Linking records of early aeronautical experimenters across data sets

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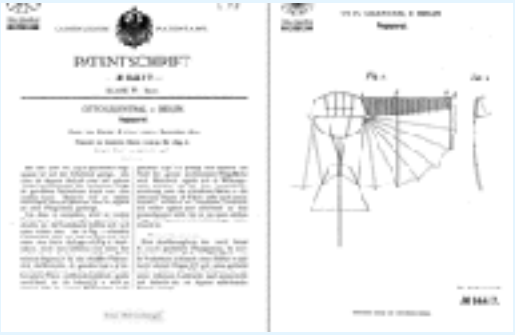
Findings and views are those of the author,
and do not represent BLS

Innovative Techniques in Record Linking session
SSHA conference, Chicago
17 November 2016

← →



← →

Goals and questions

Airplanes have a long pre-history. What processes led to their invention and the startup industry?

We have data on many categories of relevant items from 1809 to 1916 that relate to the invention of the airplane and the startup industry. There is vast documentation.

- **Patents** (the focus here)
- Published articles
- Inventors
- Authors
- Ballooning and aero clubs
- Exhibitions and conferences
- Letters of inventors / authors
- Startup firms

And more: Journals, patent tech category, definitions of terms, language, country, secondary sources

Each of these can have a wiki page

Example: Lilienthal patent

Otto Lilienthal MUSEUM

KAISERLICHES PATENTAMT.

PATENTSCHRIFT

— № 84417 —

KLASSE 77: SPORT.

OTTO LILIENTHAL IN BERLIN.

Flugapparat.

Zusatz zum Patente № 77916 vom 1. September 1894.

Patentirt im Deutschen Reiche vom 29. Mai 1895 ab.

Längste Dauer: 1. September 1908.

Bei dem unter Nr. 77916 geschützten Flugapparat hat sich der Uebelstand gezeigt, dass, wenn der Apparat die Luft unter sehr spitzem Winkel durchschneidet, die Vorderkante infolge der gewölbten Flächenform Druck von oben erhalten kann. Dadurch wird ein stetiges Durchgleiten der Luft gefährdet, und der Apparat aus seiner Flugrichtung gedrängt.

Um dieses zu vermeiden, wird die vordere Flächenpartie derart beweglich gemacht, dass dieselbe um die Vorderkante drehbar sich nach unten richten kann. Das in Fig. 1 schraffirte Flächenstück kann sich um die Achse *a b* nach unten, etwa bis in die Lage *c d* (Fig. 2) herabsenken, durch einen Luftdruck von unten aber wieder bis in die Lage *e e* erheben. Durch federnde Organe *f f* hat das schraffirte Flächenstück das Bestreben, die gewölbte Lage *e d* einzunehmen, und zwar ist der normale, auf diese bewegliche Fläche auftreffende Luftdruck gerade ausreichend, um die Federn *f f* so weit zu spannen, dass das vordere Flächenstück in die gehobene Lage *e e* gelangt und dadurch ein Theil der ganzen geschlossenen Flügelfläche wird. Hierdurch ergiebt sich die Wirkungsweise insofern, als bei einer Luftdruckverminderung unter der schraffirten Fläche *e e* die federnden Organe die Fläche selbst nach unten drücken, wodurch der verminderte Luftdruck sich wieder ergänzt und aufrichtend auf den ganzen Apparat wirkt, bis die zu einem stabilen Fluge des Apparates erforderliche Lage wieder erreicht ist.

Patent-Anspruch:

Eine Ausführungsform des durch Patent Nr. 77916 geschützten Flugapparates, bei welcher der vordere Theil der Flügelfläche (*a b*) nach unten drehbar ist und durch federnde Organe *f f* nach unten gedrückt wird, so dass er sich beim Nachlassen des von unten wirkenden Luftdruckes nach unten dreht und dadurch ein den Apparat aufrichtendes Moment erzeugt.

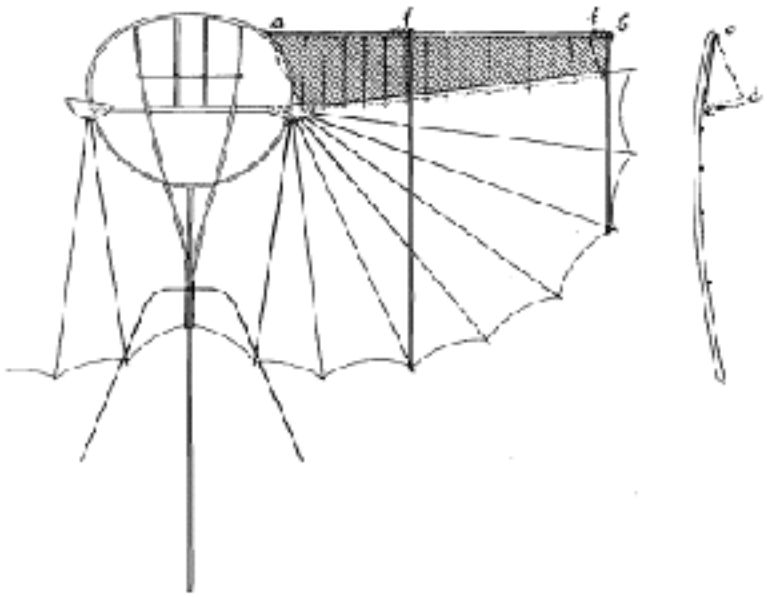
Hierzu 1 Blatt Zeichnungen.

Otto Lilienthal MUSEUM

OTTO LILIENTHAL IN BERLIN.

Flugapparat.

Fig. 1. Fig. 2.



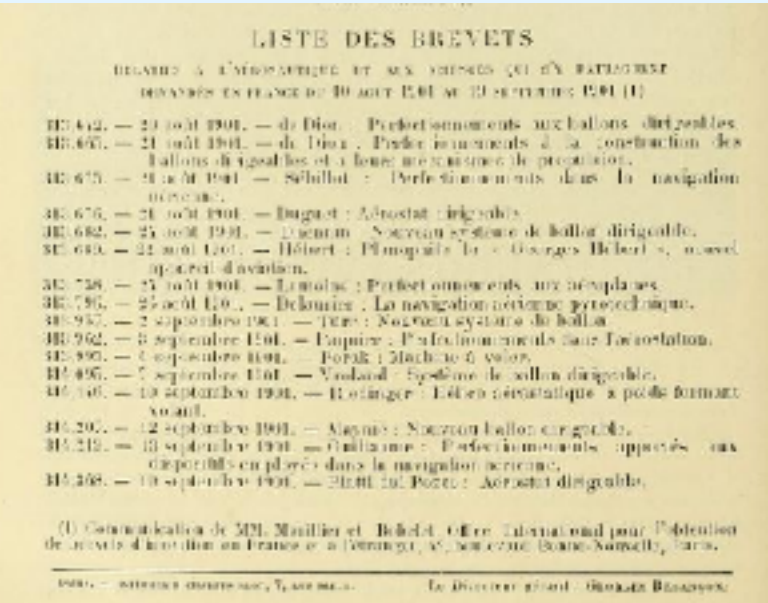
Zu der Patentschrift

№ 84417.

BERLIN. DRUCK DER REICHSDRUCKEREI.

Data on patents

- EPO's Patstat / Espacenet data
  - Coverage back to 1910 or earlier, varying by country
- Data before 1910 is drawn from many sources
  - INPI: French vintage patent database online
  - *L'Aerophile*
  - *AÉRO-MANUEL 1914*
  - *Catalogue des brevets d'invention*, 1880s
  - SUBJECT-MATTER INDEX OF PATENTS FOR INVENTION (1883)
  - Google patents
  - US Patent and Trademark Office
  - Brewer and Alexander, 1893, *Aeronautics*
  - *Aeronautical Journal*
  - coverage of German patents is incomplete
- ~13,500 aero patents to 1916


LISTE DES BREVETS

Patent counts grew over time then spiked up

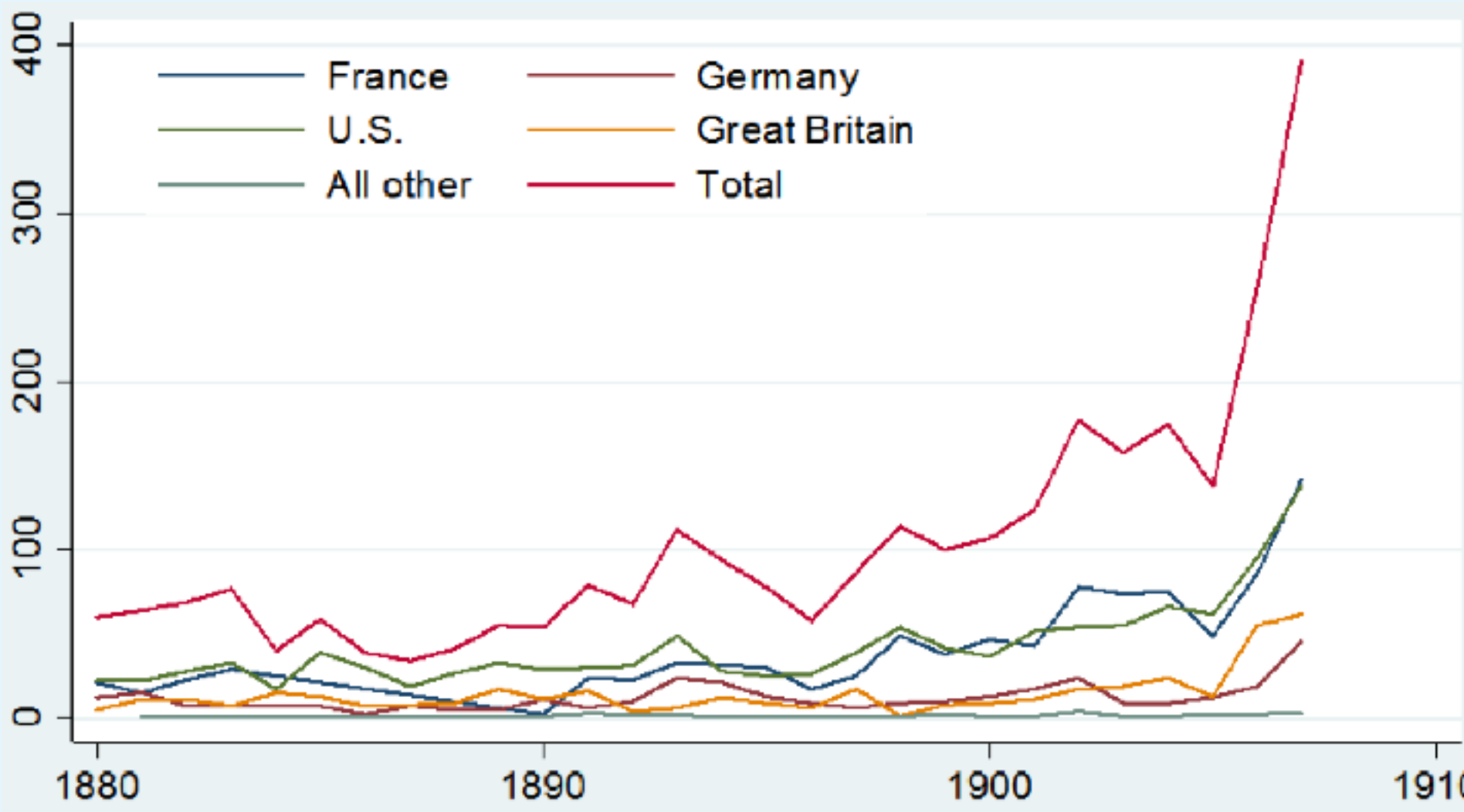
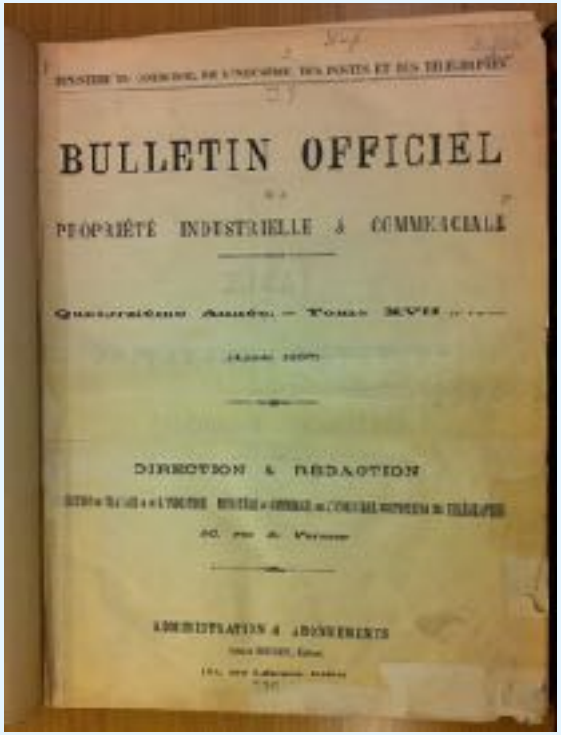
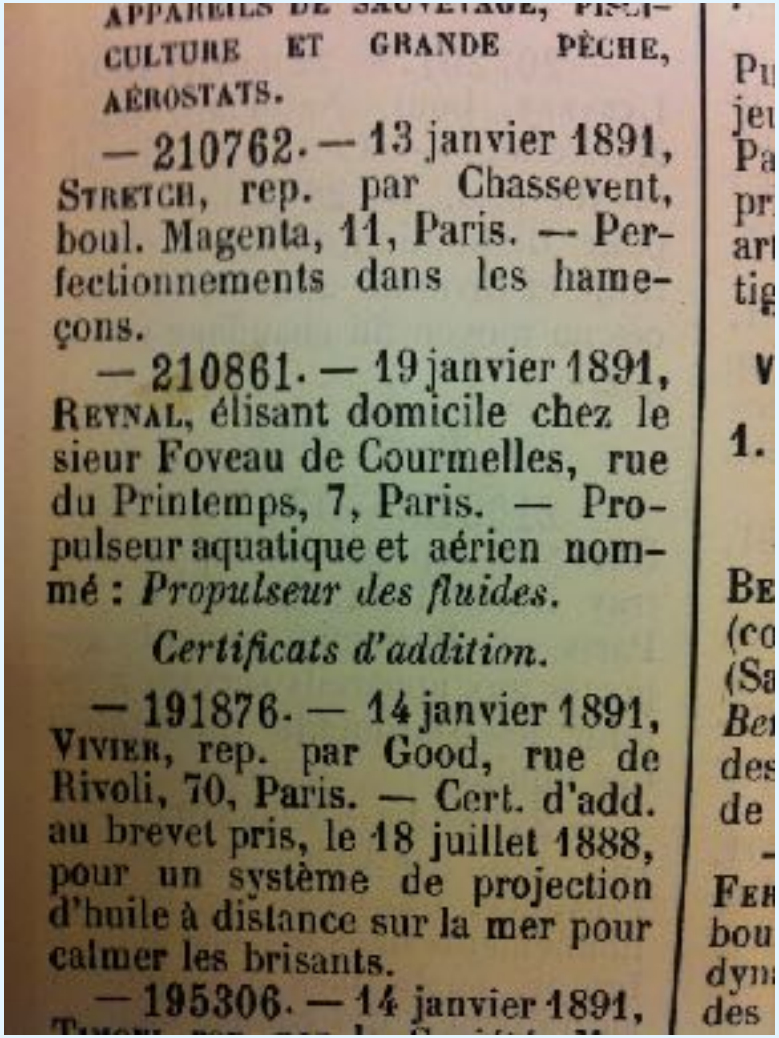


Figure 3. Patents per year related to aeronautics and aviation before the airplane industry began, using the relevance criteria in the text

Data on historic patents is incomplete

- Missing given names
- Ambiguous certificates of addition





APPAREILS DE SAUVETAGE, PISCI-CULTURE ET GRANDE PÊCHE, AÉROSTATS.

— 210762. — 13 janvier 1891, STRETCH, rep. par Chassevent, boul. Magenta, 11, Paris. — Perfectionnements dans les hameçons.

— 210861. — 19 janvier 1891, REYNAL, élisant domicile chez le sieur Foveau de Courmelles, rue du Printemps, 7, Paris. — Propulseur aquatique et aérien nommé : *Propulseur des fluides.*

Certificats d'addition.

— 191876. — 14 janvier 1891, VIVIER, rep. par Good, rue de Rivoli, 70, Paris. — Cert. d'add. au brevet pris, le 18 juillet 1888, pour un système de projection d'huile à distance sur la mer pour calmer les brisants.

— 195306. — 14 janvier 1891,

Ambiguity and uncertainty in this data

- Missing given names or patent #s
- “Paris Exhibition” in historical texts
- “DON SIMONI” turned out to be François André don Simoni
- Which patents are “relevant”? Patent categories changed over time, and the inventive context changed — are marine propellers relevant? car engines?

Patent data on the wiki

page | discussion | view form | view source | history

Patent GB-1897-15221

Year filed	1897
Year granted	1897
Office	GB
Patent number	15221
Inventors	Octave Chanute, Augustus M. Herring
Inventor country	US
Applicant person	
Applicant firm	
Applicant type	
Applicant is inventor?	Yes
Original title	Improvements in or relating to mounts and appliances for effecting Aerial Navigation
English title	Improvements in mounts and appliances for effecting Aerial Navigation
Tech fields	aerospace
Filing date	May 31, 1897
Full specification filed date	
Application number	
Grant date	June 26, 1897
Granted?	Yes
Publication date	
Supplementary to patent	
Related to other patent?	
Series number	1
Patent agent	Thomas May
Assigned to	
Information categories	
IPC4	
CPC4	
Priority year	1897
First filing?	NO
Number of citations	
Cited by	
Applications	
INPADOC family ID	
Number of text pages	
Number of diagram pages	
Number of figures	
Number of claims	

It is a triplane with engine, as well as a biplane, with five or three stacked wings; two propellers, one in front and one in rear, rotating in opposite directions, according to Simine Shortland Steve Spicer at Spiceweb, which says the patent application filed 31 May 1897 through Thomas May as the agent for O. Chanute and A.M. Herring. British Patent No. 15221 (GPO).[1] Nelson (1910), p24, 73 also refers to it.

Espacenet says no text at the patent office, retrieved on 30 of November 2016.

References

1. ↑ The main source for this record is An Extended Bibliography on Octave Chanute & at Spiceweb

Category: Patents

page | discussion | edit with form | edit | history | delete | move | protect

CPC B64C11/00

Enclosing categories	CPC B64C
Subcategories	CPC B64C11/46
Affiliated concepts	CPC F01D5/06, propellers
Notes and sources	

Propellers, e.g. of "ducted type"; features common to propellers and rotors for rotorcraft.[1][2]

The phrase "ducted propeller" means is a propeller whose nozzle does not rotate; another name is Kort nozzle.[3]

This class covers:

- Propeller hubs, blades and pitch-changing mechanisms[2]
- Propeller vibration absorbing or balancing means; Arrangements of multiple propellers (e.g. coaxial propellers)[2]
- Active or passive propeller measures for noise reduction (only such disclosures are attributed the symbol B64C 11/00)[2]

References [edit]

1. ↑ B64C11/00 elements listed at Espacenet
2. ↑ 2.0 2.1 2.2 2.3 B64C11/00 listed at USPTO
3. ↑ Ducted propeller on English Wikipedia

Category: Techtypes

Semantic wikis

Pages in a **semantic wiki** record “relationships” between page topics to use when reporting on or exporting data

Such relationships help support disambiguation and linking to the right record

This one is at http://aero.referata.com

Pages can show reports on other pages

Octave Chanute

Octave Chanute (b. 1832 in Paris) was one of the most important aeronautical inventors and networkers before the invention of the airplane.[1][2]

References [edit]

1. ↑ Octave Chanute on English Wikipedia
2. ↑ Simine Short. 2014. *Locomotive to Aeromotive: Octave Chanute and the Transportation Revolution*

Patents by Octave Chanute

Patent GB-1897-15221, Patent GB-1898-13372, Patent GB-1898-13373, Patent US-1897-582718, Patent US-1906-834658

Publications by Octave Chanute

Chanute, 1893, The secret of soaring

Letters sent by Octave Chanute

Octave Chanute to G. Corelli 12-Oct-1897, Octave Chanute to G. Corelli 21-Apr-1898, Octave Chanute to G. Corelli 22-Nov-1898, Octave Chanute to G. Corelli 6-Jun-1898, Octave Chanute to John Montgomery e, Octave Chanute to John Montgomery g, Octave Chanute to John Montgomery h, Octave Chanute to John Montgomery i, Octave Chanute to John Montgomery j, Octave Chanute to John Montgomery l, Octave Chanute to John Montgomery m, Octave Chanute to John Montgomery n, Octave Chanute to Louis-Pierre Mouillard 1-Jul-1892, Octave Chanute to Louis-Pierre Mouillard 1-Oct-1892, Octave Chanute to Louis-Pierre Mouillard 10-Oct-1894, Octave Chanute to Louis-Pierre Mouillard 11-Feb-1892, Octave Chanute to Louis-Pierre Mouillard 12-Dec-1892, Octave Chanute to Louis-Pierre Mouillard 12-Jan-1897, Octave Chanute to Louis-Pierre Mouillard 12-Jul-1891, Octave Chanute to Louis-Pierre Mouillard 12-Sep-1892, Octave Chanute to Louis-Pierre Mouillard 13-Aug-1893, Octave Chanute to Louis-Pierre Mouillard 14-Jun-1893, Octave Chanute to Louis-Pierre Mouillard 15-Apr-1896, Octave Chanute to Louis-Pierre Mouillard 15-Aug-1894, Octave Chanute to Louis-Pierre Mouillard 15-Jun-1894, Octave Chanute

How to make a report

The reports on patents and letters are generated automatically by a query statement in the underlying wikitext that will be translated to SQL and run on the database

The report (query) is run and shown in the browser when the user loads the page. This query finds patents by inventor Octave Chanute

```
{{#cargo_query:table=Patents|fields=_pageName|
where=Inventors HOLDS 'Octave Chanute’|format=ul}}
```

The query would not list items that weren’t in the Patents table, or where Chanute’s name appeared only outside the Inventors column.

The underlying software is MediaWiki with the extension Cargo.

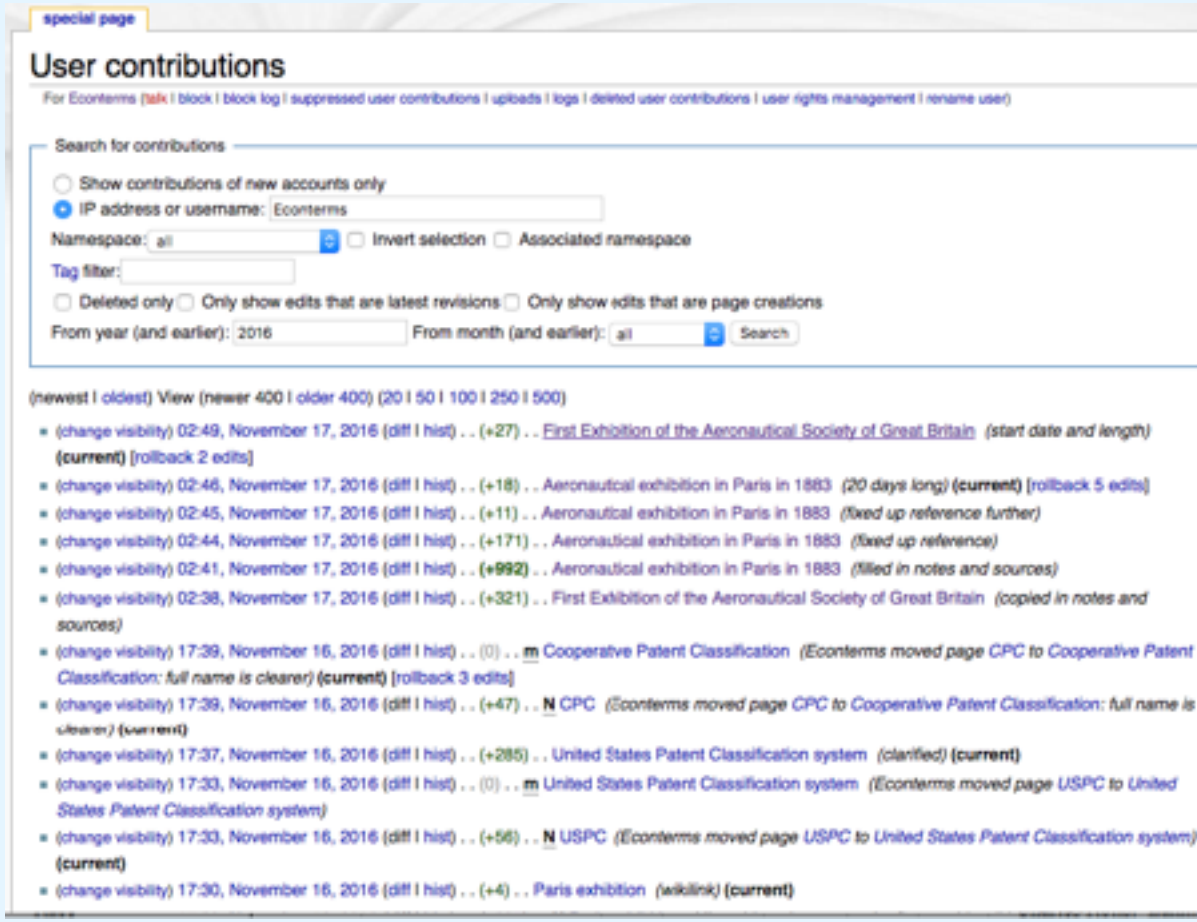
Users and pages have histories

A page has a history — a list of earlier versions and who changed them

Users have histories too

Can find problems later

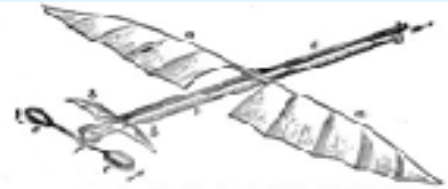
Can “audit” history



Design evolution

Would like to relate to patents and letters in such cases

Lilienthal's glider

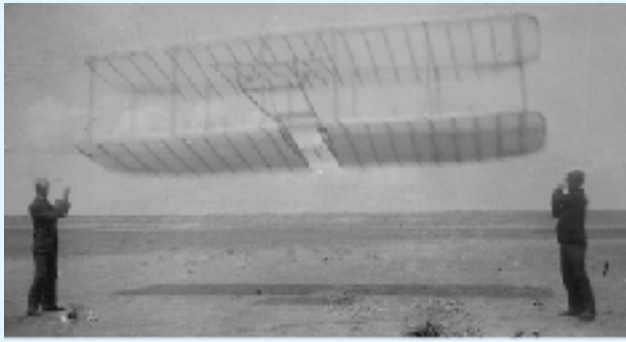


Penaud's tail

Hargrave's box kites

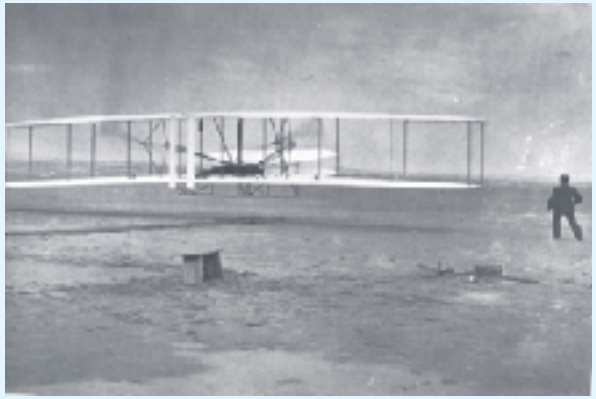
Pratt truss for bridges

Chanute-Herring glider, 1896



Wright brothers 1901-2 kites and gliders

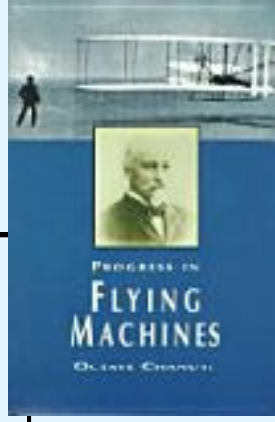
Wright 1903 powered glider



Conclusion

- The wiki approach works at a basic level
  - It is immature but I am optimistic
- It tracks problems of uncertain record linkage, does not fix them
  - Historical research required
  - Probabilities could be incorporated in some way
- Could be well suited to other projects with slow investigation of historical detail
  - Notably the broader set of historical patents, also other research with biographies

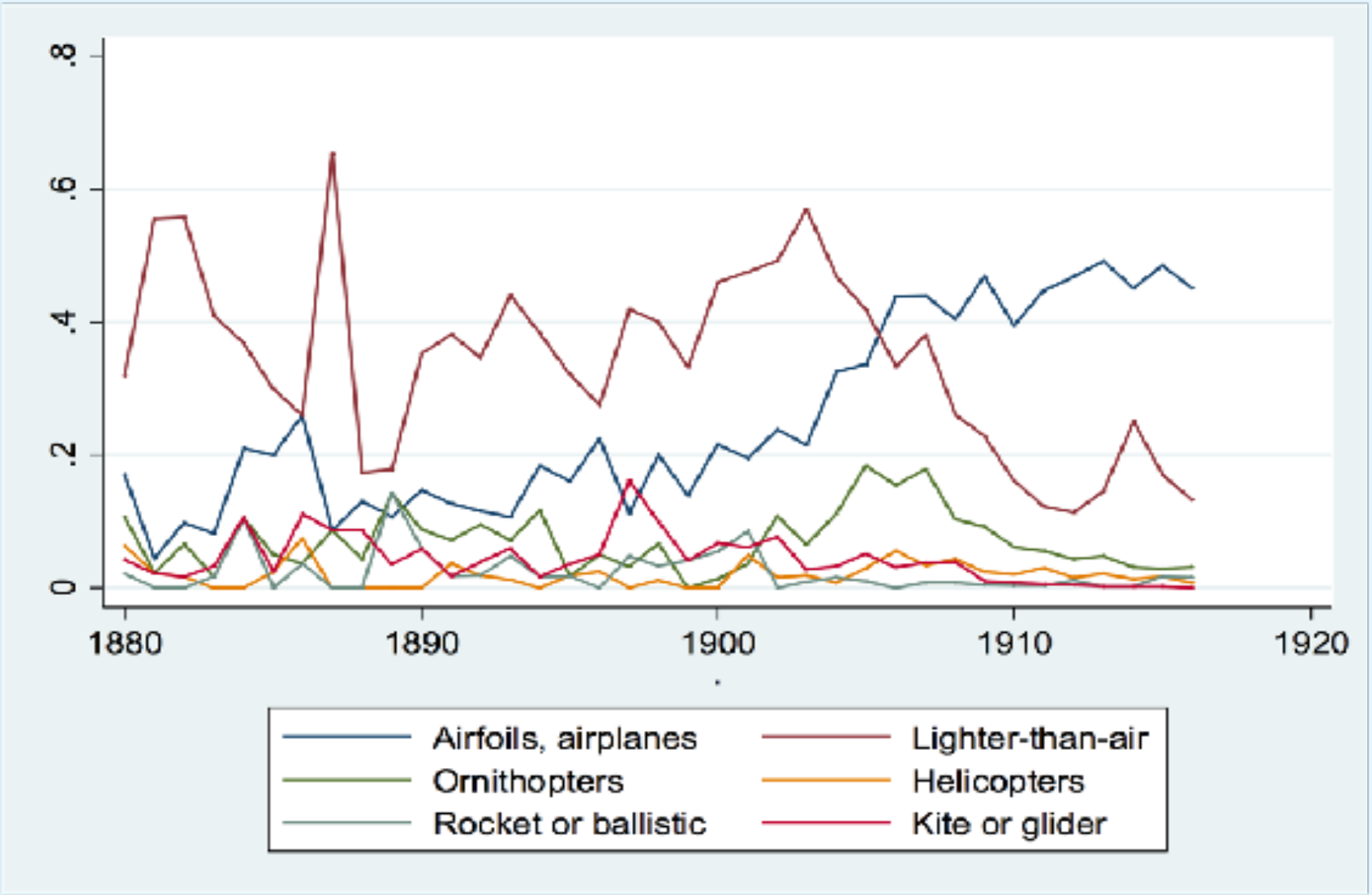
One would like to improve on this table: Most-cited early experimenters published and patented



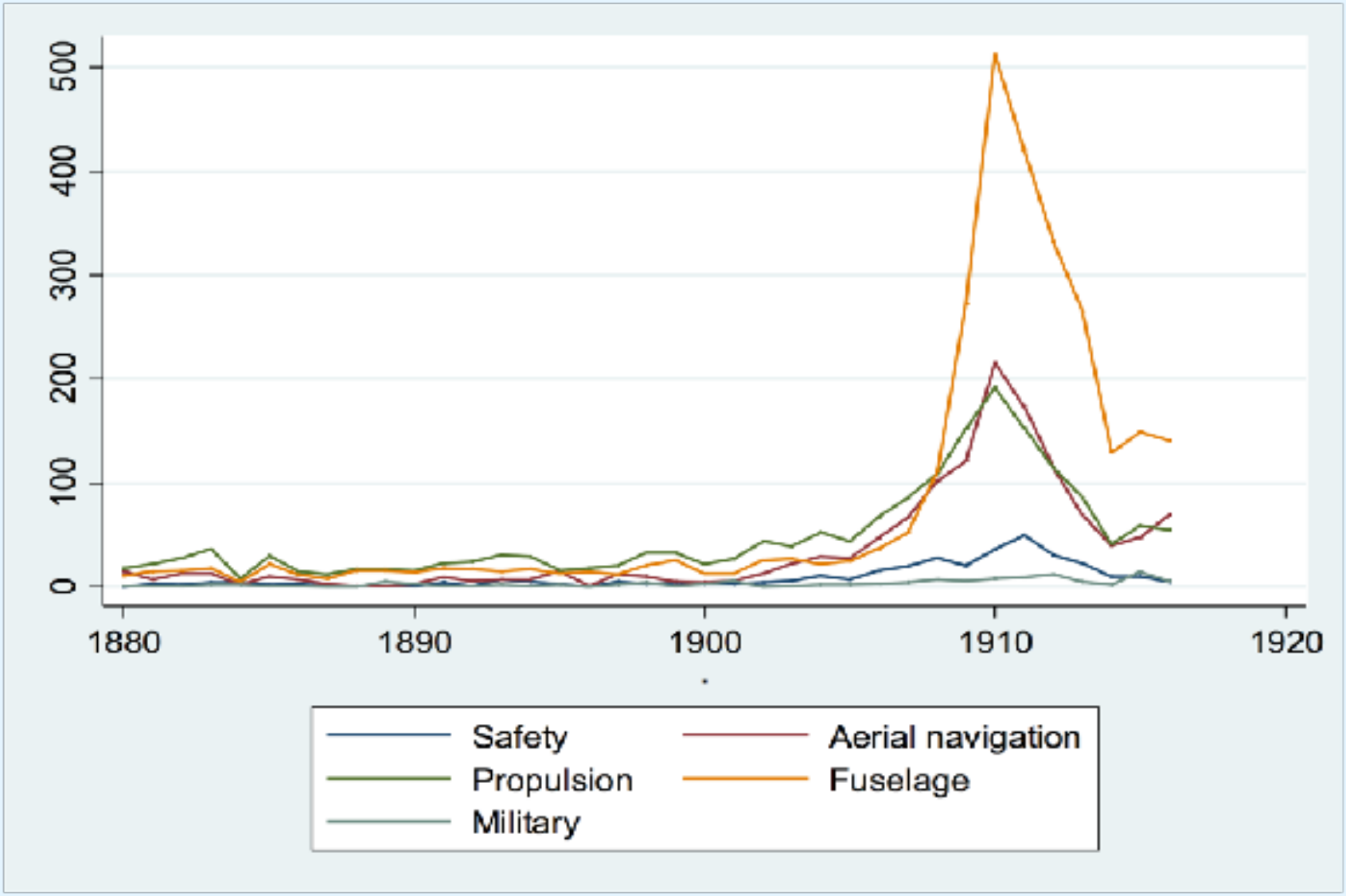
Experimenter	Location (home)	Page counts, Chanute (1894)	Publication counts, Brockett (1910)	Patent counts
Maxim	Britain (US)	33	25+	11
Lilienthal	Germany	31	50+	15
Pénaud	France	22	12	2
Mouillard	Algeria, Egypt (Fr)	21	6	1
Hargrave	Australia (Br)	19	25+	0
Moy	Britain	19	10	9
Le Bris	France	17	0	1
Langley	U.S.	16	40+	0
Wenham	Britain	15	10+	1
Phillips	Britain	14	3	4
Chanute	U.S. (France)	*	50+	5

Extra slides

As proportion of aero patents, wings/airfoils/airplanes take over from other ways of lift and flight



Other themes and topics of patents



Military low: not clearly distinguished, not mainly aeronautic, and furthermore patents make information public which is not helpful for military intent

Conclusions

Three big phases of patenting

- Scientific / hobbyist “open source” period to 1906 -- growth
- Startup industry period to 1914 -- boom
- Decline into World War I period

Burst of patents across aeronautic/aviation topics starting in 1907

Publications, clubs, and exhibitions boom then too

Technology topics focuses on airfoil/fixed-wings especially

Inflow of companies and interest in that topic, not mainly change in focus

Military interest important for business but not as visible in patents