



# What's new with scientific content in Google Patents

Summer, 2020

*Ian Wetherbee, Broderick Arneson, Vihang Mehta, Google*

*Stephen K. Boyer, Jane Frommer, Scientific Advisors, Collabra, Inc. on behalf of Google*

Please send questions, feedback and suggestions to:

Steve Boyer, [skboyer@google.com](mailto:skboyer@google.com)

Ian Wetherbee, [wetherbee@google.com](mailto:wetherbee@google.com)

# Google Patents History

1

**2006**  
Google Patents  
launches

2

**2015**  
patents.google.com

3

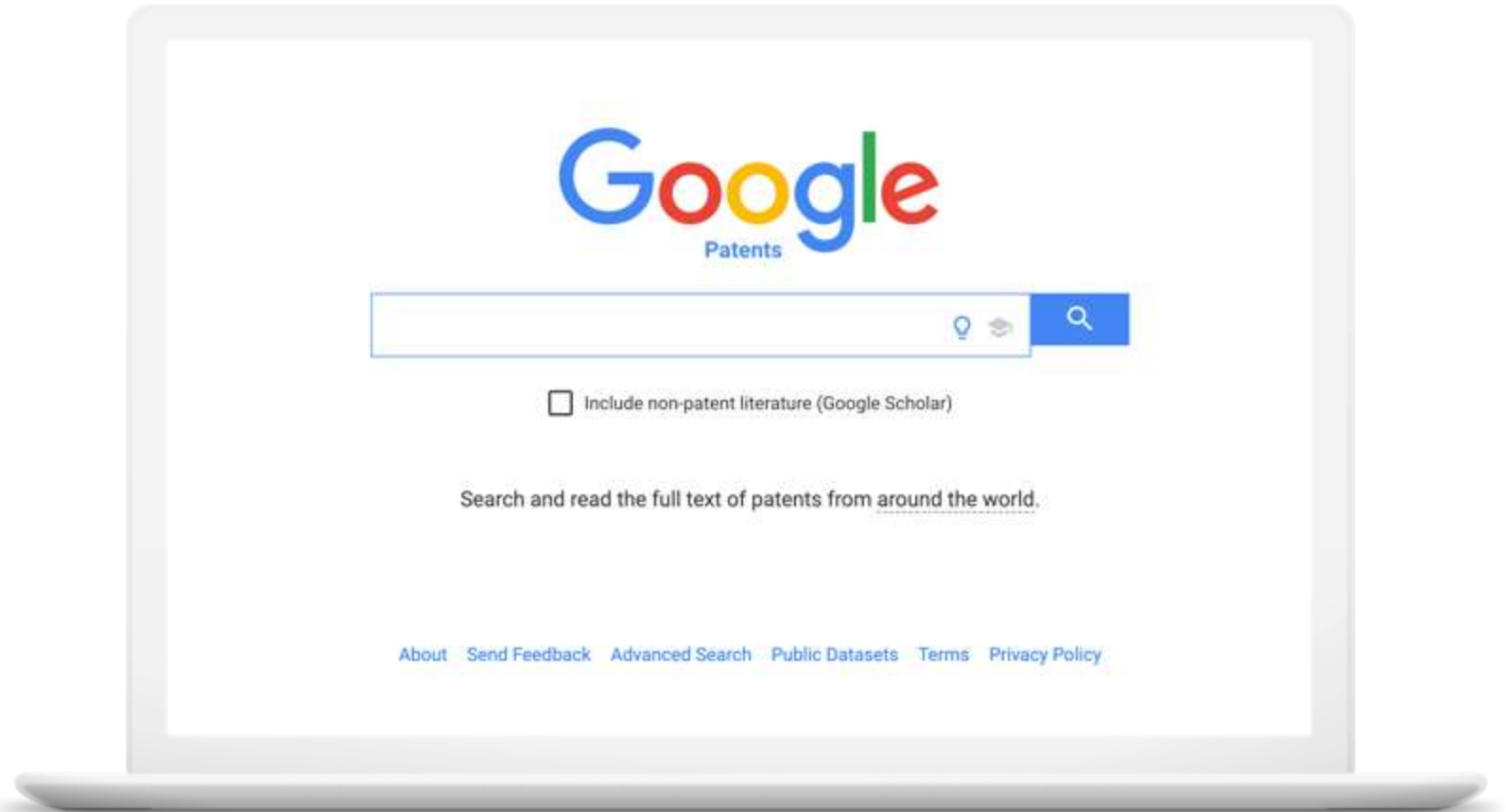
**2018**  
100+ countries

4

**2019**  
Litigation data  
Image OCR

5

**2020**  
Annotated Data  
Chemical Search

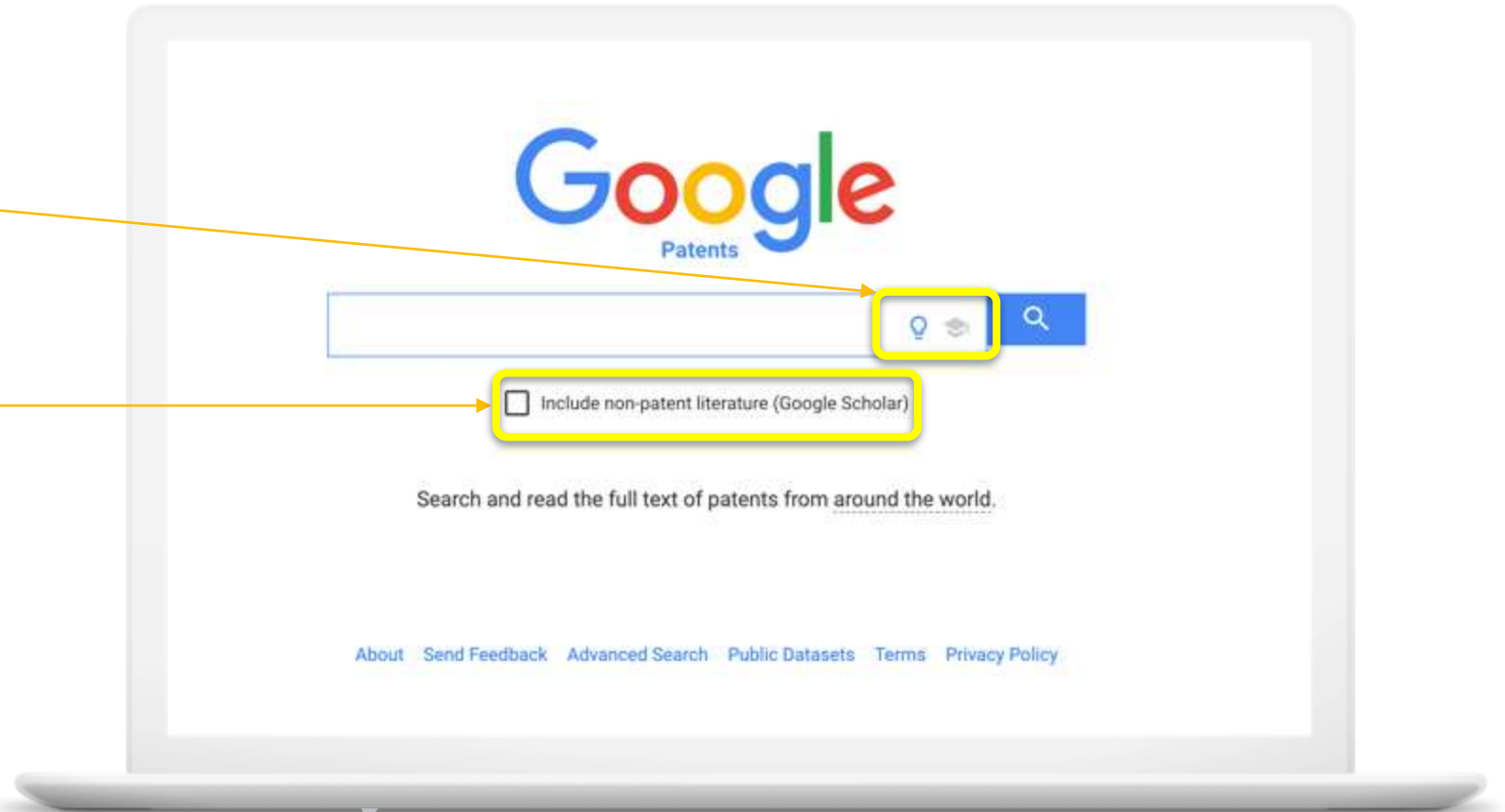


# Basic Search Options

- Patents
- Non-patents (Google Scholar & Books)
- Both

## Scholar

- Full text of journals + books
- Machine-classified with CPCs
- Prior art archive  
technical manuals, press releases



# What's new in Google Patents with scientific content?

# Chemical Search Roadmap

5

**2020 Q1**

Google Patents launches  
chemical search

6

**2020 Q2**

Chemicals from text  
+ US images, 2001-> present

7

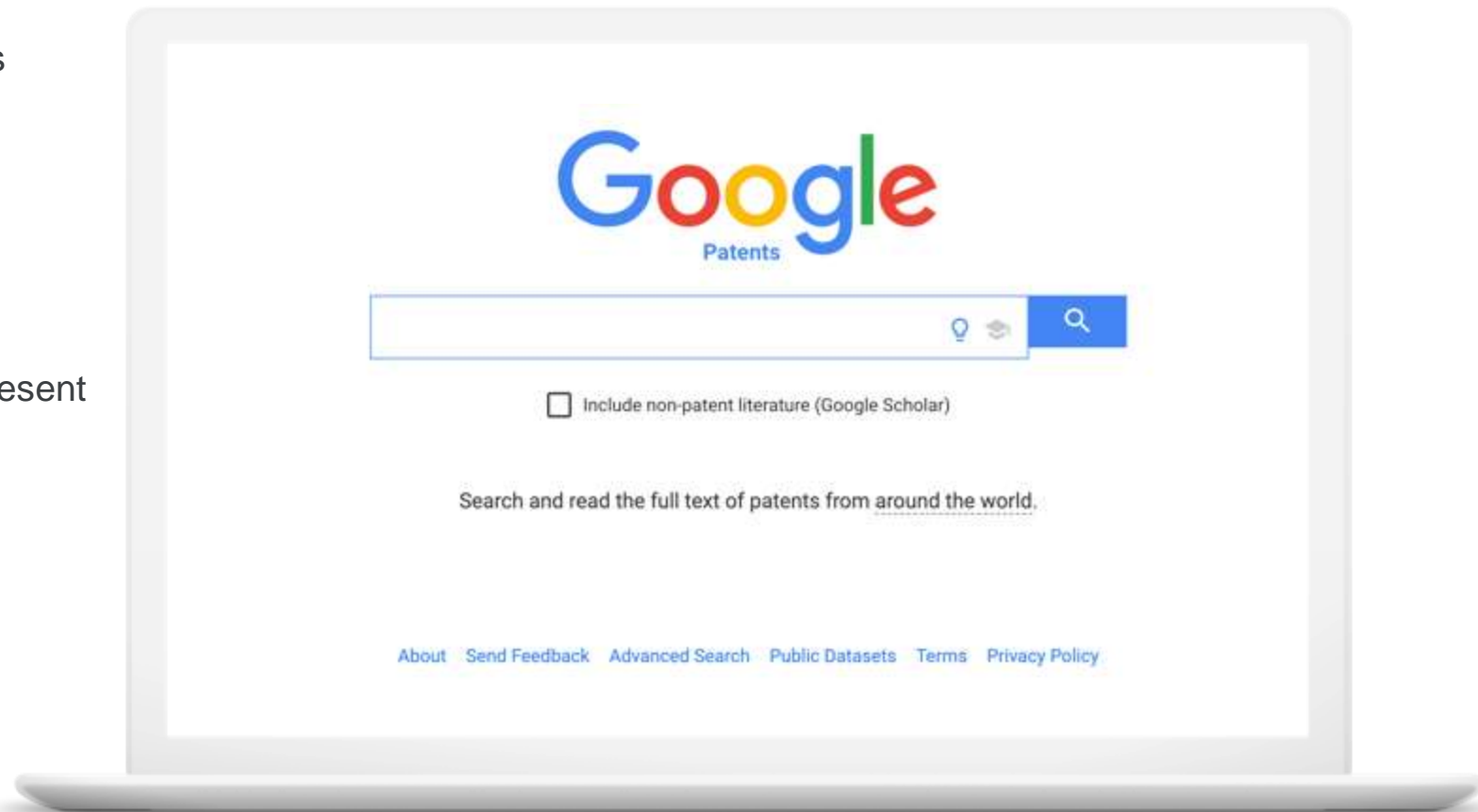
**2020 Q3**

Chemicals from images

8

**2020 Q4**

Chemicals from reactions



# Chemical Search

## Exact Structure Search

- Text, SMILES or InChIKey

## Similarity Search (~)

- ~text, ~SMILES or ~InChIKey

## Substructure Search (SSS)

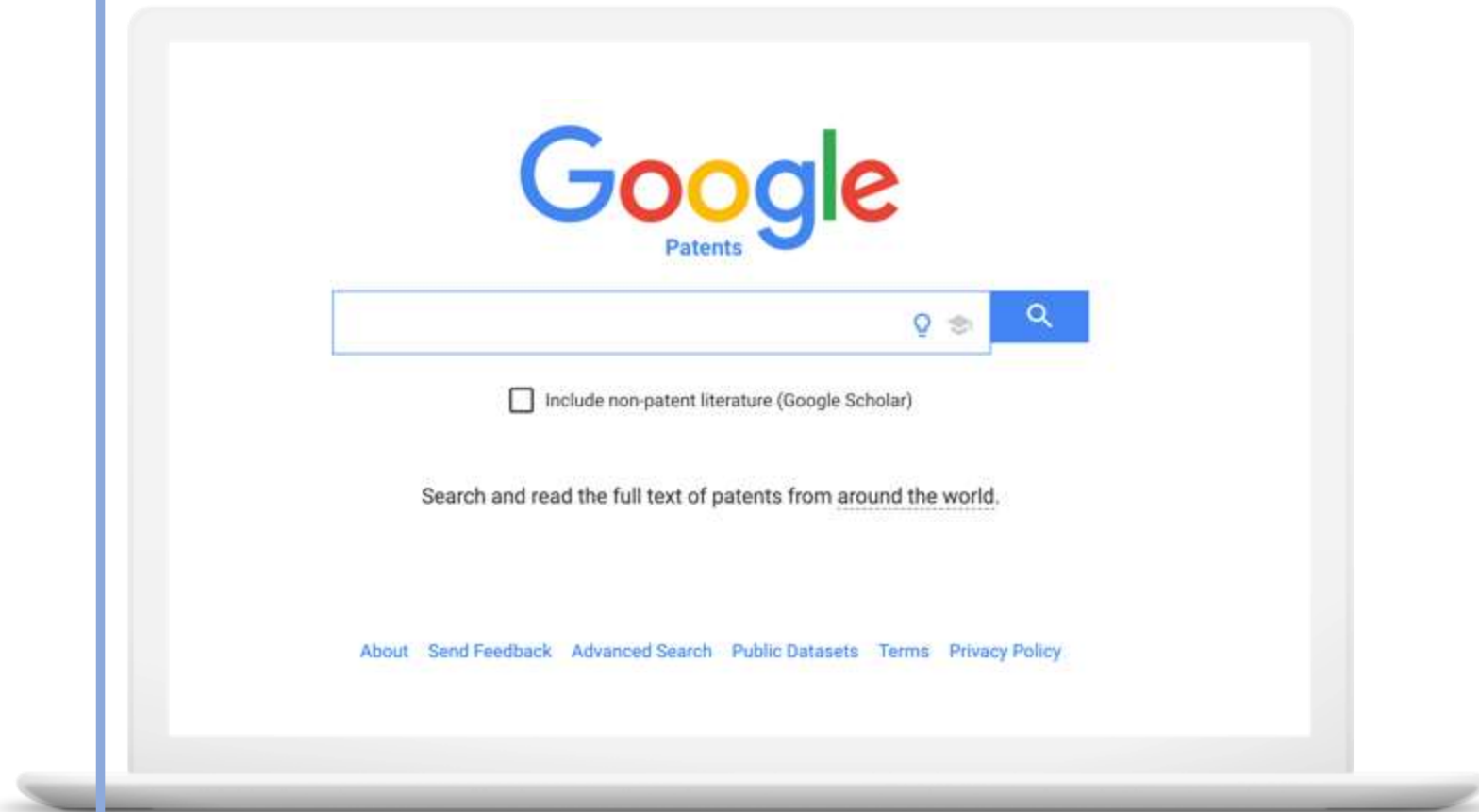
- SSS= SMILES

## In-Claims Only Search (CL)

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES



# Chemical text search

## Exact Structure Search

- **Text**, SMILES or InchiKey

## Similarity Search

- ~text, ~SMILES or ~InchiKey

## Substructure Search

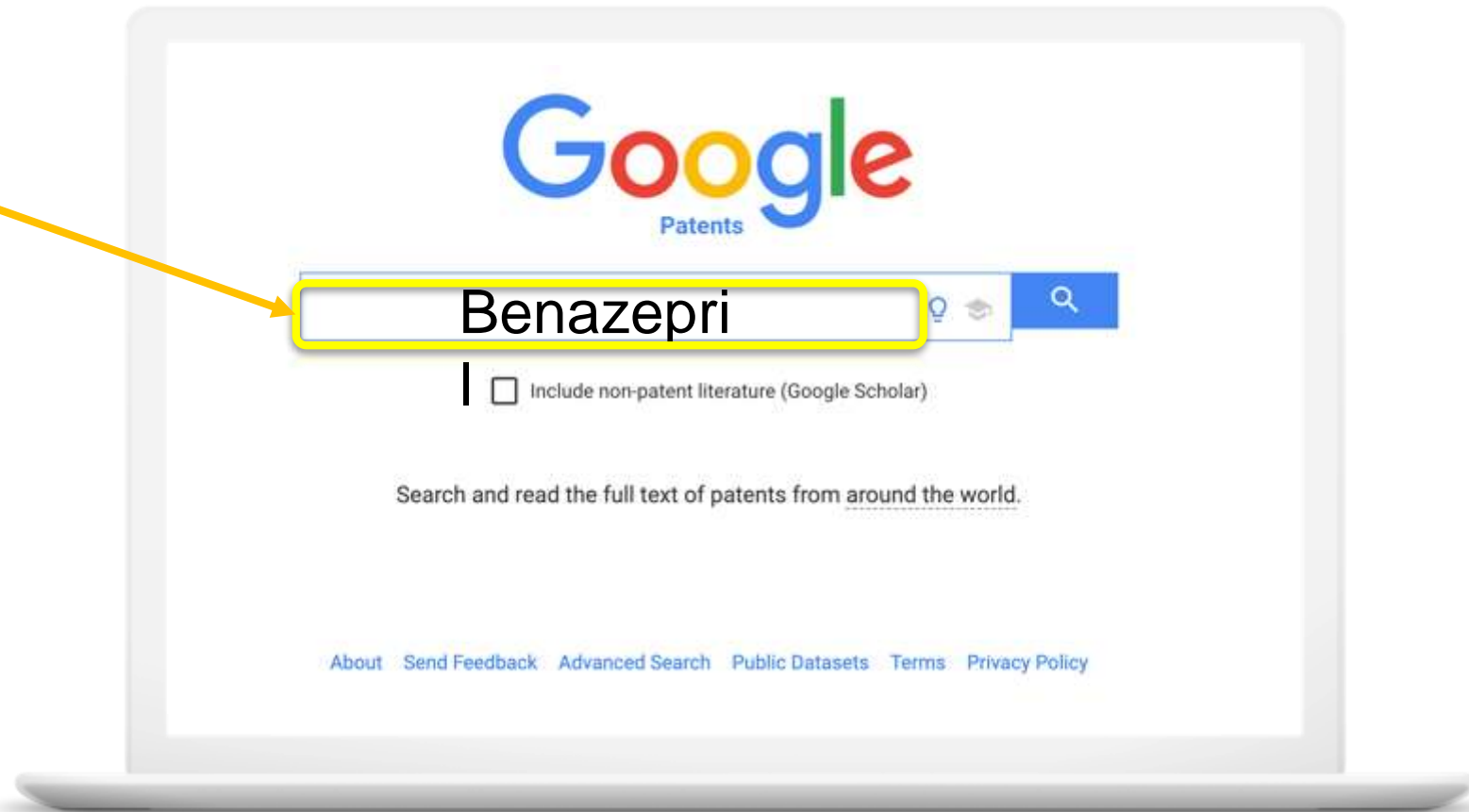
- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES



# InChIKey search

## Exact Structure Search

- Text, SMILES or **InChIKey**

## Similarity Search

- ~text, ~SMILES or ~InChIKey

## Substructure Search

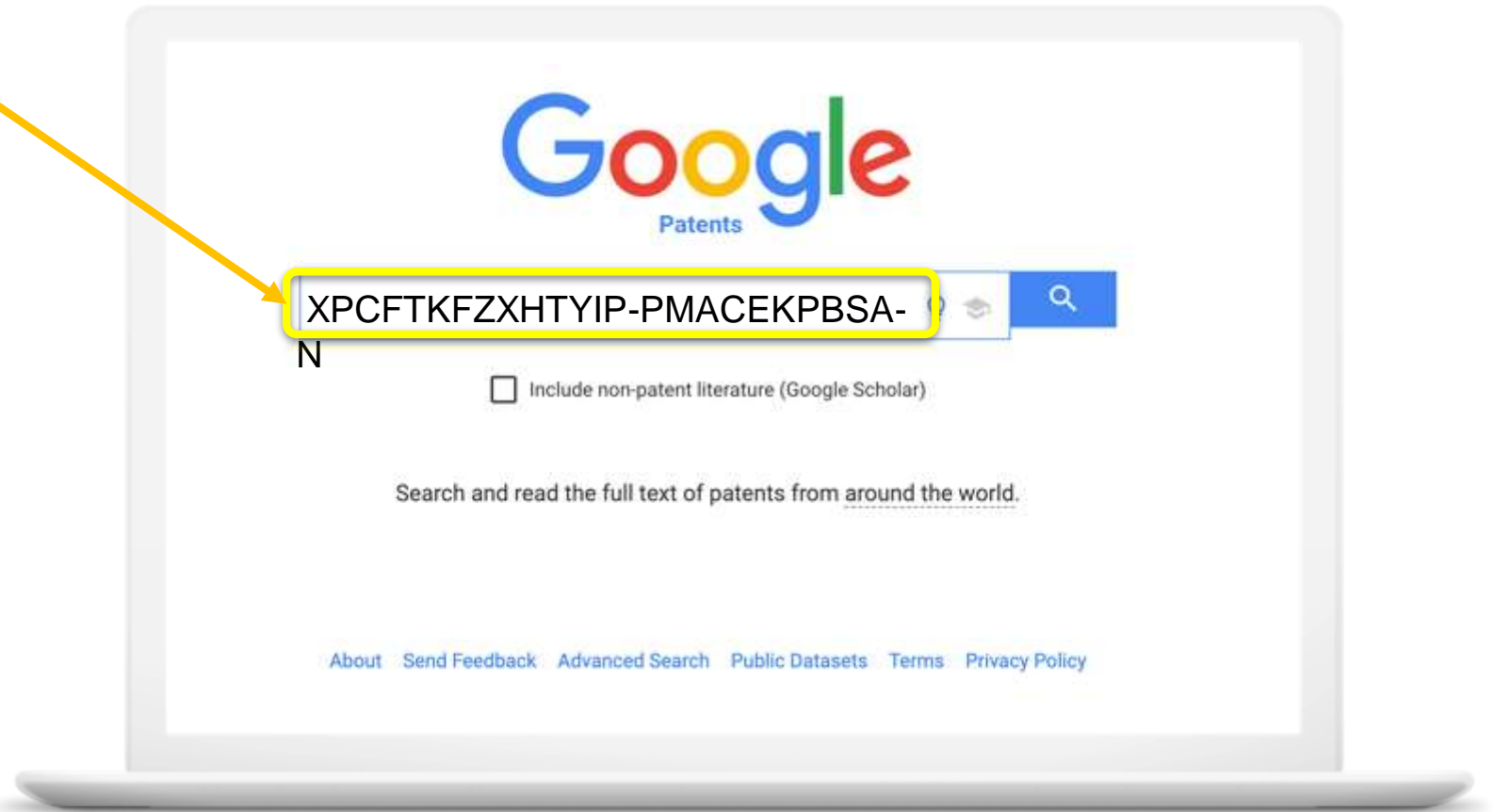
- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES





# SMILES string search

## Exact Structure Search

- Text, **SMILES** or InChIKey

## Similarity Search

- ~text, ~SMILES or ~InChIKey

## Substructure Search

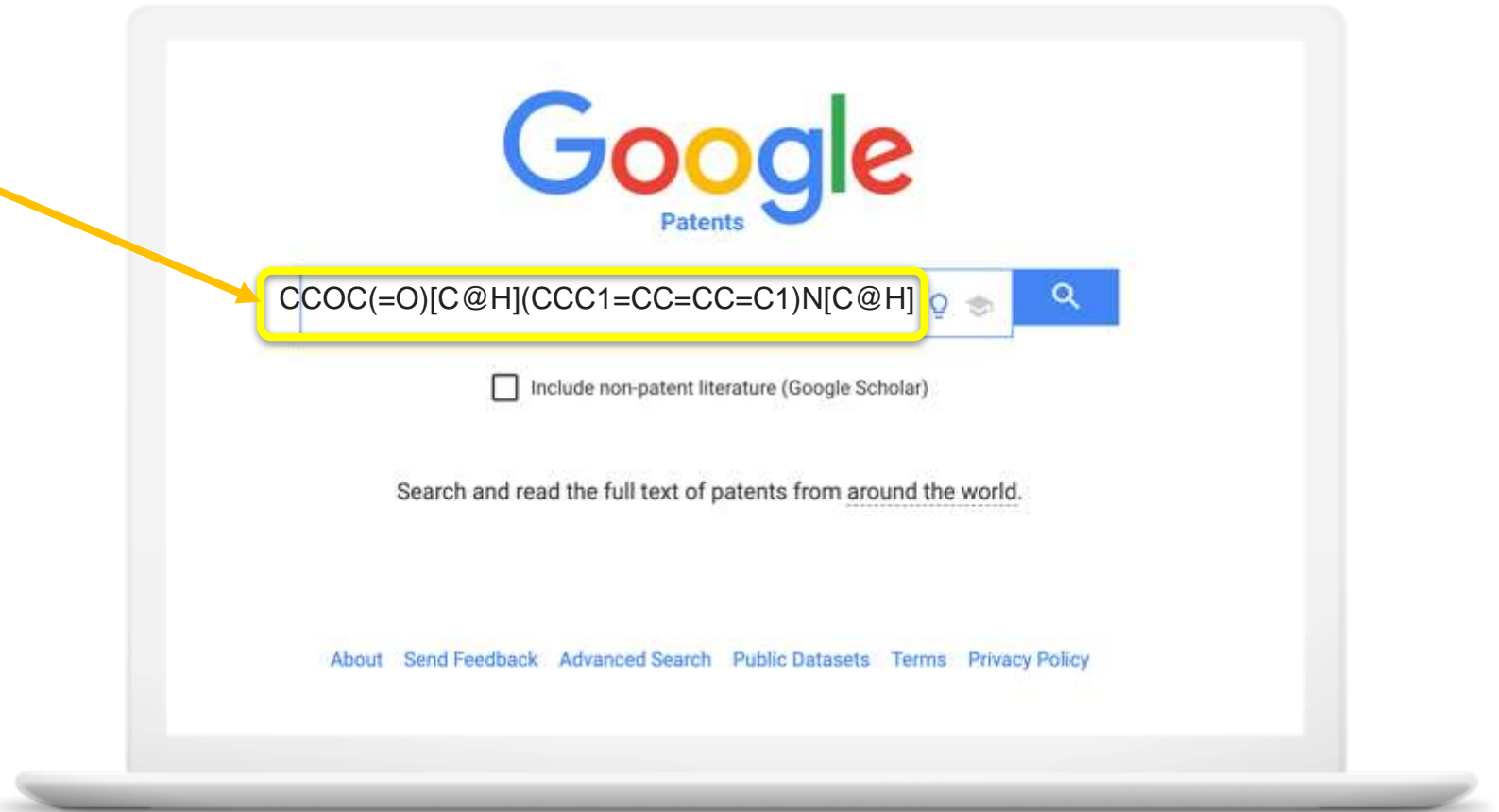
- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES



# Similarity & substructure search

# Similarity search with ~text

## Exact Structure Search

- Text, SMILES or InchiKey

## Similarity Search

- **~text**, ~SMILES or ~InchiKey

## Substructure Search

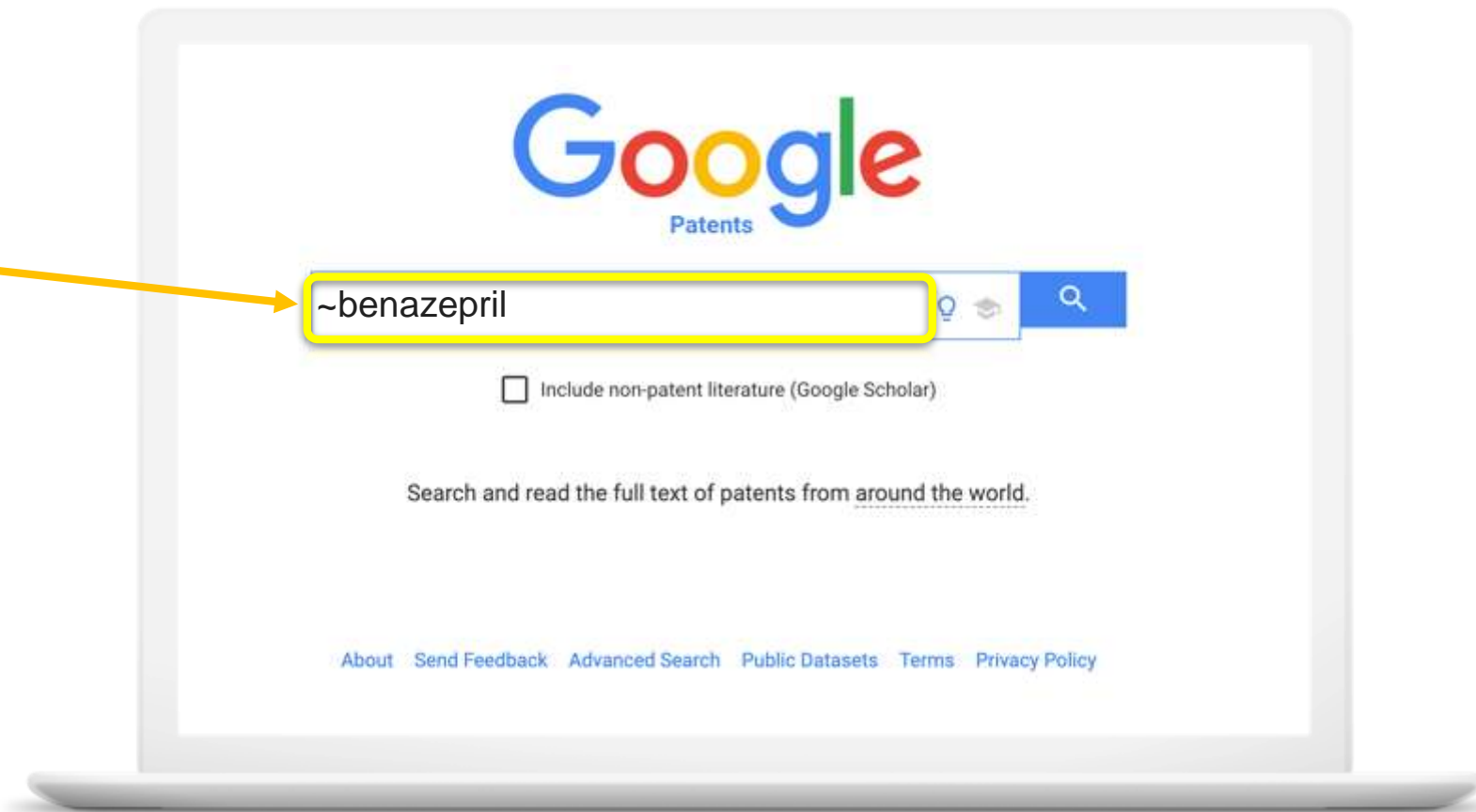
- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES



Works in Google Scholar

# Results of similarity search with ~text

## Exact Structure Search

- Text, SMILES or InchiKey

## Similarity Search

- ~text, ~SMILES or ~InchiKey

## Substructure Search

- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES

The screenshot shows the Google Patents search interface. The search bar at the top contains the query '~benazepril'. Below the search bar, the results are displayed in a grid format. The first result is for patent US942245B2, titled 'Nepriylsin inhibitors', filed on 2015-02-18. The second result is for patent US9688692B2, also titled 'Nepriylsin inhibitors', filed on 2016-06-06. The third result is for patent US10123984B2, titled 'Nepriylsin inhibitors', filed on 2017-05-12. The fourth result is for patent US9273008B2, titled 'Dual-acting imidazole antihypertensive agents', filed on 2015-03-19. Each result includes a chemical structure diagram and the name of the inventor and assignee. The search interface also includes filters for search terms, search fields, and sorting options.

# Similarity search of ~InChIkey

## Exact Structure Search

- Text, SMILES or InchiKey

## Similarity Search

- ~text, ~SMILES or ~InchiKey

## Substructure Search

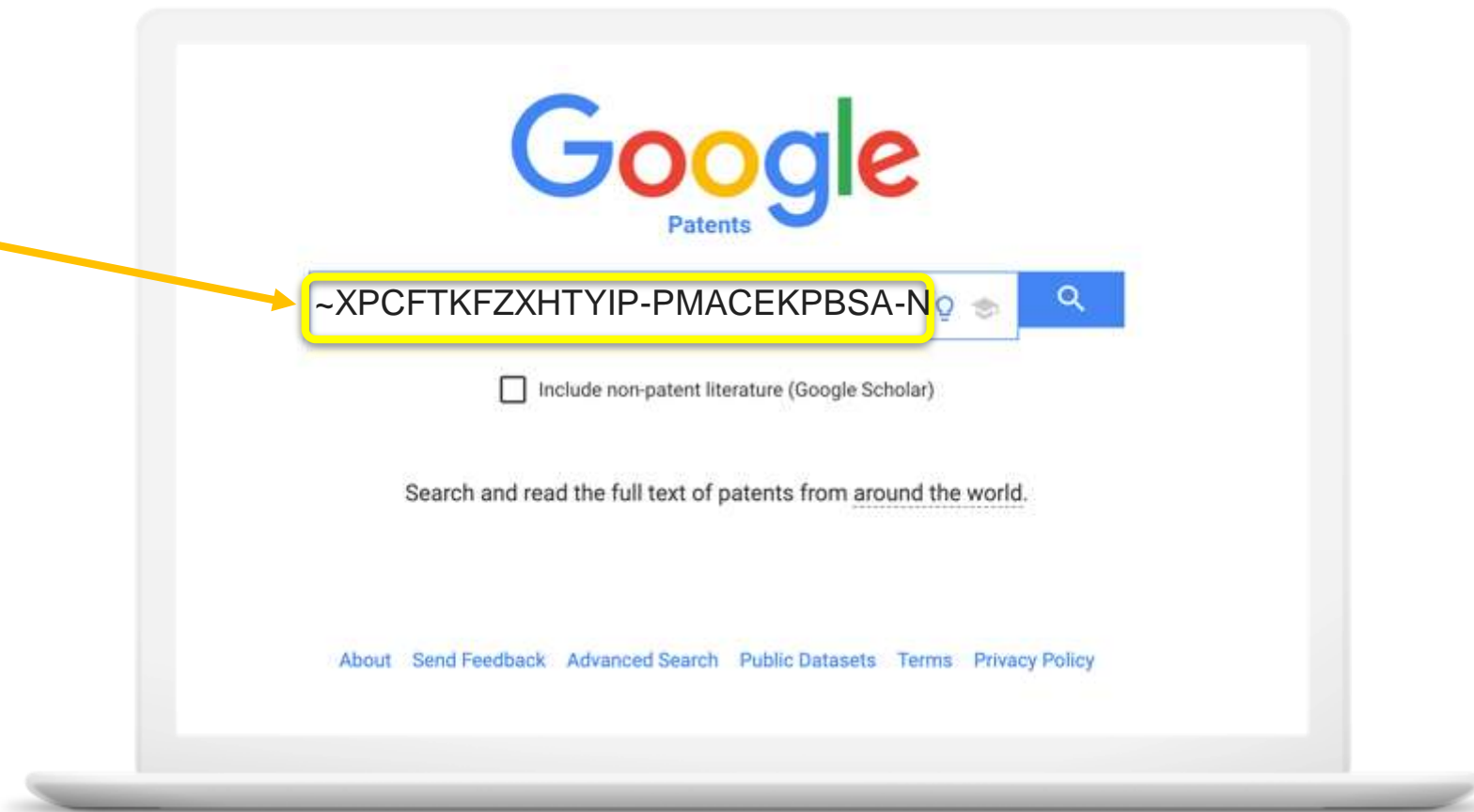
- SSS= SMILES

## In Claims Only

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-----coming soon-----

- Reaction Search
- Reaction SMILES



Works in Google Scholar

# Results of similarity search of ~InChIKey

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## Similarity Search

- ~text, ~SMILES or ~InChIKey

## Substructure Search

- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES

Google Patents

~XPCFTKFZXHTYIP-PMACEKPBSA-N

SEARCH TERMS: ~XPCFTKFZXHTYIP-PMACEKPBSA-N

SEARCH FIELDS: Date - Priority - YYYY-MM-DD - YYYY-MM-DD, Inventor, Assignee, Patent Office - Language -, Status - Type -, Litigation -

About 26,481 results

Sort by - Relevance - Group by - None - Deduplicate by - Family - Results / page - 10 -

**Nanochanneled device and related methods**

US9005185B2  
Mauro Ferrari  
The Board Of Reg...  
Filed  
2013-12-06

**Neprilysin inhibitors**

US9845332B2  
Roland Gendron  
Theravance Biopha...  
Filed  
2017-05-19

**Neprilysin inhibitors**

US9724359B2  
Melissa Fleury  
Theravance Biopha...  
Filed  
2016-04-06

**Neprilysin inhibitors**

US9422245B2  
Roland Gendron  
Theravance Biopha...  
Filed  
2015-02-18

# Substructure search of SMILES SSS=

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## Similarity Search

- ~text, ~SMILES or ~InChIKey

## Substructure Search

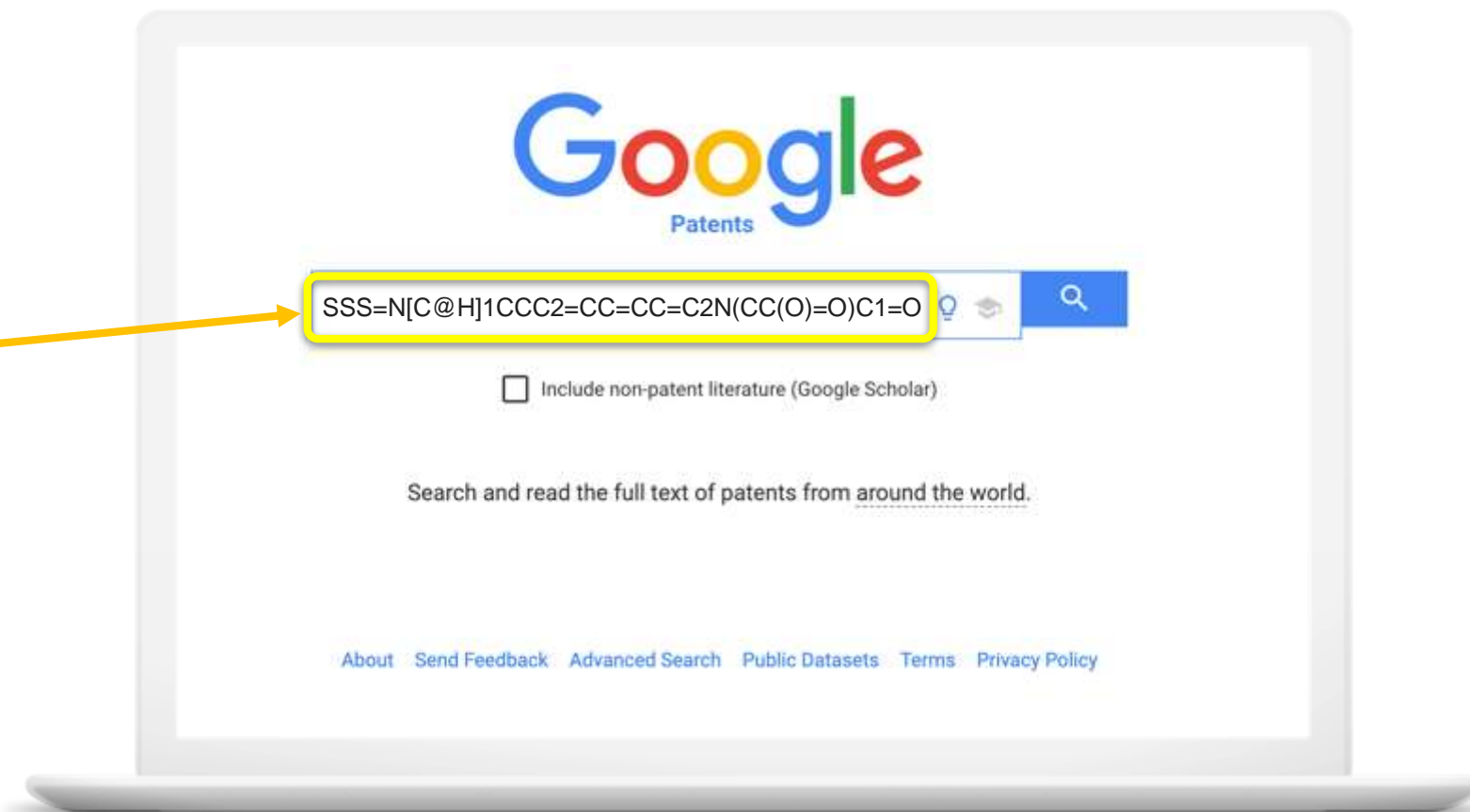
- **SSS= SMILES**

## In Claims Only

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-----coming soon-----

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Works in Google Scholar

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-----coming soon-----

- Reaction Search
- Reaction SMILES

Google Patents

SSS=N[C@H]1CCC2=CC=CC=C2N(CC(O)=O)C1=O

SEARCH TERMS

SSS=N[C@H]1CCC2=CC=CC=C2N(CC(O)=O)C1=O

or + Synonyms

+ Synonyms

SEARCH FIELDS

Date - Priority -

YYYY-MM-DD - YYYY-MM-DD

+ Inventor

+ Assignee

Patent Office - Language -

Status - Type -

Litigation -

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**Nepilysin inhibitors**

US9555041B2  
Cameron Smith  
Theravance Biopharma  
Filed  
2015-07-21

**Intermediates for preparing dual-acting benzyl triazole antihypertensive agents ...**

US8895755B2  
Paul Allegretti  
Theravance Biopharma  
Filed  
2013-09-24

**Nepilysin inhibitors**

US8853427B2  
Melissa Fleury  
Theravance Biopharma  
Filed  
2013-06-03

**Nepilysin inhibitors**

US9422245B2  
Roland Gendron  
Theravance Biopharma  
Filed  
2015-02-18

XMQODGUTLZXUGZ-RPBOFLJWSA-N

Search Add to query PubChem from machine annotation



# additional resources

## Exact Structure Search

- Text, SMILES or InChIKey

## Similarity Search

- ~text, ~SMILES or ~InChIKey

## Substructure Search

- SSS= SMILES

## In Claims Only

- CL= SMILES=\*

-----coming soon-----

- Reaction Search
- Reaction SMILES

Google Patents

SSS=N[C@H]1CCC2=CC=CC=C2N(CC(O)=O)C1=O

SEARCH TERMS

SEARCH FIELDS

Date - Priority  -

+ Inventor

+ Assignee

Patent Office - Language -

Status - Type -

Litigation -

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Filed  
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Theravance Biopharm  
Filed  
2013-06-03

**Nepilysin inhibitors**

US9422245B2  
Roland Gendron  
Theravance Biopharm  
Filed  
2015-02-18

**XMQODGUTLZXUGZ-RPBOFLJWSA-N** InChIkey

**additional info**

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# Download results

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Google Patents

Benazepril

SEARCH TERMS ×

Benazepril × or + Synonym

+ Synonym

SEARCH FIELDS

Date ▼ Priority ▼

YYYY-MM-DD - YYYY-MM-DD

+ Inventor

+ Assignee

Patent Office ▼ Language ▼

Status ▼ Type ▼

Litigation ▼

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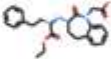
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**Novel crystalline object of benazepril hydrochloride and preparation method of ...**

CN · [CN103012267B](#) · 胡秀荣 · 浙江大学

Priority 2012-10-11 · Filed 2012-12-05 · Granted 2015-02-25 · Published 2015-02-25

The invention discloses a stable **benazepril** hydrochloride I crystal form. A thermogravimetry spectrogram of the crystal form shows that the weight loss ratio of the crystal form is 10.6% in the range of a room temperature to 160 DEG C, which explains that the crystal form contains 10.6% of solvent;




**Process for preparation of benazepril**

WO EP CN · [CN1829696A](#) · Y-库马 · 兰贝克泰实验室有限公司

Priority 2003-07-31 · Filed 2004-07-30 · Published 2006-09-06

The present invention relates to an improved process for preparation of highly pure **benazepril** of Formula I, wherein R is hydrogen or pharmacologically acceptable salt thereof by completely eliminating the impurity of 7-bromo analogue of **benazepril** of Formula Ia, wherein R is bromo group.



**Kinetic resolution of intermediater body for preparing benazepril and its ...**

WO EP US CN JP AT AU CA DE ES NZ · [CN1266136C](#) · 普伟宏 · 台湾神隆股份有限公司

Priority 2001-05-18 · Filed 2002-05-20 · Granted 2006-07-26 · Published 2006-07-26

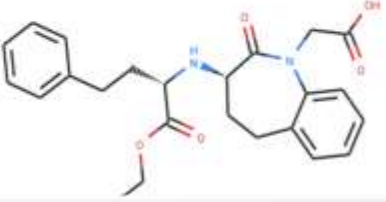
The present invention provides an efficient synthetic process for making **benazepril** and analogues thereof by having an intermediate compound undergo epimerization and kinetic resolution.

**Therapeutic combination of amlodipine and benazepril/benazeprilat**

WO EP CN JP KR AT AU BR CA CZ DE DK EC ES HK HU IL MX NO NZ PL PT RU SI SK ZA · [AU2002232620B2](#) · Ann Reese Comfort · Novartis Ag

Priority 2000-12-18 · Filed 2001-12-17 · Granted 2005-11-03 · Published 2005-11-03

2. Use according to claim 1 wherein the amlodipine is amlodipine besylate. 3. Use according to claim 1 or 2 wherein the **benazepril** is **benazepril** hydrochloride. 4. Use according to any one of claims 1 to 3 wherein



XPCFTKFZXHTYIP-PMACEKPBSA-N

# Download chemical data

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Benazepril

SEARCH TERMS ×

Benazepril × or + *Synonym*

+ *Synonym*

SEARCH FIELDS

Date ▼ Priority ▼

YYYY-MM-DD - YYYY-MM-DD

+ *Inventor*

+ *Assignee*

Patent Office ▼ Language ▼

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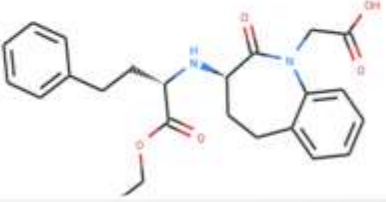

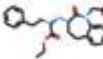
**Therapeutic combination of amlodipine and benazepril/benazeprilat**

WO EP CN JP KR AT AU BR CA CZ DE DK EC ES HK HU IL MX NO NZ PL PT RU SI SK ZA · [AU2002232620B2](#) · Ann Reese Comfort · Novartis Ag

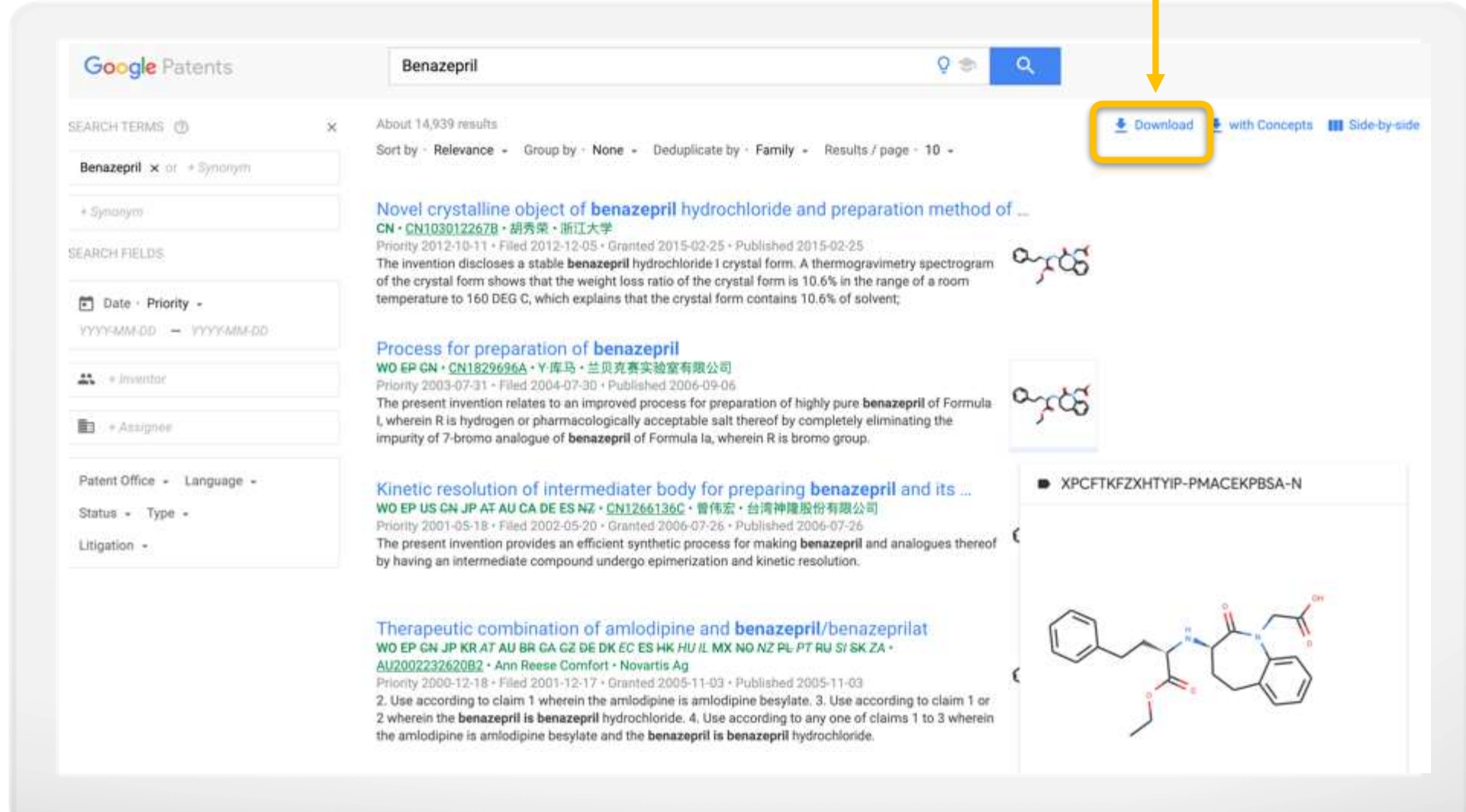
Priority 2000-12-18 · Filed 2001-12-17 · Granted 2005-11-03 · Published 2005-11-03

2. Use according to claim 1 wherein the amlodipine is amlodipine besylate. 3. Use according to claim 1 or 2 wherein the **benazepril** is **benazepril** hydrochloride. 4. Use according to any one of claims 1 to 3 wherein

id
name
domain
InChIkey
SMILES
query match
sections




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Benazepril

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Benazepril x or + Synonym

+ Synonym

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+ Inventor

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[CN · CN103012267B · 胡秀荣 · 浙江大学](#)  
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**Kinetic resolution of intermediater body for preparing benazepril and its ...**  
[WO EP US CN JP AT AU CA DE ES NZ · CN1266136C · 曾伟宏 · 台湾神隆股份有限公司](#)  
Priority 2001-05-18 · Filed 2002-05-20 · Granted 2006-07-26 · Published 2006-07-26  
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[WO EP CN JP KR AT AU BR GA G2 DE DK EC ES HK HU IL MX NO NZ PL PT RU SI SK ZA · AU2002232620B2 · Ann Reese Cornfort · Novartis Ag](#)  
Priority 2000-12-18 · Filed 2001-12-17 · Granted 2005-11-03 · Published 2005-11-03  
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XPCFTKFZXHTYIP-PMACEKPBSA-N

CCOC(=O)C(CCN1C(=O)N(C1)C2=CC=CC=C2)C3=CC=CC=C3

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Google Patents

Benazepril

SEARCH TERMS **Benazepril** x or + Synonym

SEARCH FIELDS

Date · Priority -  
YYYY-MM-DD - YYYY-MM-DD

Inventor

Assignee

Patent Office - Language -  
Status - Type -  
Litigation -

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Benazepril

SEARCH TERMS  or

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Date · Priority -  
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Inventor

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Litigation -

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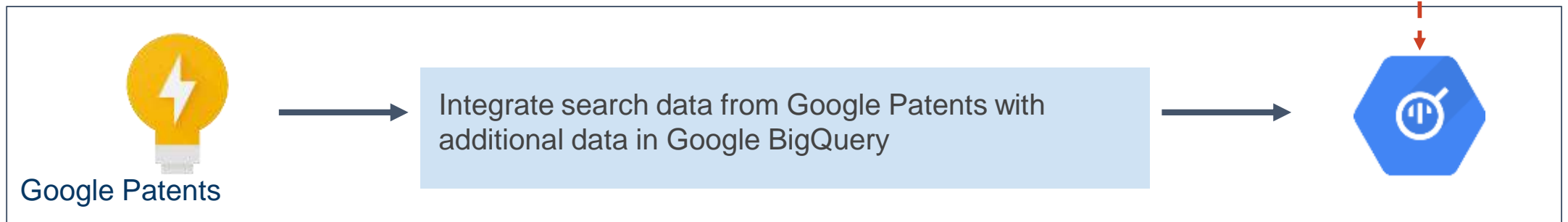
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WO EP CN JP KR AT AU BR CA CZ DE DK EC ES HK HU IL MX NO NZ PL PT RU SI SK ZA · AU2002232620B2 · Ann Reese Comfort · Novartis Ag  
Priority 2000-12-18 · Filed 2001-12-17 · Granted 2005-11-03 · Published 2005-11-03  
2. Use according to claim 1 wherein the amlodipine is amlodipine besylate, 3. Use according to claim 1 or 2 wherein the benazepril is benazepril hydrochloride, 4. Use according to any one of claims 1 to 3 wherein the amlodipine is amlodipine besylate and the benazepril is benazepril hydrochloride.



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From Tables to Charts

CPC	Application Number	Prosecution Status
C07D401/12	US-68526603-A	Instituted
C07D413/12	US-24512202-A	Terminated-Denied
C07D487/04	US-201113173486-A	FWD Entered
C07D487/04	US-201514707912-A	PO Response Filed
C07D471/04	US-24512202-A	Terminated-Denied
C07D401/06	US-200913119743-A	FWD Entered
C07D401/12	US-68526603-A	Waiver Filed
C07D401/12	US-24512202-A	Terminated-Denied
C07D495/04	US-24512202-A	Terminated-Denied
C07D495/04	US-201113173486-A	FWD Entered





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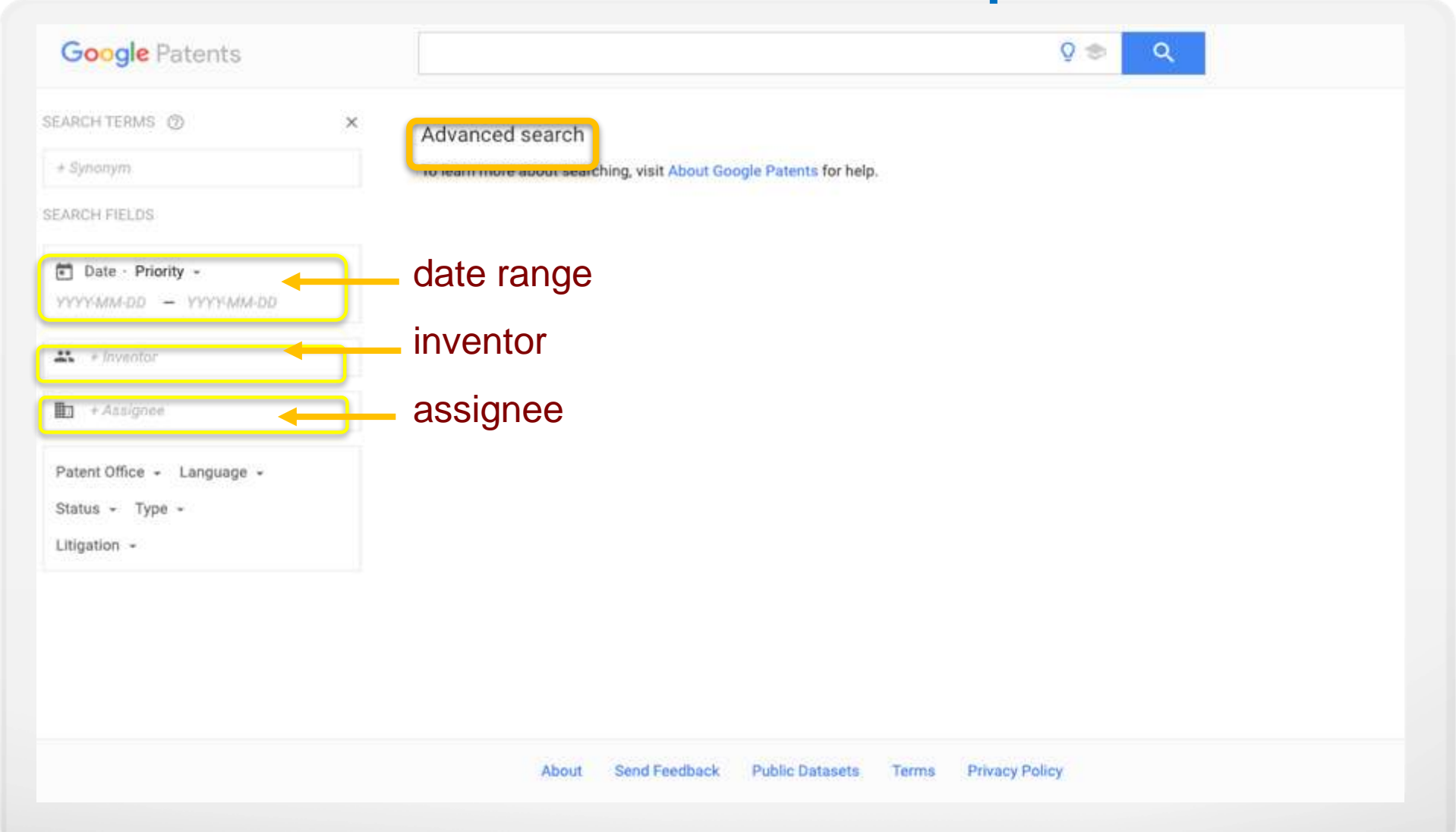


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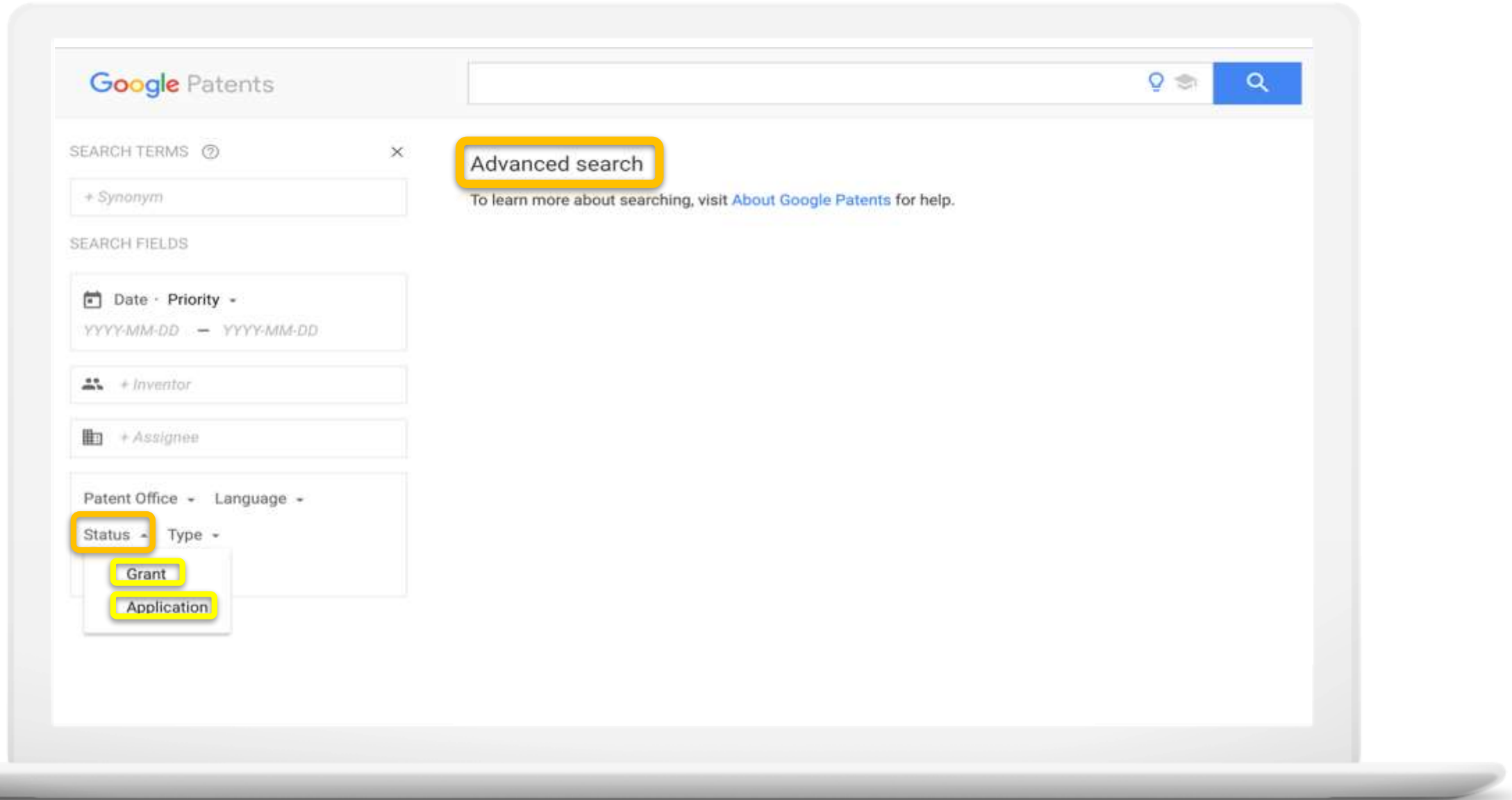
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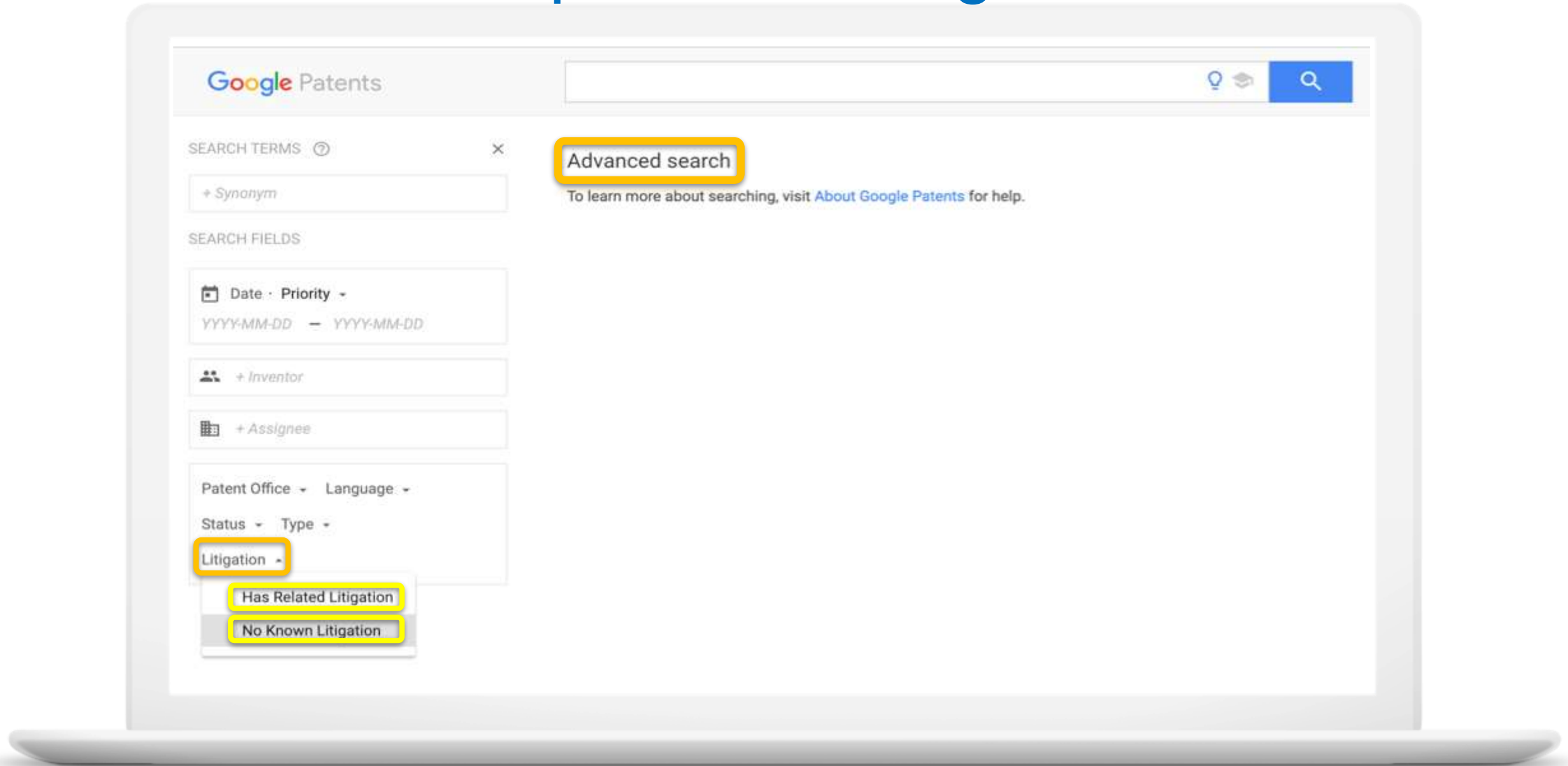
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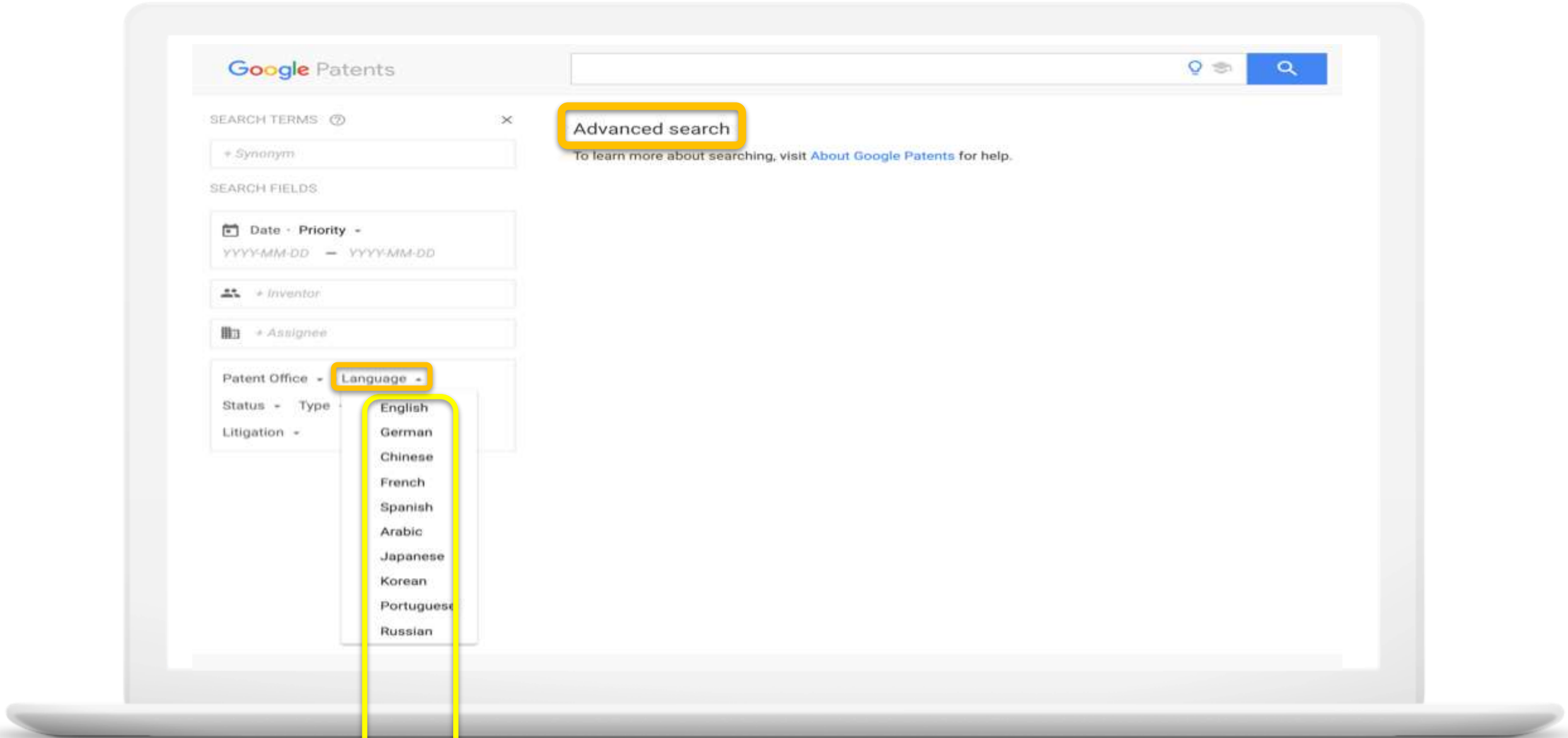
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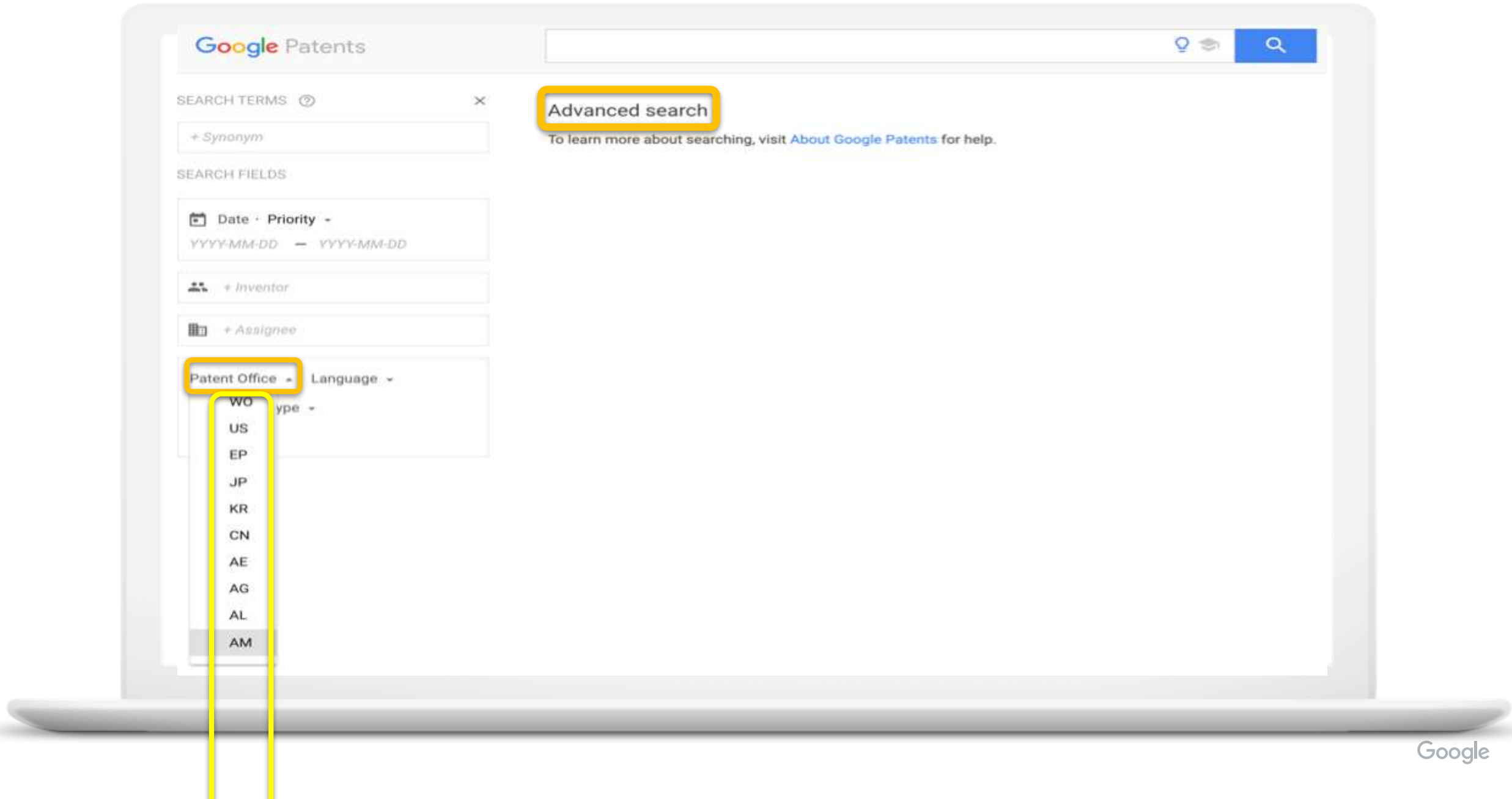
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