Title: Intellectual Property Colloquium: How Scientists and Innovators can Utilize the Patent System

Speakers: Paul Smith, Michael Henry

Series: Colloquium

Date: May 04, 2022 - 2:00 PM

URL: https://pirsa.org/22050003

Abstract: The patent system is designed to help innovators protect their intellectual property. In this colloquium, we will discuss logistical and strategic aspects of the patent process, to help you better understand how to leverage the patent system. Topics will include the anatomy of a patent, deadlines and procedural steps for filing patent applications, and strategic considerations in developing the claims and other components of a patent application.

Zoom Link: https://pitp.zoom.us/j/91402107798?pwd=UDRQV0IvY3JEUkVJeC9QR3JXVjZSdz09

HENRY PATENT LAW FIRM

Intellectual Property Colloquium: **How Scientists and Innovators Can Utilize the Patent System**

Presented to Perimeter Institute
May 4, 2022
Michael K. Henry, Ph.D., J.D.

Patents – A Physics Tradition!

Oct. 27, 1936.	A. EINSTEIN BLOUSE	Des. 101,756

May 17, 1955	E. FERMI ET AL NEUTRONIC REACTOR	2,708,656
Filed Dec. 19, 1944		27 Sheets-Sheet 1

Aug. 2, 1955	A. G. ANDERSON ET AL SPIN ECHO STORAGE TECHNIQUE	2,714,714

INVENTORS
ARTHUR G. ANDERSON
ERWIN L. HAHN

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Outline

- Recap from December IP Colloquium
- Deadlines for Filing Patent Applications
- Anatomy of a Patent Application
- Process for Preparing Patent Applications
- Claim Drafting Considerations

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Recap: Patent Basics

- **Types of intellectual property:**
  - Patents, trademarks, copyrights, trade secrets
- **What is a patent?**
  - A limited monopoly: **exclusive right to the claimed invention**, for a limited time, in a specified territory (a country or region)
- **Main requirements for patentability:**
  - **Claims:** Novelty and inventive ("non-obvious") relative to prior art
  - **Description:** Must include "enabling" technical description of the invention
- **Value of patents**
  - Royalties ($$); exclusivity (commercialization); recognition; cross-licensing

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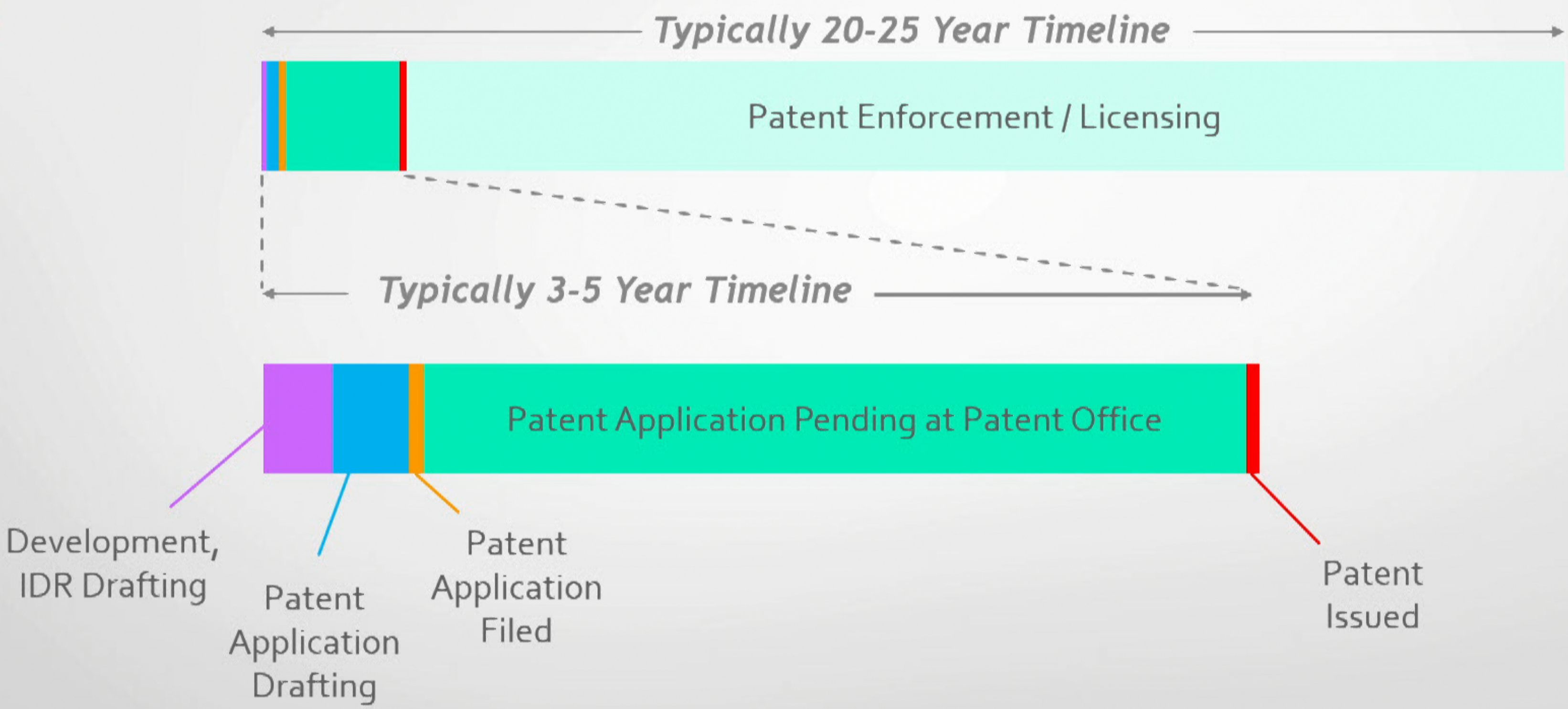
Life of a Patent



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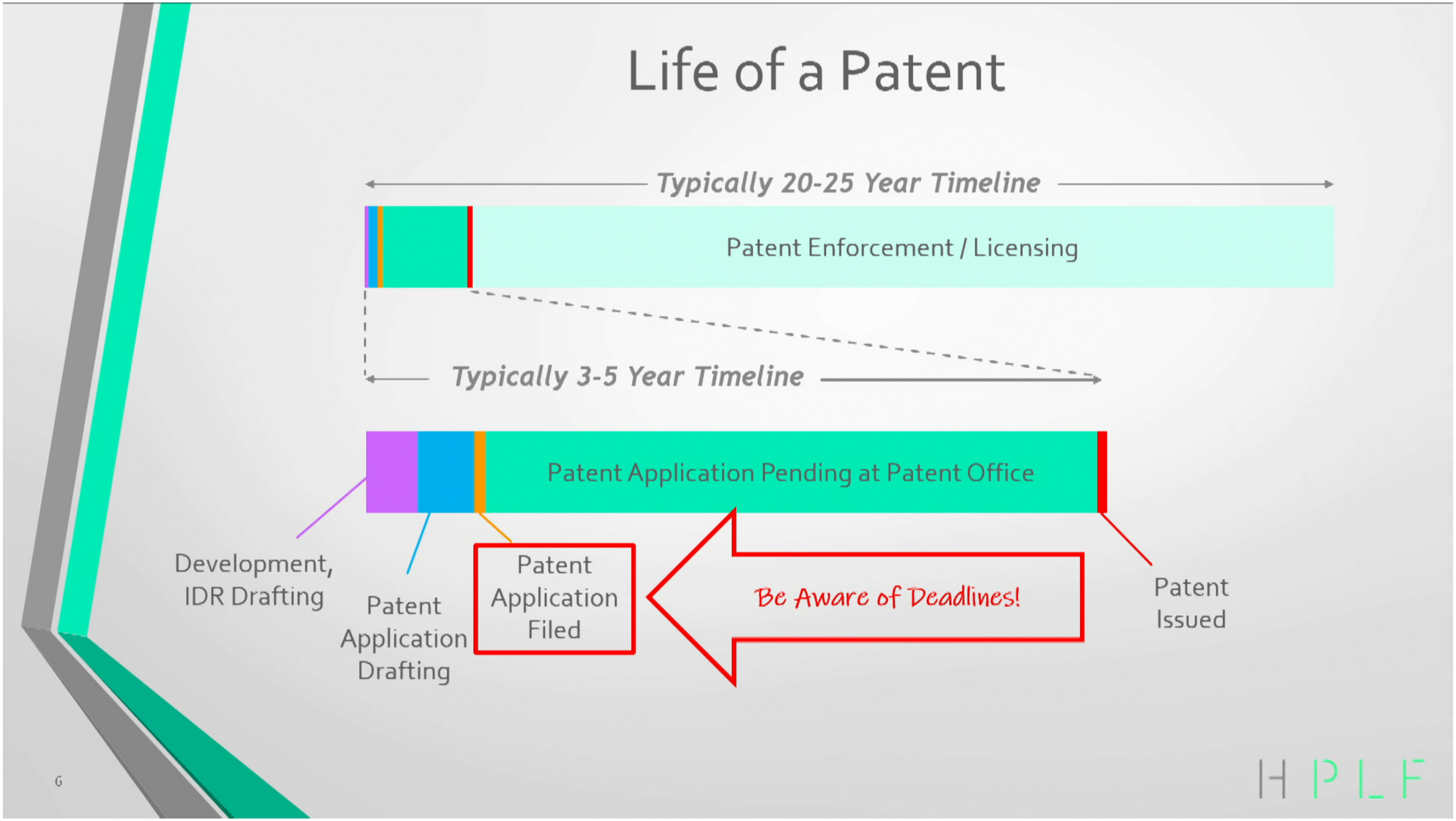
Life of a Patent
Typically 20-25 Year Timeline
Patent Enforcement / Licensing
Typically 3-5 Year Timeline
Patent Application Pending at Patent Office
Development, IDR Drafting
Patent Application Drafting
Patent Application Filed
Be Aware of Deadlines!
Patent Issued
6
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File Patent Applications ***BEFORE***…

- Submitting a paper for publication, posting to archive, etc.
- Presenting at a conference
- Submitting a grant application
- Launching or announcing a new product
- Beta testing with users (even under NDA)
- Demo'ing at trade show or to customer
- Selling *or offering* to customer
- Attending industry events
- Disclosure to collaborator or investor (even under NDA)

Best Practice: Do Not Rely on "Grace Period" or NDAs Unless You Must

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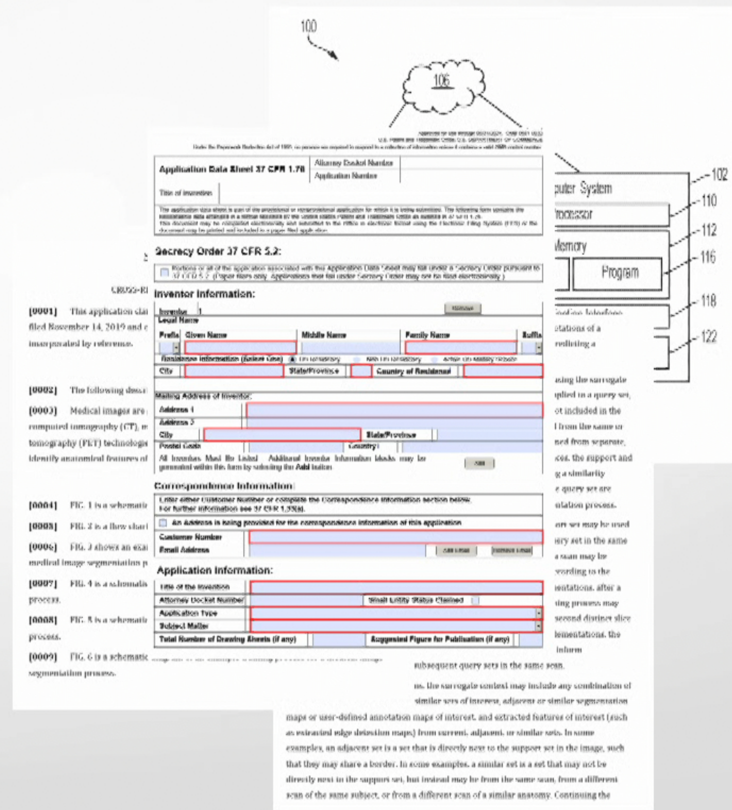
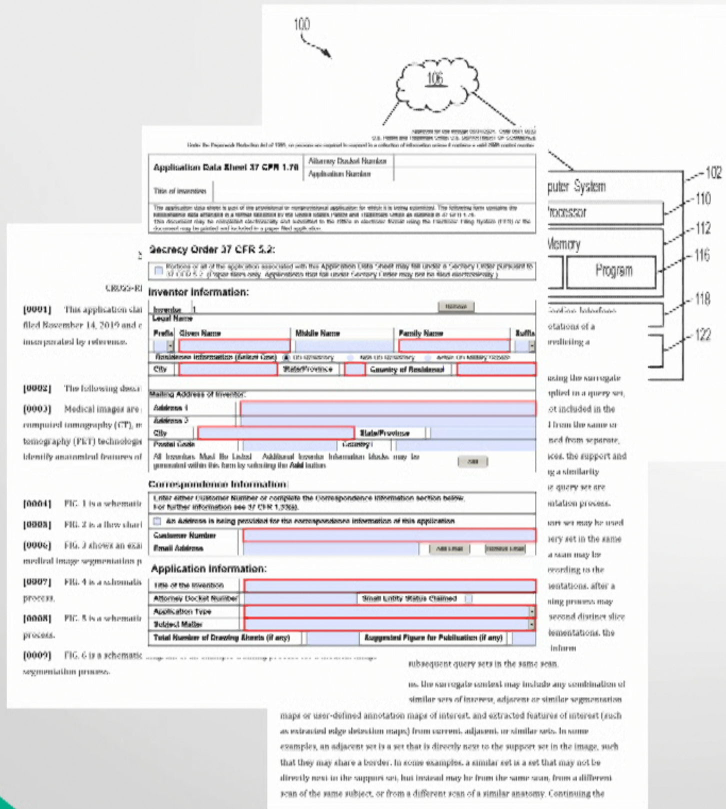
Anatomy of a Patent Application

- **Data / Patent Office Forms**
  - Inventors, Assignee, Applicant, References
- **Drawings**
- **Specification**
  - Title, Abstract
  - Background, Detailed Description
- **Claims**

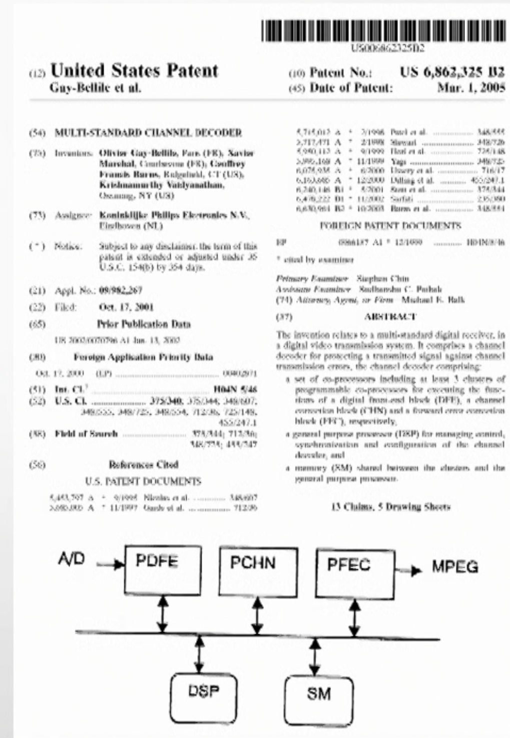


Further reading: https://henry.law/blog/anatomy-of-a-patent/

… Becomes a Patent



Examination / Prosecution / Allowance / Issuance



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US006862325B2

(12) **United States Patent**
Gay-Bellile et al.

(10) **Patent No.:** **US 6,862,325 B2**
(45) **Date of Patent:** **Mar. 1, 2005**

(54) **MULTI-STANDARD CHANNEL DECODER**

(75) Inventors: **Olivier Gay-Bellile**, Paris (FR); **Xavier Marchal**, Courbevoie (FR); **Geoffrey Francis Burns**, Ridgefield, CT (US); **Krishnamurthy Vaidyanathan**, Ossining, NY (US)

(73) Assignee: **Koninklijke Philips Electronics N.V.**, Eindhoven (NL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 354 days.

(21) Appl. No.: **09/982,267**

(22) Filed: **Oct. 17, 2001**

(65) **Prior Publication Data**

US 2002/0070796 A1 Jun. 13, 2002

(30) **Foreign Application Priority Data**

Oct. 17, 2000 (EP) 00402871

(51) **Int. Cl.**[7] **H04N 5/46**
(52) **U.S. Cl.** **375/340**; 375/344; 348/607; 348/555; 348/725; 348/554; 712/36; 725/148; 455/247.1
(58) **Field of Search** 375/344; 712/36; 348/725; 455/247

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,453,797 A * 9/1995 Nicolas et al. 348/607
5,688,008 A * 11/1997 Garde et al. 712/36
5,715,012 A * 2/1998 Patel et al. 348/555
5,717,471 A * 2/1998 Stewart 348/726
5,930,112 A * 9/1999 Hori et al. 725/148
5,995,168 A * 11/1999 Yagi 348/725
6,075,935 A * 6/2000 Ussery et al. 716/17
6,163,685 A * 12/2000 Dilling et al. 455/247.1
6,240,146 B1 * 5/2001 Stoll et al. 375/344
6,478,222 B1 * 11/2002 Sarfati 235/380
6,630,964 B2 * 10/2003 Burns et al. 348/554

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EP 0966157 A1 * 12/1999 .... H04N/5/46

* cited by examiner

Primary Examiner—Stephen Chin
Assistant Examiner—Sudhanshu C. Pathak
(74) *Attorney, Agent, or Firm*—Michael E. Belk

(57) **ABSTRACT**

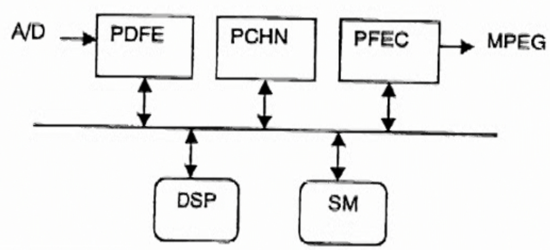
The invention relates to a multi-standard digital receiver, in a digital video transmission system. It comprises a channel decoder for protecting a transmitted signal against channel transmission errors, the channel decoder comprising:

a set of co-processors including at least 3 clusters of programmable co-processors for executing the functions of a digital front-end block (DFE), a channel correction block (CHN) and a forward error correction block (FEC), respectively,

a general purpose processor (DSP) for managing control, synchronization and configuration of the channel decoder, and

a memory (SM) shared between the clusters and the general purpose processor.

13 Claims, 5 Drawing Sheets



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What Does The Patent Describe?

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US006862325B2

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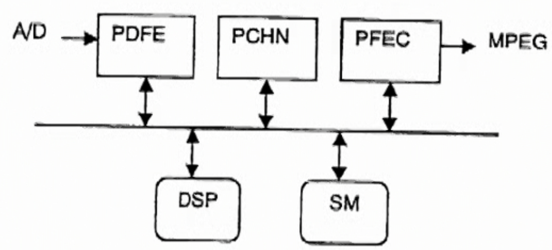

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(73) Assignee: **Koninklijke Philips Electronics N.V.**, Eindhoven (NL)

Who Are The Inventors, and Who Owns The Patent?

HPLF

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 354 days.

(21) Appl. No.: **09/982,367**

(22) Filed: **Oct. 17, 2001**

(65) **Prior Publication Data**

US 2002/0070796 A1 Jun. 13, 2002

(30) **Foreign Application Priority Data**

Oct. 17, 2000 (EP) 00402871

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(58) **Field of Search** 375/344; 712/36; 348/725; 455/247

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6,240,146 B1 * 5/2001 Stott et al. 375/344
6,478,222 B1 * 11/2002 Sarfati 235/380
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FOREIGN PATENT DOCUMENTS

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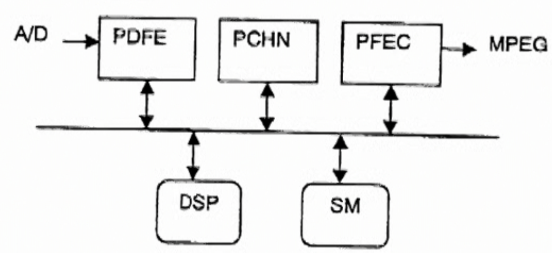

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5,717,471 A * 2/1998 Stewart 348/726
5,950,112 A * 9/1999 Hori et al. 725/148
5,995,168 A * 11/1999 Yagi 348/725
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FOREIGN PATENT DOCUMENTS

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What Prior Art Was Considered?

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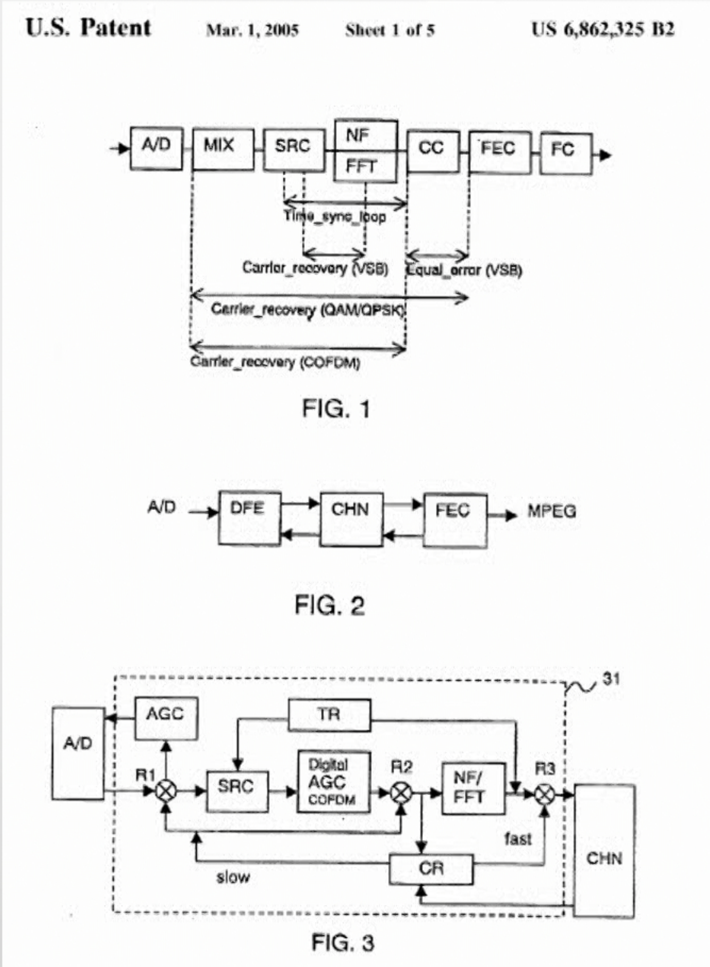

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MULTI-STANDARD CHANNEL DECODER

The invention relates to a multi-standard channel decoder for digital systems. It is advantageously applicable to any digital broadcasting standard using any transmission medium.

Many incompatible transmission standards are used in today's digital television broadcasting market. Dedicated implementations using dedicated algorithms are developed in order to meet the high computation power requirements of each channel decoding standard. Having many dedicated solutions increases the development costs and causes each product to be less flexible. On its web site, Oren semiconductor advertises a programmable multi-standard demodulator which is compatible with all major American digital television transmission standards: OR5 1220 DVT US Multi-standard demodulator with FEC, 1998. The device utilizes a mixture of dedicated and programmable functions that are controlled by a special DSP (Digital Signal Processor) core.

It is an object of the invention to provide a multi-standard channel decoder which is compatible with any transmission standard all over the world and thus reduces development and manufacturing costs.

In accordance with the invention, a receiver is proposed in a digital transmission system, comprising a channel decoder for protecting a transmitted signal against channel transmission errors, the channel decoder comprising:

- a set of co-processors including at least 3 clusters of programmable co-processors for executing the functions of a digital front-end block (DFE), a channel correction block (CHN) and a forward error correction block (FEC), respectively,
- a general purpose processor (DSP) for managing control, synchronization and configuration of the channel decoder, and
- a memory (SM) shared between the clusters and the general purpose processor.

The invention also relates to a method of channel decoding in a digital video receiver and to a computer program for carrying out the steps of the method. It also relates to a signal for carrying the computer program.

The invention and additional features, which may be optionally used to implement the invention to advantage, are apparent from and will be elucidated with reference to the drawings described hereinafter.

FIG. 1 is a conceptual block diagram illustrating a channel decoder.

FIG. 2 is a conceptual block diagram illustrating a unified system view of a digital channel decoder according to the invention.

FIGS. 3 to 7 are functional block diagrams illustrating examples of embodiments of a digital channel decoder according to the invention.

FIG. 8 is a block diagram of an architecture of a programmable digital receiver according to the invention.

FIGS. 9 to 11 are functional block diagrams illustrating examples of embodiments of an architecture of a receiver according to the invention.

FIG. 12 is a block diagram showing an example of a digital television receiver according to the invention.

FIG. 13 shows a device in accordance with the invention.

There are many different broadcast channel decoding standards used by the different broadcast media, e.g. terrestrial, cable, satellite media, and with different market regions. For example, Europe uses the DVB (Digital Video Broadcasting) standards, North America uses ATSC

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(Advanced Television Systems Committee) standards and Japan uses the ISDB (Integrated Services Digital Broadcasting) standards. Depending on the medium, several modulations are used, e.g. COFDM (Coded Orthogonal Frequency Division Multiplexing) for terrestrial transmissions, QAM (Quadrature Amplitude Modulation) for cable transmissions and QPSK (Quadrature Phase Shift Keying) for satellite transmissions. A common framework for signal processing and data flow representation in a digital receiver is illustrated in FIG. 1. This already fits all existing broadcast standards. A distinction is made between single carrier modulation formats e.g. 8-VSB (Vestigial Side-Band), QAM, QPSK, and multi-carrier modulation formats e.g. COFDM. The signal processing functions are represented in blocks, including:

- an analog-to-digital converter A/D, to receive the analog IF (Intermediate frequency) signal and to output digital IF samples,
- a mixer MIX, to convert the IF samples into digital base-band samples,
- a sample-rate converter SRC, to output time-synchronized samples,
- in the case of single carrier modulation, a Nyquist filter NF of in the case of COFDM modulation, a FFT (Fast Fourier Transform) filter, to generate demodulated symbols,
- a channel correction block CC, to output channel-corrected symbols,
- a forward error correction block FEC, to output error-corrected bits,
- a format converter FC, to output data in the appropriate format, e.g. MPEG (Motion Picture Experts Group) packets.

The signal processing blocks of the demodulator actually perform 3 main functions front-end demodulation, channel correction and forward error correction. The front-end of the demodulator which consists of the A/D, MIX, SRC, Nyquist or FFT filter, is mostly consistent among standards. The ordering of the signal processing and the structure of the time synchronization loop "time_sync_loop" is mostly consistent. The largest point of divergence is the use of the FFT or Nyquist filter, depending on whether the transmission is multi (COFDM) or single carrier-modulated. The interconnections for carrier recovery are implementation-dependent vary in accordance with the standards. Several carrier recovery procedures are thus implemented for each standard, denoted "carrier_recovery (VSB)", "carrier_recovery (QAM/QPSK)" and "carrier_recovery (COFDM) ". Key parameter divergences are the overall symbol rate, especially in the case of QPSK.

Channel correction CC is differently implemented, depending on standards. All single carrier systems, except satellite QPSK, use a decision feedback equalizer for channel compensations, denoted "equal_error (VSB)" for the VSB standard. However, depending on the physical medium, the lengths of the adaptive filters vary widely. In a completely different way, the COFDM receiver uses the information in the pilot carriers to interpolate both time and frequency to estimate the channel transfer function. To support implementation changes and to support both single and multi-carrier channel correction, the channel decoder requires software-programmable elements, significant interconnection flexibility and re-assignable computation resources.

Forward error correction FEC, which comprises all signal processing downstream from symbol-bit mapping, is perly from the nitrogenous compounds. Such radioactive carbon is suitable for medical and physiological uses as it may be incorporated in organic compounds and used as tracers in living organisms. Well 21 can also be filled with graphite blocks and the resultant pier projected upwardly through the top. The top of this graphite pier provides a strong thermal neutron source and such a pier is known as a thermal neutron column.

It can thus be seen that the neutrons normally escaping from the reactors need not be lost, but can be put to work, and the neutrons escaping from the reactors can be utilized to produce transmutations or isotopes from elements placed in, or surrounding all parts of the active portion of the reactor. For example, the number of neutrons radiated from the external surface of a uranium-graphite reactor when operating at ten thousand kilowatts power output in the form of heat, is approximately 1.8×10^{15} neutrons per second.

In utilizing the output of reactors, internal shafts such as shaft 26 and tube 109b play an important role. They extend to the vicinity of the center of the reactors where the highest neutron densities exist, and intense neutron bombardment of materials inserted into the bottom of these shafts will take place, particularly at high reactor powers. Furthermore, the shafts act to collimate the fast neutrons released inside of the reactors and a high density collimated beam of neutrons emerges through the external aperture, projected outwardly. Such a collimated beam, having a far greater fast neutron density than any neutron beam heretofore produced, can be utilized outside of the pile for nuclear research in all of its aspects. The number of neutrons escaping from these shafts is several times the number escaping over an area of the external surface of the reactors equal to the cross section of the shafts.

In addition, extremely high energy gamma rays are emitted during nuclear fission. These rays also escape through the shafts to the exterior of the reactors and can there be used for taking radiographs through large castings, for example, with relatively short exposures, during high power operation of the reactors. The neutrons coming from the reactors can be screened out of the gamma ray beam by the use of relatively thin sheets of materials having high neutron absorption cross sections without substantially reducing the gamma ray intensity. In addition, a bismuth filter has been found to effectively reduce the gamma rays, without substantial interference with the neutron beam. Thus shaft 26 and tube 109b can be used either to produce a high intensity collimated neutron beam, or to produce a high energy beam of gamma rays, as desired, both for use outside the reactors.

In addition, all of the reactors described are also extremely useful in testing materials for neutron absorption and neutron production. Using one or more of the removable stringers 36a for example, in the uncooled graphite uranium reactor the reactor can be balanced at a given neutron density with uranium bodies of known constants in the stringer. The stringer is then withdrawn and new uranium bodies substituted for those withdrawn. The stringer is reinserted into the pile, and the neutron intensity brought to the original value. The change in position of the control rod for the balance condition, when corrected for atmospheric pressure and temperature, will at once tell whether or not the newly inserted bodies are better or worse when used as elements in the system, than those removed. From the results obtained, calculations can be made as to systems incorporating the new bodies. The effect of changes in size, impurities, coatings and temperature on the chain reaction, can similarly be determined. In the latter case, uranium lumps can be heated and inserted to determine the effect of temperature on the reaction as measured by change in the position of the control rod. However, the stringer

method of determining the effect of changes in pile construction is no part of the present invention. Similarly, materials can be tested by insertion in tube 109b in the D_2O reactor or in the coolant channels in the other reactors.

The reactors described herein, in addition to being high power neutron generators, are capable of producing the products of the neutronic reaction in quantities related to the power at which they are operated, in that at least a portion of the uranium bodies are removable from the reactors after exposure to the reaction for varying periods of time. By proper chemical treatment the 94^{239} and fission products can be recovered from the removed irradiated uranium bodies and thereafter utilized as desired.

With modifications, the reactors herein described can also be used as sources of power in useful form. The D_2O moderated reactors can be operated under pressure at an elevated temperature, with continuous removal of the heated D_2O for flashing into D_2O steam for operation of low pressure turbines. Enriched uranium with a light water moderator can be operated in the same manner. The gas cooled reactors, when cooled with helium under pressure, for example, can be used to produce steam by passing the heated helium through heat exchangers. Diphenyl when used as a coolant in the liquid cooled reactor can be heated above the boiling point of water and then used in heat exchangers to produce steam. With proper design, neutronic reactors can also be operated to produce steam directly in tubes passing through the reactor, utilizing the heat of vaporization for cooling the reactor, and the resultant steam for power.

While the theory of the nuclear chain fission mechanism in uranium set forth herein is based on the best presently known experimental evidence, we do not wish to be bound thereby, as additional experimental data later discovered may modify the theory disclosed.

What is claimed is:

1. A neutronic reactor which comprises a moderator of graphite and natural uranium rods disposed in a geometric pattern therein, the size of the rods and the volume ratio of moderator to uranium being within the area encompassed by the $k=1.00$ curve of Figure 3, the purity of the graphite and the uranium and the total mass thereof being sufficient to sustain a chain reaction.

2. A neutronic reactor which comprises a moderator selected from the group consisting of heavy water and graphite and bodies of a thermal neutron fissionable material selected from the group consisting of natural uranium and natural uranium oxide disposed in a geometric pattern therein, each body being surrounded by moderator and the moderator being in a substantially continuous phase, the shape of the bodies and the radius of the bodies and the volume ratio of moderator to thermal neutron fissionable material being within the area encompassed by the $k=1.00$ curve of Figures 2 through 6, the purity of the moderator and the thermal neutron fissionable material and the total mass thereof being sufficient to sustain a chain reaction.

3. A neutronic reactor which comprises a moderator of graphite and bodies of natural uranium in the form of spheres disposed in a geometric pattern therein, each body being surrounded by moderator and the moderator being in a substantially continuous phase, the radius of the bodies and the volume ratio of moderator to uranium being within the area encompassed by the $k=1.00$ curve of Figure 2, the purity of the moderator and the uranium and the total mass thereof being sufficient to sustain a chain reaction.

4. A neutronic reactor which comprises a moderator of graphite and bodies of natural uranium oxide in the form of spheres disposed in a geometric pattern therein, each body being surrounded by moderator and the moderator being in a substantially continuous phase, the radius of the bodies and the volume ratio of moderator to uranium oxide being within the area encompassed by

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Claims – Define Scope of Exclusive Right

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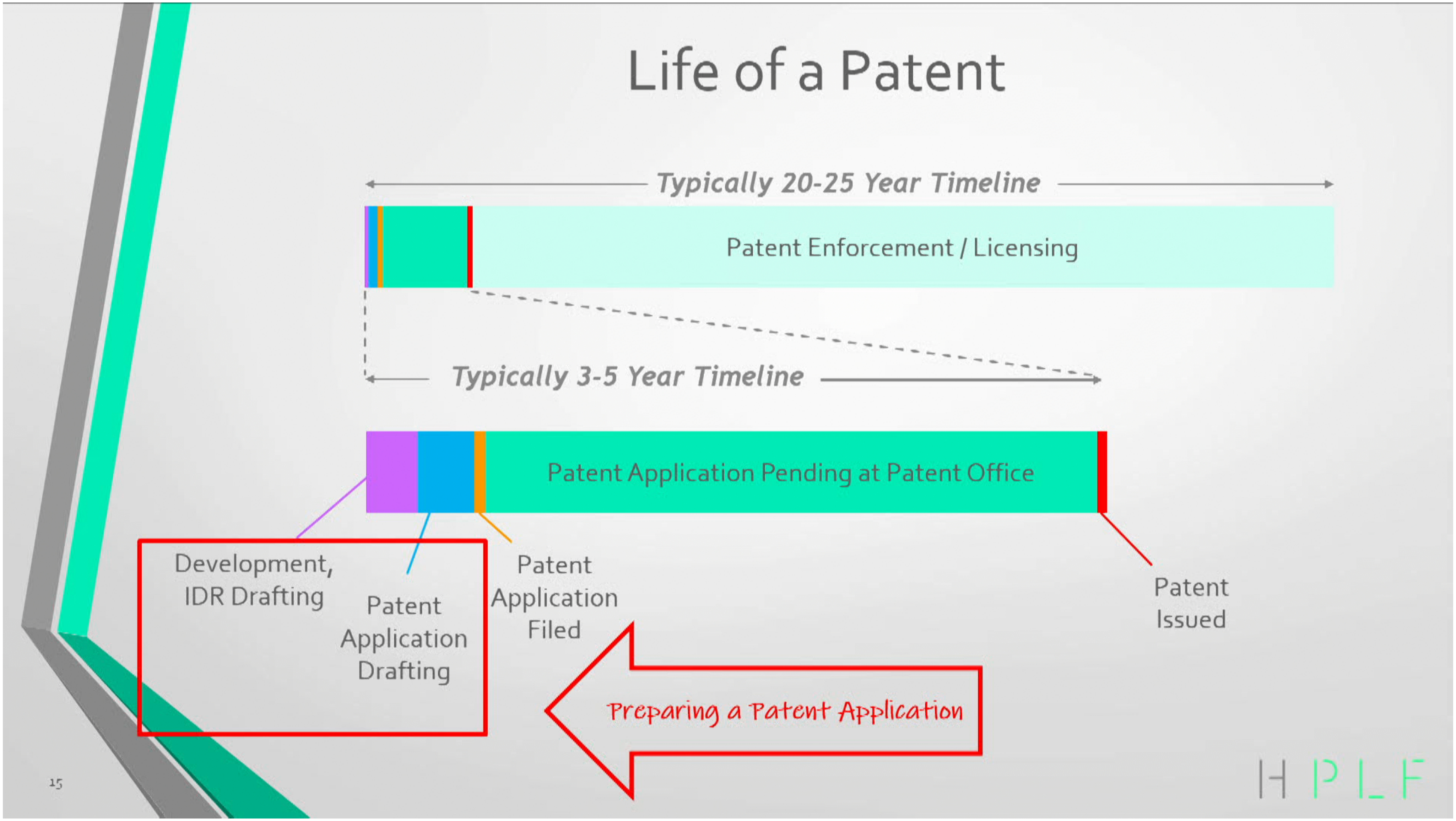

Life of a Patent
Typically 20-25 Year Timeline
Patent Enforcement / Licensing
Typically 3-5 Year Timeline
Patent Application Pending at Patent Office
Development, IDR Drafting
Patent Application Drafting
Patent Application Filed
Patent Issued
Preparing a Patent Application
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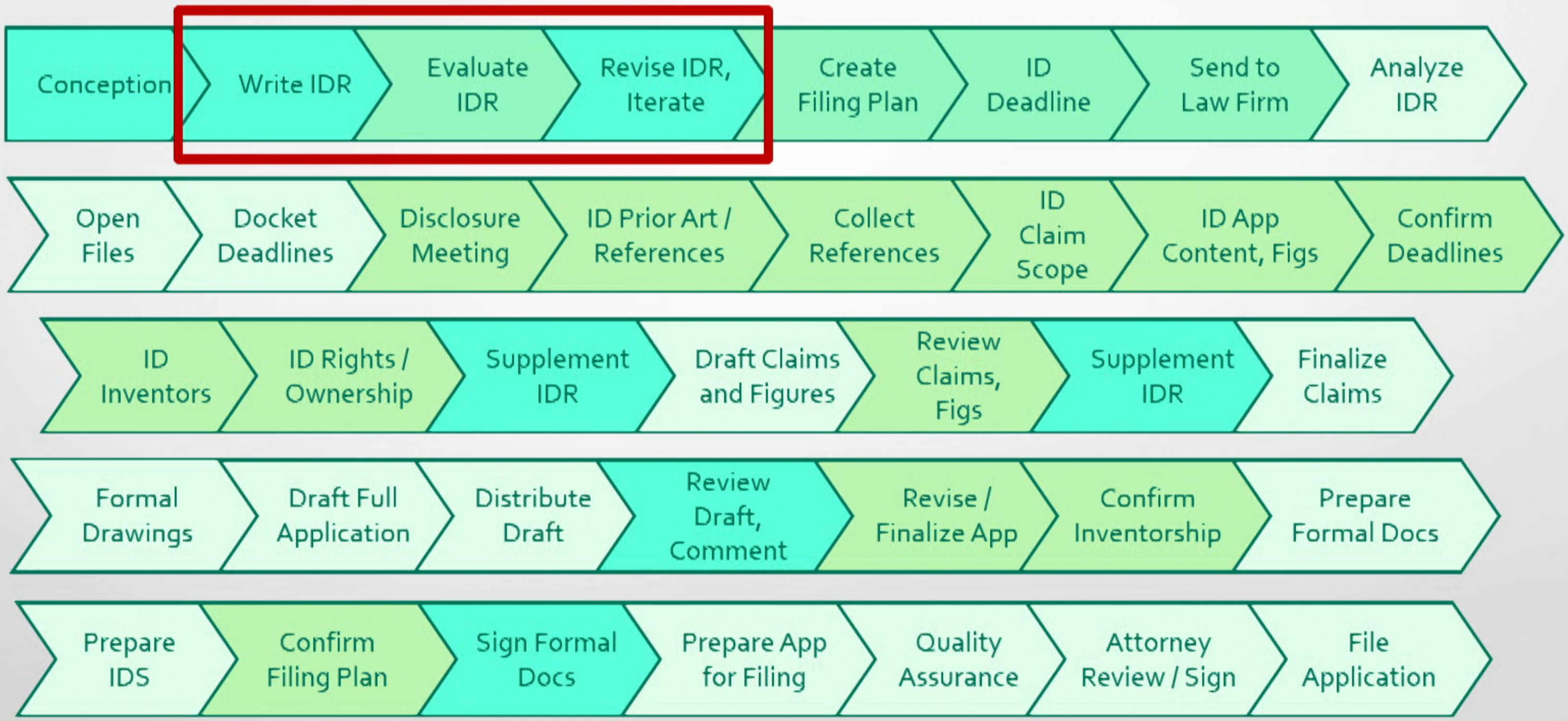
Preparing a Patent Application

Example Work Flow



Invention Disclosure Records (IDRs)

- Formally Document Inventions
  - Creates value, even if no patent or patent application
- Provide a Basis for Patent App. Drafting
  - Should contain all details needed
- Document Technical Details of Invention
  - Out of the inventor's brain, onto paper
- Document Relevant Facts and Circumstances
  - Inventors, Dates, Prior Art, Relevant Products
- Enable Decisions & Next Steps
  - Determine Value, Identify Strategy

Further reading: https://henry.law/blog/write-idr/

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Technical Content in IDR (and Patent Application)

- Include detailed drawings and figures
  - Flow charts, schematics, diagrams, etc.
- Describe the **context** where the invention is valuable
  - Describe applications to industry
- Describe as many alternatives / embodiments as possible
  - This makes the patent broader (not narrower)
- Helpful but (usually) not necessary:
  - Data; Working prototype; Mathematical proofs

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How Do Claims Work?

- A claim defines an **open-ended** checklist of elements of the invention – components (of a system) or steps (of a method)
- **Independent** claims are stand on their own, **dependent** claims add elements to independent claims
- The patent application (claims, drawings, description) provides the primary context for **interpretation**
- To be valid, claims must distinguish the prior art – they must recite a combination of elements not found in prior art
- For a patent to be infringed, a product must include each and every element recited in at least one independent claim

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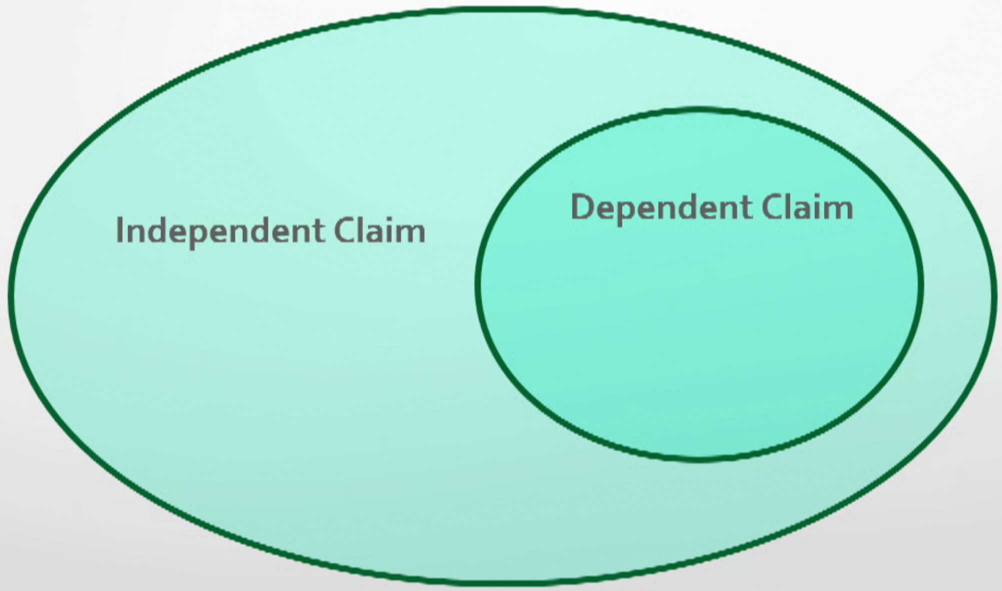
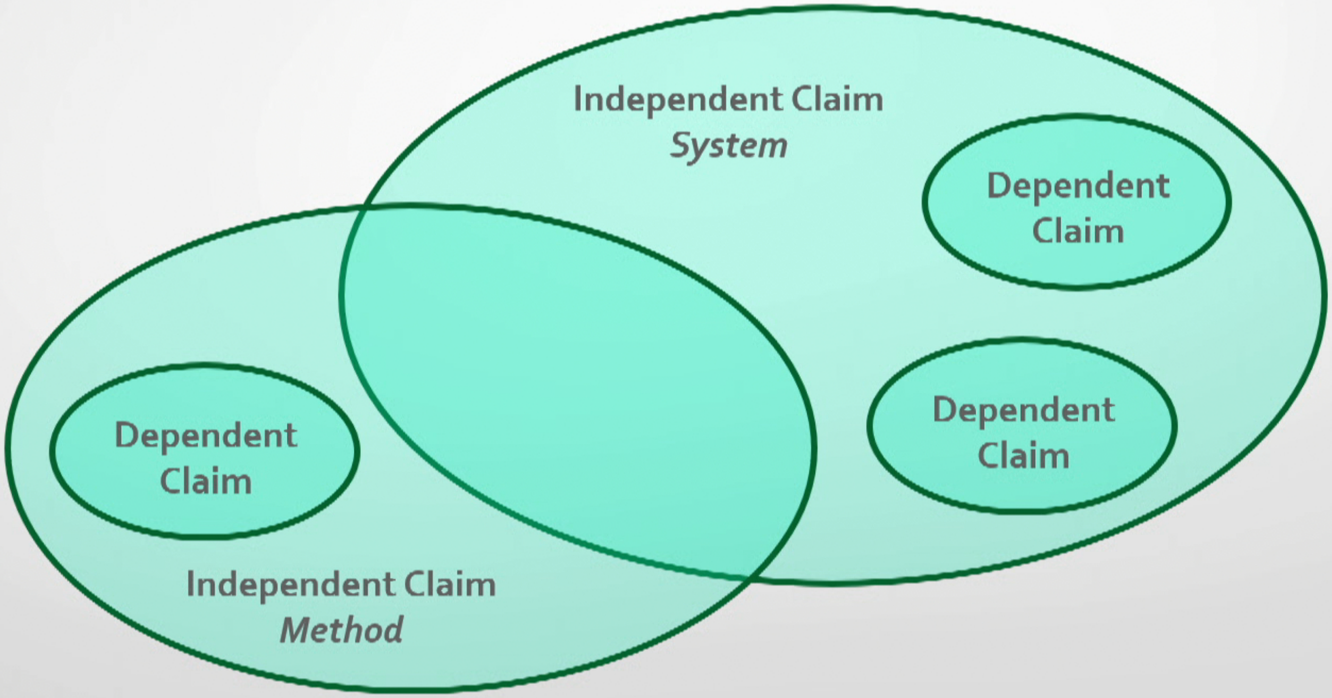
How Do Claims Work?
Independent vs. Dependent



How Do Claims Work?
System and Method Claims



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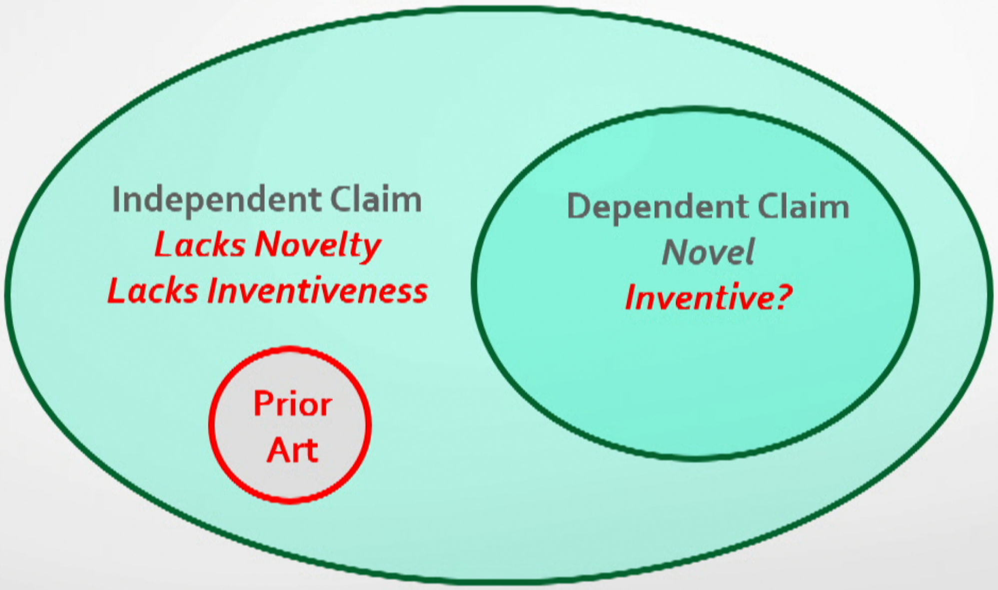
How Do Claims Work?

Evaluating Novelty and Inventiveness



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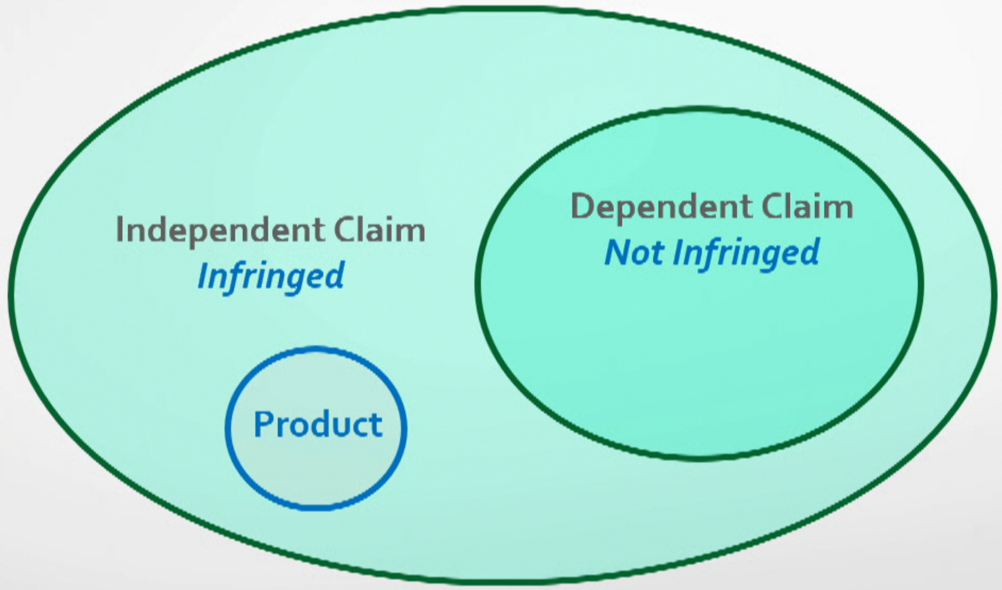
How Do Claims Work?
Evaluating Infringement



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Claims – Which Is Novel?

Claim A:

A stool comprising:

a seat; and

a plurality of legs attached to the seat.

Claim B:

The stool of claim A, further comprising a back attached to the seat.

Prior Art:

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Claims – Which Is Novel?

Claim A:

A stool comprising:

a seat; and

a plurality of legs attached to the seat.

Claim B:

The stool of claim A, further comprising a back attached to the seat.

Prior Art:

Answer: Only Claim B is novel because Claim A covers the prior art.

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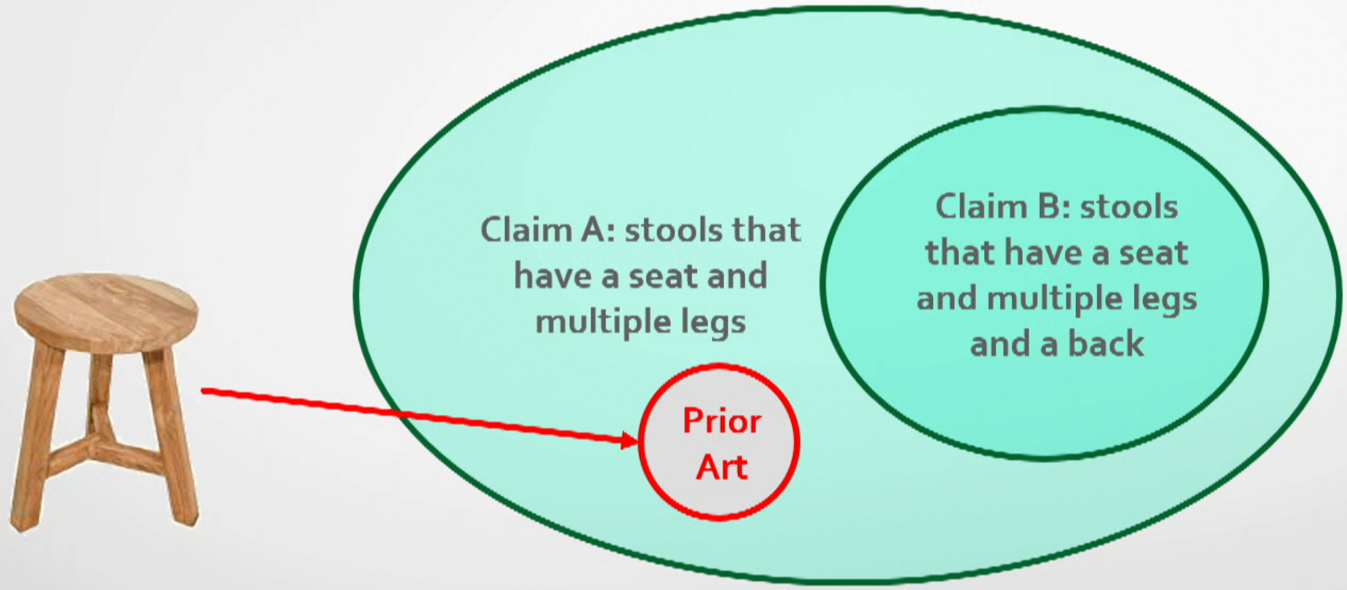
Claims – Which Is Novel?



Answer: Only Claim B is novel because Claim A covers the prior art.

Claims – Which Is Infringed?

Claim A:

A chair comprising:

a seat; and

a plurality of legs attached to the seat.

Claim B:

The chair of claim A, further comprising a back attached to the seat.

Product:

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Claims – Which Is Infringed?

Claim A:

A chair comprising:

a seat; and

a plurality of legs attached to the seat.

Claim B:

The chair of claim A, further comprising a back attached to the seat.

Product:

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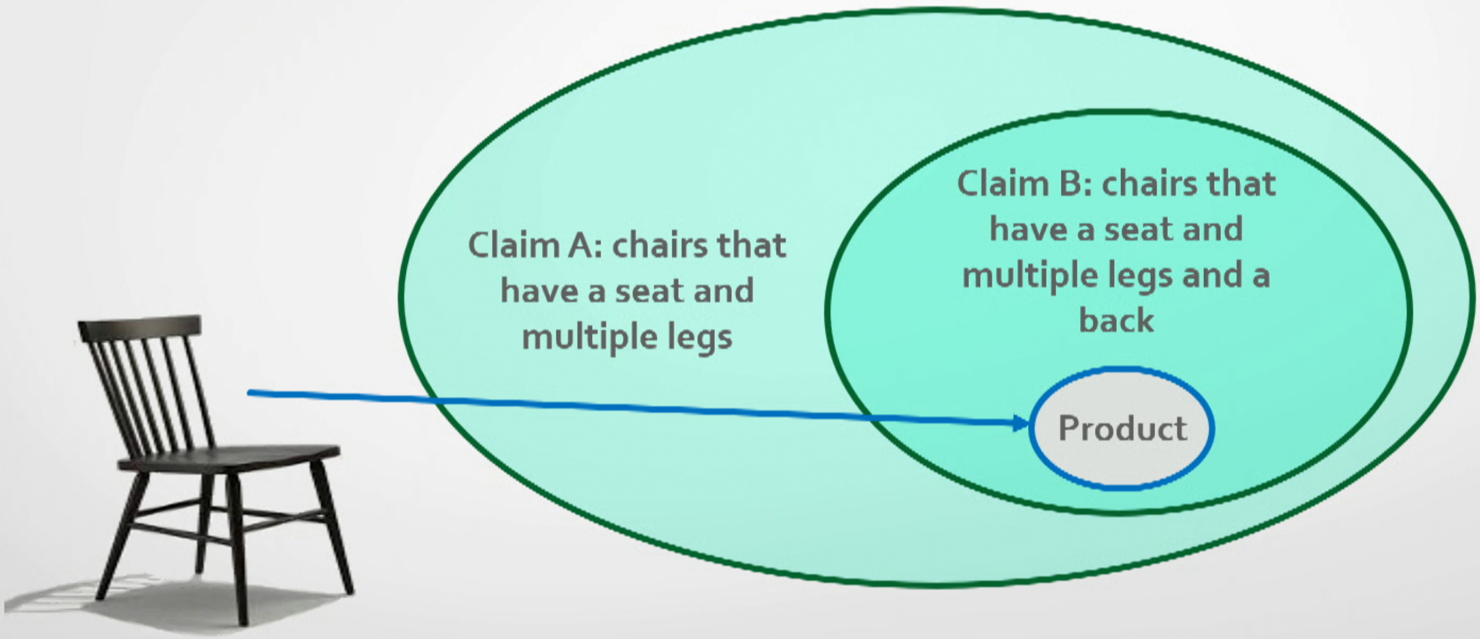
Claims – Which Is Infringed?



Answer: Both are Infringed

Claims – Which Is Infringed?

Claim A:

A stool comprising:

a seat; and

three legs attached to the seat.

Product:

Claim B:

The stool of claim A, comprising a back attached to the seat.

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Claims – Which Is Infringed?

Claim A:

A stool comprising:

a seat; and

three legs attached to the seat.

Product:

Claim B:

The stool of claim A, comprising a back attached to the seat.

Answer: Claim A because the product has three legs. Not Claim B because no back.

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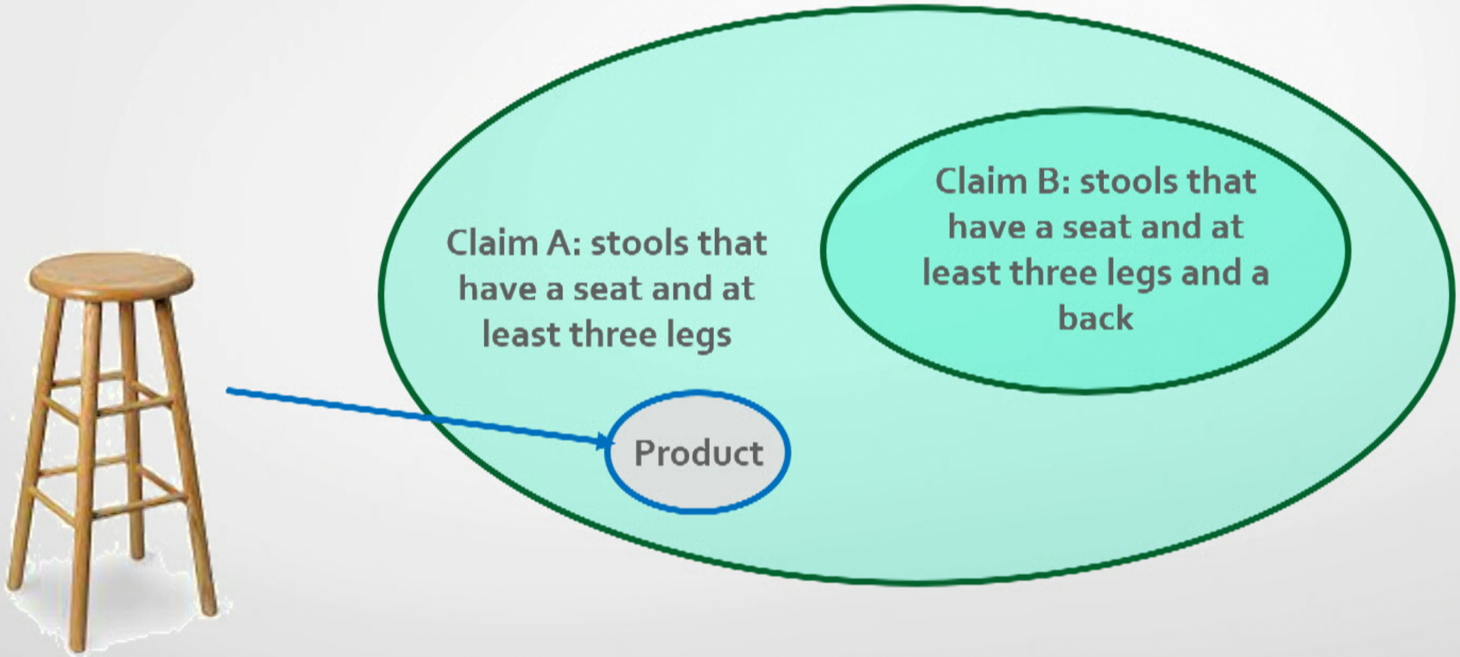
Claims – Which Is Infringed?



Answer: Claim A because the product has three legs. Not Claim B because no back.

Patent Strategy: Advantages / Risks of Broader Claims

- Advantages
  - Harder for a competitor to "design around"
  - More likely to cover valuable embodiments / useful variations
- Risks
  - More likely to be rejected (longer prosecution)
    - Prior art (obviousness), abstract idea (eligibility), indefinite (clarity)
  - Easier for a competitor to challenge validity

Further reading:
https://henry.law/blog/can-your-patent-claims-ever-be-too-broad/

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Patent Strategy: Advantages / Risks of Broader Claims

- Advantages
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Further reading:
https://henry.law/blog/can-your-patent-claims-ever-be-too-broad/

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Patent Strategy:
Advantages / Risks of Narrower Claims

- Advantages
  - More likely to be allowed quickly (faster prosecution)
  - Harder for a competitor to challenge validity
- Risks
  - Easier for competitor to "design around"
  - Less likely to cover valuable embodiments / useful variations

Further reading:
https://henry.law/blog/can-your-patent-claims-ever-be-too-narrow/

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Patent Strategy: Value / Cost of Dependent Claims

- Value: Dependent claims provide **fallback position**
  - Examination: dependent claims may be allowed even when independent claims are rejected
  - Enforcement: dependent claims may "survive" a validity challenge even when independent claims do not
- Cost: Dependent claims require **more effort and fees upfront**
  - Each dependent claim must be fully supported / enabled in the specification (requires more technical detail and drafting effort)
  - Most patent offices charge "excess claims fees" for claims in excess of a minimum (e.g., 15 or 20)

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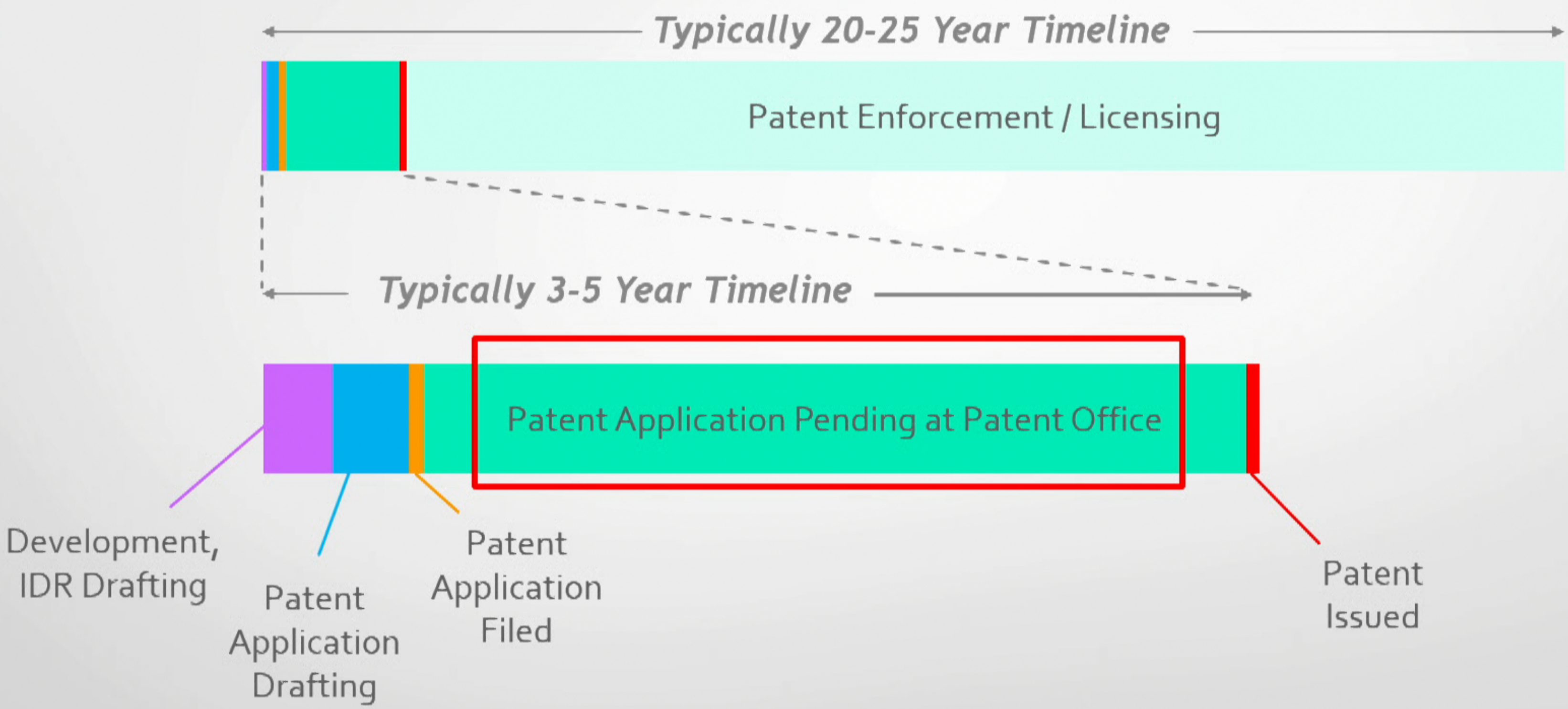
Life of a Patent



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Important Things to Know About Examination / Prosecution

- Can Amend the Claims, but Cannot Add New Technical Material to the Application
- "New" Prior Art References Emerge
- Patent Office Policy (and Patent Law) Subject to Change
- Each Patent Office Conducts an Independent Examination, with Slightly Different Rules
- Ongoing Duty to Disclose (US)

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