

Evolution in the Wine Industry: A Patent Mining Approach

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Many Wine Innovations are Patented...

Winemaking can rely on multiple IP tools:

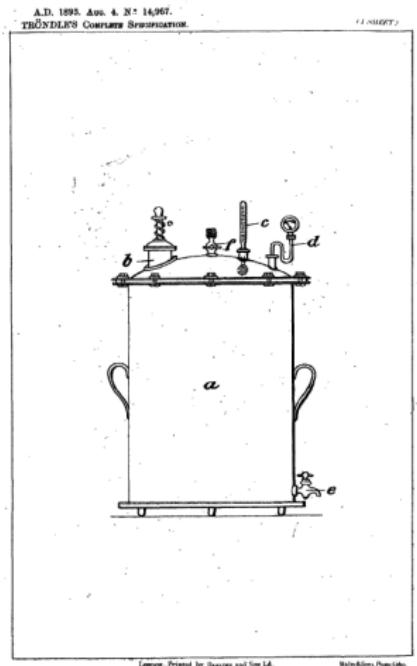
- ① Geographical Indications
- ② Trademarks
- ③ Patents

Main insights:

- I. Industry requirements
- II. Consumers' tastes

Key issues:

- Dense corpus
- Highly technical jargon



Source: EPO. Patstat Global (Spring 2024).

Figure 1: Drawings of GB189314967A.

This Paper

NLP Analysis | Network Mapping

Construct index of patent quality à la Kelly et al. (2021)

▶ Literature

Question I

How has patenting in the wine industry **evolved** over the years?

Question II

Why are many patents **no longer enforceable**?

A Sample Patent Application

► Appendix I


US 20150374155A1

(19) United States
(12) Patent Application Publication
Krumwiede et al.

(10) Pub. No.: US 2015/0374155 A1 ← Publication Number
(43) Pub. Date: Dec. 31, 2015 ← Publication Date

Title → (54) CANTILEVER-STYLE WINE BUCKET AND BOTTLE HOLDER ← CPC Class

Applicant → (71) Applicant: JEK2, LLC, Mount Prospect, IL (US) ← Abstract

Inventor → (72) Inventor: Judi Krumwiede, Mount Prospect, IL (US); James Krumwiede, Mount Prospect, IL (US)

Application Number → (21) Appl. No: 14/319,263

Filing Date → (22) Filed: Jun. 30, 2014

Publication Classification

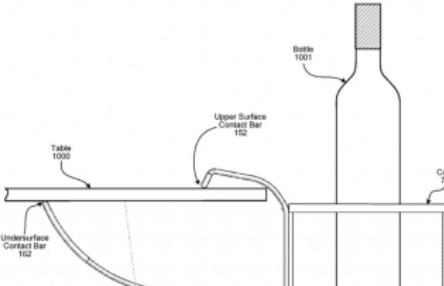
IPC Class → (51) Int. CL. A47G 23/02; F16M 13/02 ←

(2006.01) (2006.01)

(52) U.S. CL. CPC A47G 23/0241 (2013.01); F16M 13/022 (2013.01); A47G 2023/0263 (2013.01)

(57) ABSTRACT

A cantilever-style wine server for mounting to a table has a unitary frame composed of shaped metal bars, such as shaped rods with circular cross-sections. The frame includes a holder that serves as a receptacle for a wine bucket, thermometer, and/or a bottle. The holder is removably attached to both side bars that mount to the side of a table and as a handle to transport the server. The holder and mount/handle are unified as a single frame, such as by multiple welds. The frame has a flat base, enabling the server (even when fully loaded) to be set down on a flat surface. A removable cover may center a wine bottle in the holder.



Source: Krumwiede & Krumwiede (2015)

Data

Wine Patents

- Universe of utility and design patents from *Lens.org*:
 - ▶ Query: (Title: "wine" AND Abstract: "wine")
 - ▶ Variables of interest: inventors, assignees, applicants, key dates, titles, abstracts, claims, citations, legal status, classification codes
- Sample restriction:
 - ▶ Exclude patents filed with China's IP Office
 - ▶ Exclude continuity, re-examined, re-issued, and plant patents
 - ▶ Final sample: 14,397 patent applications from 60 jurisdictions 1893-2023

Figure 2: Wine Patenting Across Countries | 1893 – 2023

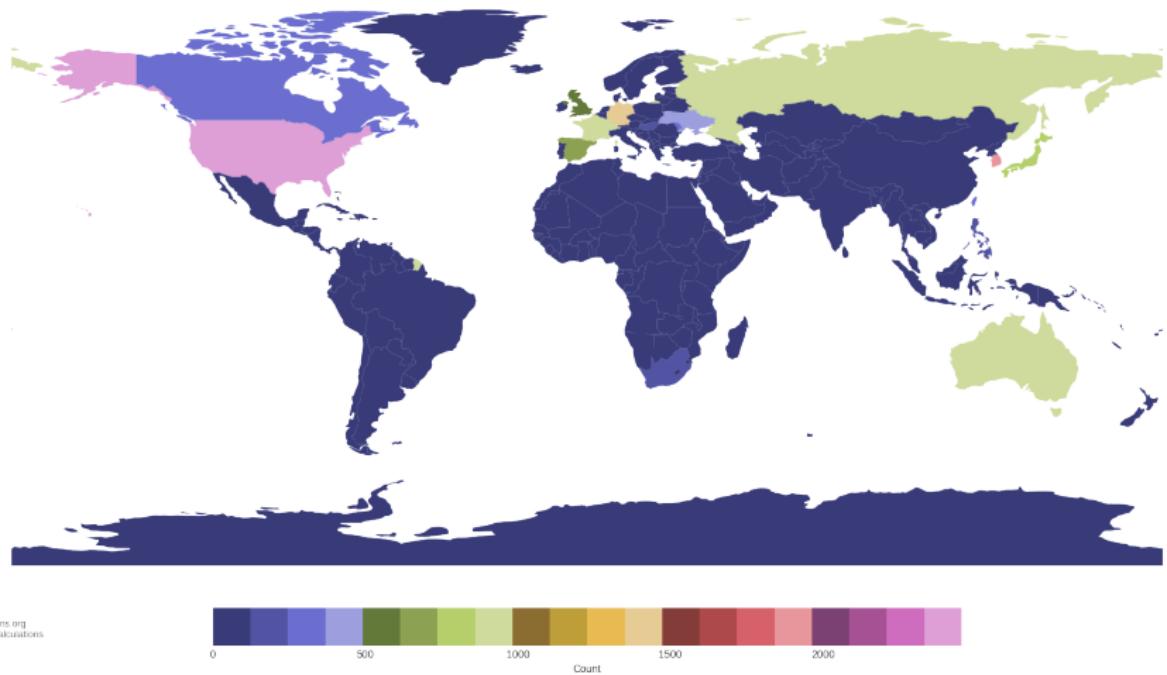
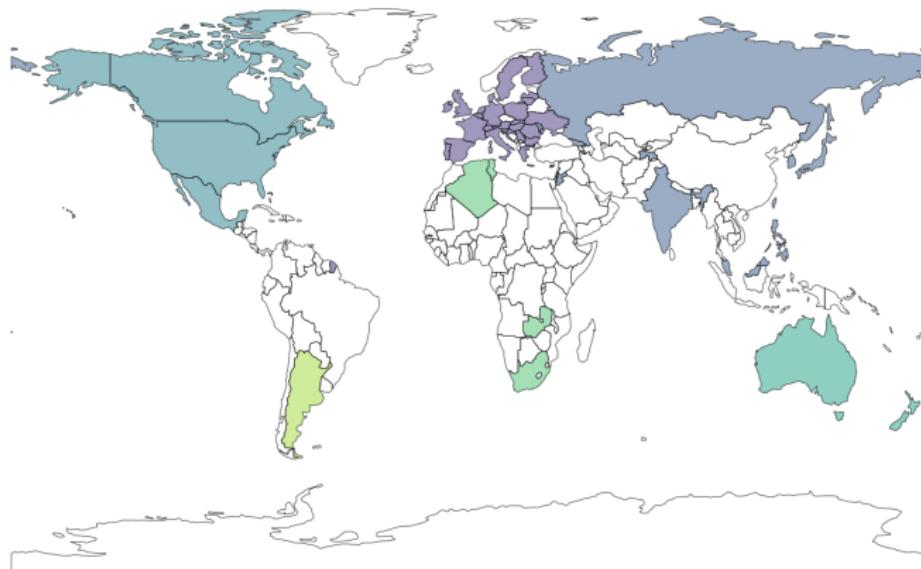


Figure 3: Wine Patenting Across Jurisdictions | 1893 – 2023

Europe: 5687 Asia: 4722 North America: 2789 Oceania: 1022 Africa: 170 South America: 7



Source: Lens.org
Author's Calculations.

Empirical Strategy I

Preprocessing

Figure 4: Evolution of Patenting in the Wine Industry | 1893 – 2023

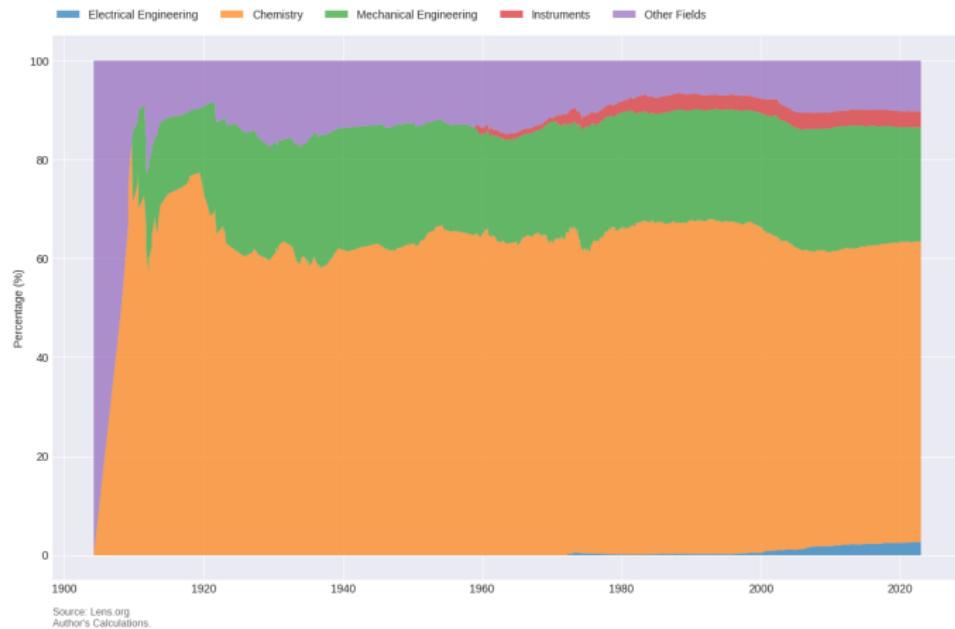
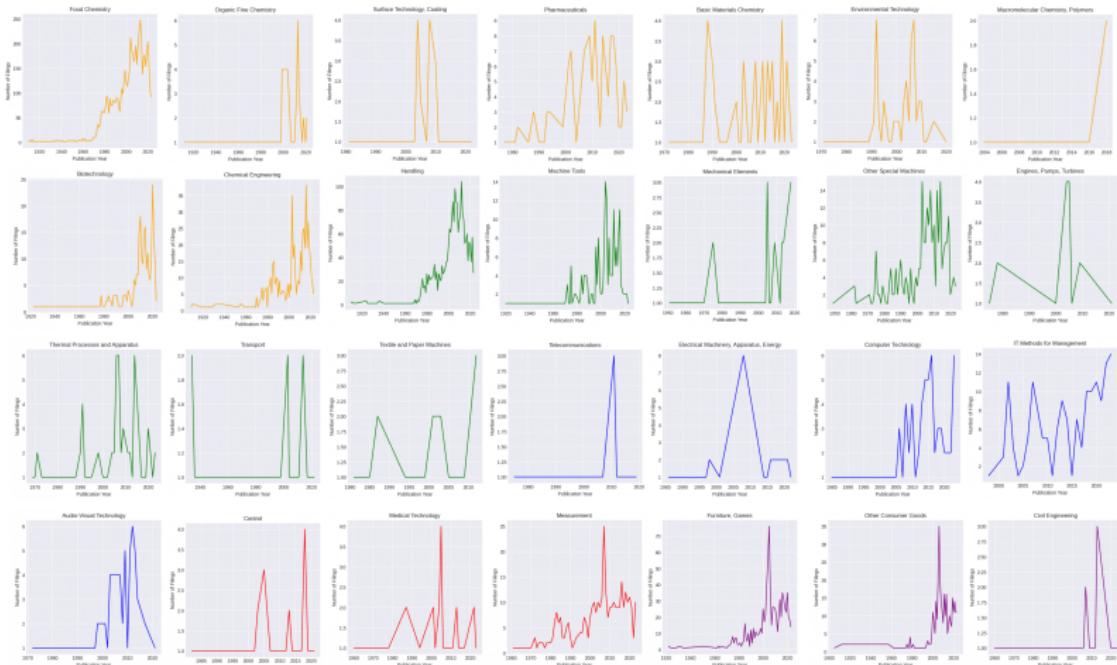


Figure 5: WIPO Technology Fields (Schmoch 2008)



Source: Lens.org
Author's Calculations.

Empirical Strategy II

Topic Modelling

- Reduce confounding language in abstracts with custom pipeline:
 - ▶ Remove stopwords, punctuation, non-alphabetical characters, and typos
 - ▶ Tokenize to remove low and high frequency tokens
- Learn technological similarity within fields using Latent Dirichelet Analysis
 - ▶ An example:

Figure 6: LDA as a Statistical Highlighter

(57)

ABSTRACT

A cantilever-style **wine** server for **mounting** to a table has a unitary frame composed of shaped metal bars, such as shaped rods with circular cross-sections. The frame includes a **holder** that serves as a receptacle for a **wine** bucket, insulator, and/or a bottle, and a **mount/handle** that serves as both a cantilever **mount** to the side of a table and as a **handle** to transport the server. The **holder** and **mount/handle** are unified as a single frame, such as by multiple welds. The frame has a flat base, enabling the server (even when fully loaded) to be set down on a flat surface. A removable cover may center a **wine** bottle in the **holder**.

Source: Krumwiede & Krumwiede (2015).

Empirical Strategy III

Patent Quality Index

$$Q_i^T = \sum_{i \in \Gamma_{j,T}} \left\{ \underbrace{\frac{s_i^{IPC-4}}{\max(s_d)}}_{\text{Patent Scope}} + \underbrace{\frac{fs_i}{\max(fs_d)}}_{\text{Family Size}} + \underbrace{\frac{b_i^o}{\max(b_d^o)}}_{\text{Backward Cites}} + \underbrace{\frac{b_i^{NPL}}{\max(b_d^{NPL})}}_{\text{Cites to NPL}} + \underbrace{\frac{f_i}{\max(f_d)}}_{\text{Forward Cites}} \right\}$$

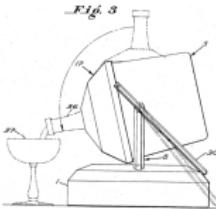
Patent Landscaping I

Mechanical and Inanimate Crafts | 1893 – 1959

METHOD OF PROCESSING WOOD FOR THE RAPID MATURATION OF WHISKEY AND OTHER ALCOHOLIC LIQUORS AND WINES
Ernst T. Krebs, San Francisco, Calif.

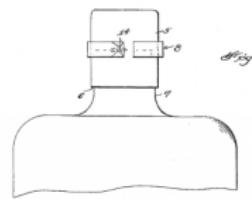
COMBINATION WINE BOTTLE COOLER AND ICE BUCKET

Joseph N. Amigone, Buffalo, N. Y.



LIQUOR OR WINE BOTTLE OPENER SEAL CUTTER

John W. Svalgaard, Minneapolis, Minn.



Source: European Patent Office. Patstat Global (Spring 2024).
Author's Analysis.

Patent Landscaping II

The Chemistry Revolution | 1960 – 1999

Stahlrollenfabrik Eppstein
GmbH & Co. KG
6239 Eppstein/Ta.

Schichtwerkstoff für Verpackungswecke, insbesondere
zur Herstellung von Flaschenkapseln

Fig. 1

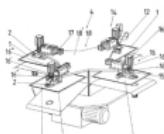


PROCEDE DE REALISATION ET DE REMPLISSAGE EN CONTINU DE RECIPIENTS SOUPLES, EN PARTICULIER AVEC DES LIQUIDES ALIMENTAIRES, ET INSTALLATION POUR LA MISE EN OEUVRE DE CE PROCEDE.

Demandeur(s) : FLEXTAINER Societe anonyme —

FR.

Inventeur(s) : ERB RENE.



[54] PROCESS FOR THE DETECTION AND THE
QUALITATIVE AND QUANTITATIVE
DIFFERENTIATION OF NATURALLY
DEUTERATED MOLECULES AND
APPLICATION THEREOF MORE
ESPECIALLY TO THE DETECTION OF
CHAPTALIZATION OF WINES

[75] Inventors: Grand J. Martin, Maryseone L.
Martin, both of Nantes, France



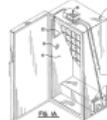
[54] STRUCTURE FOR A WINE STRIPPER

[76] Inventor: Hsi W. Hsiao, No. 502, Chung Shan
Road, Chung Ho, Taipei, Taiwan



[54] TEMPERATURE CONTROLLER AND
METHOD FOR FACILITATING THE
STORAGE OF WINE AND LIKE
PERISHABLES

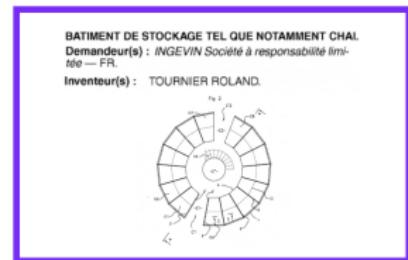
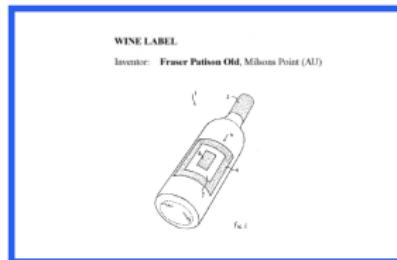
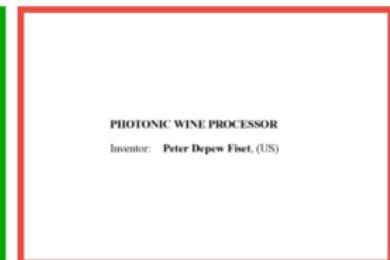
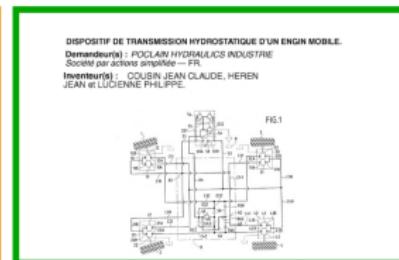
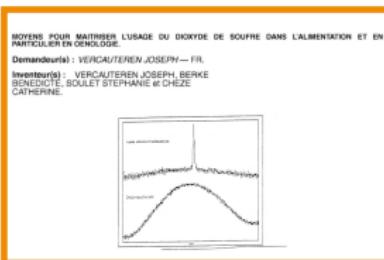
[75] Inventor: William A. Gowan, Raleigh, N.C.



Source: European Patent Office. Patstat Global (Spring 2024).
Author's Analysis.

Patent Landscaping III

Wine as an Experience | 2000 – 2023



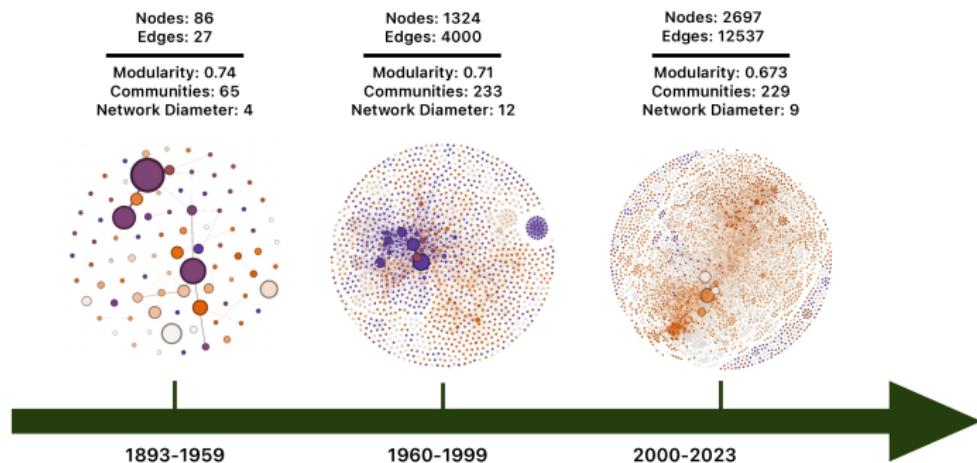
Source: European Patent Office. Patstat Global (Spring 2024).
Author's Analysis.

Ongoing Work...

Patent Status

- Only 23.3% of sampled wine patents is active. Why?

Figure 7: IPC Co-occurrence Network | 1893 – 2023.



Source: Gephi 0.10.1
Author's Analysis.

Thank you!

fc73@st-andrews.ac.uk

<https://francescachiaradia.com>

References |

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References II

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- Unwin, T. (2005), *Wine and the Vine: An Historical Geography of Viticulture and the Wine Trade*, Routledge, London.

Appendix

Table 1: Patent Variable Definition.

Variable	Definition
<i>Patent No.</i>	Unique patent identifier granted upon publication
<i>Pub. Date</i>	Patent publication date
<i>Title</i>	Title of the invention
<i>Applicant</i>	Name of applicant
<i>Inventor</i>	First named inventor
<i>Appl. No.</i>	Numeric application identifier at the time of filing
<i>Filed</i>	Application filing date
<i>Int. Cl.</i>	International Patent Classification (IPC) code(s)
<i>U.S. Cl.</i>	US Classification code(s)
<i>Abstract</i>	Detailed summary of patent content

Table 2: WIPO Technology Fields (Schmoch 2008).

Field	Categories
<i>Electrical Engineering</i>	Audio-Visual Technology; Computer Technology; Digital Communication; Electrical Machinery and Apparatus; IT Methods for Management; Semiconductors; Telecommunications
<i>Chemistry</i>	Basic Materials Chemistry; Biotechnology; Chemical Engineering; Environmental Technology; Food Chemistry; Macromolecular Chemistry, Polymers; Materials, Metallurgy; Organic Fine Chemistry; Pharmaceuticals; Surface Technology, Coating
<i>Mechanical Engineering</i>	Engines, Pumps, Turbines; Handling; Machine Tools; Mechanical Elements; Other Special Machines; Textile and Paper Machines; Thermal Processes and Apparatus; Transport
<i>Instruments</i>	Control; Measurement; Medical Technology; Optics
<i>Other Fields</i>	Civil Engineering; Furniture, Games; Other Consumer Goods

Literature Review

- **Intellectual property in the wine industry**

- ▶ Deconinck & Swinnen (2014), Meloni & Swinnen (2013), Simpson (2011)
 - ✓ Focus on patent intelligence to uncover patterns from unstructured text

- **Text mining, dimensionality reduction, and summarization tasks**

- ▶ Ash & Hansen (2023), Korinek (2023), Gentzkow et al. (2019)
 - ✓ Application of topic modelling and knowledge graphs to model wine evolution

- **Wine industry regulation, enablement, and evolution**

- ▶ Meloni et al. (2019), Anderson et al. (2018), Unwin (2005)
 - ✓ Relate key wine legislation to patenting activity across jurisdictions