Technology Licensing Office

MIT Libraries

IAP 2024: IP Speaker Series

Innovate and Protect:
A Deep Dive into the Patenting Process

Paul D. Sorkin
Intellectual Property Portfolio Associate – Physical Sciences, MIT TLO

January 16, 2024

Today's Topics

- Intro
- What Can Be Patented / The Patent Right and its origin
- MIT Technology Licensing Office (TLO)
- Types Of Patents
- Types Of Patent Applications
- Claims (The Excluding Right)
- Inventorship And Ownership
- The Patenting Process (MIT -> USPTO)
- Continuations/Divisionals/C-I-P Applications and Timelines
- Maintenance Fees
- Infringement

I will pause for questions

About Me
Paul Sorkin

- Rutgers University, Electrical Engineering
- Industry experience as a Manufacturing and Quality Engineer
- Suffolk University Law School
- Registered Patent Attorney
- Law firm and in-house counsel experience

Who's in the Audience?

Raise your hand if:

- you're a named inventor on an issued patent either at MIT or elsewhere

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- you're a named inventor on a pending, i.e., filed, patent application either at MIT or elsewhere
- you're working on, i.e., you're involved with, a disclosure that has been submitted to the MIT TLO but has not yet been filed
- you're going to be working on, or involved with, a disclosure that will be submitted to the MIT TLO **and** (of course) you want to understand what will happen so you can make it as successful a process as possible

"*Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof,* ***may obtain a patent therefor****..." 35 USC §101*

Patent:

A property right granted to an inventor in exchange for teaching how to make and use the invention

What Can Be Patented?

"…any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof,…" 35 USC §101

Pretty much anything…

But NOT:

laws of nature,

physical phenomena,

abstract ideas, or

anything directed to a judicial exception

What Is the Patent Right?

*"…the right to **exclude others** from making, using, offering for sale, or selling the invention…" 35 USC §154*

A ***limited duration property right*** granted to an inventor in exchange for teaching how to make and use the invention

Patent owner receives:

- Right to exclude, i.e., a "negative" right
- Real property or "Intellectual Property"
- Can be sold, licensed, pledged as collateral, inherited

Patent rights are geographically bound, i.e., US patent effective only in US, German patent in Germany, etc.

Where Does Patent Protection Originate?

"The Congress shall have power…to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

US Constitution Article 1, Section 1, Clause 8

- Exclusive and limited time is reward for inventor's contribution
  - To encourage innovation by others building upon the ideas
  - Benefit to society
- When patent expires, falls into public domain, for anyone to practice

MIT TLO

MIT is driven by its mission to make a better world, through education, research and innovation

Technology transfer is the movement of knowledge and discoveries to the general public

MIT's Technology Licensing Office (TLO):

- Strategically evaluates disclosures from faculty and researchers
- Determines which ones will be protected and commercialized
    - (NOT all disclosures will be pursued)
- Licenses MIT-owned intellectual property to start-ups or corporations

TLO Evaluation Factors (Technology & Market)

- What problem does the technology solve?
- Is it a disruptive solution or incremental improvement?
- Is it patentable?

- Is the technology jointly owned?
- Is there an obligation to a third party, e.g., a sponsor?
- Are companies interested in externally developed solutions?

Commercialization of MIT Technologies

Wednesday, January 17, 2024 at 1:45pm

Building 4, 149

182 MEMORIAL DR (REAR), Cambridge, MA 0213

Have you ever wondered how technology that's developed in academic institutions is converted into a product for the public?

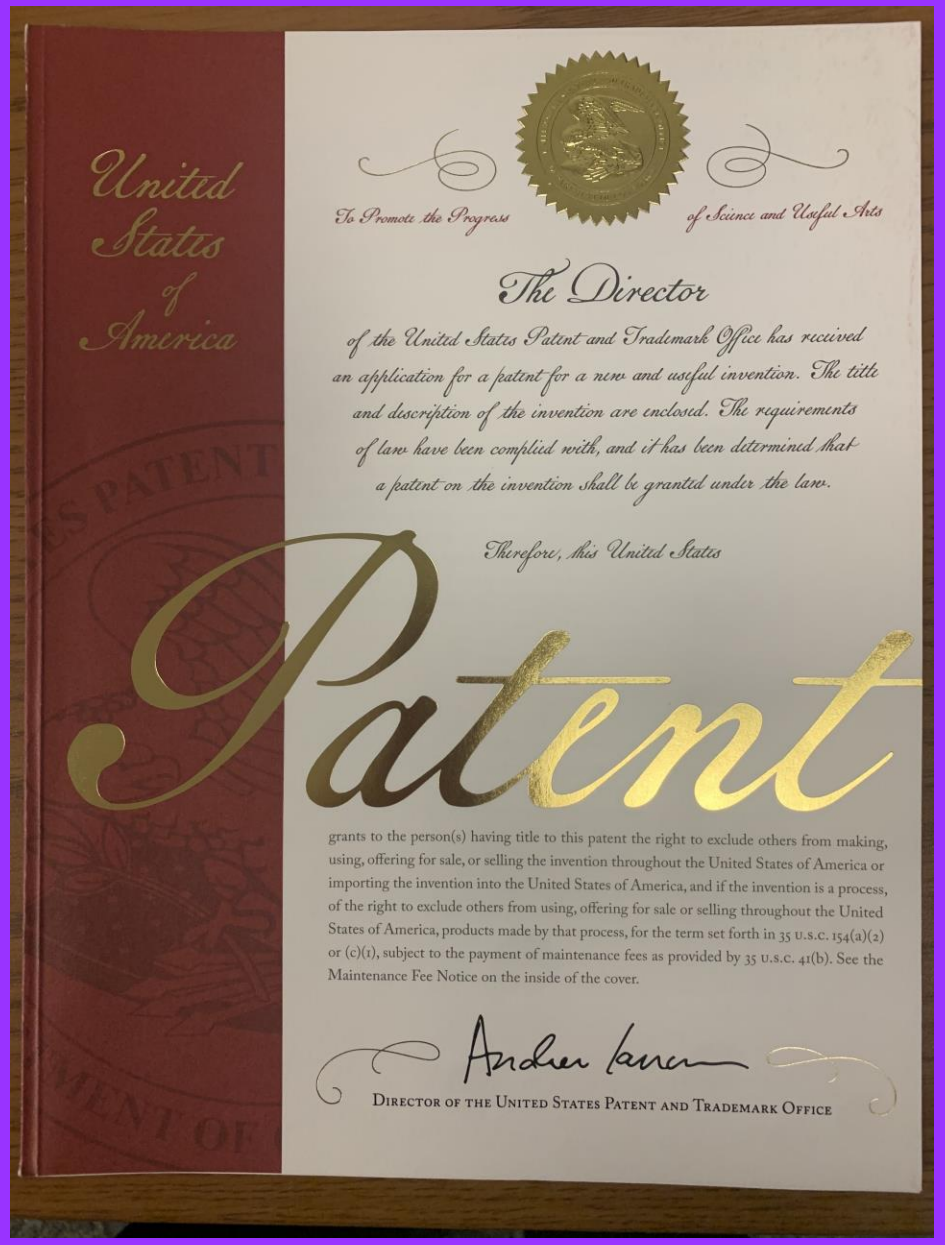
Have you ever wondered how technology that's developed in academic institutions is converted into a product for the public? This process is known as technology transfer, and tech transfer professionals at research organizations all over the world evaluate new inventions, protect intellectual property, and license the technology to third parties, such as start-up ventures or existing companies, for development and commercialization.

At MIT, the Technology Licensing Office (TLO) supports MIT inventors throughout this process and plays a vital role in the entrepreneurial ecosystem.

You'll hear from Lauren Foster and Deirdre Zammit, Associate Directors of the TLO, about the strategic approach MIT takes to move innovations from the bench to the marketplace.

Learn more about the TLO

U.S. PATENTS


United States of America
To Promote the Progress
of Science and Useful Arts
The Director
of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.
Therefore, this United States
Patent
grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.
Director of the United States Patent and Trademark Office

Plant Patent

New and distinct plant,
invented or discovered,
asexually reproduced,
including
cultivated sports, mutants, hybrids, and newly found seedlings

NOT a tuber propagated plant or a plant found in an uncultivated state

(12) **United States Plant Patent**
Spil

(10) **Patent No.: US PP35,529 P2**
(45) **Date of Patent: Dec. 5, 2023**

(54) ***ECHINACEA* PLANT NAMED 'IFECSSWHIB'**

(50) Latin Name: ***Echinacea hybrida***
Varietal Denomination: **IFECSSWHIB**

(71) Applicant: **INNOFLORA PLANT BREEDING B.V.**, Heerhugowaard (NL)

(72) Inventor: **Glenn Spil**, Zuidermeer (NL)

(73) Assignee: **INNOFLORA PLANT BREEDING B.V.**, Heerhugowaard (NL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/114,839**

(22) Filed: **Feb. 27, 2023**

(51) **Int. Cl.**
A01H 5/02 (2018.01)
A01H 6/14 (2018.01)

(52) **U.S. Cl.**
USPC **Plt./428**

(58) **Field of Classification Search**
USPC Plt./428
See application file for complete search history.

(56) **References Cited**

PUBLICATIONS

CPVO Application Consulation (version 4.9.13); citation for 'IFECSSWHIB'. Retrieved from the Internet on Jun. 20, 2023.*

* cited by examiner

Primary Examiner — Susan McCormick Ewoldt
(74) *Attorney, Agent, or Firm* — C. Anne Whealy

(57) **ABSTRACT**

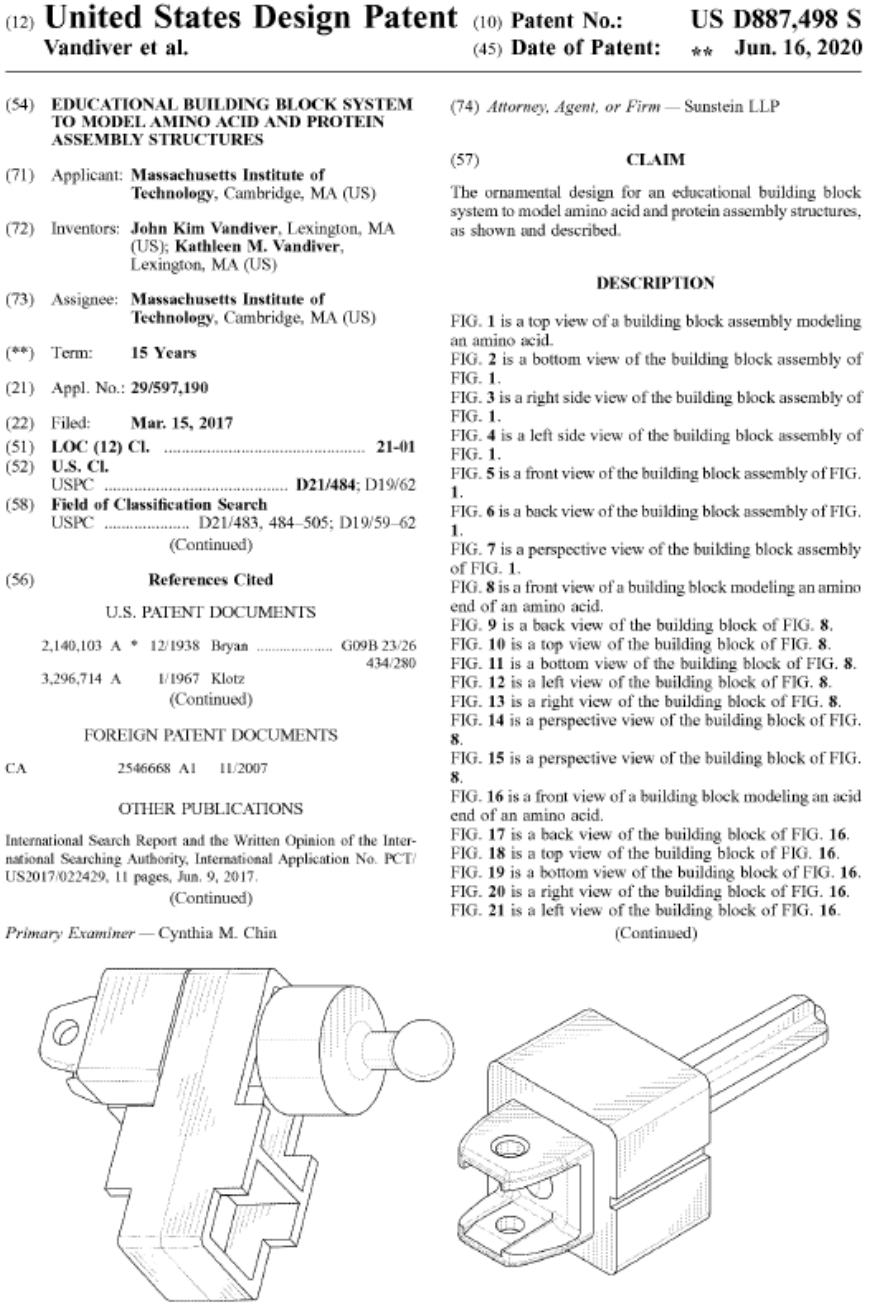
A new and distinct cultivar of *Echinacea* plant named 'IFECSSWHIB', characterized by its relatively compact and upright plant habit; moderately vigorous to vigorous growth habit; freely branching habit; strong flowering stems; numerous single-type inflorescences with white-colored ray florets and bright yellow green-colored receptacle spines; and good garden performance.

2 Drawing Sheets

Design Patent

For a new, original, and ornamental design embodied in or applied to an article of manufacture

Design Patents are in effect for 15 years from date of issuance



(12) **United States Design Patent**
Vandiver et al.

(10) **Patent No.: US D887,498 S**
(45) **Date of Patent: ** Jun. 16, 2020**

(54) **EDUCATIONAL BUILDING BLOCK SYSTEM TO MODEL AMINO ACID AND PROTEIN ASSEMBLY STRUCTURES**

(71) Applicant: **Massachusetts Institute of Technology**, Cambridge, MA (US)

(72) Inventors: **John Kim Vandiver**, Lexington, MA (US); **Kathleen M. Vandiver**, Lexington, MA (US)

(73) Assignee: **Massachusetts Institute of Technology**, Cambridge, MA (US)

(**) Term: **15 Years**

(21) Appl. No.: **29/597,190**

(22) Filed: **Mar. 15, 2017**

(51) **LOC (12) Cl.** **21-01**

(52) **U.S. Cl.**
USPC **D21/484**; D19/62

(58) **Field of Classification Search**
USPC D21/483, 484–505; D19/59–62
(Continued)

(56) **References Cited**

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CA 2546668 A1 11/2007

OTHER PUBLICATIONS

International Search Report and the Written Opinion of the International Searching Authority, International Application No. PCT/US2017/022429, 11 pages, Jun. 9, 2017.
(Continued)

Primary Examiner — Cynthia M. Chin

(74) *Attorney, Agent, or Firm* — Sunstein LLP

(57) **CLAIM**

The ornamental design for an educational building block system to model amino acid and protein assembly structures, as shown and described.

DESCRIPTION

FIG. **1** is a top view of a building block assembly modeling an amino acid.
FIG. **2** is a bottom view of the building block assembly of FIG. **1**.
FIG. **3** is a right side view of the building block assembly of FIG. **1**.
FIG. **4** is a left side view of the building block assembly of FIG. **1**.
FIG. **5** is a front view of the building block assembly of FIG. **1**.
FIG. **6** is a back view of the building block assembly of FIG. **1**.
FIG. **7** is a perspective view of the building block assembly of FIG. **1**.
FIG. **8** is a front view of a building block modeling an amino end of an amino acid.
FIG. **9** is a back view of the building block of FIG. **8**.
FIG. **10** is a top view of the building block of FIG. **8**.
FIG. **11** is a bottom view of the building block of FIG. **8**.
FIG. **12** is a left view of the building block of FIG. **8**.
FIG. **13** is a right view of the building block of FIG. **8**.
FIG. **14** is a perspective view of the building block of FIG. **8**.
FIG. **15** is a perspective view of the building block of FIG. **8**.
FIG. **16** is a front view of a building block modeling an acid end of an amino acid.
FIG. **17** is a back view of the building block of FIG. **16**.
FIG. **18** is a top view of the building block of FIG. **16**.
FIG. **19** is a bottom view of the building block of FIG. **16**.
FIG. **20** is a right view of the building block of FIG. **16**.
FIG. **21** is a left view of the building block of FIG. **16**.
(Continued)

Utility Patent

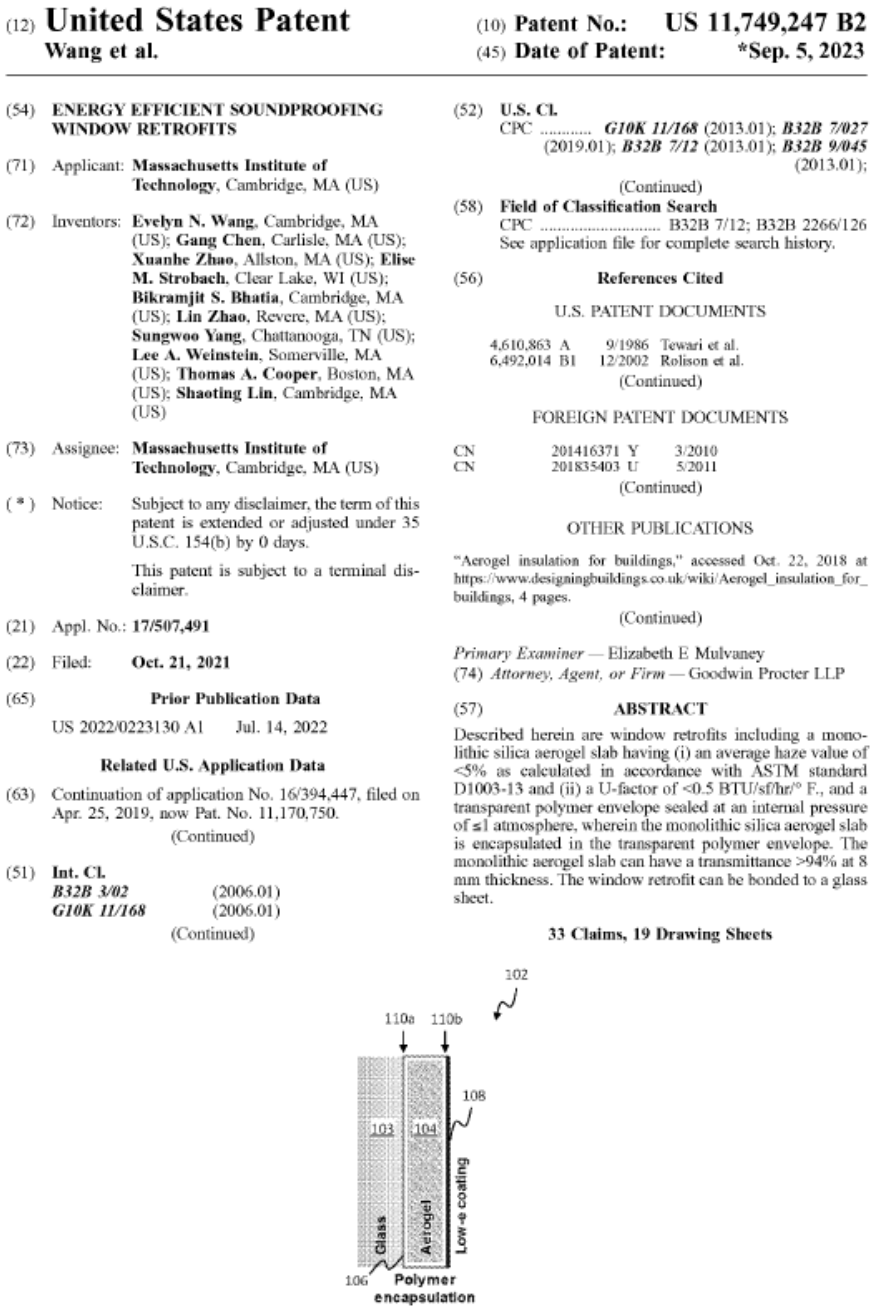
Granted for the invention of a new and useful process, machine, manufacture, or composition of matter, or a new and useful improvement thereof

Most MIT patents are utility patents

Once issued, effective for 20 years from filing date

The **enforceable** term is shortened by time pending at USPTO

US patents issue on Tuesdays



(12) **United States Patent**
Wang et al.

(10) **Patent No.: US 11,749,247 B2**
(45) **Date of Patent: *Sep. 5, 2023**

(54) **ENERGY EFFICIENT SOUNDPROOFING WINDOW RETROFITS**

(71) Applicant: **Massachusetts Institute of Technology**, Cambridge, MA (US)

(72) Inventors: **Evelyn N. Wang**, Cambridge, MA (US); **Gang Chen**, Carlisle, MA (US); **Xuanhe Zhao**, Allston, MA (US); **Elise M. Strobach**, Clear Lake, WI (US); **Bikramjit S. Bhatia**, Cambridge, MA (US); **Lin Zhao**, Revere, MA (US); **Sungwoo Yang**, Chattanooga, TN (US); **Lee A. Weinstein**, Somerville, MA (US); **Thomas A. Cooper**, Boston, MA (US); **Shaoting Lin**, Cambridge, MA (US)

(73) Assignee: **Massachusetts Institute of Technology**, Cambridge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **17/507,491**

(22) Filed: **Oct. 21, 2021**

(65) **Prior Publication Data**

US 2022/0223130 A1 Jul. 14, 2022

Related U.S. Application Data

(63) Continuation of application No. 16/394,447, filed on Apr. 25, 2019, now Pat. No. 11,170,750.
(Continued)

(51) **Int. Cl.**
B32B 3/02 (2006.01)
G10K 11/168 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G10K 11/168*** (2013.01); ***B32B 7/027*** (2019.01); ***B32B 7/12*** (2013.01); ***B32B 9/045*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC B32B 7/12; B32B 2266/126
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,610,863 A 9/1986 Tewari et al.
6,492,014 B1 12/2002 Rolison et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 201416371 Y 3/2010
CN 201835403 U 5/2011
(Continued)

OTHER PUBLICATIONS

"Aerogel insulation for buildings," accessed Oct. 22, 2018 at https://www.designingbuildings.co.uk/wiki/Aerogel_insulation_for_buildings, 4 pages.
(Continued)

Primary Examiner — Elizabeth E Mulvaney
(74) *Attorney, Agent, or Firm* — Goodwin Procter LLP

(57) **ABSTRACT**

Described herein are window retrofits including a monolithic silica aerogel slab having (i) an average haze value of <5% as calculated in accordance with ASTM standard D1003-13 and (ii) a U-factor of <0.5 BTU/sf/hr/° F., and a transparent polymer envelope sealed at an internal pressure of ≤1 atmosphere, wherein the monolithic silica aerogel slab is encapsulated in the transparent polymer envelope. The monolithic aerogel slab can have a transmittance >94% at 8 mm thickness. The window retrofit can be bonded to a glass sheet.

33 Claims, 19 Drawing Sheets

Types of U.S. Utility Patent Applications

Provisional

Nonprovisional

Published application

Patent Cooperation Treaty (PCT) application

Provisional Patent Application

Automatically expires 12 months from filing date

Provides a "priority date D_0"

OFTEN filed to maintain novelty before:

- a paper is published;
- thesis publication;
- trade show;
- offer for sale;
- discussions not covered by NDA; or
- other public disclosure

NOT examined and **NOT** published

No such thing as a **Provisional *Patent***

CANNOT assert infringement of a provisional patent application

CAN be conveyed, sold, pledged, etc.

CAN mark items as "patent pending" or "patents applied for"

Nonprovisional **Patent Application**

IS examined on its merits

WILL BE published 18 months from its earliest priority date

Unless specifically request non-publication at filing

Must have at least one claim

Published Patent Application

Published Patent Application is NOT a granted Patent

Nonprovisional application publishes 18 months after filing date

- Publish on Thursdays
- The proceedings at USPTO then available online for all to see

Tip: If you see a report on a Thursday about a "patent," most likely it is this publication and not an issued patent

Patent Cooperation Treaty (PCT) Application

Central “clearinghouse” for seeking patent protection in countries around the world

File in a Receiving Office and then proceed to other jurisdictions

Most industrial nations are members

Patent harmonization

<u>Must be filed within one year from a previously filed application to enjoy the earliest priority date</u>

Then all applications descended from it, enjoy that earlier priority

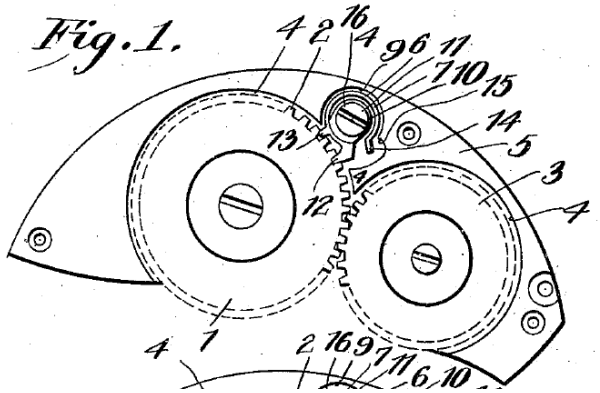
***Generally, MIT only pursues patent applications outside US if licensed because it is very expensive ($$$$)**

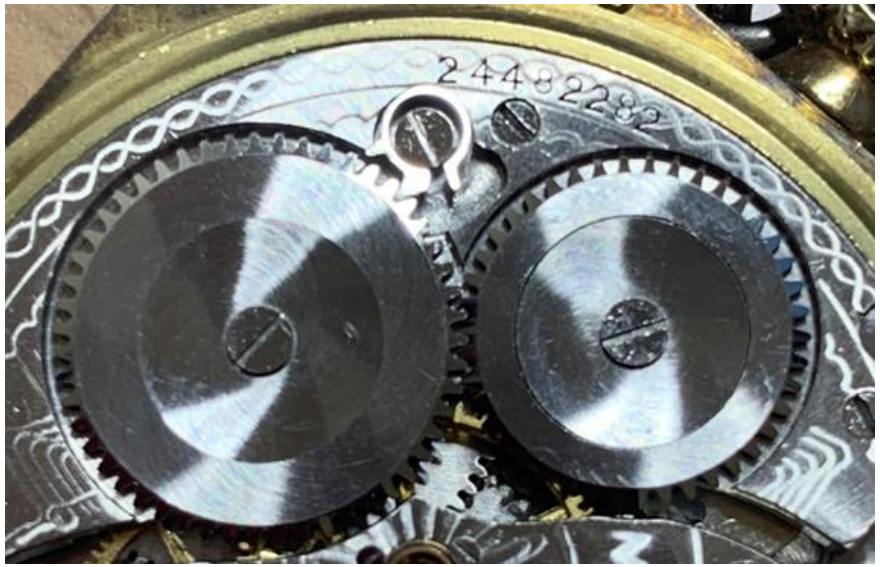
Waltham Watch Company

A. AUNE.
WATCH.
APPLICATION FILED DEC. 3, 1908.

940,117. Patented Nov. 16, 1909.

Fig. 1.





The Right to Exclude

(It's All About the Claims*)

*Apologies to Meghan Trainor

Remember

"…the right to exclude others from making, using, offering for sale, or selling the invention…" 35 USC §154

So, how does a patent define what others are **excluded** from doing?

Claims Define What Others Cannot Do

(12) **United States Patent**
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(10) **Patent No.: US 11,749,247 B2**
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(Continued)

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(Continued)

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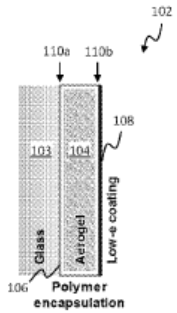
33 Claims, 19 Drawing Sheets



8.5.1.3 Repeatability—In comparing two mean values of the same material, obtained by the same operator using the same equipment on the same day, the means should be judged not equivalent if they differ by more than the r value for that material.

8.5.1.4 Reproducibility—In comparing two mean values for the same material obtained by different operators using different equipment on different days, either in the same laboratory or in different laboratories, the means should be judged not equivalent if they differ by more than the R value for that material.

8.5.1.5 Judgments made as described in 8.5.1.3 and 8.5.1.4 will be correct in approximately 95% of such comparisons.

8.5.1.6 For further information, see Practice E691.

8.5.2 Bias—Measurement biases cannot be determined since there are no accepted referee methods for determining these properties.

(ASTM International standard D1003-13, published November 2013, pages 4-5.)

X1. Derivation of Formulas for Haze

X1.1 The derivation of the formula for haze for both procedures is as follows:

X1.1.1 Total luminous transmittance, T_t, is calculated as follows:

$$T_t = T_2/T_1 \quad \text{(X1.1)}$$

where:

T_2=total light transmitted by the specimen, and

T_1=incident light.

X1.1.2 If T_3, the light scattered by the instrument, is zero, the diffuse luminous transmittance, T_d, is calculated as follows:

$$T_d = T_4/T_1 \quad \text{(X1.2)}$$

where:

T_4=light scattered by the instrument and specimen.

X1.1.3 If T_3 is greater than zero due to light scattered by the instrument, the total scattered light, T_4, will be greater than the light scattered by the specimen by an amount proportional to T_3 and equal to T_3 times T_2/T_1. The corrected amount of light scattered by the specimen will then be the following:

$$T_4 - T_3(T_2/T_1) \quad \text{(X1.3)}$$

X1.1.4 The diffuse luminous transmittance, T_d, is then calculated as follows:

X1.1.5 Percent haze is then calculated from the ratio of diffuse, T_d, to total luminous transmittance, T_t, as follows:

$$\text{haze, \%} = (T_d/T_t)\times 100 \quad \text{(X1.5)}$$
$$= [(T_4 - T_3(T_2/T_1))/T_1 \div (T_2/T_1)]\times 100$$
$$= [(T_4 - T_3(T_2/T_1))/T_2]\times 100$$
$$= [(T_4/T_2) - (T_3/T_1)]\times 100$$

(ASTM International standard D1003-13, published November 2013, page 6.)

Thus, particular embodiments of the subject matter have been described. Other embodiments are within the scope of the following claims. In some cases, the actions recited in the claims can be performed in a different order and still achieve desirable results. In addition, the processes depicted in the accompanying figures do not necessarily require the particular order shown, or sequential order, to achieve desirable results.

What is claimed is:

1. A window retrofit comprising:
a monolithic silica aerogel slab; and
a transparent polymer envelope,
wherein the monolithic silica aerogel slab is encapsulated in the transparent polymer envelope.

2. The window retrofit of claim **1**, wherein the monolithic aerogel slab has a transmittance >94% at 8 mm thickness.

3. The window retrofit of claim **1**, wherein the monolithic aerogel slab has a transmittance >96% at 3 mm thickness.

4. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab comprises pores having a mean radius of less than 5 nm.

5. The window retrofit of claim **1**, further comprising a low-emissivity coating disposed on a surface of the transparent polymer envelope.

6. The window retrofit of claim **1**, further comprising an anti-reflective coating disposed on a surface of the transparent polymer envelope.

7. The window retrofit of claim **1**, further comprising:
a glass sheet, the monolithic silica aerogel slab being bonded to the glass sheet,
wherein the transparent polymer envelope encapsulates the monolithic silica aerogel slab bonded to the glass sheet.

8. The window retrofit of claim **1**, wherein the slab has the U-factor of <0.5 BTU/sf/hr/° F. at an external temperature of −15° C. or greater.

9. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a porosity of at least 90%.

10. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a density selected from a range of 0.1 g/cm^3 to 0.2 g/cm^3.

11. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a thermal conductivity selected from a range of 0.005 W/m·K to 0.025 W/m·K.

12. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab comprises cross-linked polymers.

13. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has an average sound transmission loss of 10 dB or greater at one or more frequencies selected from a range of 50 Hz to 1600 Hz.

14. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a compressive strength of more than 2 MPa.

15. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a bending strength of more than 1 MPa.

16. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a Young's modulus of more than 5 MPa.

17. A window pane comprising:
the window retrofit of claim **1** bonded to a glass sheet.

18. A method for producing an aerogel-glass sheet assembly, the method comprising:
forming a monolithic silica aerogel slab; and
bonding the monolithic silica aerogel slab to a glass sheet.

19. The method of claim **18**, wherein forming the monolithic silica aerogel slab comprises:
diluting tetramethyl orthosilicate (TMOS) by methanol to create a TMOS solution; and

Claims Define What Others Cannot Do

Claims list the requirements of the patented invention

- Combination of elements or steps from which others are excluded
- The "metes and bounds" of the invention
- **MUST** have support in the specification

The patent specification "explains" the claims

- Once one understands what cannot be done, one can "work around" the claims
- Alternatives become available, i.e., competition

*Patent Examiner analyzes **claims** for patentability*

No matter what else might be disclosed in the specification

Independent & Dependent Claims

- Independent: stands alone
- Dependent: references another claim
  - Can be “multi-level”

Claim scope

- Refers to relative number of designs that infringe
- Broad to narrow scope

A “broad” claim

- Shorter - has fewer elements
- More product versions might infringe as all claim elements are required

A “narrow” claim

- Longer - has relatively more elements, i.e., more specific
  - Might be able to “design around” by NOT including all claim elements

Claim scope decreases as claim length increases

- More requirements
- Independent claim broader than a dependent claim

‘247 Claims

1. A window retrofit comprising:

a monolithic silica aerogel slab; and

a transparent polymer envelope,

wherein the monolithic silica aerogel slab is encapsulated in the transparent polymer envelope.

1. A window retrofit comprising:
a monolithic silica aerogel slab; and
a transparent polymer envelope,
wherein the monolithic silica aerogel slab is encapsulated in the transparent polymer envelope.

2. The window retrofit of claim **1**, wherein the monolithic aerogel slab has a transmittance >94% at 8 mm thickness.

3. The window retrofit of claim **1**, wherein the monolithic aerogel slab has a transmittance >96% at 3 mm thickness.

4. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab comprises pores having a mean radius of less than 5 nm.

5. The window retrofit of claim **1**, further comprising a low-emissivity coating disposed on a surface of the transparent polymer envelope.

6. The window retrofit of claim **1**, further comprising an anti-reflective coating disposed on a surface of the transparent polymer envelope.

7. The window retrofit of claim **1**, further comprising:
a glass sheet, the monolithic silica aerogel slab being bonded to the glass sheet,
wherein the transparent polymer envelope encapsulates the monolithic silica aerogel slab bonded to the glass sheet.

8. The window retrofit of claim **1**, wherein the slab has the U-factor of <0.5 BTU/sf/hr/° F. at an external temperature of −15° C. or greater.

9. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a porosity of at least 90%.

10. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a density selected from a range of 0.1 g/cm^3 to 0.2 g/cm^3.

11. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a thermal conductivity selected from a range of 0.005 W/m·K to 0.025 W/m·K.

12. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab comprises cross-linked polymers.

13. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has an average sound transmission loss of 10 dB or greater at one or more frequencies selected from a range of 50 Hz to 1600 Hz.

14. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a compressive strength of more than 2 MPa.

15. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a bending strength of more than 1 MPa.

16. The window retrofit of claim **1**, wherein the monolithic silica aerogel slab has a Young’s modulus of more than 5 MPa.

17. A window pane comprising:
the window retrofit of claim **1** bonded to a glass sheet.

Dependent claims

Dependent Claims

1. A window retrofit comprising:

a monolithic silica aerogel slab; and

a transparent polymer envelope,

wherein the monolithic silica aerogel slab is encapsulated in the transparent polymer envelope.

2. The window retrofit of claim 1, wherein the monolithic aerogel slab has a transmittance >94% at 8 mm thickness.

3. The window retrofit of claim 1, wherein the monolithic aerogel slab has a transmittance >96% at 3 mm thickness.

4. The window retrofit of claim 1, wherein the monolithic silica aerogel slab comprises pores having a mean radius of less than 5 nm.

5. The window retrofit of claim 1, further comprising a low-emissivity coating disposed on a surface of the transparent polymer envelope.

6. The window retrofit of claim 1, further comprising an anti-reflective coating disposed on a surface of the transparent polymer envelope.

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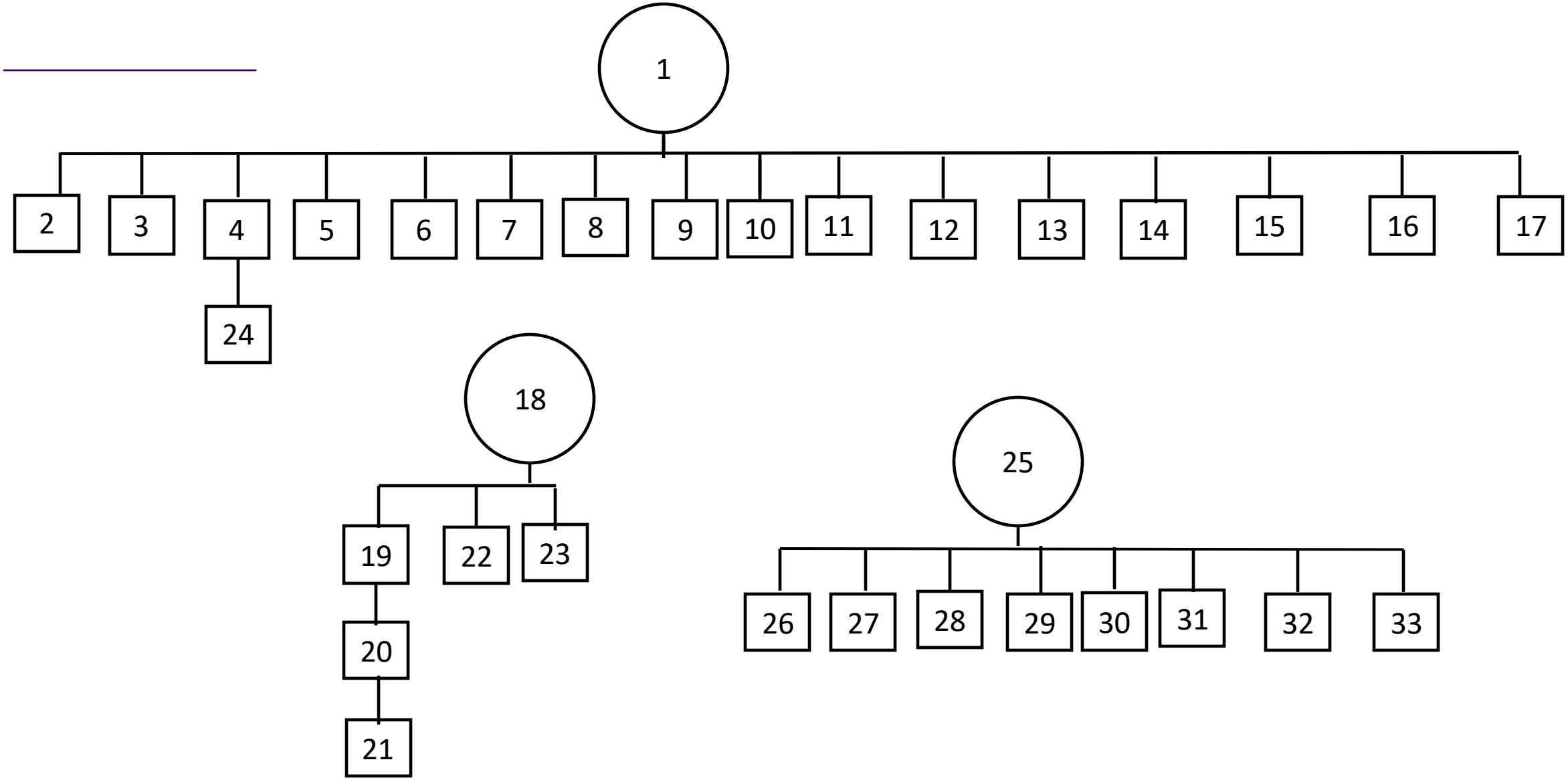
.

17. A window pane comprising:

the window retrofit of claim 1 bonded to a glass sheet.

Claim Hierarchy

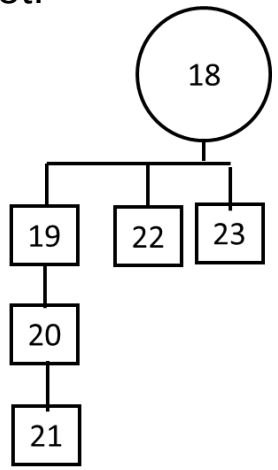


Dependent Claims

18. A method for producing an aerogel-glass sheet assembly, the method comprising:

forming a monolithic silica aerogel slab; and

bonding the monolithic silica aerogel slab to a glass sheet.



19. The method of claim 18, wherein forming the monolithic silica aerogel slab comprises:

diluting tetramethyl orthosilicate (TMOS) by methanol to create a TMOS solution; and

combining the TMOS solution with an ammonia solution comprising ammonia and water to form a silica aerogel precursor, wherein a ratio of ammonia to TMOS is less than 0.0025.

20. The method of claim 19, further comprising:

allowing the silica aerogel precursor to gel, thereby forming a silica aerogel.

21. The method of claim 20, further comprising:

annealing the silica aerogel to reduce a pore size of pores in the silica aerogel.

22. The method of claim 18, wherein bonding the monolithic silica aerogel slab to the glass sheet comprises inducing a van der Waals bond between the aerogel slab and glass sheet.

23. The method of claim 18, wherein bonding the monolithic silica aerogel slab to the glass sheet comprises applying an optically transparent adhesive to a surface of either the aerogel slab or the glass sheet.

Claiming Strategy

The claims define what others **cannot** do.

- What “space” do we want to protect?
- Perhaps “stakeout” where the industry is heading
- To increase interest for potential licensees

Will we be able to detect infringement?

- Reverse engineering

Balance of trying to claim as much as possible, i.e., broad protection, without “falling into” or “reading on” the prior art

It takes time and effort to generate a set of claims

Drafting claims first can provide an outline or map for preparing the specification

An inventor should understand the claiming strategy and agree with it

Inventors and Inventorship

Who is an inventor is a legal determination

The claims control who is an inventor on an application

Threshold question in determining inventorship:

Who conceived of the invention as defined by the claims?

Unless a person contributes to the conception of the invention, they are NOT an inventor

Misidentifying inventors, either through improper inclusion or exclusion, can result in the invalidation of a patent

Inventorship, however, CAN BE CORRECTED

Patent Ownership

Inventor is presumptive owner of a patent application and any patents that issue therefrom, **unless**

- There is a contractual arrangement to the contrary

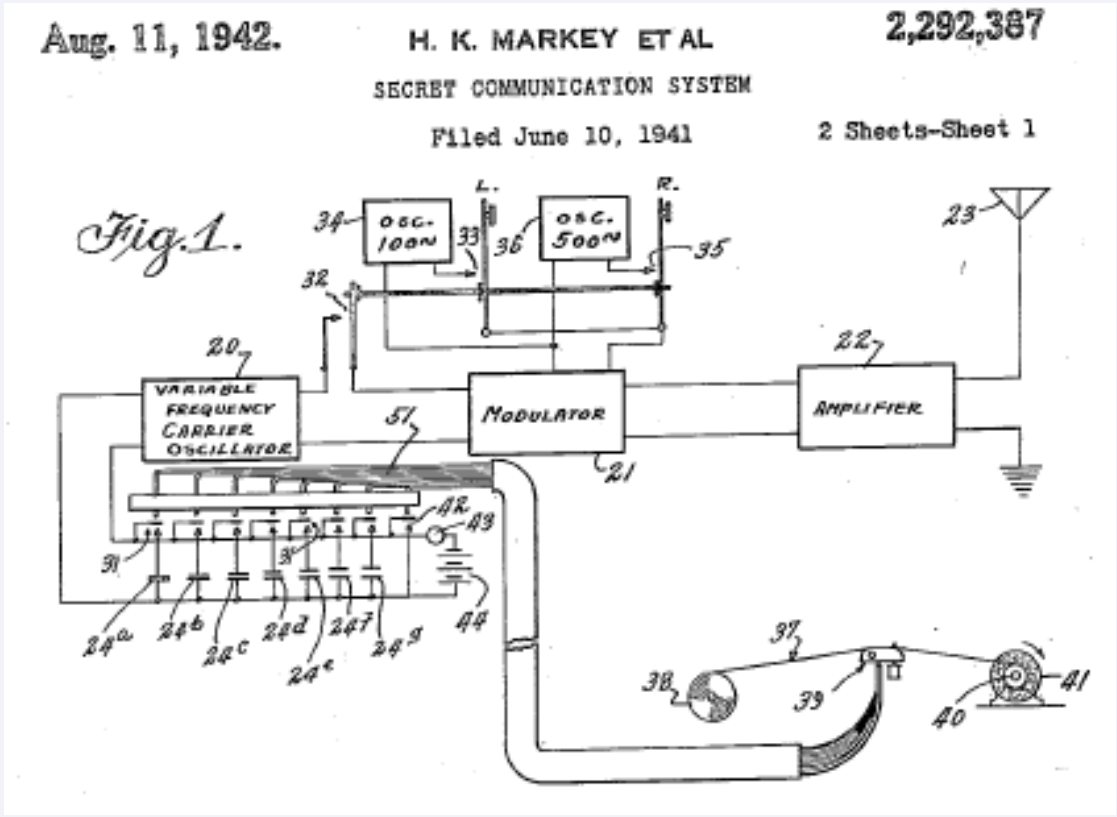
MIT inventors **assign, i.e., transfer,** ownership to MIT

- *See*, MIT Inventions and Proprietary Information Agreement "IPIA"
  - Terminates any and all property interests of inventor
  - Assignment is recorded at US PTO

MIT retains ownership and, therefore, control of the patent

TLO licenses MIT-owned Intellectual Property to others

Hedy Lamarr, Co-Inventor of “Frequency Hopping”



The Process

The Process @ MIT

Submit an invention disclosure via Research@MIT

TLO will:

- Review and discuss with submitters
- Decide whether or not to file patent application
  - If to be filed, send to outside counsel

Outside counsel will:

- Review disclosure materials
- Discuss with inventors
- Draft patent application (an iterative process)

Inventors will:

- Review drafts of patent application, *especially the claims*
- Correct/clarify technical errors/issues therein
- Approve final version for filing

Parts of a Patent Application

Title

Background

Summary

Drawings

Detailed Description

Claims

Abstract

The Patent

Patent must teach persons of ordinary skill in the art how to practice, i.e., how to make and use, the invention

- It is not just a set of drawings
- Must provide an “enabling” technical description
- Can’t hide information needed to make invention
- Each element of a claim must be shown in a drawing
    - Method steps would be shown in a flowchart

The USPTO Process

US is a First-to-file system

If two applicants have same invention, **first filer has *priority***

Accordingly, want to file as soon as you have enough information to describe your invention

MANY countries require "absolute novelty"

Invention not publicly disclosed prior to application's filing date

To ***best*** preserve option of filing in other countries, ***a patent application should be filed before any public disclosure***

e.g., conference presentation, article publication, thesis publication, trade show, demonstration, offer for sale, etc.

Tip: Always indicate planned public disclosures or any that have already happened

Priority Date and Prior Art

Priority Date (D_0): earliest filing date from which priority is asserted by applicant

Prior Art: what was known before the priority date D_0

Patent application examined by comparing **claims** to ***prior art***

Determine whether invention is new and inventive

Prior art includes patents, published patent applications, publications, products, etc.

> Inventor's prior work, e.g., published papers, offers to sell the invention, presentations, etc., could potentially be prior art

The Patent Process

US has a one-year "grace period"

- A US patent application can be filed up to one year from an initial public disclosure **by the inventor**
- Keeping good records of dates can be important
  - Filing one year + 1 day after disclosure has resulted in patents being unenforceable

Why might one publicly disclose before filing?

- Is product commercially worth investing in patent application
- Not interested in protection outside US
- Inadvertently disclosed but want to at least obtain protection in US

The USPTO Process

USPTO receives the application

Then we wait – applications are taken up in order they are filed

Claims examined with respect to prior art and an "Office Action" issues

Reasoned rejection of claims as being anticipated and/or obvious over one or more prior art references

Applicant (via MIT's patent counsel) reviews Office Action and can:

Submit arguments against the rejection; and/or

Amend (modify) the claims to better distinguish over prior art

ONLY to extent the amendments are supported in the specification

Inventor is often involved in the technical review

Examiner considers the arguments and can:

Reject on same or new grounds or allow the claims

Conceptually, this can go back-and-forth many times

However, it becomes more expensive as the cycles repeat

Examination Process (Patentability)

What the Patent Examiner Reviews

Patentable Subject Matter

Process, machine, manufacture, or composition of matter

NOT directed to a judicial exception

Utility

A person of ordinary skill in the art would immediately appreciate why the invention is useful and the utility is specific, substantial, and credible.

Enablement

Must describe how to practice the invention

Such that one of ordinary skill can practice the invention

Examination Process (Patentability)

What the Patent Examiner Reviews

Is Not Anticipated (§102)

NOT known to the public before the priority date

Lacks Novelty: if a single reference shows the claimed invention

Is Not Obvious (§103)

Difference between claimed invention and prior art are such that, as a whole, NOT obvious to a *person having ordinary skill in the pertinent art*

Is there an "inventive step?"

Graham v. John Deere obviousness analysis:

Determine scope and content of prior art;

Ascertain differences between claims and prior art; and

Resolve level of person of ordinary skill in pertinent art.

Is Obvious: **IF** a combination of references would lead one of ordinary skill to claimed invention

Person of Ordinary Skill In The Pertinent Art?

A *hypothetical* person who is presumed to know the relevant art at the priority date.

"A person of ordinary creativity, not an automaton"

Consider:

- "type of problems encountered in the art"
- "prior art solutions to those problems"
- "rapidity with which innovations are made"
- "sophistication of the technology"
- "educational level of active workers in the field"

Examination Process (Cont.)

Inventor may be asked to review reference(s) cited as the basis for rejecting one or more claims

Remember, the Examiner is looking at the claims

Always read the pending claims first

If you see a technical difference, as long as there is support in the specification, it could be added to the claim in order to distinguish

Modifying a claim, e.g., by adding a limitation, might make it patentable but also makes it “narrower”

Arguments to overcome rejection must be based on claim language

Prior Art Search

Publicly available information that predates the filing date of a patent application

Identify and examine the prior art that is relevant to the technology, i.e., the disclosure, in question

Potential benefits:

- Assess patentability
- Assess difference between disclosure and prior art
- Assess possible scope of claims coverage
- Determine whether or not to file
- Prepare claims to not “read on” prior art

Continuations/Divisionals/C-I-P Applications and Timelines

Continuation Patent Application

An application that continues from a co-pending nonprovisional application (the “parent”)

- Could be prosecuted “in parallel” with the parent; or
- Continuing on when a patent issues from the “parent”

Opportunity to seek different coverage via different claims sets

Co-pendency is required

- As long as there is co-pendency, i.e., an overlap, priority “chain” is unbroken

Continuation-in-part (CIP) Patent Application

Similar to a Continuation **BUT**

"New," i.e., "additional," subject matter has been added to the specification

Raises an issue of "mixed" priority dates

As between original and new subject matter

The "new" subject matter has the filing date of the CIP as its priority date

Divisional Patent Application

Per statute, only allowed one invention per patent

- Number of different inventions is based on the claims

If there are two or more claimed inventions, a “restriction requirement” is asserted

The claims associated with one invention have to be “elected,” i.e., chosen, for examination in the current application

- Non-elected claims are withdrawn or canceled

The divisional application is, therefore, a type of continuation, where the “non-elected” claims are pursued

Divisional Example

An application teaches a system having a hammer and a nail

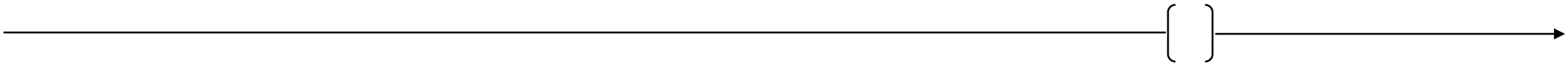
A set of hammer claims

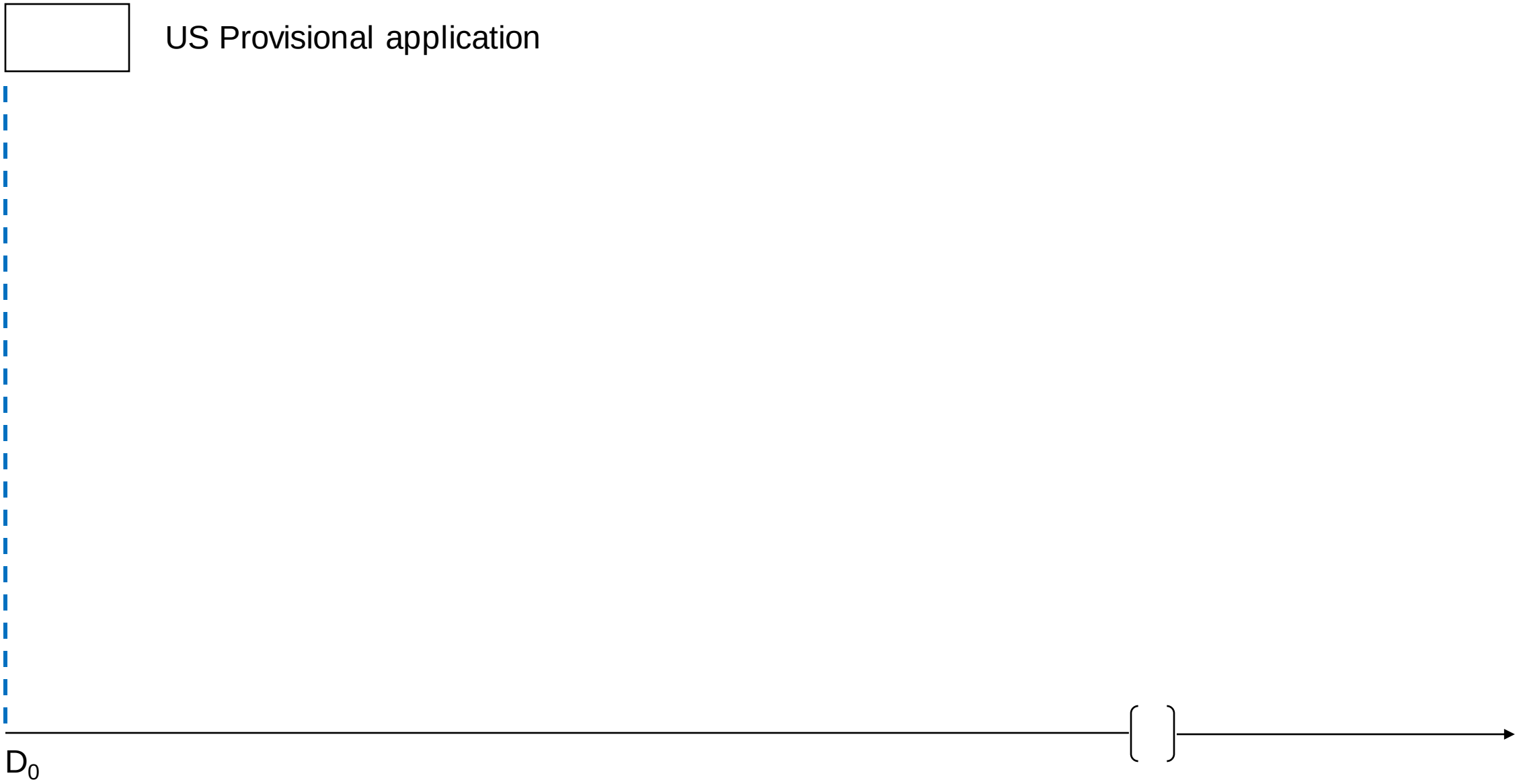
A set of nail claims

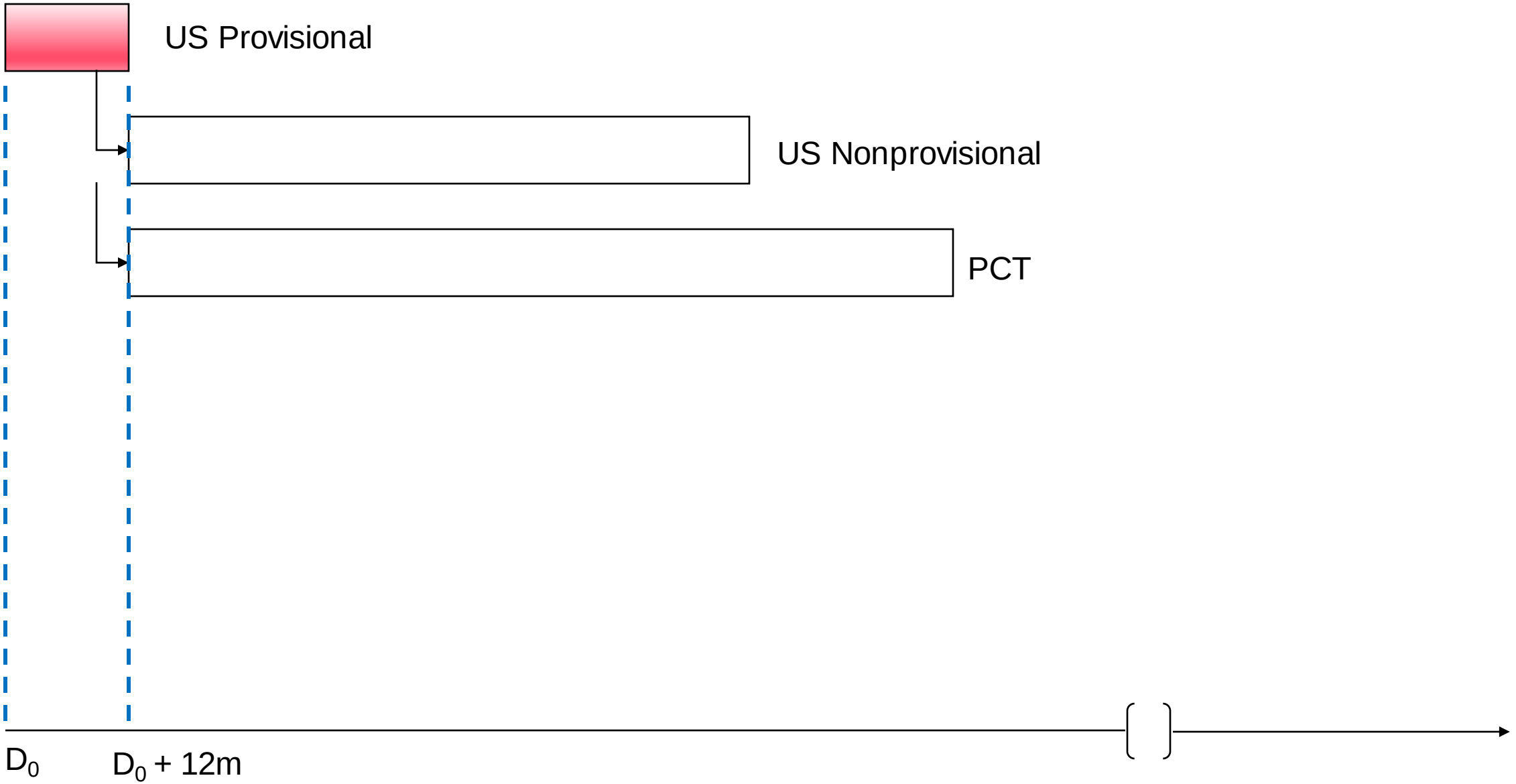
Hammers and nails are different inventions, so one invention is "elected," i.e., chosen

Claims are assigned to a technical art unit for examination where the Examiners have expertise in the technology

Timeline 1




US Provisional application
D_0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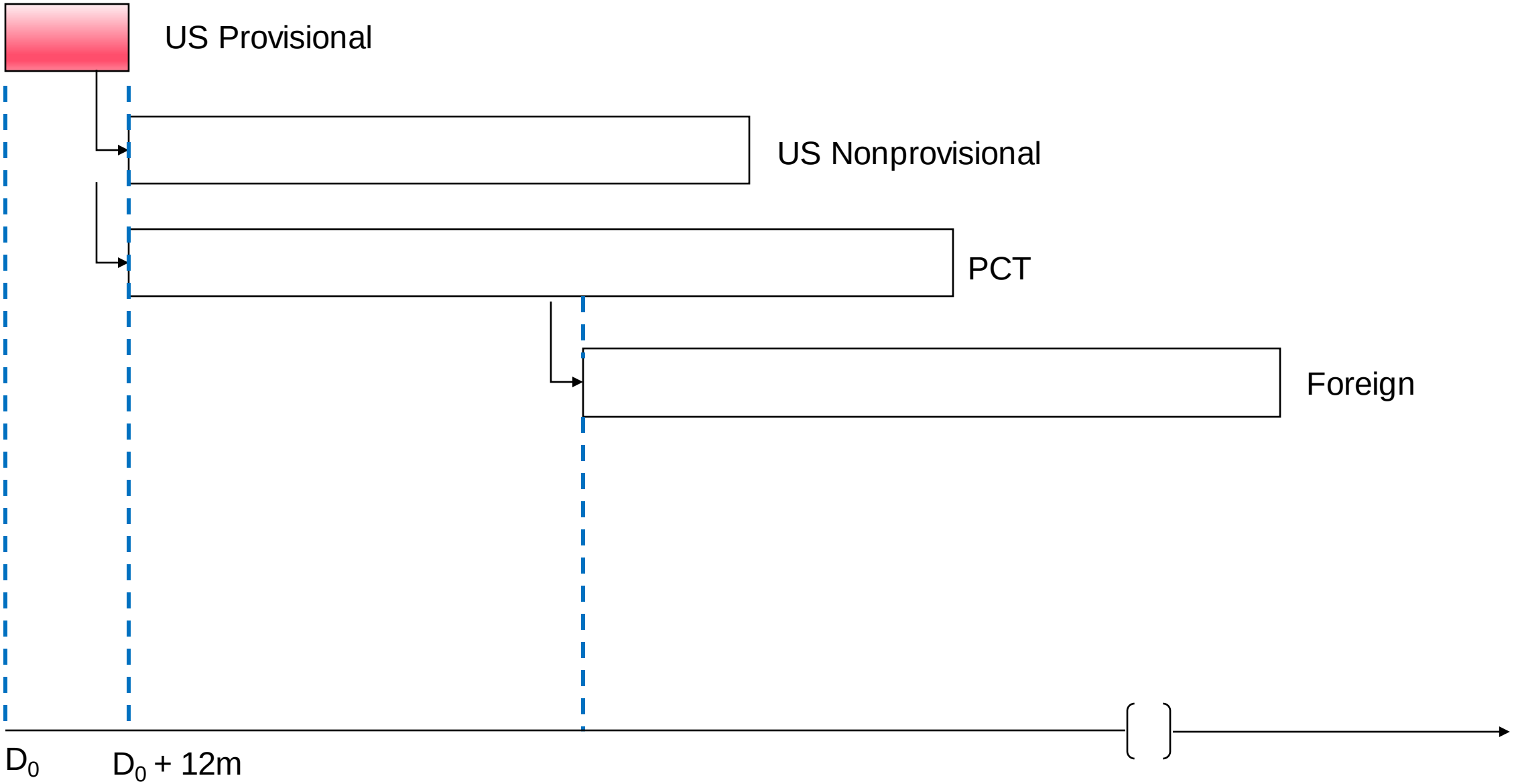
US Nonprovisional
PCT
D_0
D_0 + 12m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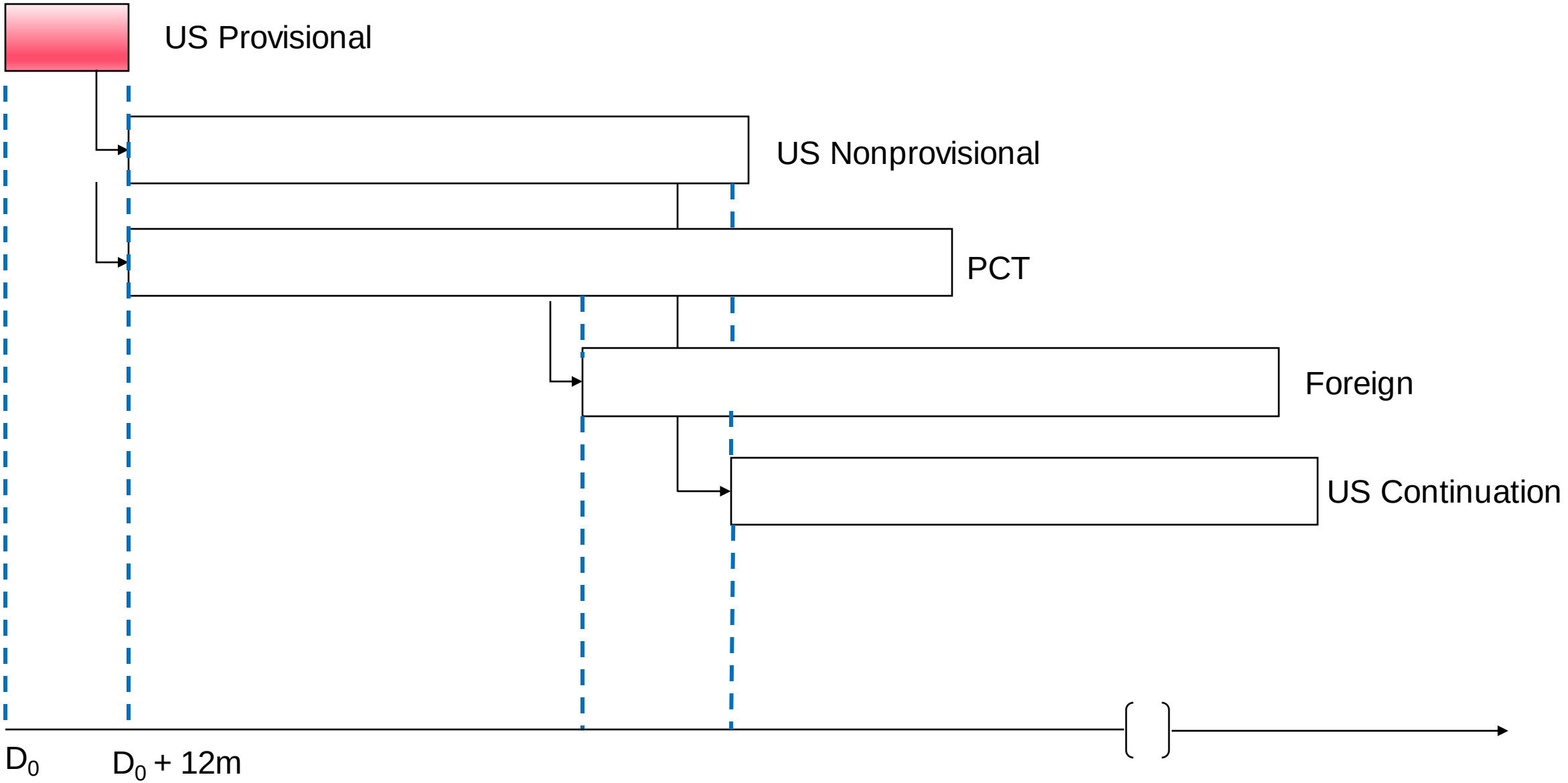
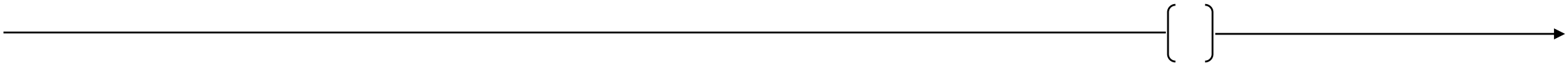
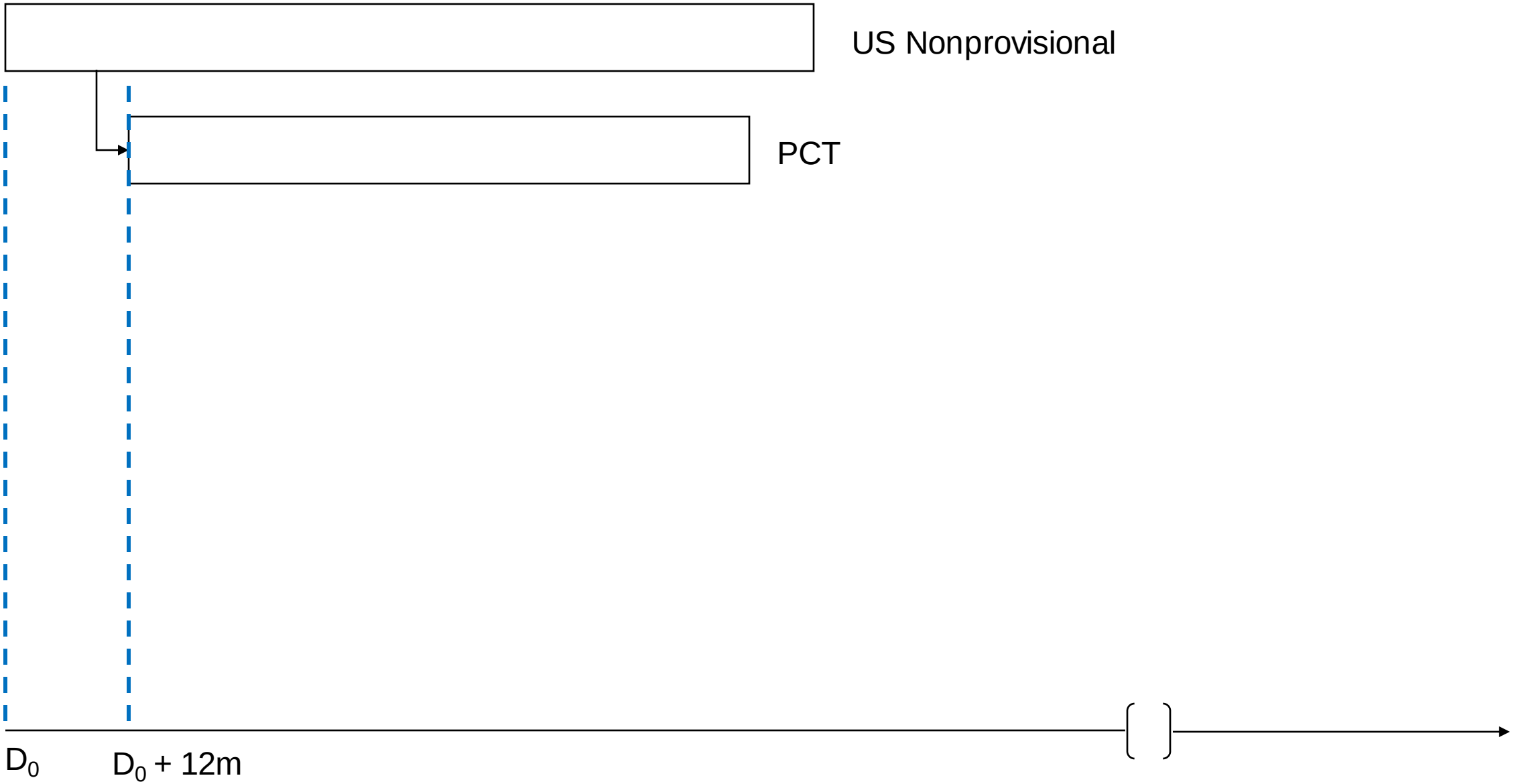
PCT
Foreign
D_0
D_0 + 12m

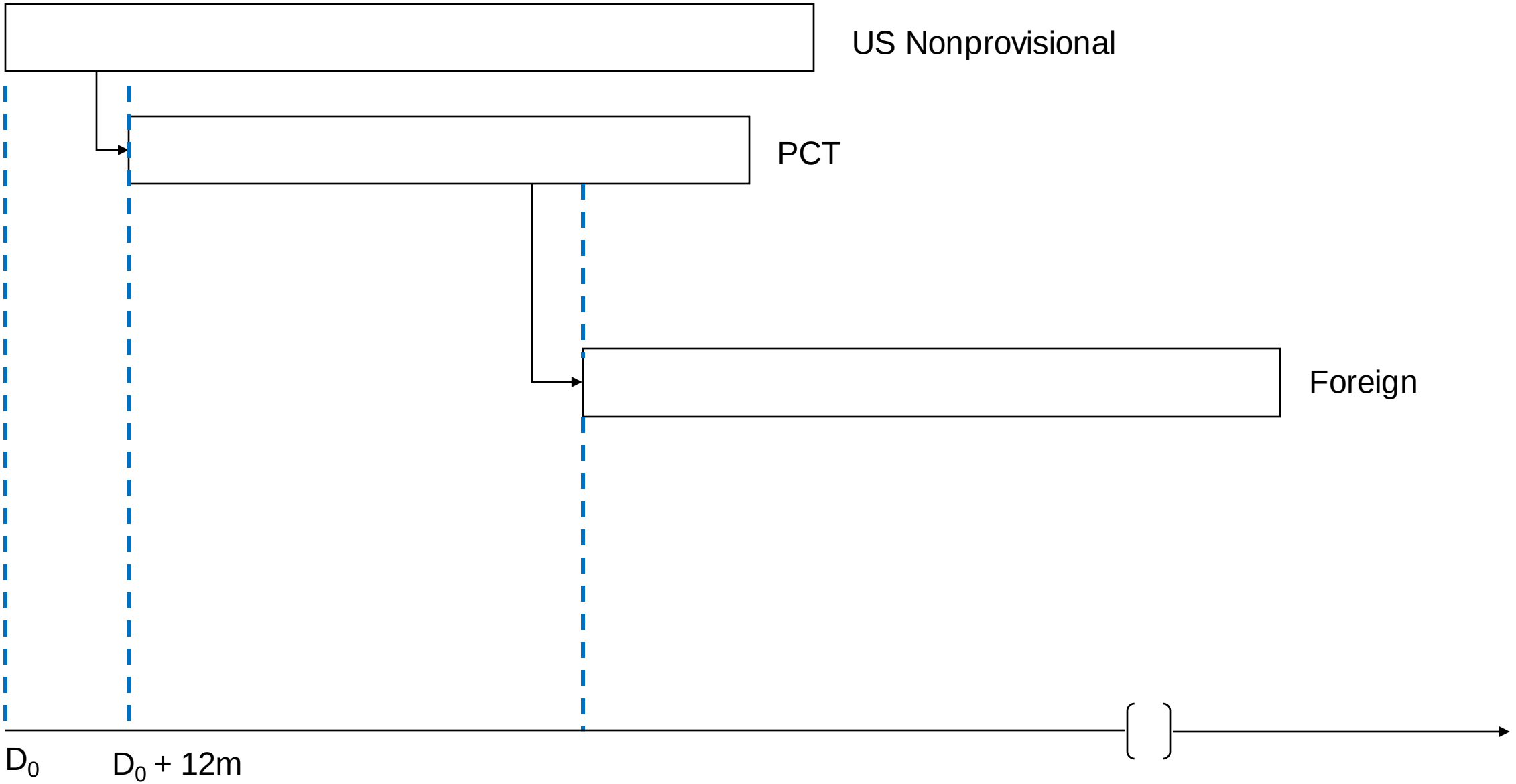

US Provisional
US Nonprovisional
PCT
Foreign
US Continuation
D_0
D_0 + 12m

Timeline 2




US Nonprovisional
D_0


US Nonprovisional
PCT
D_0
D_0 + 12m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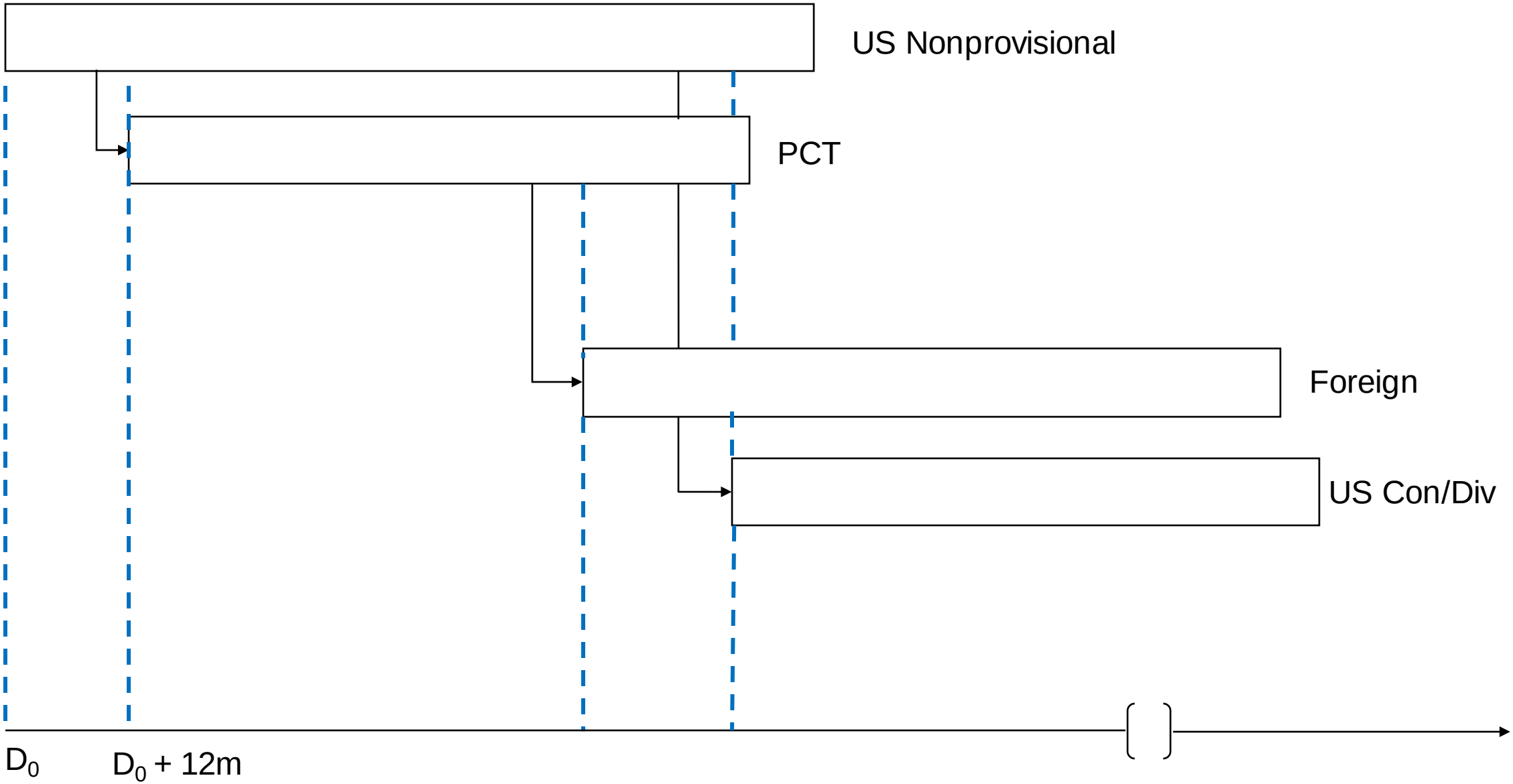
PCT
Foreign
D_0
D_0 + 12m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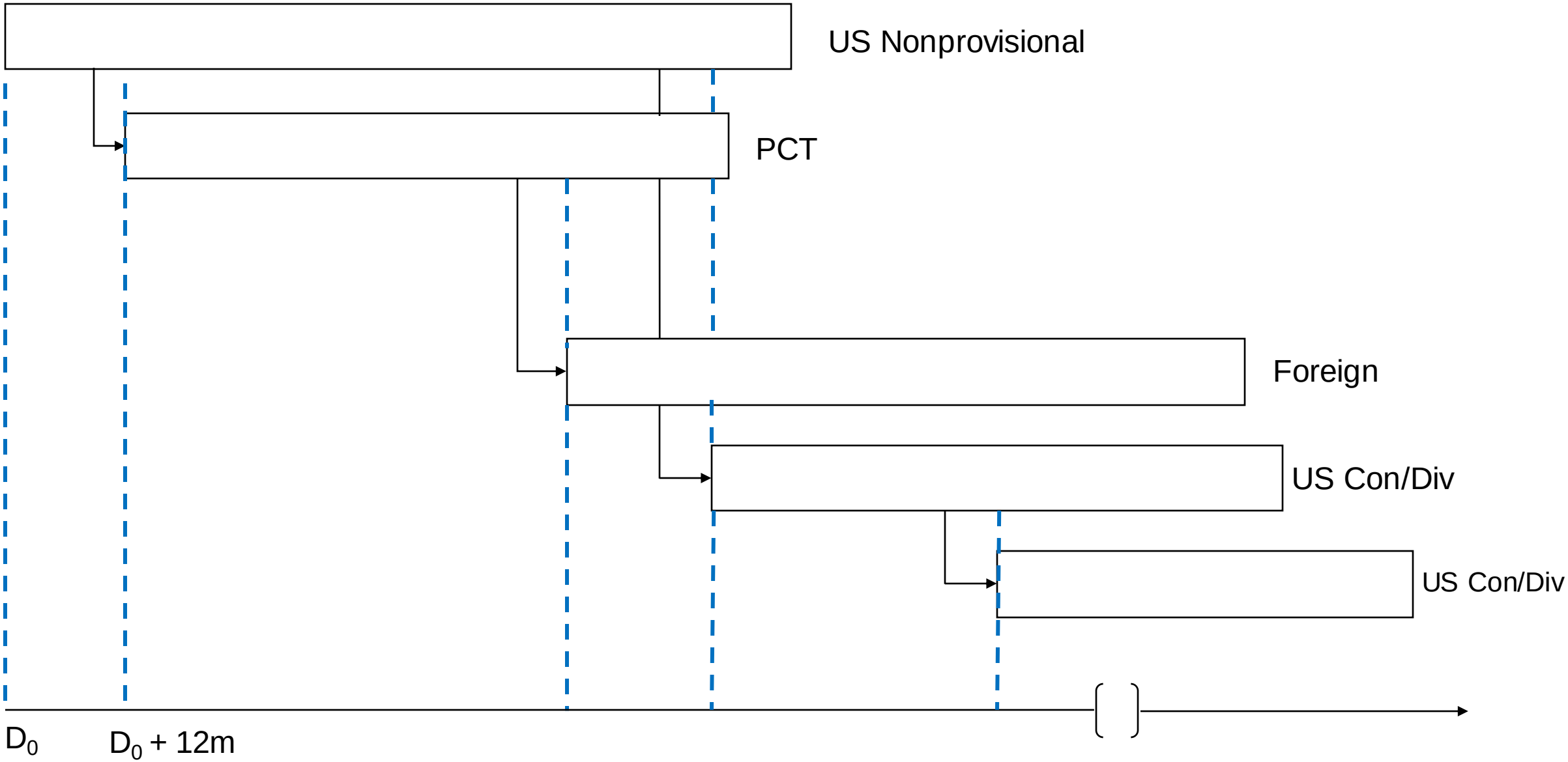
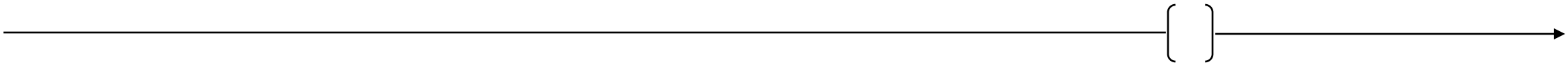
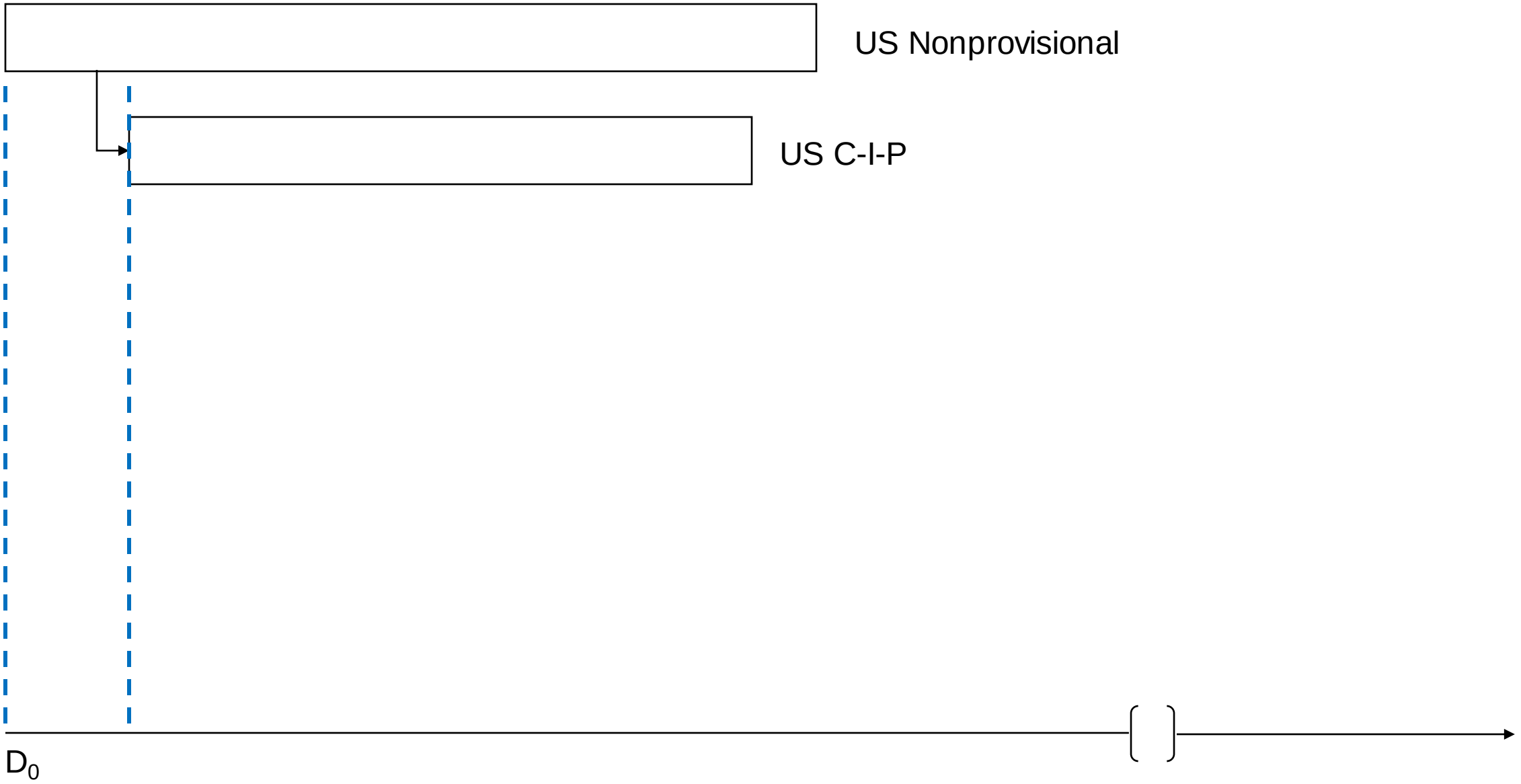
PCT
Foreign
US Con/Div
D_0
D_0 + 12m

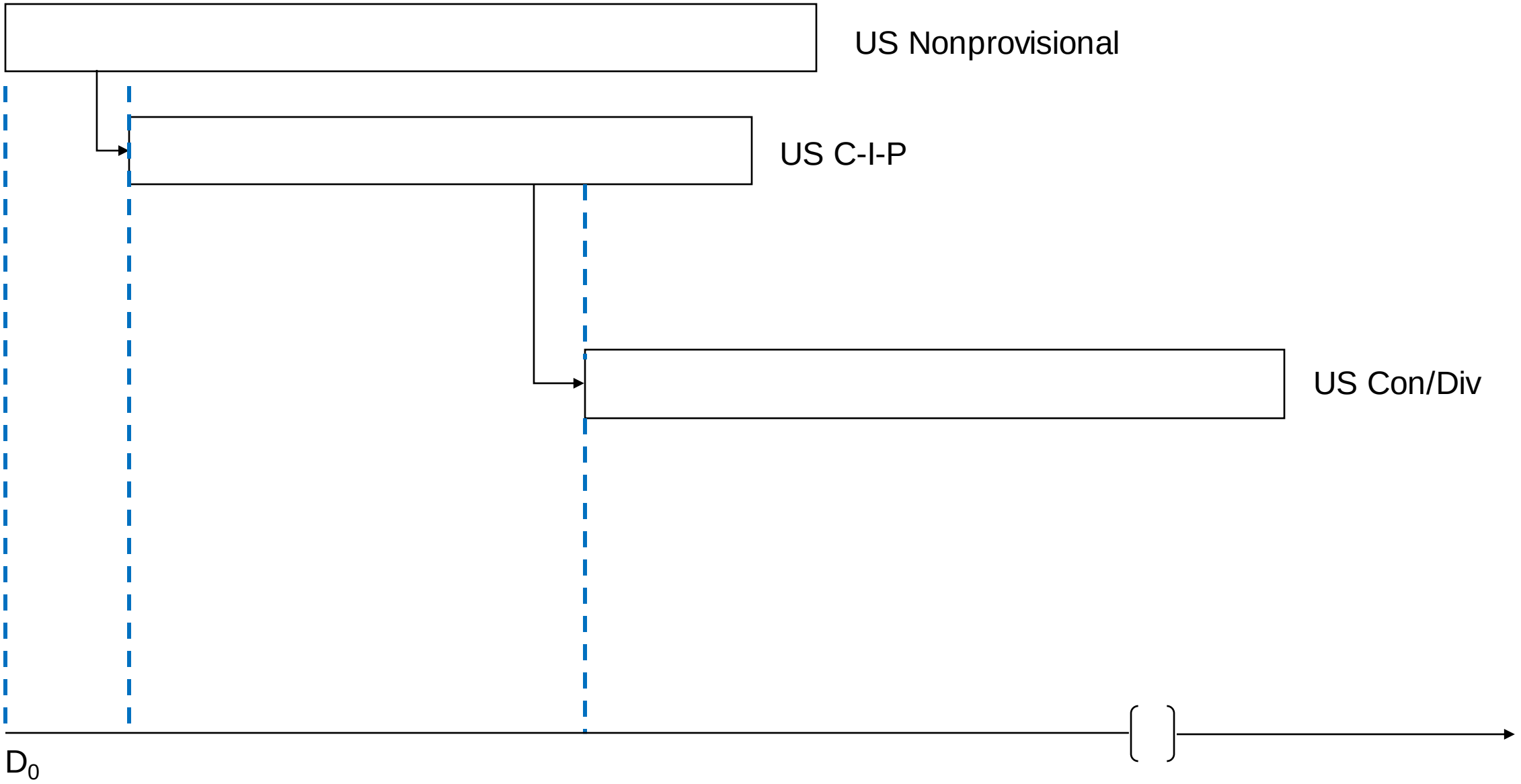

US Nonprovisional
PCT
Foreign
US Con/Div
US Con/Div
D_0
D_0 + 12m

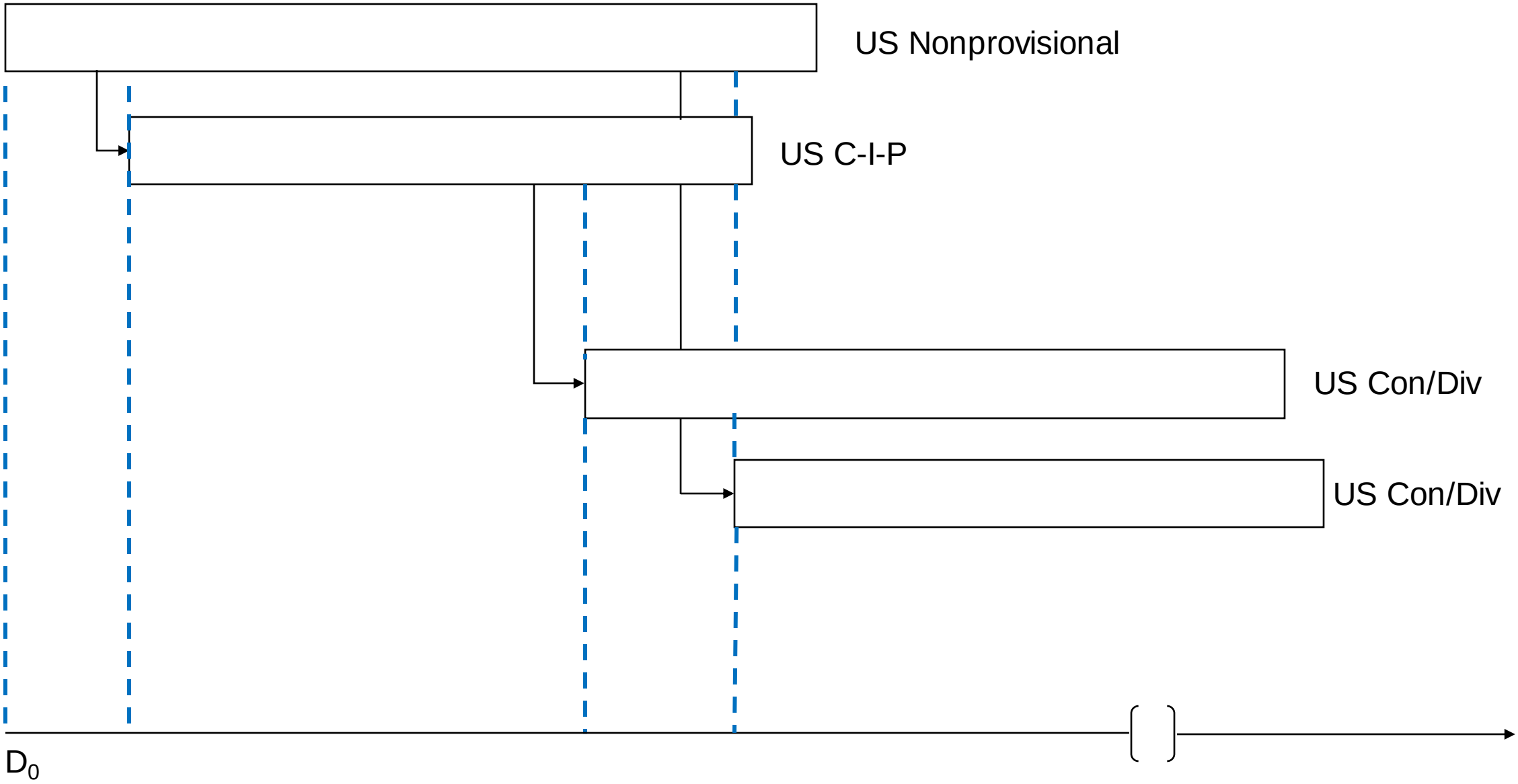
Timeline 3




US Nonprovisional
D_0


US Nonprovisional
US C-I-P
D_0


US Nonprovisional
US C-I-P
US Con/Div
D_0


US Nonprovisional
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US Con/Div
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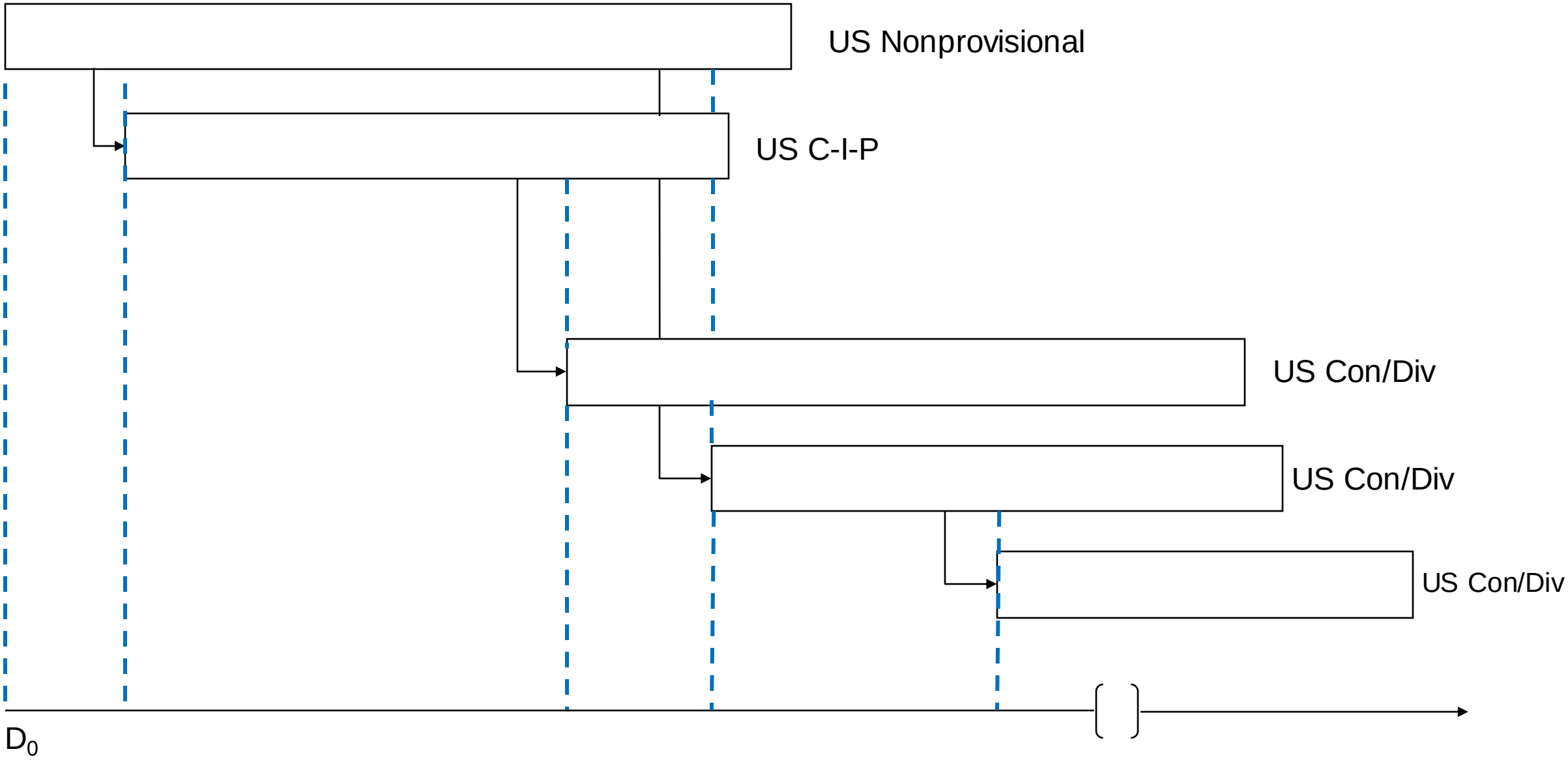

US Nonprovisional
US C-I-P
US Con/Div
US Con/Div
US Con/Div
D_0

U.S. Maintenance Fees

Must be paid to keep a US utility patent in force

- Payable at 3.5, 7.5 and 11.5 years from issue date
  - Fees increase as the patent gets older
  - Business decision whether to maintain a patent

Don’t have to practice the invention to keep in force, just pay fees

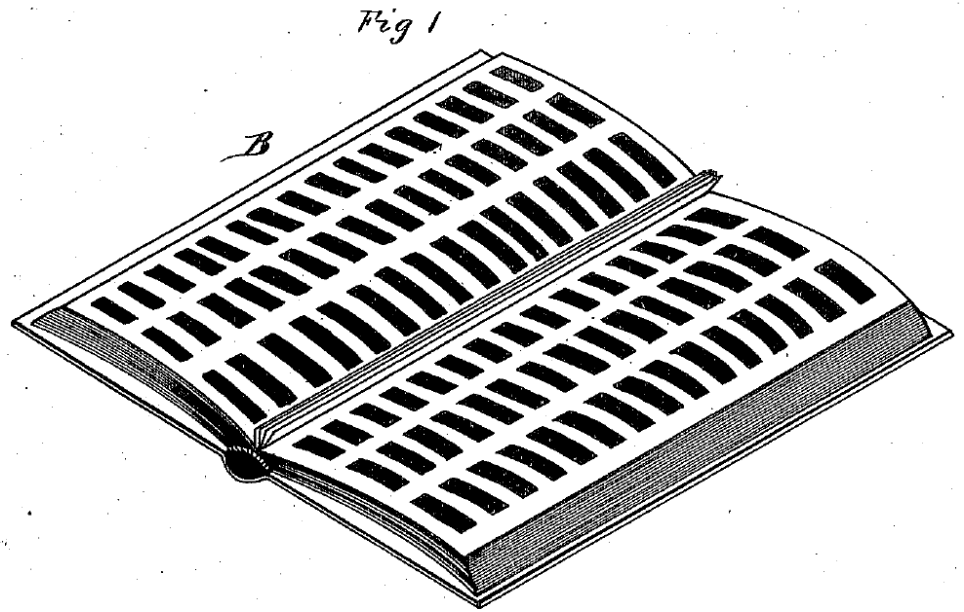
Failure to pay a fee results in abandonment of the patent

- Falls into the public domain for anyone to use

Fun Fact

Samuel L. Clemens Had Three Patents

He was commercially successful with this one for a self-pasting scrapbook



UNITED STATES PATENT OFFICE.

SAMUEL L. CLEMENS, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN SCRAP-BOOKS.

Specification forming part of Letters Patent No. **140,245**, dated June 24, 1873; application filed May 7, 1873.

To all whom it may concern:

Be it known that I, SAMUEL L. CLEMENS, of Hartford, in the county of Hartford and in the State of Connecticut, have invented certain new and useful Improvements in Scrap-Book; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in a self-pasting scrap-book, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawing, which represents perspective views of two of my scrap-books.

A and B represent two scrap-books of any desired dimensions, and made, as far as material, binding, &c., is concerned, in any of the known and usual ways. The leaves of which the book A is composed are entirely covered, on one or both sides, with mucilage or other suitable adhesive substance, while the leaves of which the book B is composed have the mucilage or adhesive substance applied only at intervals, as represented in Fig. 1.

In either case the scrap-book is, so to say, self-pasting, as it is only necessary to moisten so much of the leaf as will contain the piece to be pasted in, and place such piece thereon, when it will stick to the leaf.

I do not wish to be understood as claiming a book-cover having short guards coated with an adhesive substance, as I am aware that such is not new.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

As an article of manufacture, a scrap-book, the surfaces of the leaves whereof are coated with a suitable adhesive substance covering the whole or parts of the entire surface, all as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of April, 1873.

Witnesses: SAML. L. CLEMENS.
A. N. MARR,
ESAU HALL.

Did You Know?

(A) NO need for a patent to make or sell a product

AND

(B) Having a *patented* product does NOT immunize from being sued for patent infringement

A patented product can infringe another's patent

Infringement* (Briefly)

ALL elements, as recited and arranged in a claim, **MUST** be found in the accused product or method

Cannot avoid infringement by adding elements or limitations

If an element is missing then, arguably, NO infringement

A “broad” claim has fewer elements

A “narrow” claim has relatively more elements

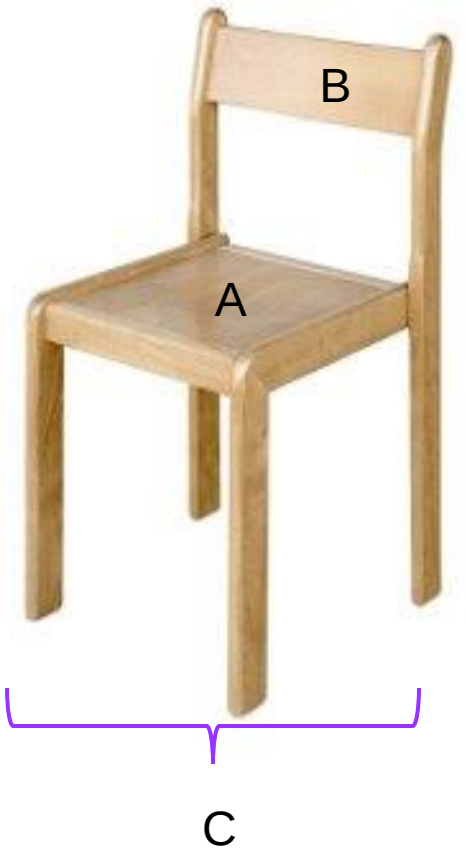
The Chair

A chair comprising:

a seating surface (A);

a backrest (B) coupled to the seating surface; and

a plurality of legs (C), coupled to the seating surface, each leg extending in a plane different from a plane of the seating surface.



Can't Avoid Infringement By Adding Features

A chair comprising:

a seating surface (A);

a backrest (B) coupled to the seating surface; and

a plurality of legs (C), coupled to the seating surface, each leg extending in a plane different from a plane of the seating surface.

The addition of the curved pieces does NOT prevent infringement

Can Patent an Improvement to a Patented Item

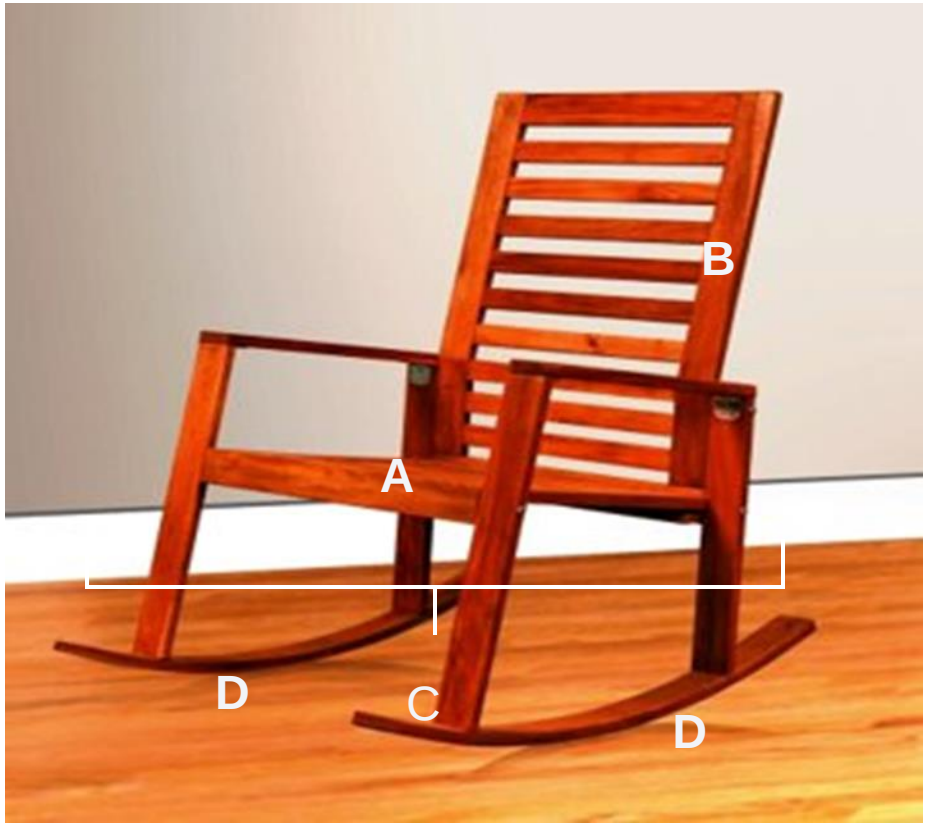
A rocking chair comprising:

a seating surface (A);

a backrest (B) coupled to the seating surface;

a plurality of legs (C), coupled to the seating surface, each leg extending in a plane different from a plane of the seating surface; and

a plurality of curved pieces (D), each curved piece coupled to a pair of legs.



Chair & Rocking Chair Claims

A chair comprising:

a seating surface (A);

a backrest (B) coupled to the seating surface; and

a plurality of legs (C), coupled to the seating surface, each leg extending in a plane different from a plane of the seating surface.

A rocking chair comprising:

a seating surface (A);

a backrest (B) coupled to the seating surface;

a plurality of legs (C), coupled to the seating surface, each leg extending in a plane different from a plane of the seating surface; and

a plurality of curved pieces (D), each curved piece coupled to a pair of legs.

Takeaways

- A right to exclude for a specified period of time
- Claims define what is excluded
- Broad v. narrow scope of claims coverage
- Need to teach how to practice the invention
- Patentability determined by comparing claims to prior art
- Reach out to MIT TLO if you have any questions

More Info

- MIT Technology Licensing Office: https://tlo.mit.edu/
- Submit Your Disclosure - RESEARCH@MIT: https://tlo.mit.edu/researchers-mit-community/protect/submit-disclosure
- Inventions and Proprietary Information Agreement (IPIA): https://tlo.mit.edu/researchers-mit-community/protect/ipia-ownership

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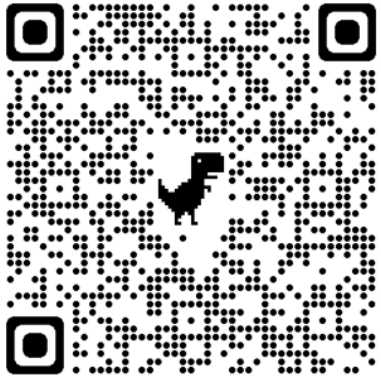

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“The patent system added the fuel of interest to the fire of genius”

Abraham Lincoln

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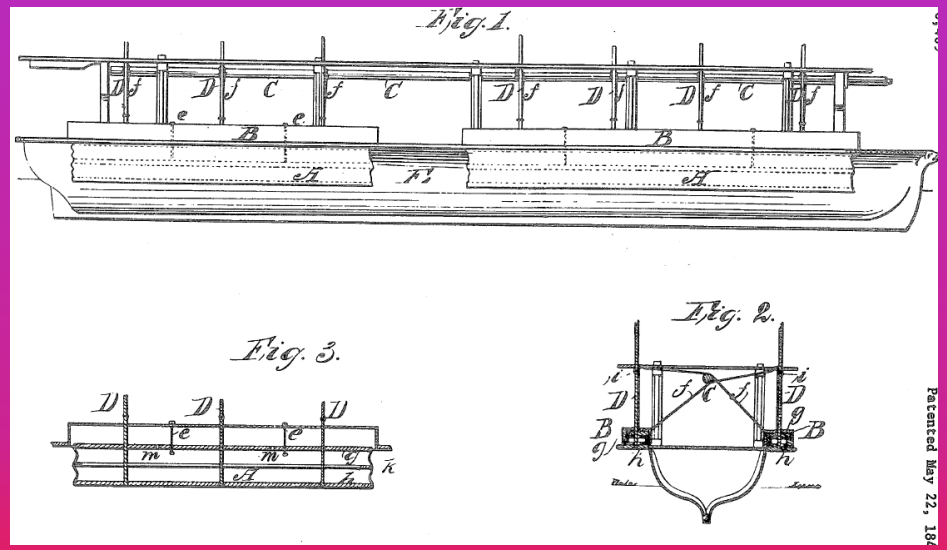
Abraham Lincoln

(The only U.S. President to have a patent)



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UNITED STATES PATENT OFFICE

ABRAHAM LINCOLN, OF SPRINGFIELD, ILLINOIS.

BUOYING VESSELS OVER SHOALS.

Specification forming part of Letters Patent No. 6,469, dated May 22, 1849; application filed March 10, 1849.

To all whom it may concern:

Be it known that I, Abraham Lincoln, of Springfield, in the County of Sangamon, in the State of Illinois, have invented a new and improved manner of combining adjustable buoyant air chambers with a steamboat or other vessel for the purpose of enabling their draught of water to be readily lessened to enable them to pass over bars, or through shallow water, without discharging their cargoes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings making a part of this specification. Similar letters indicate like parts in all the figures.

The buoyant chambers A, A, which I employ, are constructed in such a manner that they can be expanded so as to hold a large volume of air when required for use, and can be contracted, into a very small space and safely secured as soon as their services can be dispensed with.

Fig. 1, is a side elevation of a vessel with the buoyant chambers combined therewith, expanded;

Fig. 2, is a transverse section of the same with the buoyant chambers contracted.

Fig. 3, is a longitudinal vertical section through the centre of one of the buoyant chambers, and the box B, for receiving it when contracted, which is secured to the lower guard of the vessel.

The top *g*, and bottom *h*, of each buoyant chamber, is composed of plank or metal, of suitable strength and stiffness, and the flexible sides and ends of the chambers, are composed of india-rubber cloth, or other suitable water-proof fabric, securely united to the edges and ends of the top and bottom of the chambers.

The sides of the chambers may be stayed and supported centrally by a frame *k*, as shown in Fig. 3, or as many stays may be combined with them as may be necessary to give them the requisite fullness and strength when expanded.

The buoyant chambers are suspended and operated as follows: A suitable number of vertical shafts or spars D, D, are combined with each of the chambers, as represented in Figs. 2 and 3, to wit: The shafts work freely in apertures formed in the upper sides of the chambers, and their lower ends are permanently secured to the under sides of the chambers: The vertical shafts or spars (D,D,) pass up through the top of the boxes B, B, on the lower guards of the vessel, and then through its upper guards, or some other suitable support, to keep them in a vertical position.

The vertical shafts (D, D,) are connected to the main shaft C, which passes longitudinally through the centre of the vessel—just below its upper deck—by endless ropes *f*, *f*, as represented in Fig. 2: The said ropes, *f*, *f*, being wound several times around the main shaft C, then passing outwards over sheaves or rollers attached to the upper deck or guards of the vessel, from which they descend along the inner sides of the vertical shafts or spars D, D, to sheaves or rollers connected to the boxes B, B, and thence rise to the main shaft (C,) again.

The ropes *f*, *f*, are connected to the vertical shafts at *i*, *i*, as shown in Figs. 1 and 2. It will therefore be perceived, that by turning the main shaft C, in one direction, the buoyant chambers will be expanded into the position shown in Fig. 1; and by turning the shaft in an opposite direction, the chambers will be contracted into the position shown in Fig. 2.

In Fig. 3, *e*, *e*, are check ropes, made fast to the tops of the boxes B, B, and to the upper sides of the buoyant chambers; which ropes catch and retain the upper sides of the chambers when their lower sides are forced down, and cause the chambers to be expanded to their full capacity. By varying the length of the check ropes, the depth of immersion of the buoyant chambers can be governed. A suitable number of openings *m*, *m*, are formed in the upper sides of the buoyant chambers, for the admission and emission of air when the chambers are expanded and contracted.

The ropes *f*, *f*, that connect the main shaft C, with the shafts or spars D, D, (rising from

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THANK YOU!

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psorkin@mit.edu

617-258-6046

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January 16, 2024