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Using Inventions in the Public Domain: A Guide for Inventors and Entrepreneurs

Ask the Expert
July 9 to July 23, 2020

Expert

- James Conley, Clinical Professor, Kellogg School of Management, Northwestern University, USA

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Advancing Knowledge through Collaboration

Kellogg School of Management — Center for Research in Technology & Innovation

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CRTI Team

Innovation Leadership

CRTI leadership, faculty and staff stimulate innovation activities by creatively combining and managing diverse inputs toward common purpose. Whether by conducting independent research, enabling others to do the same, networking the brightest minds worldwide or partnering with corporations to develop sustainable innovation capabilities, they exemplify innovation through collaboration.

James Gerard Conley

Creating methods and systems for leveraging intangible assets

COLLABORATORS

Corporate

Microsoft

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WIPO — World Intellectual Property Organization

Academic Partners

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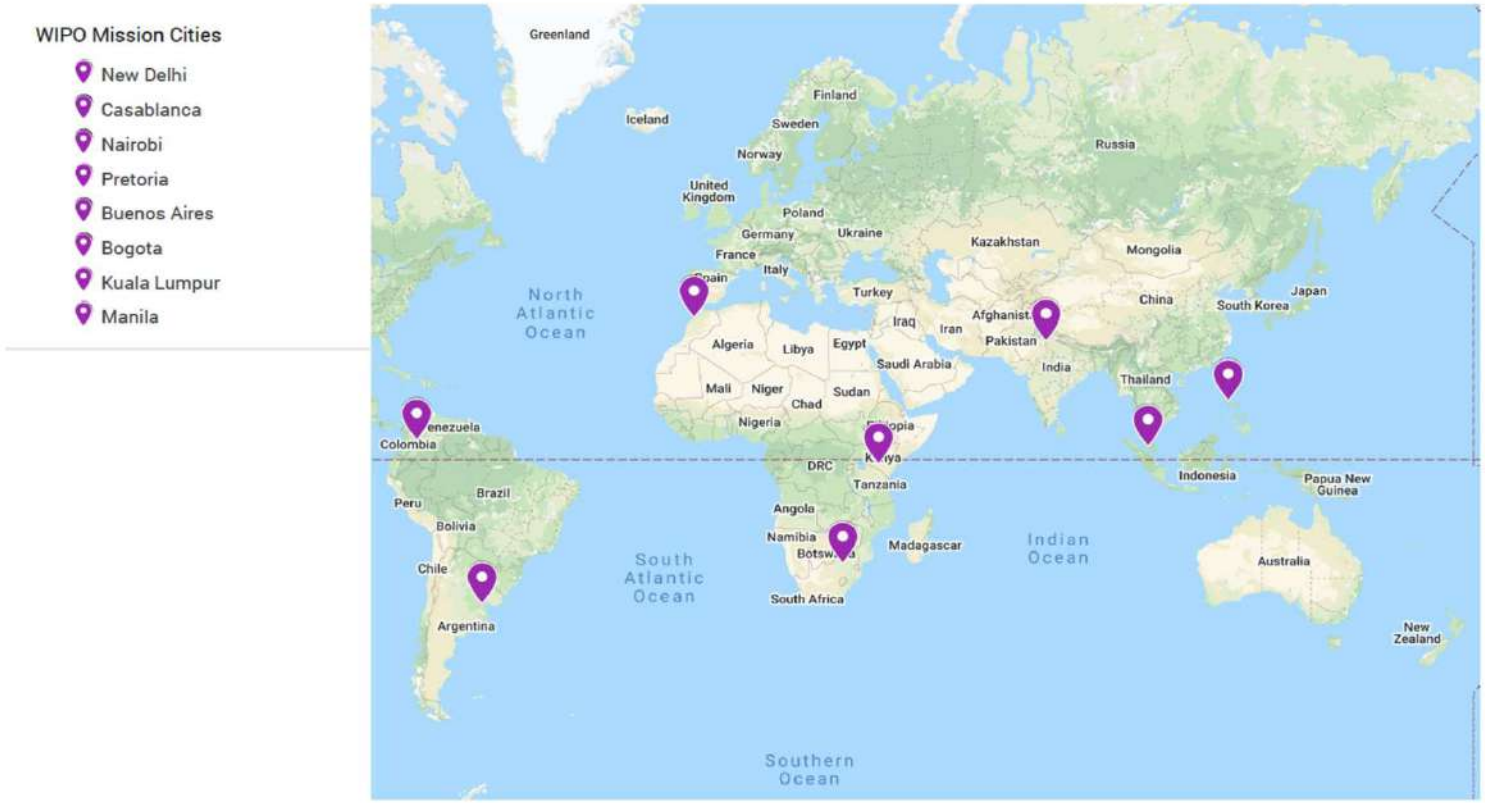
Pilot Cities to test and socialize the Guides

WIPO Missions (2018-2019)



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Exemplary Missions in Asia, Africa and Latin America

New Delhi, Dec 2018

Nairobi, Mar 2019

Bogota, May 2019

Buenos Aires, May 2019

Kuala Lumpur, June 2019

Manila, June 2019

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Introduction to the Guide on the Use of Inventions in the Public Domain

Purpose of the Guide

The guide's purpose is to…

- Help TISC staff who assist entrepreneurs and SMEs in developing regions and LDCs to access and use public domain knowledge and technology
- Introduce patent documents and non-patent literature (NPL) as reliable sources of information on inventions
- Explore how subject matter disclosed in patent documents impart detailed invention information
- Introduce key steps in product development and marketing processes that utilize external and internal resources and capabilities such as patent documents
- Present relevant case examples from recent research and practice.

Words from a leader for all seasons…..

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.

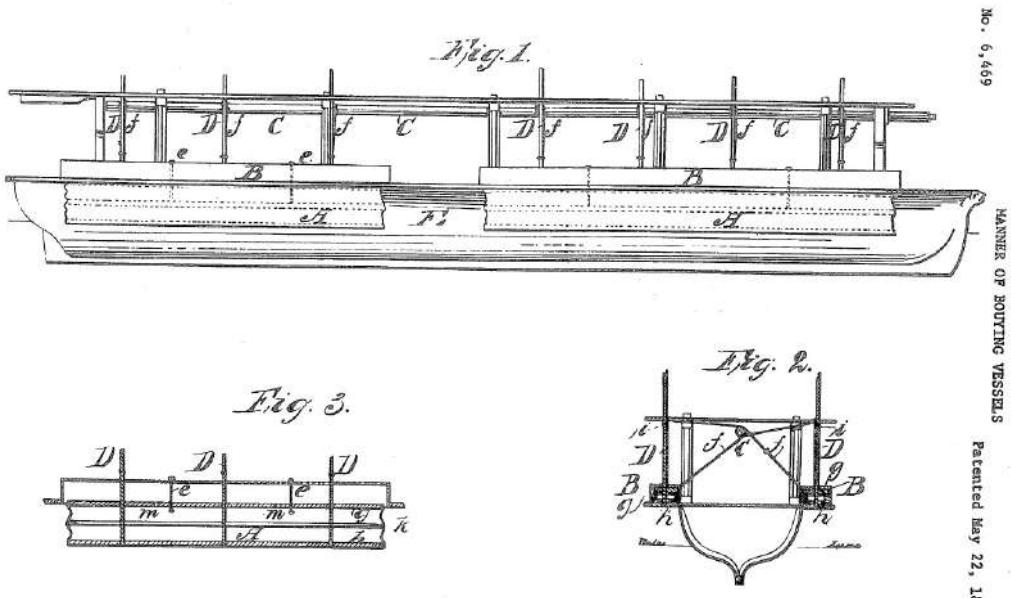
The ropes *f*, *f*, are connected to the vertical shafts at *i*, *i*, as shown in Figs. 1 and 2. It will therefore be perceived, that by turning the main shaft C, in one direction, the buoyant chambers will be expanded into the position shown in Fig. 1; and by turning the shaft in an opposite direction,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

"The Patent system added the fuel of interest to the fire of genius"

Abraham Lincoln



DC Inventors & Innovators *USING* information in the Public Domain

William Gwata, Zimbabwe

Fatima Zahra, Morocco

Drs. Tabaoda and Siacor, Philippines

Anthony Mutua and team, Kenya

This guide support TISC and eTISC services…

Access to patent and non-patent databases

Increase awareness on IP and contribute to economic growth in the country

Provide quality services on patent search and analysis

Support to inventors in patent filing and IP commercialization

Training on access to and use of patent information

The Guide in a Nutshell

The Guide addresses the questions like…	
Who	TISC staff in developing and least developed countries (LDCs) who can assist clients with inventive ideas
When	The guide can be used when a client comes with a new idea for a product/service and wants to commercialize it. Guide on identifying inventions in the public domain is the prerequisite guide for this.
Where	To be used in TISCs, institutions, firms and companies
How	To be used to explore public domain knowledge for improvement of invention of new products/services

Scope of the Guide

Public domain and patents

Public domain knowledge as inventions disclosed in patent documents

Using public domain knowledge in the product development process

Limitations of the Guide

Explanations in the Guide are…

- **NOT** a formal introduction to the product development process
- **NOT** to be used as a legal guide in any way
- **NOT** a comprehensive guide on public domain
- **Aware** of the lack of access to resources discussed in the Guide in many regions in the world

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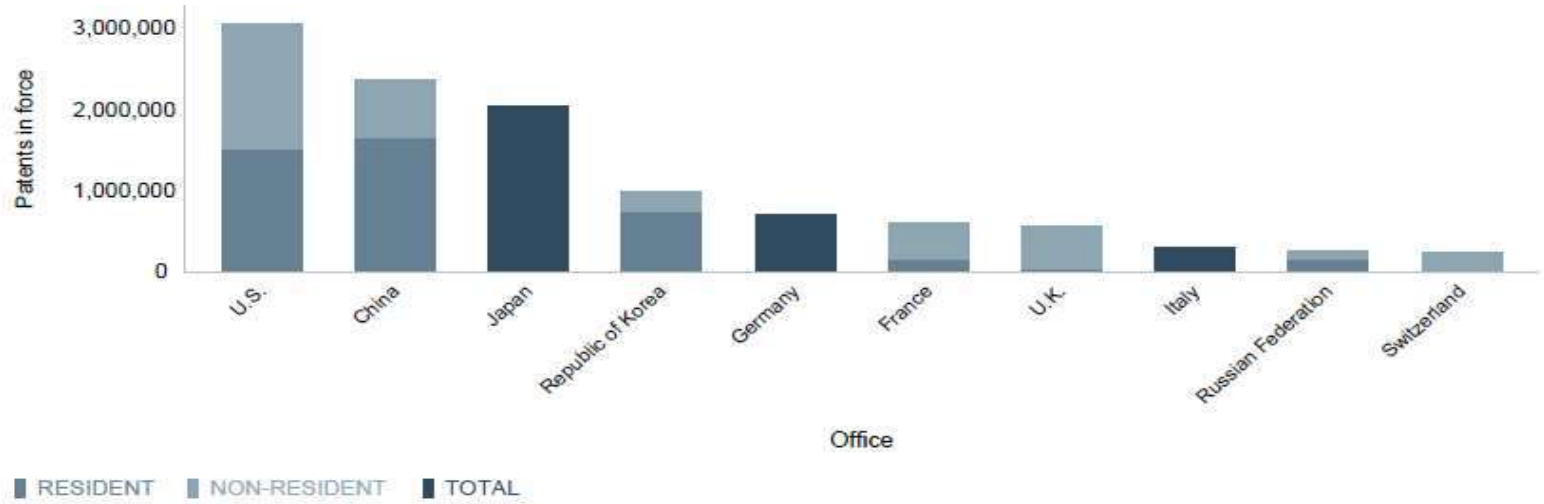
Module I: Defining the Public Domain and its Relationship with Patents

Top 10 Patent Offices with Active Patents in 2018



Based on the data provided in World Intellectual Property Indicators 2019. WIPO.

Public Domain in Developing Countries and LDCs

Developed countries are leading applicants of patents.

Patents need economic reason to be filed in developing and LDCs. In practice few patents from developed countries are filed in LDCs. Hence most inventions from developed countries are part of public domain in LDCs.

Freedom to Operate (FTO search) is important regardless.

Patent knowledge in most cases could be part of public domain in developing and Least Developed Countries (LDCs).

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Module II

Finding Opportunities to Leverage Inventions and Public Domain Knowledge

Useful Elements in a PCT Patent Document

Patent Classification

International Application no. & Filing Date

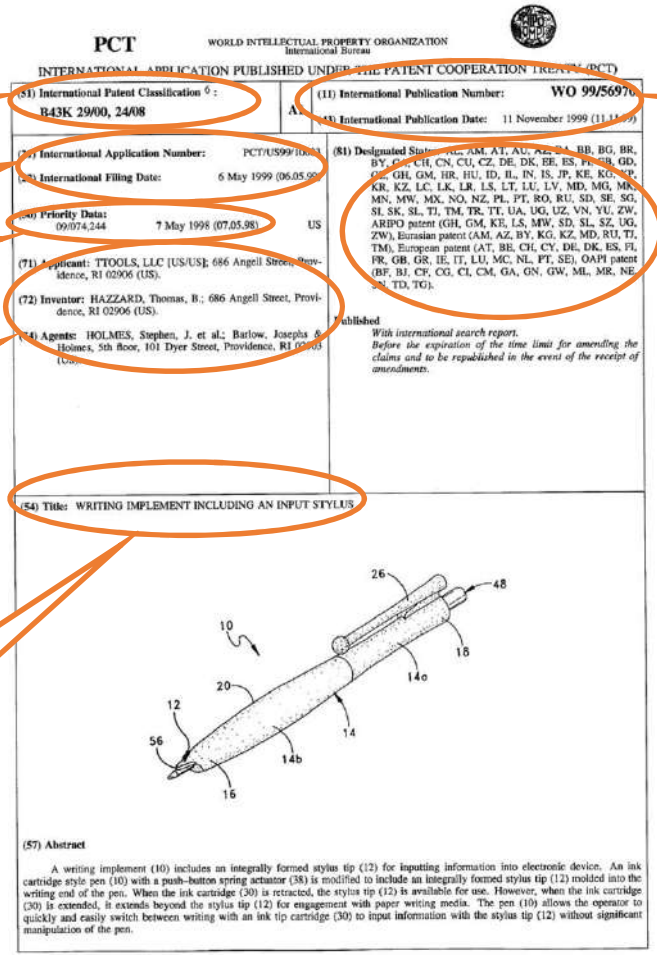
Priority Date: May 7, 1998

Names & Addresses of:
Applicant
Inventor
Agents (patent attorney)

Title of Invention

Patent no. and Date of Issue

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).


PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B43K 29/00, 24/08

(11) International Publication Number: WO 99/56970

(43) International Publication Date: 11 November 1999 (11.11.99)

(21) International Application Number: PCT/US99/10033

(22) International Filing Date: 6 May 1999 (06.05.99)

(30) Priority Data: 09/074,244 7 May 1998 (07.05.98) US

(71) Applicant: TTOOLS, LLC [US/US]; 686 Angell Street, Providence, RI 02906 (US).

(72) Inventor: HAZZARD, Thomas, B.; 686 Angell Street, Providence, RI 02906 (US).

(74) Agents: HOLMES, Stephen, J. et al.; Barlow, Josepha & Holmes, 5th floor, 101 Dyer Street, Providence, RI 02903 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: WRITING IMPLEMENT INCLUDING AN INPUT STYLUS

(57) Abstract

A writing implement (10) includes an integrally formed stylus tip (12) for inputting information into electronic device. An ink cartridge style pen (10) with a push-button spring actuator (38) is modified to include an integrally formed stylus tip (12) molded into the writing end of the pen. When the ink cartridge (30) is retracted, the stylus tip (12) is available for use. However, when the ink cartridge (30) is extended, it extends beyond the stylus tip (12) for engagement with paper writing media. The pen (10) allows the operator to quickly and easily switch between writing with an ink tip cartridge (30) to input information with the stylus tip (12) without significant manipulation of the pen.

Example of Patent Information in Use

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

(10) **Patent No.: US 9,715,257 B2**
(45) **Date of Patent: Jul. 25, 2017**

(54) **ACTIVE SCREEN PROTECTION FOR ELECTRONIC DEVICE**

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

(72) Inventors: **Tyson B. Manullang**, Sunnyvale, CA (US); **Stephen B. Lynch**, Portola Valley, CA (US); **Emery A. Sanford**, San Francisco, CA (US)

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 560 days.

(21) Appl. No.: **14/256,002**

(22) Filed: **Apr. 18, 2014**

(65) **Prior Publication Data**

US 2015/0301565 A1 Oct. 22, 2015

(51) **Int. Cl.**

G06F 1/18	(2006.01)
G06F 1/16	(2006.01)
H04M 1/18	(2006.01)
H04M 1/02	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 1/182*** (2013.01); ***G06F 1/1637*** (2013.01); ***H04M 1/185*** (2013.01); *H04M 1/0266* (2013.01); *H04M 2250/12* (2013.01)

(58) **Field of Classification Search**

CPC G06F 1/1637; G06F 1/182; H04M 1/0266; H04M 1/185; H04M 2250/12; H04M 1/02; H04M 1/0202; H04M 1/18; H04M 2250/00; H04B 1/3888

USPC 340/3.1, 5.1

See application file for complete search history.

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4,370,894	A	2/1983	Sturesson

(Continued)

FOREIGN PATENT DOCUMENTS

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CN	2710238	7/2005

(Continued)

Primary Examiner — Brian Wilson

(74) *Attorney, Agent, or Firm* — Kendall W. Abbasi; David K. Cole

(57) **ABSTRACT**

An electronic device includes one or more screens, multiple screen protectors moveable between a retracted position and extended position where they extend above the screen to create a gap, and one or more sensors. When the sensor detects a drop event, the screen protectors move from the retracted to extended position, functioning as a shock absorber and preventing the screen from connecting with a surface that the electronic device contacts. In some implementations, the screen protectors may be multiple tabs that may be moved between the retracted and extended positions by one or more motors and/or other actuators coupled to one or more pinions. Such tabs may be formed of various flexible and/or rigid materials such as plastic, plastic film, polyethylene terephthalate or other polymers, metal, thin film metal, combinations thereof, and/or other such materials.

20 Claims, 8 Drawing Sheets

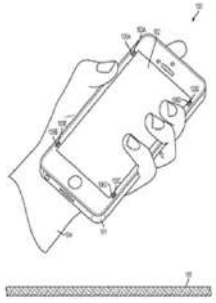


FIG. 1

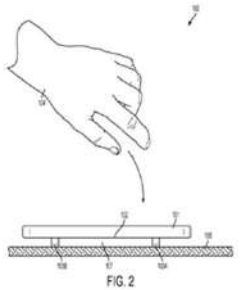


FIG. 2

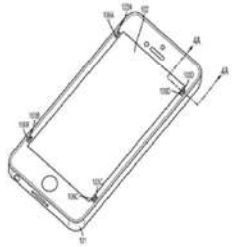


FIG. 3A

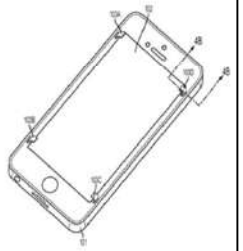


FIG. 3B

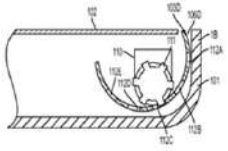


FIG. 4A

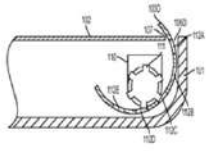


FIG. 4B

And…Frenzel Filed his Utility Model in Germany

(19) Deutsches Patent- und Markenamt

(10) **DE 20 2018 101 276 U1** 2018.05.09

(12) **Gebrauchsmusterschrift**

(21) Aktenzeichen: **20 2018 101 276.2**
(22) Anmeldetag: **07.03.2018**
(47) Eintragungstag: **03.04.2018**
(45) Bekanntmachungstag im Patentblatt: **09.05.2018**

(51) Int Cl.: ***H05K 5/03*** (2006.01)
H04M 1/18 (2006.01)
H04M 1/02 (2006.01)

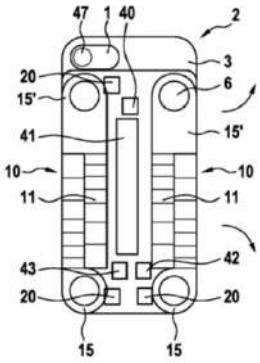
(73) Name und Wohnsitz des Inhabers:
frenzel + mayer solutions GbR
(vertretungsberechtigter Gesellschafter: Philip Frenzel, 73430 Aalen, DE), 73430 Aalen, DE

(74) Name und Wohnsitz des Vertreters:
RAUNECKER PATENT, 89073 Ulm, DE

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen.

(54) Bezeichnung: **Umhausung für ein elektronisches Gerät**

(57) Hauptanspruch: Umhausung (2) für ein elektronisches Gerät (1), umfassend,
- mindestens eine Dämpfungseinheit (10), die zwischen einer eingefahrenen und einer ausgefahrenen Position bewegt werden kann, wobei die Dämpfungseinheit (10) eine Feder (13) und einen Dämpfer (12) umfasst
- mindestens einen Sensor, der dazu ausgebildet ist, einen Fallvorgang des elektronischen Gerätes zu detektieren,
eine Auslöseeinheit (20), die dazu eingerichtet ist, bei einer Detektion eines Fallvorganges einen Positionswechsel der mindestens einen Dämpfungseinheit (10) von der eingefahrenen in die ausgefahrene Position auszulösen, dadurch gekennzeichnet, dass
die Feder (13) und der Dämpfer (12) dazu eingerichtet sind, bei der Bewegung von der eingefahrenen Position in die ausgefahrene Position ihre Form zu ändern.



DE 20 2018 101 276 U1 2018.05.09

ZITATE ENTHALTEN IN DER BESCHREIBUNG

Diese Liste der vom Anmelder aufgeführten Dokumente wurde automatisiert erzeugt und ist ausschließlich zur besseren Information des Lesers aufgenommen. Die Liste ist nicht Bestandteil der deutschen Patent- bzw. Gebrauchsmusteranmeldung. Das DPMA übernimmt keinerlei Haftung für etwaige Fehler oder Auslassungen.

Zitierte Patentliteratur

- US 9715257 B2 [0003]
- US 7059182 B1 [0004]

Cited Patent Literature

-**US 9715257 B2 [0003]**
-US 7059182 B1 [0004]

Photos: Philip Frenzel Facebook

So you are all set to begin… what's next?

New Product Development Process

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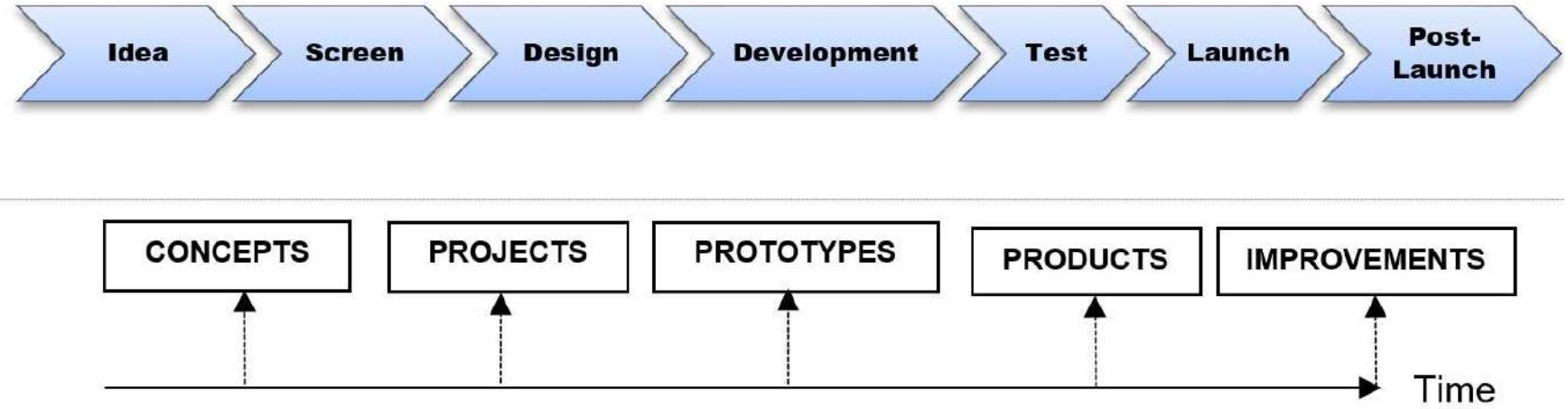
Module III

Integrating Public Domain Knowledge into Product Development Processes

New Product Development Process



Tools Discussed in the Guide

- ❑ Balanced Scorecard
- ❑ Porter's Value Chain Analysis
- ❑ Business Model Canvas
- ❑ SWOT Analysis
- ❑ The 5 Ps of Marketing
- ❑ TRIZ Methodology
- ❑ Product Manager in NPD
- ❑ Technology Risk Management

Technology Trends & Market Data

Identify Technology Trends and Market Segments

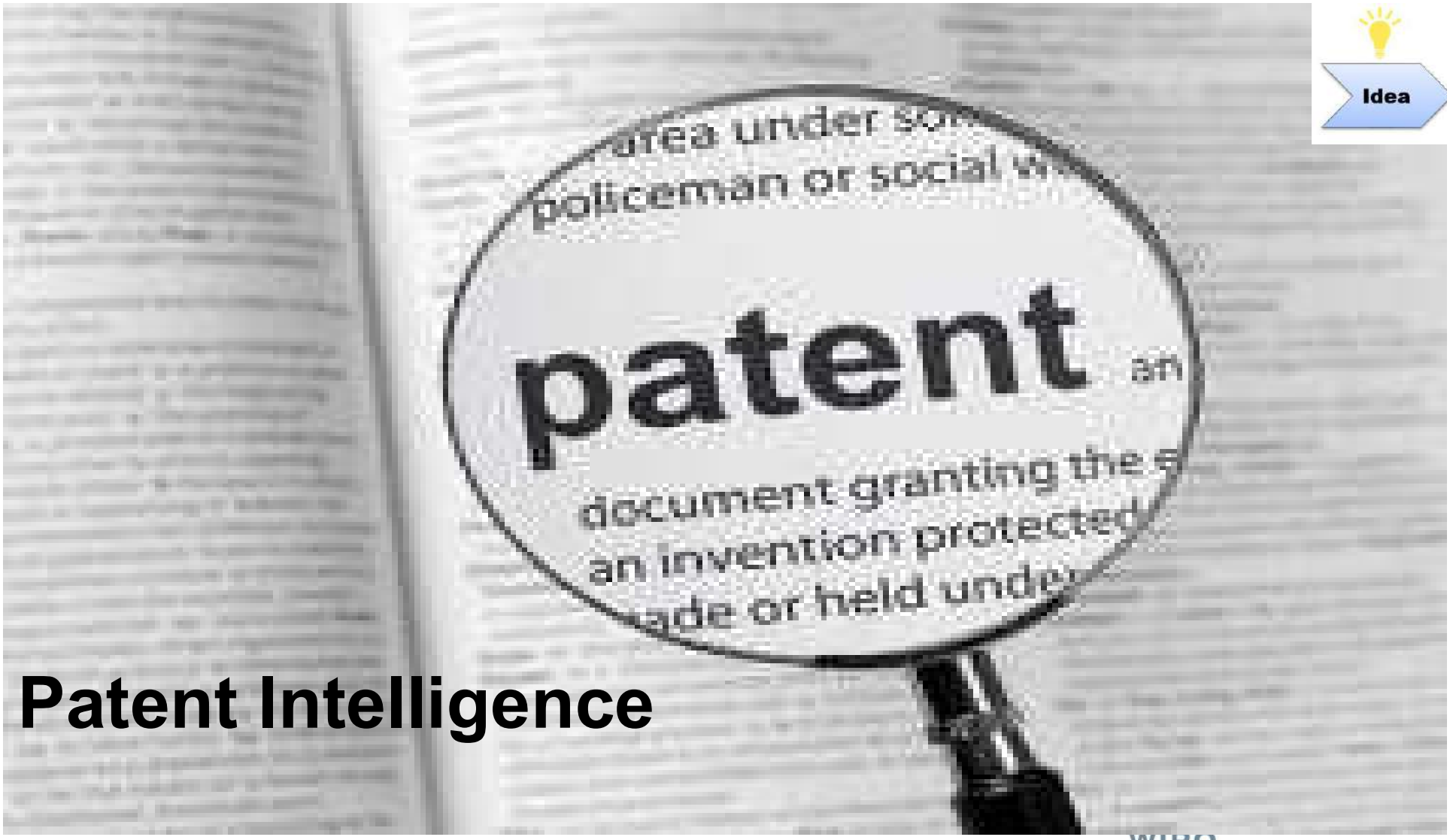
- Market Opportunities: who will buy your product/service?
- Market Data: what information do you have of the market you want to enter in?
- Reviewing what technologies are already in the market
- Finding if there are available technologies you can exploit to identify market opportunities
- Patent intelligence based on patent database searches, patent statistics and reports

Market Opportunities Example: Gwatamatic

- An automated sadza maker by William Gwata
- Sadza – staple meal in Africa but too labor intensive
- Gwata pursued domestic buyers for his sadza make
- Gwata finally realized the market opportunity for his invention – for commercial use

Existing Technology to Develop New Product Example: BIODOME

- BIODOME by Fatima Zahra of Morocco
- An alternate composter that harnessed renewable biogas
- Ms. Zahra studied existing composters in the market
- Target customers who could use a composter and biogas as a source of fuel



Patent Intelligence

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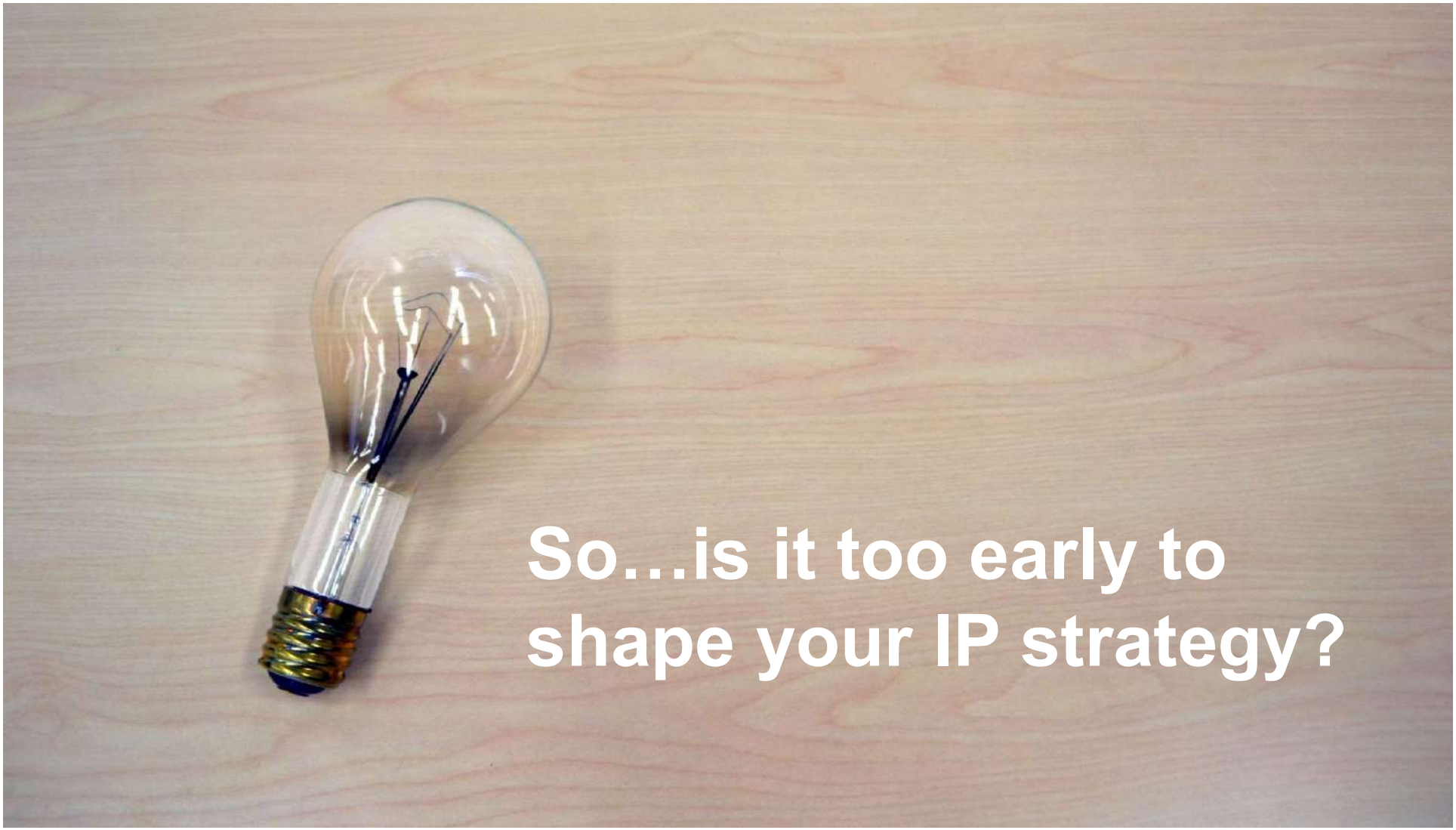
Patent Intelligence for your Client's Benefit

Patent Intelligence: Supplement your invention with information available in patent databases
Ask questions like…

What technology of interest is free-to-use?

What is the scope of patent search?

Do the target markets for your client's product/service also limits your client's use of certain technology?



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IP Strategy is Necessary from Early Stage in NPD

Make sure your invention is protected against infringement

Determine what kind of IP protection would be the best

- Patent protection
- Trademark filing

Seek an expert to draft your IP strategy

- Lack of resources often discourage legal help but may prove worthwhile **in the** long run

Business Model Canvas

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Example of Business Model Canvas

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure			Revenue Streams	

Source: www.businessideageneration.com

Business Model Canvas Example: Hatua Charger

- Pressure based mobile phone charger
- Device installed inside a shoe's inner sole
- Walking motion exerts pressure on the piezoelectric crystal

Photo: Anthony Mutua

Example of Business Model Canvas

Key Partners

- Innovation lab at TUM
- Kenyan Patent Office for patent research on existing technology
- Investors
- Shoemakers
- Piezoelectric crystal chip and other parts suppliers

Key Activities

- Assemble parts to be put in shoes
- Retrofit shoes with the chargers
- Provide solutions/feedback to complaints/suggestions

Key Resources

- Research partners at TUM
- Investors
- Skilled workers in assembly
- Shoemakers with technical know-how

Value Proposition

- Alternative solution to lack of electricity for charging phones
- No change in the original design of the shoes after retrofitting
- Low maintenance after retrofitting the shoes
- Quick turnaround for installing the phone chargers
- Low costs to the business
- Affordable pricing model for customers

Customer Relationships

- Cost effective
- Ease of use
- Safe to use

Channels

- Servicing:
- Licensed outlets for retrofitting
- Accessible retrofitting locations for customers
- Marketing
- Social media channels
- Word-of-mouth

Customer Segments

- People-on-the-go who walk frequently
- People who live in areas where electricity is unreliable or unavailable
- Moderate to frequent users of mobile phones

Cost Structure

- Cost of labor to assemble the chargers and to retrofit them in the shoes
- Cost of training staff and partner shoemakers
- Technical support for defective chargers
- Initial costs of the charger parts
- Research & Development (R&D)
- Marketing and sales cost

Revenue Streams

- Paid partnerships with shoemakers selling retrofitted shoes
- Revenue model: Price of retrofitted shoes paid by customers
- Future licensing fees from the patented technology

Source: www.businessideageneration.com


IP Strategy Example

GEMS Insights:

GREEN ENVIRO MANAGEMENT SYSTEMS INC.

Dr. Tabaoda with Dr. Siacor Photo: WIPO Magazine

Dr. Evelyn B. Taboada, professor of chemical engineering at University of San Carlos discovered an innovative use for mango waste.

In 2008, she was asked by mango processing companies to find solution to mango waste. Half of mangoes processed were wastes filling up landfills and polluting environment.

Research team led by her came up with additional uses of mango skin and kernels in making mango flour, butter and tea.

In 2012, start-up GEMS was founded.

GEMS Notable Insights:

GEMS exclusively licensed the process technology developed by Dr. Taboada and her team

Products such as:

- **Mango flour**: rich in vitamins, minerals, dietary fibers, polyphenols (antioxidants), probiotics
- **Mango pectin**: used as thickener, gelling agent in jams etc.
- **Mango polyphenol**: used as additives
- **Mango tea**: rich in nutrients of mango
- **Mango butter**: food stuff, nutraceuticals, cosmetics, pharmaceuticals
- **Feed mix**: used as a nutritious feed for livestock and pets
- **Seed, husks, briquettes**: alternative sources of fuels with high heating value

Words from a leader for all seasons…..

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.

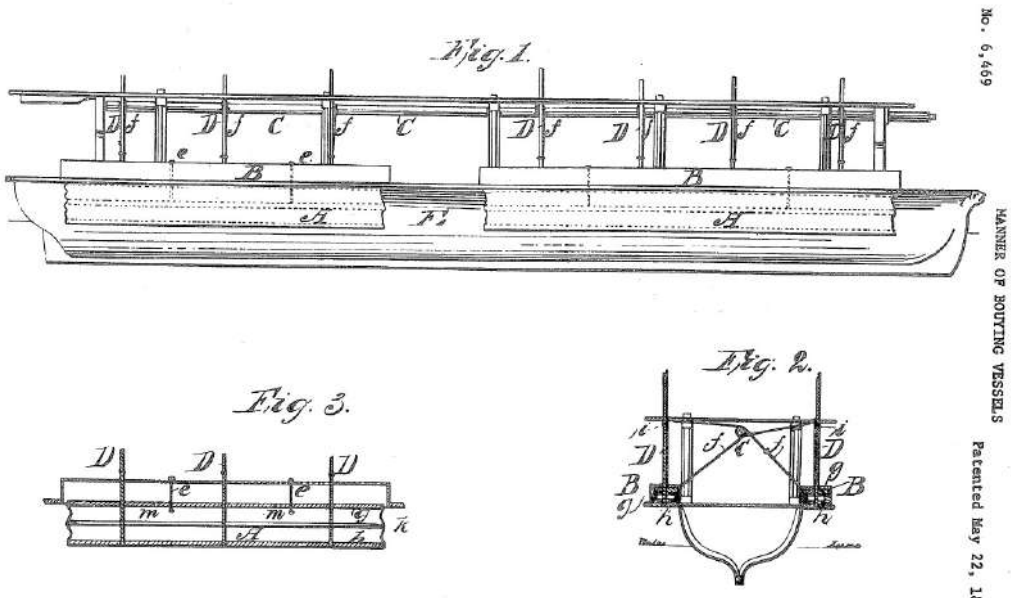
The ropes *f*, *f*, are connected to the vertical shafts at *i*, *i*, as shown in Figs. 1 and 2. It will therefore be perceived, that by turning the main shaft C, in one direction, the buoyant chambers will be expanded into the position shown in Fig. 1; and by turning the shaft in an opposite direction,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

"The Patent system added the fuel of interest to the fire of genius"

Abraham Lincoln



Tools Discussed in the Guide

- ❑ Balanced Scorecard
- ❑ Porter's Value Chain Analysis
- ❑ Business Model Canvas
- ❑ SWOT Analysis
- ❑ The 5 Ps of Marketing
- ❑ TRIZ Methodology
- ❑ Product Manager in NPD
- ❑ Technology Risk Management

Thank You

Questions?

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