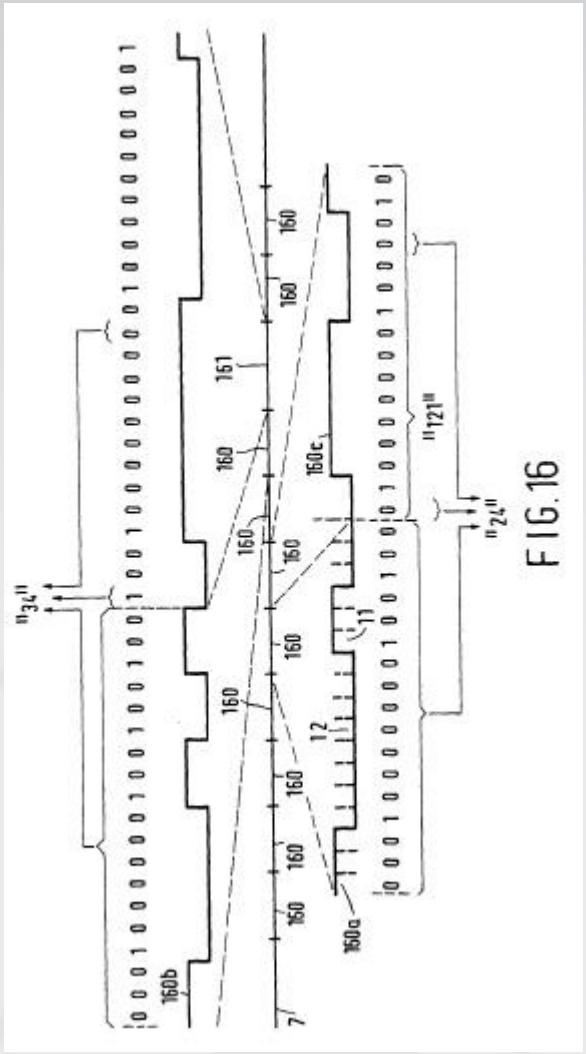


FIG.16

European PATENT granted - EP0745254B1

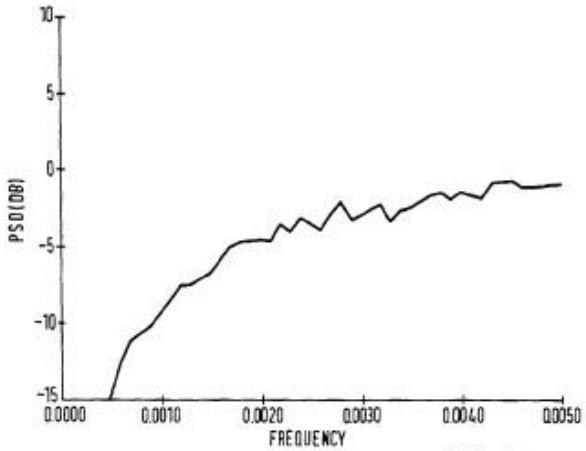


FIG. 5a

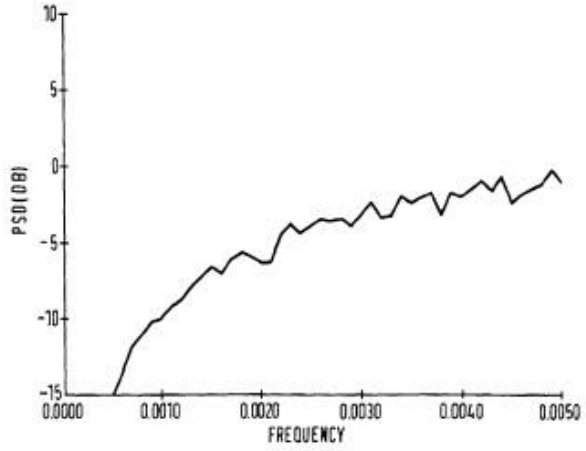


FIG. 5b

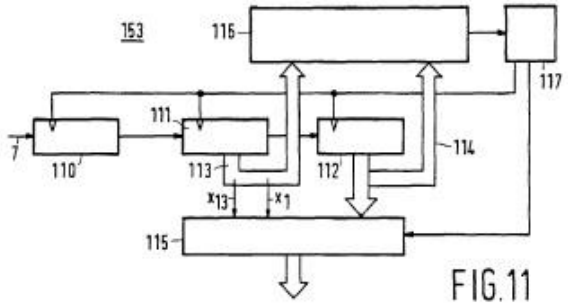


FIG. 11

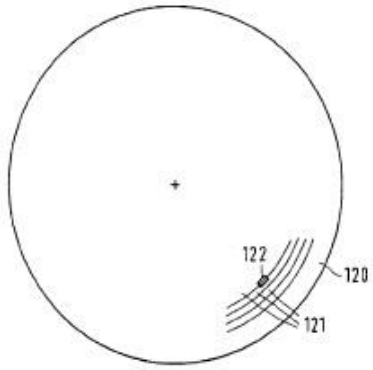


FIG. 12

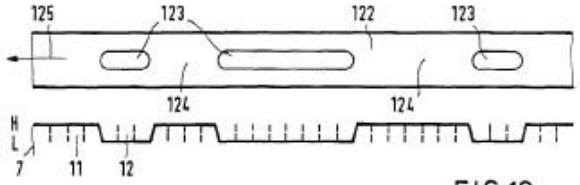


FIG. 13

European PATENT granted - claims

1. Method of converting information words (1) to a modulated signal (7), in which method a series of m-bit information words is converted to a series of n-bit code words (4) according to rules of conversion, and the series of code words are converted to the modulated signal, with m and n being integers and n exceeding m, the rules of conversion being such that the modulated signal satisfies a predetermined criterion, and in which method one code word (4) is delivered for one received information word (1), which code word is selected from one of a plurality of sets (V1,V2,V3,V4) of code words, which one set is associated with a coding state (S1,S2,S3,S4) established when the preceding code word was delivered, characterized in that the code words (4) are spread over at least a group of a first type (G11,G12) and at least a group of a second type (G2), and in that the delivery of each of the

.....

11. Method for providing a record carrier (120) in which a modulated signal (7) is generated by the method as claimed in one of the preceding Claims and the record carrier (120) is then provided with an information pattern (123,124) representing this signal.

12. Coding device (140) for performing the method as claimed, the device comprising an m-to-n bit converter (60) for converting the m-bit information words to n-bit code words by delivering one code word for one received information word, and state establishing means (60,64) for establishing a coding state (S1,S2,S3,S4) on the delivery of the code word, which convertor comprises means for select-

.....

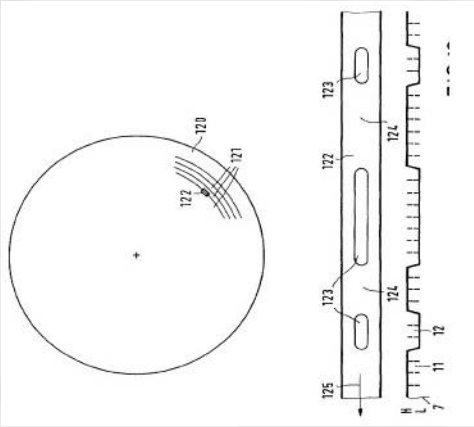
European PATENT granted - claims

23. Device for recording information, which device comprises a coding device (140) as claimed in one of the Claims 12 to 22 for converting a series of information words representing the information to a modulated signal and means (141,142) for recording on a record carrier (143) an information pattern corresponding to the signal.

24. Signal comprising a sequence of successive information signal portions (160) each representing an information word, in which signal each of the information signal portions (160) comprises n bit cells having a first or second logical value, characterized in that the information signal portions are spread over at least a group (G11,G12) of a first type and at least a group (G2) of a second type, while each information signal portion belonging to a group of the first type uniquely represents an information word and each information signal portion belonging

.....

32. Record carrier (120) on which the signal (7) as claimed in one of the Claims 24 to 31 is recorded in a track (121) in which information patterns (123,124) represent the signal portions (160), which information patterns comprise first and second parts (123,124) alternating in the direction of the track, the first parts present detectable properties and the second parts present second properties distinguishable from the first properties, and the parts having the first properties represent bit cells having the first logical value and the parts having the second properties represent the bit cells having the second logical value.



European PATENT granted - claims

33. Decoding device for converting the signal (7) as claimed in one of the Claims 24 to 31 to a series of m-bit information words (1), this device comprising means (110) for converting the signal to a bit string of bits having a first or second logical value, this bit string containing n-bit code words (4) which correspond to the information signal portions (160) and which device comprises converting means (113,114,115) for converting the series of code words to a series of information words, one information word being assigned to one code word to be

38. Reading device for reading a record carrier (151) on which information is recorded in an information pattern, this device comprising means (150,152) for converting the information pattern to a corresponding binary reading signal, the reading device comprising a decoding device (153) as claimed in one of the Claims 33 to 37 for converting the binary reading signal to a series of m-bit information words.

European PATENT granted - EP1580181B1

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a **honeycomb structure** used for a filter for trapping particles contained in exhaust gas from an internal combustion engine, boiler, or the like, and a **method of manufacturing** the same.

2. Background Information

Since a large amount of particulates (particulate matter) containing carbon as the major component, which may cause environmental pollution, is contained in exhaust gas discharged from an internal combustion engine such as a diesel engine, a filter (diesel particulate filter (DPF)) for trapping particulates may be provided to the exhaust system of an internal combustion engine.

…….

Problems and drawbacks of the known solutions…….

Reference to prior art, …….

European PATENT granted - EP1580181B1

3. SUMMARY OF THE INVENTION

An objective of the present invention is to provide a honeycomb structure and a method of manufacturing the same which can significantly improve the yield of the honeycomb structure due to the capability of plugging the peripheral portion after the peripheral portion of the honeycomb structure in the diametrical direction is determined, and can significantly reduce the manufacturing cost due to the formation of the peripheral plugging portions of the honeycomb structure in the diametrical direction without firing.

…….……
Reference to the attached claims….

4. BRIEF DESCRIPTION OF THE DRAWINGS

reference to the attached drawing figures ……

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

Long and detailed description of technical features of the embodiments ….
Reference to attached drawings ……

……..

6. CLAIMS

……

European PATENT granted - EP1580181B1

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

.....

Examples 1 to 5

[0059] A honeycomb formed product having a diameter of 206 mm, a length of 178 mm, a partition wall length of 0.3 mm, and a cell density of 46 per cm^2, of which the raw materials were adjusted so that the porosity after firing was 65%, was provided with plugging portions in a checkered flag pattern at one end and the other end of the honeycomb formed product, alternately. The honeycomb formed product was (1) fired at a high temperature, (2) ground so that the outer diameter was 191 mm, (3) coated peripheral portion with coating material, and (4) plugged with a coating material to a length "c" of 3 mm (see FIG. 2) at each end face of the peripheral portion over five cells inward from the periphery, and dried to obtain five honeycomb structures 20 (DPF) (see FIGS. 6 (a) to (d)).

[0060] Table 1 shows the measurement results for the number of plugged peripheral cells of the above two types of DPFs in the directions which intersect the cells at right angles (0°, 90°, 180°, and 270° directions (see FIG. 6)).

TABLE 1

	Number of plugged cells			
	0°	90°	180°	270°
Comparative Example 1	3	3	7	7
Comparative Example 2	3	1	7	9
Comparative Example 3	5	3	5	7
Comparative Example 4	7	3	3	7

European PATENT granted - EP1580181B1

FIG.1(a)

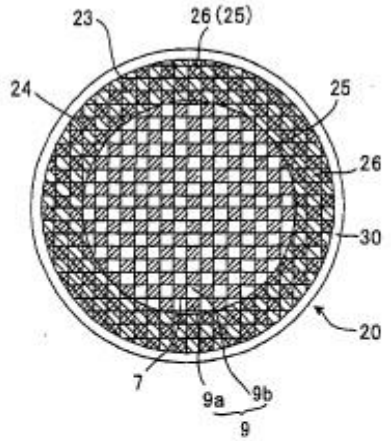
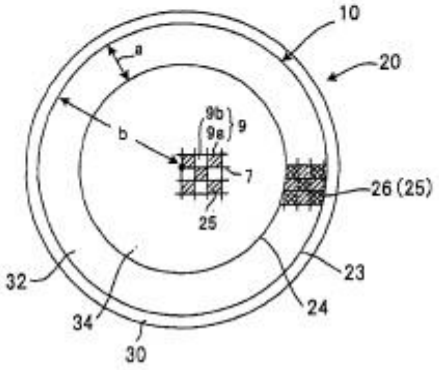
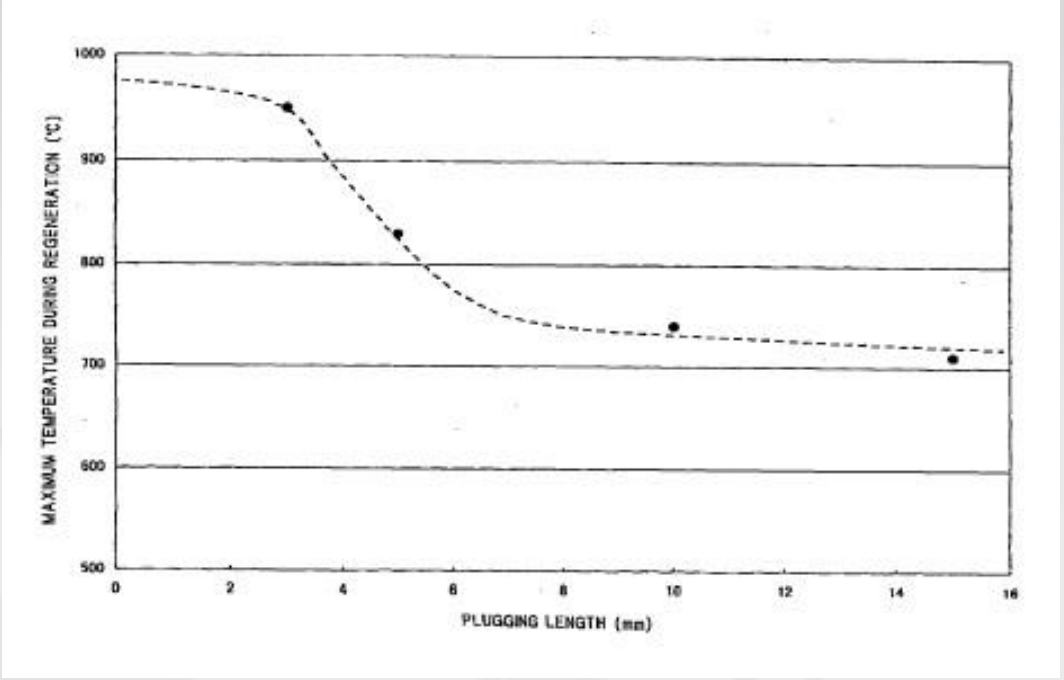


FIG.1(b)





European PATENT granted - claims

1. A honeycomb structure, comprising a cell structure (10) having a plurality of cells (9) communicating between two ends of the cell structure and partitioned by porous partition walls (7), an outer wall (30) provided at a periphery of the cell structure, and first plugging portions (25) provided in cells in a checkered flag pattern at each end of the cell structure to plug the two open ends of the cells alternately, whereby a fluid flowing from open ends thereof and penetrating the porous partition walls into the neighboring cells whose other ends are open and flowing out from the other open ends is filtered, the first plugging portions being fired after plugging,
wherein second plugging portions (26) are provided at at least one end face of the cell structure to plug the ends of first ones of said cells located at an outermost peripheral portion of the structure and second ones of the cells located inwardly from the first cells within a predetermined number of cells counting from the first cells, the first and second cells being cells in which the first plugging portions (25) are not provided at the same end of the structure,
said first and second cells being all the respective cells around the whole of the cell structure in its peripheral direction,
other than the cells at which the first plugging portions are provided at the same end of the structure,
characterized in that said second plugging portions (26) are unfired after plugging.

17. Use of a honeycomb structure as a filter for trapping particles contained in exhaust gas from an internal combustion engine or boiler, wherein the honeycomb structure is according to any one of claims 1 to 12.

European PATENT granted - claims

13. A method of manufacturing a honeycomb structure which comprises the steps of:

(i) providing first plugging portions (25) to a honeycomb formed product (10), in which a plurality of cells (9) communicating between two open ends are partitioned by porous partition walls, in a checkered flag pattern at each end of the honeycomb formed product so that one of the two open ends of each of the cells is plugged with a first plugging material,
(ii) after step (i), firing the honeycomb formed product to obtain a honeycomb structure having first plugging portions (25) formed by the first plugging material,
(iii) grinding the periphery of the honeycomb structure after step (ii) to a predetermined outer dimension to form grooves open to the outside and extending in the axial direction by removing an outer portion of partition walls of the outermost. peripheral cells,
(iv) after step (iii) filling at least the grooves thus formed with a material containing ceramics to form an outer wall (30) having a predetermined outer dimension, and
(v) at at least one end of the structure filling the open ends of cells with a second plugging material, these being first cells located at an outermost peripheral portion of the structure and second cells located inwardly from the cells at a position within a predetermined number of cells counting therefrom, the first and second cells being cells in which the first plugging portions (25) are not provided at the same end of the structure, and being all the respective cells around the whole of the cell structure in its peripheral direction, other than the cells at which the first plugging portions are provided at the same end of the structure, and
(vi) drying the second plugging material to form second plugging portions (26), said second plugging portions being unfired.

European PATENT granted - EP1609896B1

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a **process for providing additives to yarn made of multifilament textiles.**

2. Background Information

Micro-encapsulation has been used in the textile industry since the early 1990's.
Many textile manufacturers are looking into the use of microcapsules to functionalize their products by giving textiles: a durable scent; a means for applying a cosmetic, such as a body lotion, or a pharmaceutical product. …….

Problems and drawbacks of the known solutions…….
Reference to prior art, …….

European PATENT granted - EP1609896B1

3. SUMMARY OF THE INVENTION

In one aspect of the invention there is a process for depositing additives into a yarn having multi-filaments comprising steps of; separating the multi-filaments of the yarn into individual filaments while winding the yarn; injecting the additive onto the individual filaments; and promoting the individual filaments of the yarn to close up one against the other, whereby the additives are entrapped within the multi-filaments.

…….……
Reference to the attached claims….

4. BRIEF DESCRIPTION OF THE DRAWINGS

reference to the attached drawing figures ……

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

Long and detailed description of technical features of the embodiments ….
Reference to attached drawings ……

……..

6. CLAIMS

……

European PATENT granted - EP1609896B1

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

.....

Reference to embodiment examples .....

EXAMPLES

[0050] Example 1) Multifilament (pes) polyester yarn with lavender perfume microcapsules. Example 1 de-

Example 2) Multifilament polyamide (nylon) yarn with citronella (lemon grass) perfume microcapsules.

[0056] Example 3) Multifilament yarn polypropylene (pp) with lavender perfume microcapsules.

European PATENT granted - EP1609896B1

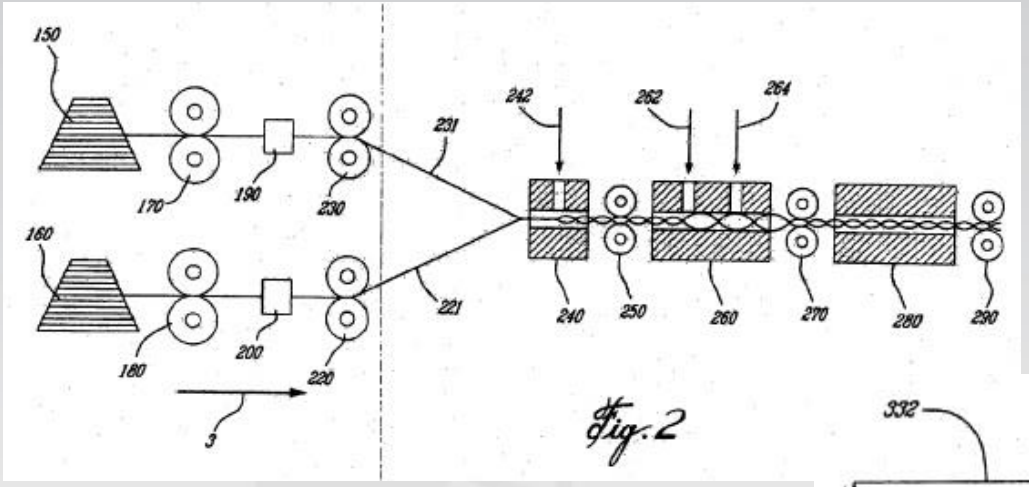


Fig. 2

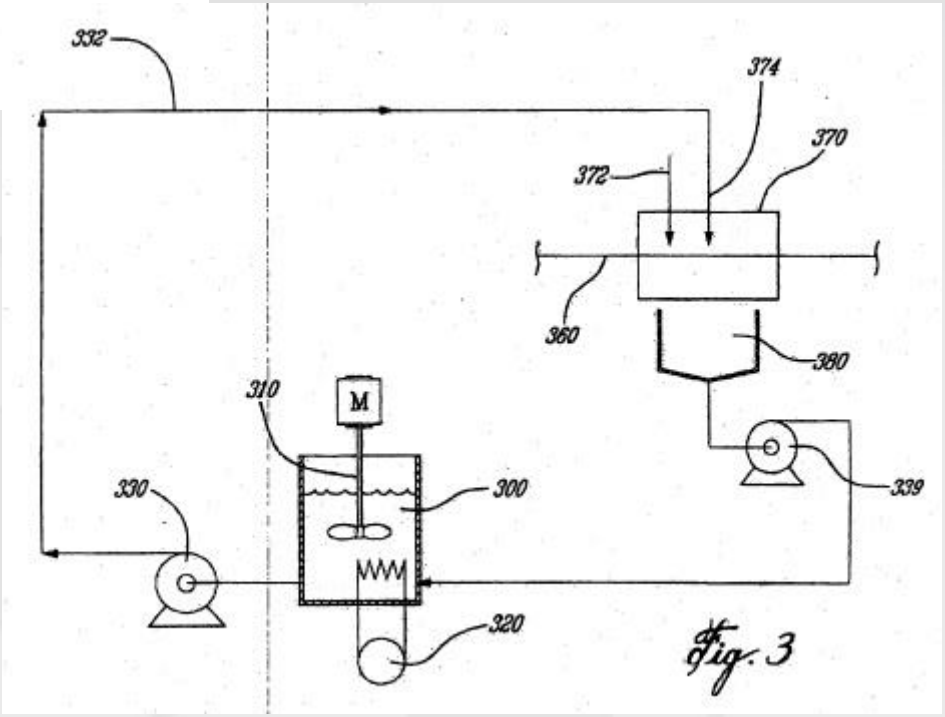


Fig. 3

European PATENT granted - claims

1. A process for depositing microcapsules into a yarn having multi-filaments comprising steps of;

preparing an aqueous suspension of microcapsules;
separating the multi-filaments of the yarn into individual filaments while winding the yarn;
injecting the aqueous suspension of microcapsules onto the individual filaments; and
promoting the individual filaments of the yarn to close up one against the other, whereby the microcapsules are entrapped within the multi-filaments.

21. A multifilament yarn having a cross sectional perimeter, the yarn comprising:

individual filaments interconnected together to produce the yarn; and
microcapsules having a range of diameter of 0.1 to 200 μm on the individual filaments within the perimeter of the yarn.

14. An apparatus for depositing microcapsules into a yarn having a plurality of filaments, the apparatus comprising;

a supply spool,
a take-up spool winding the yarn in a first direction between the supply spool and the take-up spool,
a means for separating the yarn at, at least one separating point disposed between the supply spool and the take-up spool, the means for separating the yarn thereby exposing the filaments, and
at least one nozzle proximate the separating point, the at least one nozzle injecting a liquid onto the filaments in a second direction transverse the first direction, the liquid having the microcapsules suspended therein and thereby injecting the microcapsules.

Thank you for your attention!

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