

A key to success for an instrument maker:  
Collaboration with a scientist  
The case of Haag-Streit (established 1858)  
and Heinrich Wild (1833-1902)

**Jean-François LOUDE**

Prof. emeritus

EPFL-BSP, SB-IPEP-LPHE

CH-1015 Lausanne

[jean-francois.loude@epfl.ch](mailto:jean-francois.loude@epfl.ch)



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# ABSTRACT

## A key to success for an instrument maker: Collaboration with a scientist The case of Haag-Streit (established 1858) and Heinrich Wild (1833-1902)

The firm known today as Haag-Streit was established in 1858 at Bern by F. Hermann and H. Studer, the latter being succeeded in 1865 by J. H. Pfister, to make precision scientific instruments.

In the same year, H. Wild became professor of physics at the University of Bern, being also responsible for meteorology and metrology. He ordered from the young Bernese workshop the instruments he needed, both the rather simple ones for meteorology or geodesy (land-surveying) and the top-quality, one-off used for metrology.

This was the beginning of a collaboration that was to last until the death of Wild, even during Wild's stay at Saint Petersburg (1868-1895) as Director of the Central Physical (Meteorological) Observatory, and after the retirement of Hermann and its replacement by A. Streit in 1889.

Instruments unrelated to meteorology or metrology were also designed by Wild: the "Polaristrobometer" (a precision chemical polarimeter), was a commercial success.

# 1. SWITZERLAND IN 1858

- 1847 Civil war (“Sonderbund”)
- 1848 Birth of modern Switzerland  
Constitution (revised 1874) inspired by the US Constitution  
Introduction of an unified currency: the Swiss Franc  
But measurement system still not metric  
(weights, lengths, areas, volumes, etc.)  
No modern topographical maps  
No countrywide meteorological systems
- 1855 Creation of the ETH–Zurich (federal “Polytechnikum”)
- 1858 First railroad station at Bern
- 1858 **Heinrich WILD** (\*1833 at Uster), PhD. Zurich (1857)  
Appointed professor of physics at Uni–Bern  
Director of the Observatory (mainly meteorological)  
“Eidgenössischer Eichmeister”

*Needs (precision) standards & instruments*



## 2. 1858 – 1868

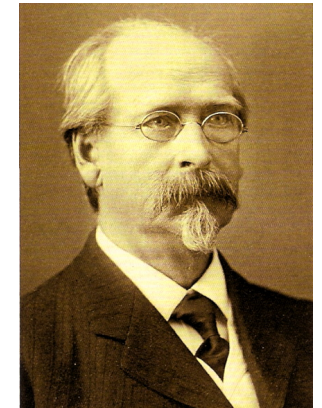
Wild persuades two young mechanics from Zurich, **Friedrich HERMANN** and **Hermann STUDER**, to set up a **workshop for precision mechanics** at Bern: “**Mechanische Werkstätte first von Hermann & Studer**”, then **from Hermann & Pfister**”



**F. Hermann**  
(1835–1906)



**H. Studer**  
(1834–1865)



**Johann-Heinrich PFISTER**  
(1841–1919) already  
succeeds Studer in 1865

“**Precision**” mechanics:  
**dividing machines**  
(linear & circular) needed

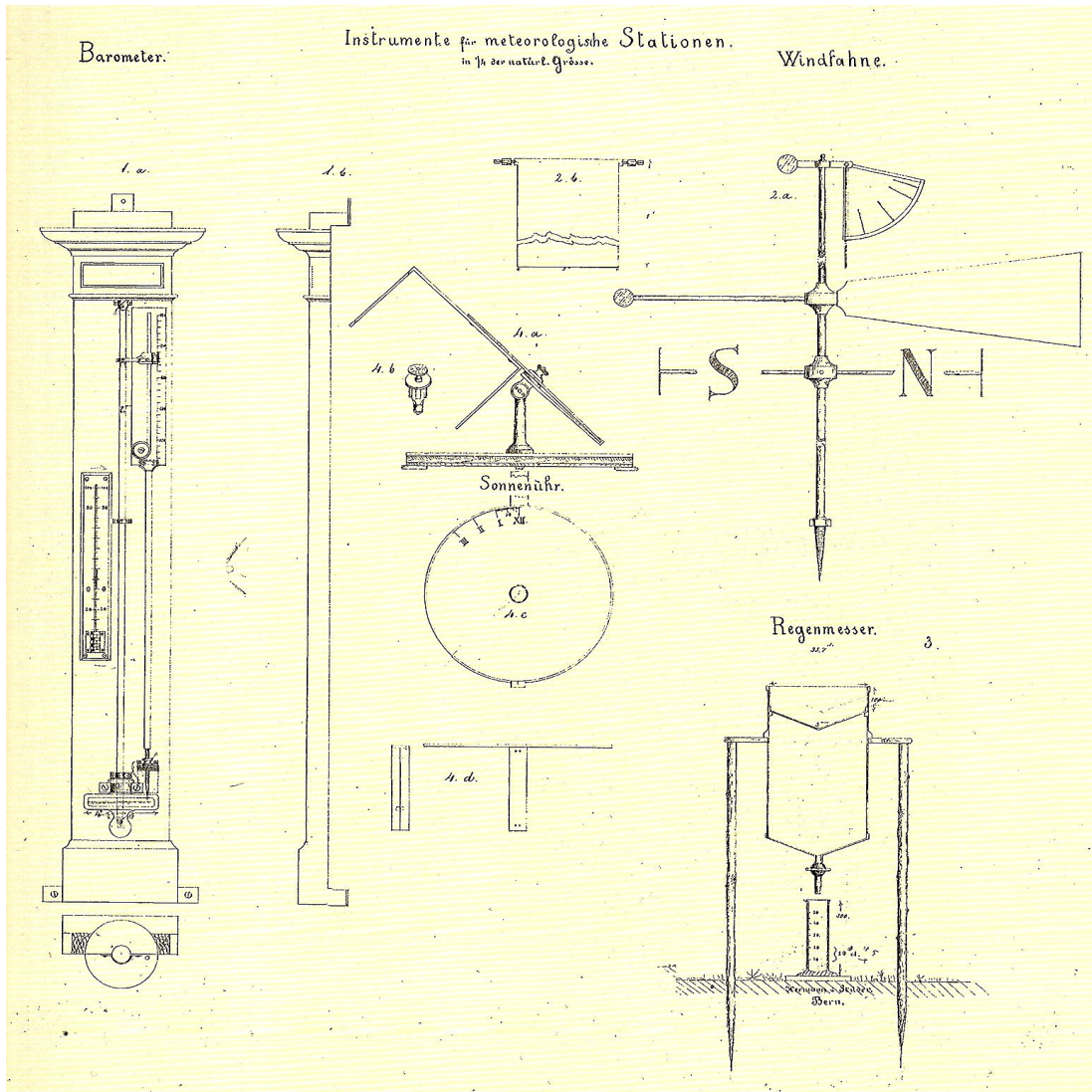


The **circular dividing machine**, in use until 1920, used the salvaged graduated circle (ø 90 cm) of a large **Ramsden theodolite** bought by the Bernese government in 1797.

[London, Science Museum]

## 2.1.1. Swiss Meteorological Network

1861: Creation of a **Swiss Meteorological network** decided by the “Schweizerische Naturforschende Gesellschaft”, to be financed by the Swiss Federal Government.



Wild recommends **Hermann & Studer** for the production, delivery and installation, to be done in less than 2 years (April 1862–December 1863), of the instruments needed for **88 stations**:

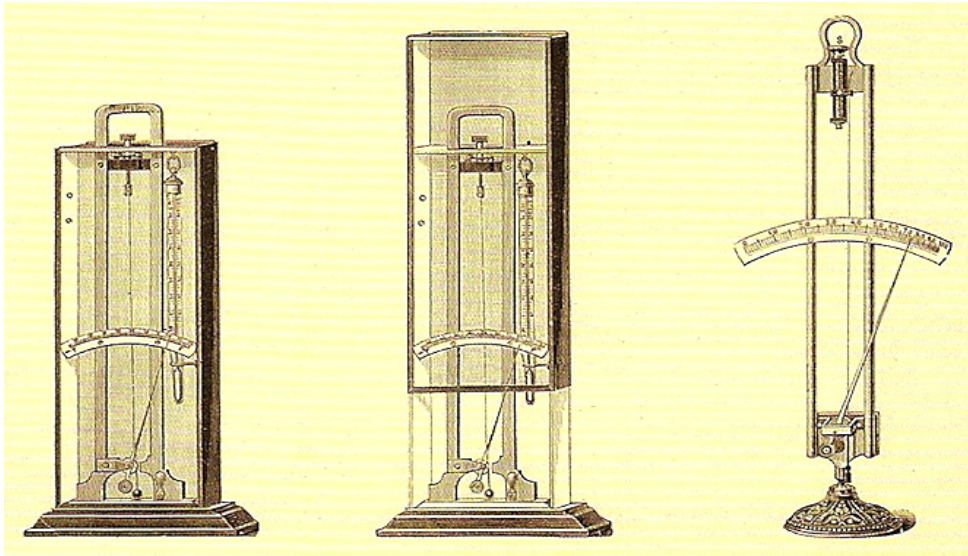
*barometers, thermometers, psychrometers, hair-hygrometers, wind vanes/gauges, pluviometers or rain-gauges, a few sundials.*

(Glassware from external suppliers)

**Each instrument thoroughly tested by Prof. Wild before installation!**

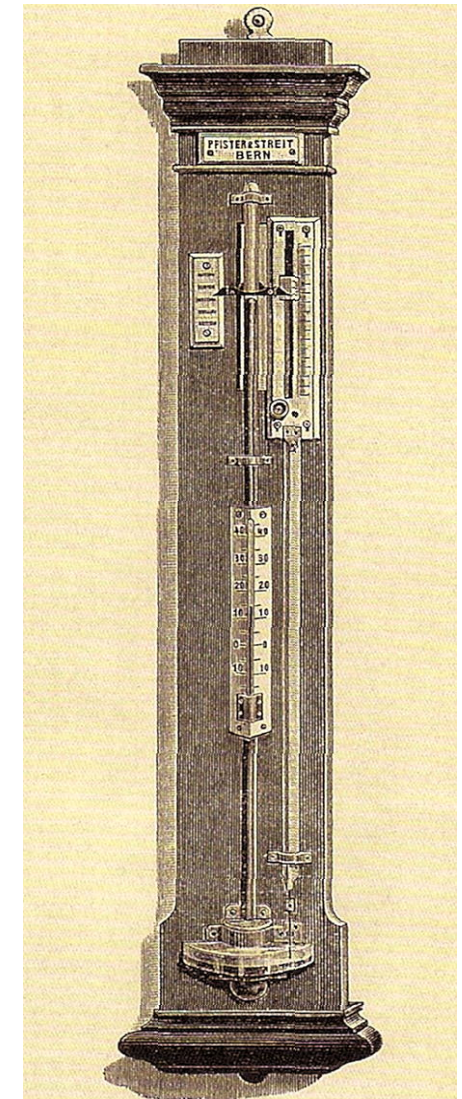
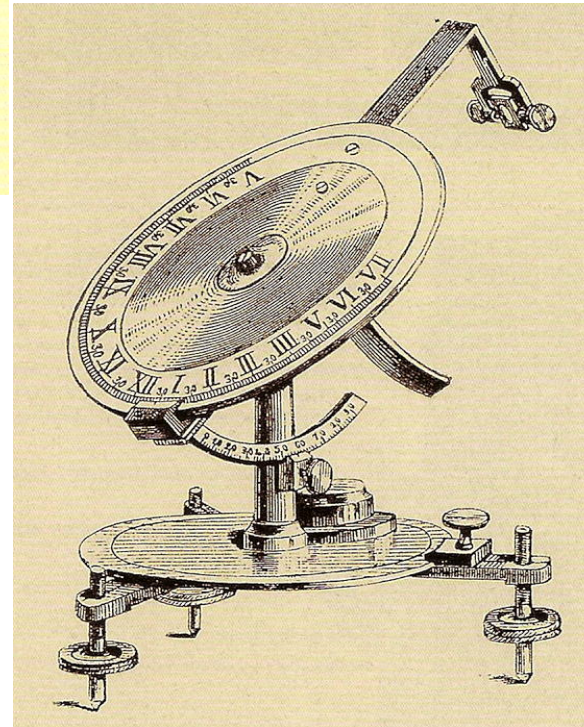
*First mass order,  
opening markets!*

## 2.1.2. Examples of meteorological instruments produced, sold and exported until the beginning of the 20th century by H-P-S:



Hair-hygrometers  
(many bought by Wild  
while at Petersburg)

Precision sundial designed for  
remote meteorological stations,  
without access to telegraph.  
Dial  $\varnothing$  26 cm  
60 SFr in 1905

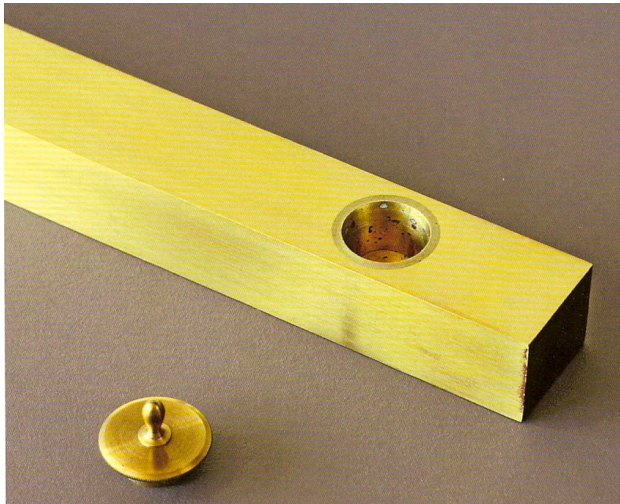


Hg-barometers  
(also for laboratories  
and  
Weather Columns)

## 2.2. Introduction of the Metric System : Length & Mass

1860–1870: Switzerland prepares the introduction of the Metric System.

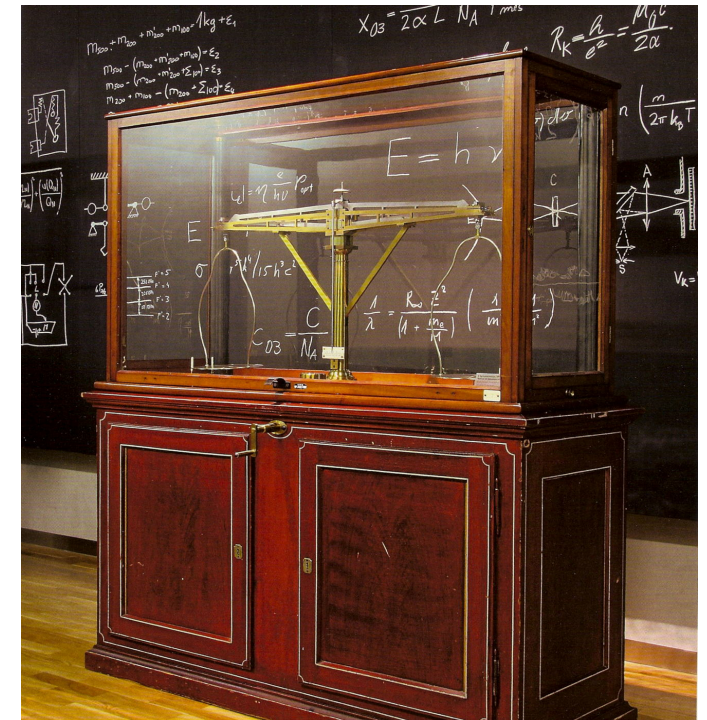
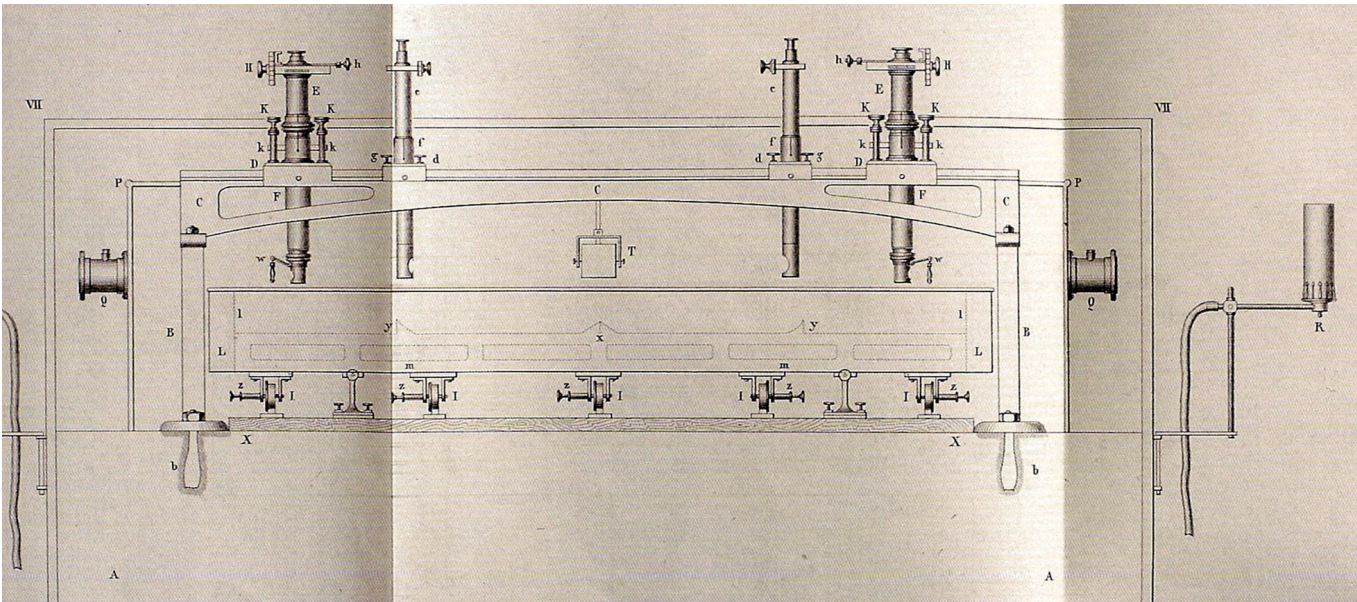
Wild orders **top-quality, one-off instruments** for the “Eidgenössische Eichstätte”:



Official Swiss length primary standard  
from 1867 to 1875;  
length 3 Swiss feet = 900 mm;  
at METAS

*Good for establishing  
the reputation of the  
newborn firm!*

Large length comparator (lost)



5 kg balance at METAS (Wabern)

+  
other scales (lost)  
and set of weights

# 3. The workshop from 1868 to 1895

Matte 42 (now Schiffflaube 12) from 1865 to 1883



1868: 5 mechanics  
+ 3 apprentices

**1868 Wild called to Saint Petersburg**

1881 Hermann, in ill health, retires from active business

1883 Move to Bundesgasse 14

1889 New partner: **Alfred STREIT** (1860-1924)

“Mathemat.-Physikal. Werkstätte von **PFISTER & STREIT**”

1894 Move to Seilerstrasse 9

**1895 Wild back to Zurich**



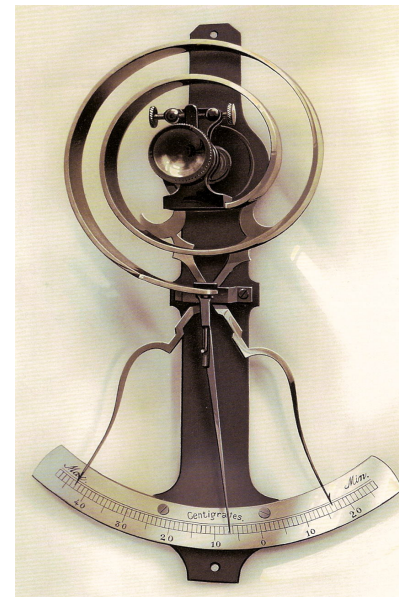


H-S-P-S ready to make any precision mechanical-optical instrument (but no electrical ones); *optical parts from external suppliers*



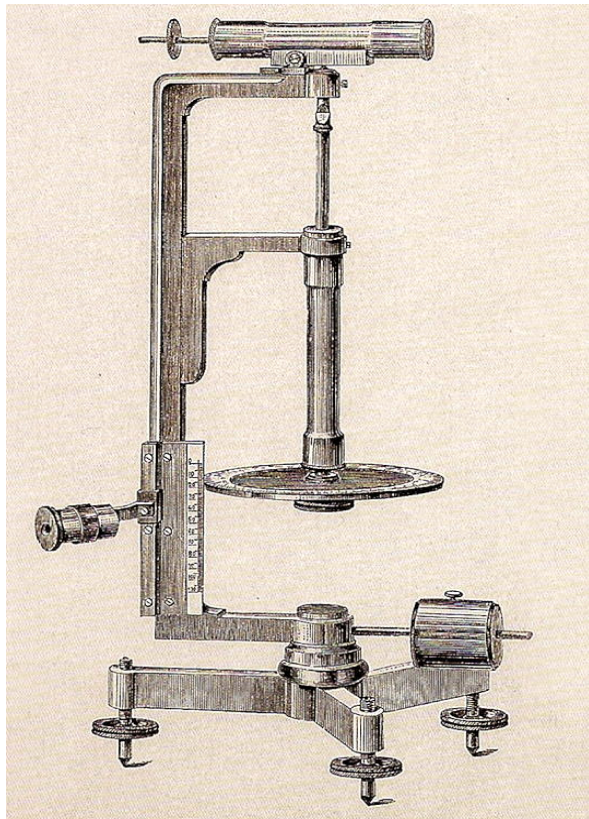
Repetition theodolite (ø 5 in.); 1865  
520 Frs

Weather column  
at Bern (1873).  
One of the 12  
in Switzerland with  
instruments supplied  
by H-P-S between  
1871 and 1903



Minimum/maximum  
bimetallic thermometer

# 1865: Sphaerometer



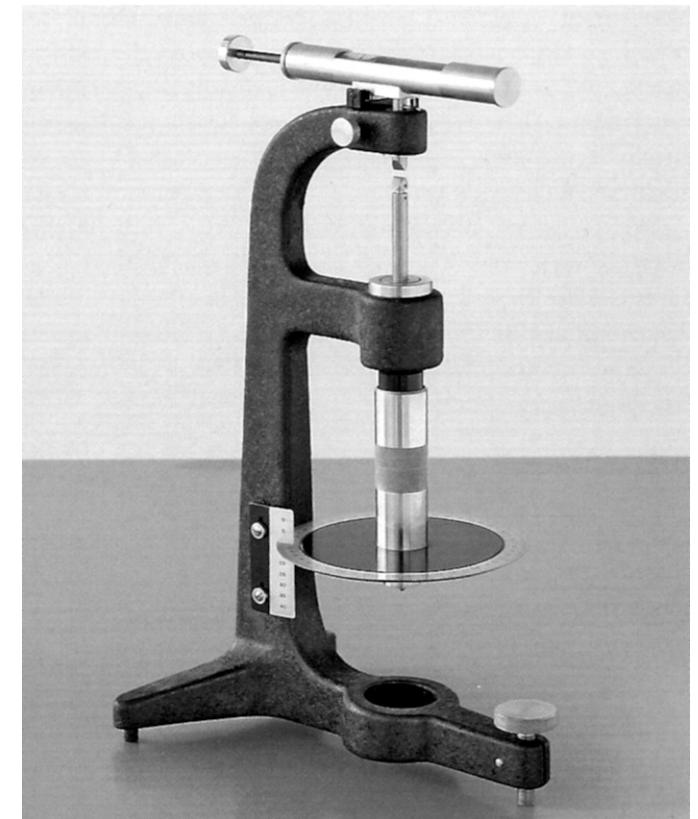
Original model (1865)

The Sphaerometer  
("Libellen-Mikrometer")  
is a **constant-force micrometer**

Wild designs it in **1865** to measure  
the thickness of quartz plates used  
to test his newly invented  
**Polaristrobometer**

Height 340 mm

Price around 1900: 165 Frs



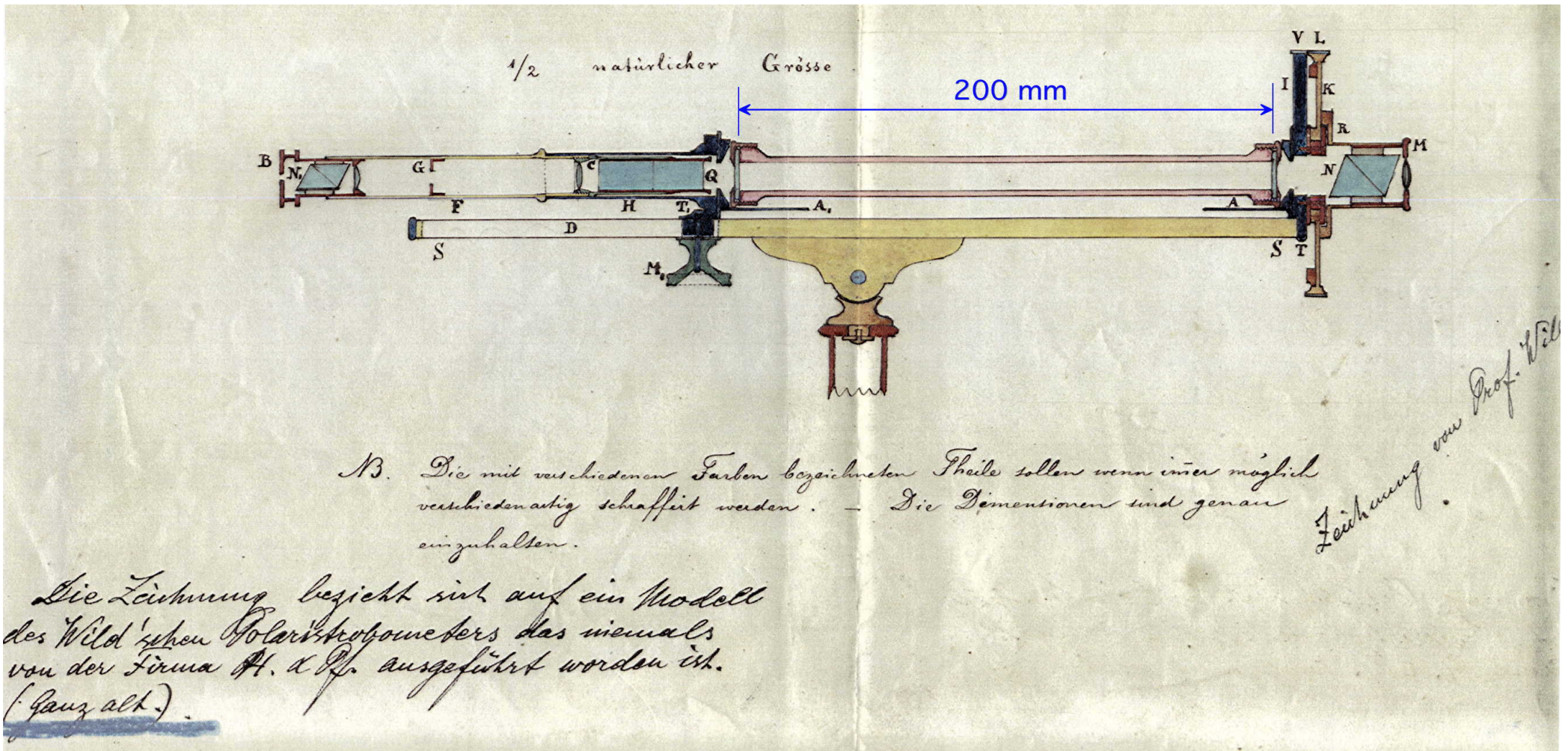
Modernized in 1928

Dr. H. Wild: Ueber ein neues Polaristrobomet  
(Saccharimeter, Diabetometer) ... (66 S. + 1 Taf.)  
(Bern: Haller'sche Verlagbuchhandlung, 1865)

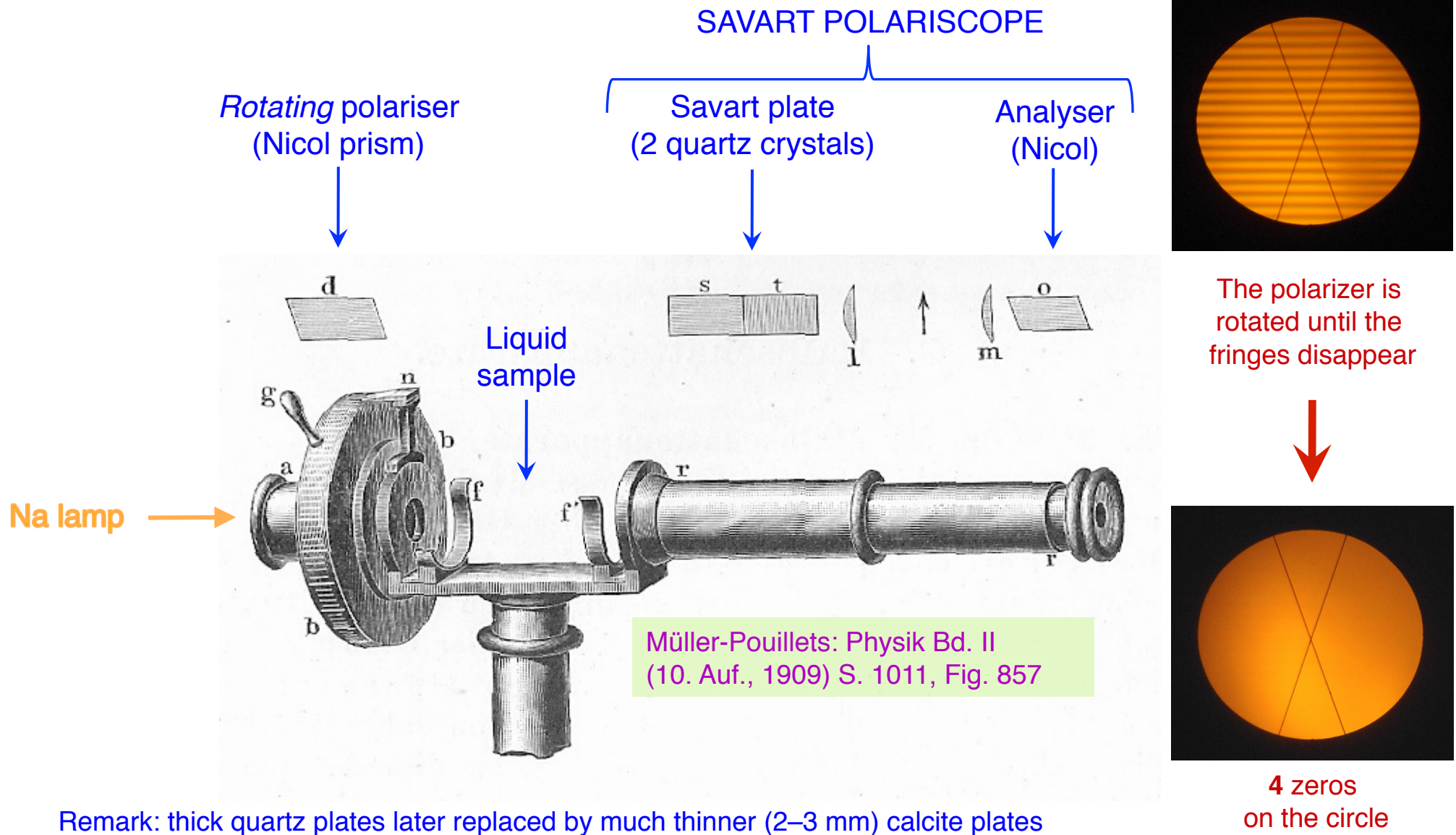
# 1865: Polaristrobometer

Wild's drawing for his newly invented Polaristrobometer:  
(a precision polarimeter for chemists).

*Instrument unrelated to the official duties of Wild at Bern!*



# Optical system of the small Polaristrobometer (100 mm tubes)

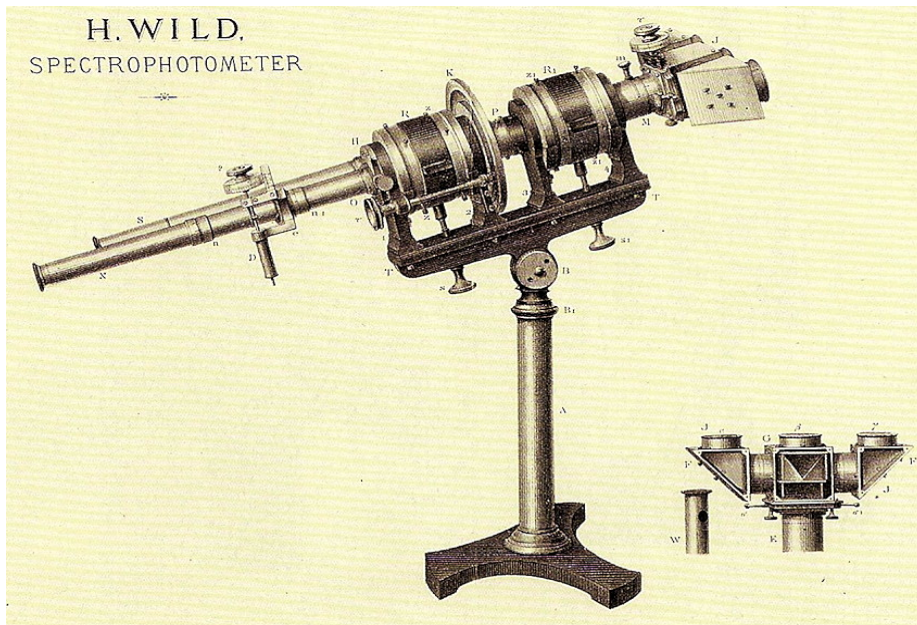


## 4. H. WILD AT SAINT PETERSBURG (1868-1895)

As Director of the Central Physical (Meteorological) Observatory,  
Member of the Imperial Academy of Sciences, extremely busy:

- extending and supervising the Russian network of meteorological stations;
- building the terrestrial magnetism Observatory at Pavlovsk;
- travelling abroad, attending and often presiding international conferences about meteorology, weights & measurements, polar expeditions.

But still in touch with Hermann & Pfister!



Wild's Spectrophotometer (1885): SFr 1150 !

**1st example: 1868-1880**

**Orders** 15 (!) Polaristrobometers

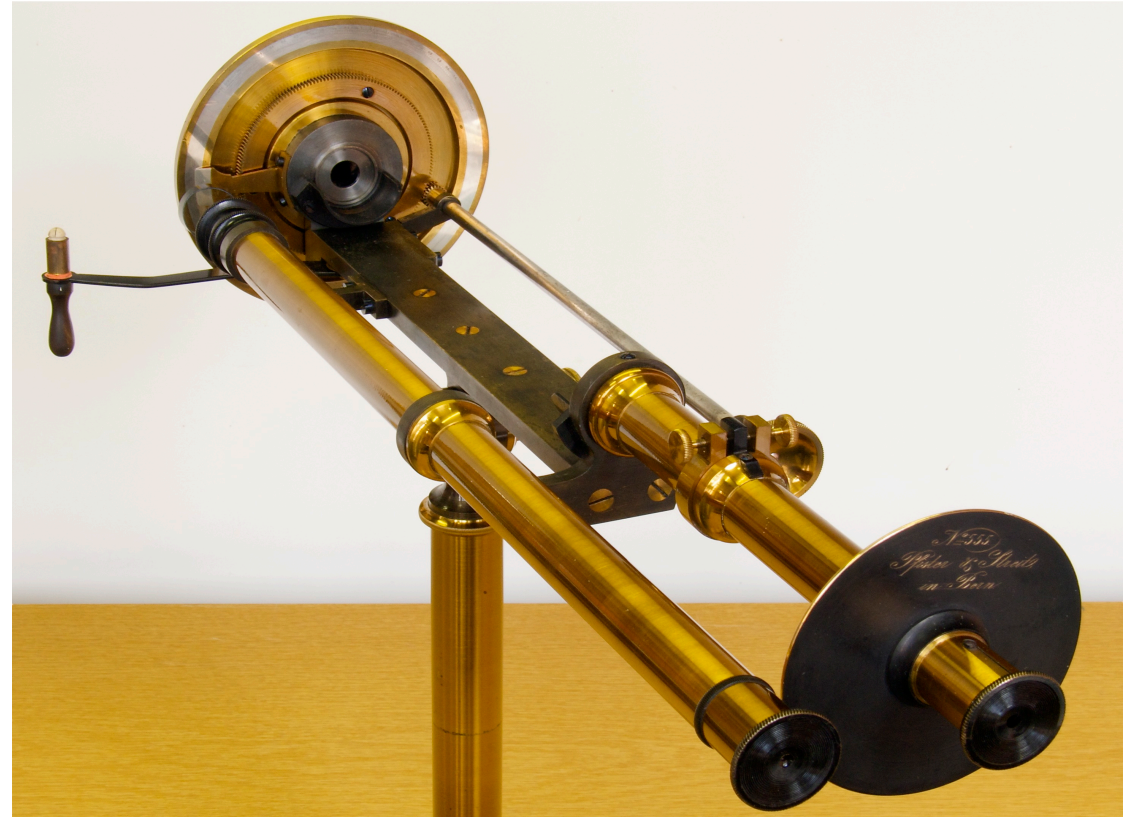
**2nd example: 1886** – 5 letters from Wild

— **Orders** 34 new hair-hygrometers and has 14 older ones repaired

— Sends detailed instructions and drawings relative to the construction of **polarisation photometers** (one for William Thomson), the most elaborate being his **spectrophotometer**.

*Wild's pet subject: 1st paper in 1856!*

The large Polaristrobometer introduced in 1868 (for laboratory and research work), made first by Hermann & Pfister, then by Pfister & Streit, was a big success!

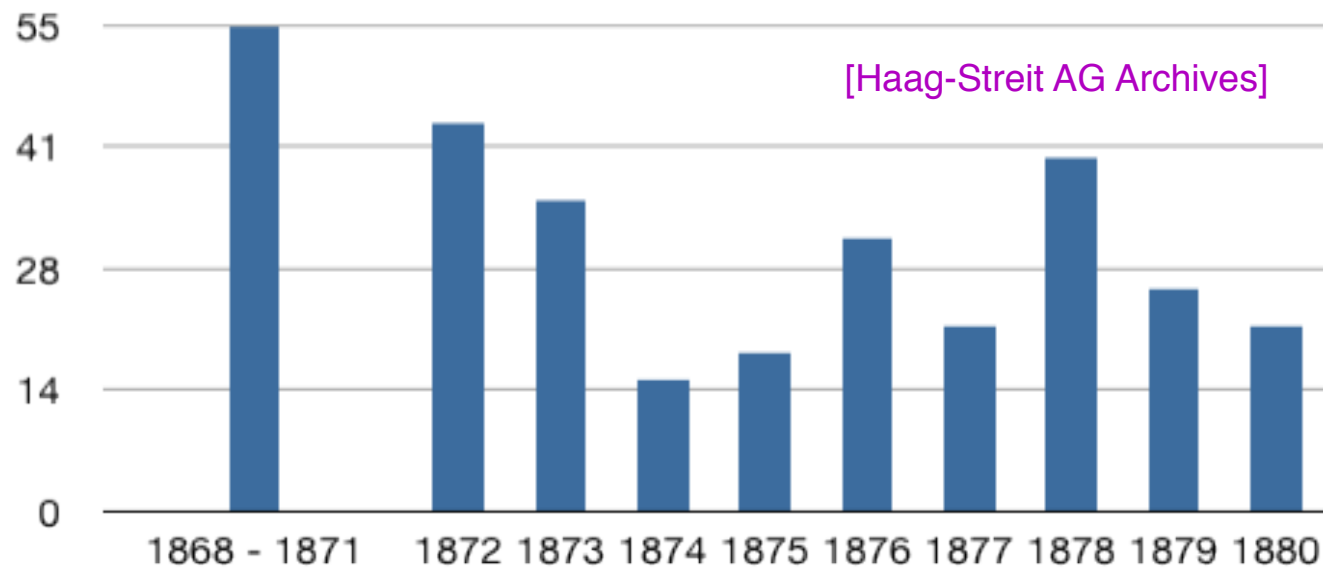


- Polarimeter/saccharimeter with *rotating polarizer*, for 200 or 220 mm tubes
- To be used with monochromatic light (Na lamp)
- Price in 1880: 340 Sfr

H. Wild: Über die neueste Gestalt meines Polaristrobometers (Saccharimeter, Diabetometer)  
Bull. Acad. impériale des Sciences de Saint-Pétersbourg Vol. 14 (1870) 149-163 +1 Taf.

Most of the **305** large Polaristrobometers built from 1868 to 1880 were **exported**, mainly to northern European countries: Germany, Austrian Empire, Belgium, Netherlands, Russian Empire, ...

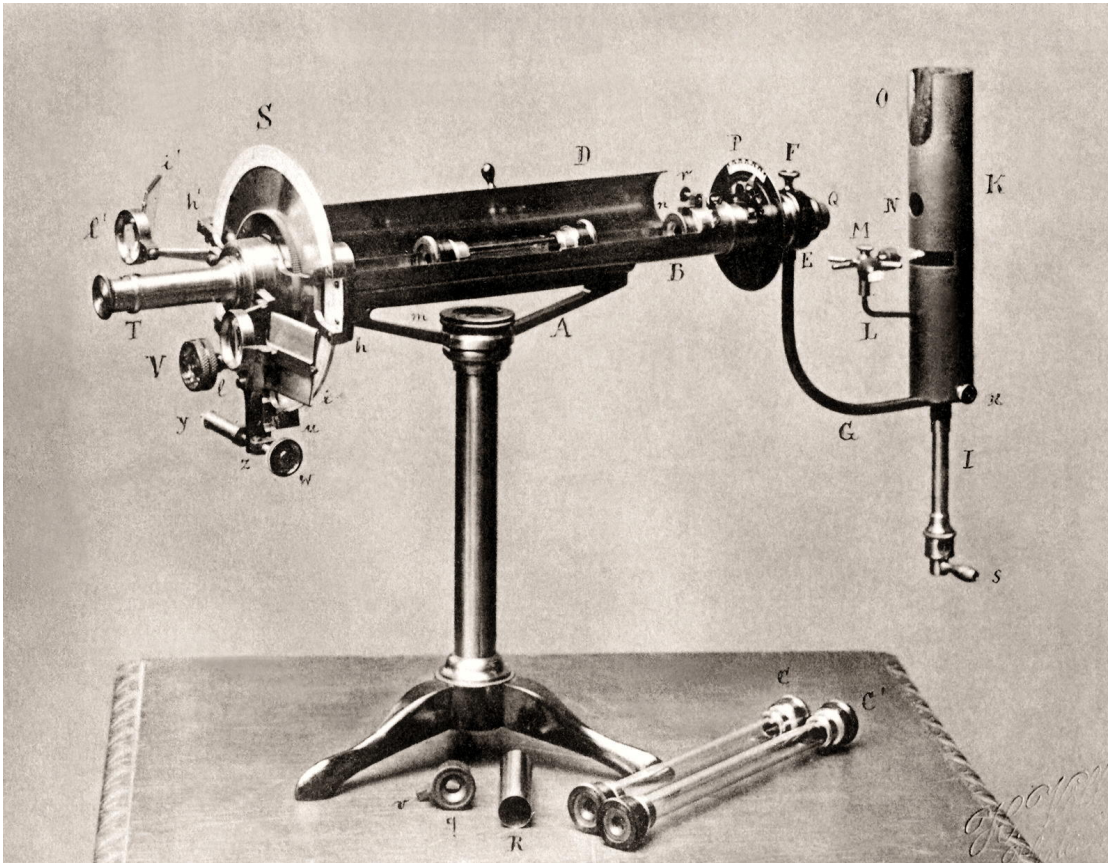
**Exceptions** (only direct sales):  
to France: 7; to Italy 3; to U.S.A.: 3; to U.K.: 1; to Spain: 1.



Polaristrobometers delivered from 1868 to 1880

## 5. 1895 – 1902 : H. von WILD BACK TO ZURICH

Wild recognises that his old Polaristrobometer has been replaced by more modern instruments (Landolt-Lippich), but is still convinced that *fringes*-polarimeters are superior to the now standard *half-shade* ones.



H. Wild: Verbesserung des Polaristrobometers  
Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich,  
43. Jahrgang, 1898, S. 37-80 + 1Taf.

- From 1897 to 1899, Wild sends from Zurich 24 letters and 2 postcards about an improved polarimeter, with *extremely detailed instructions* about its construction
- Has the final prototype sent to Zurich for testing
- Convertible to *half-shade* (“Halbschatten”) polarimeter
- Several other improvements such as a *rotating analyser* and better polarisers
- Price 420 Sfr
- Commercially successful ?  
Much competition!



## Provisional conclusion after half-a century of activity:

Hermann–Pfister–Streit still in activity, slowly growing, but never more than 20 employees until WW I

Had been making:

- meteorological instruments
- polarimeters for chemists
- various precision mechanical instruments

**Heinrich Wild** had apported a decisive contribution to this (moderate) success, especially during the first 10 years (1858–1868), by placing orders and designing the Polaristrobometer.

The real success would come later, mainly during the second half of the XXth century, marked by a progressive **specialisation in ophtalmology**.  
Again, the **collaboration with a scientist** was decisive.

*2008 150th anniversary*

## Haag-Streit in 2012

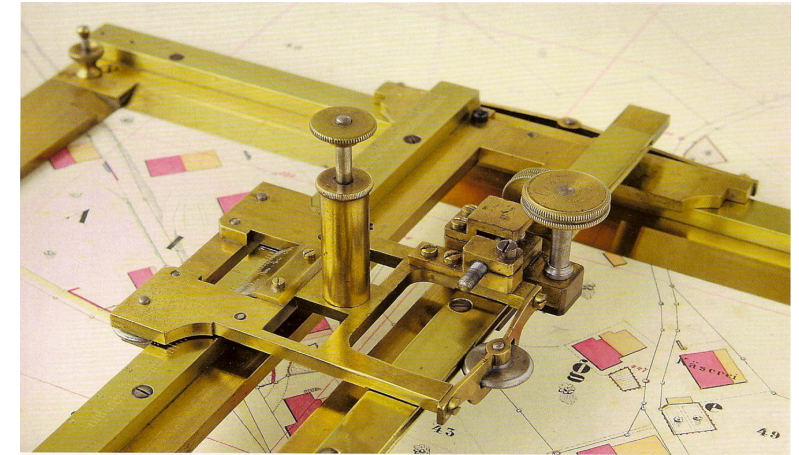
21 companies are grouped in  
**HAAG-STREIT HOLDING AG**,  
company seat at Köniz (Be),  
still a family-owned business, focusing on  
**Medical Technology Equipment**, especially for  
**ophthalmology**.

Workforce of **800-1000 people**  
in Switzerland, Germany, France, United Kingdom, USA.

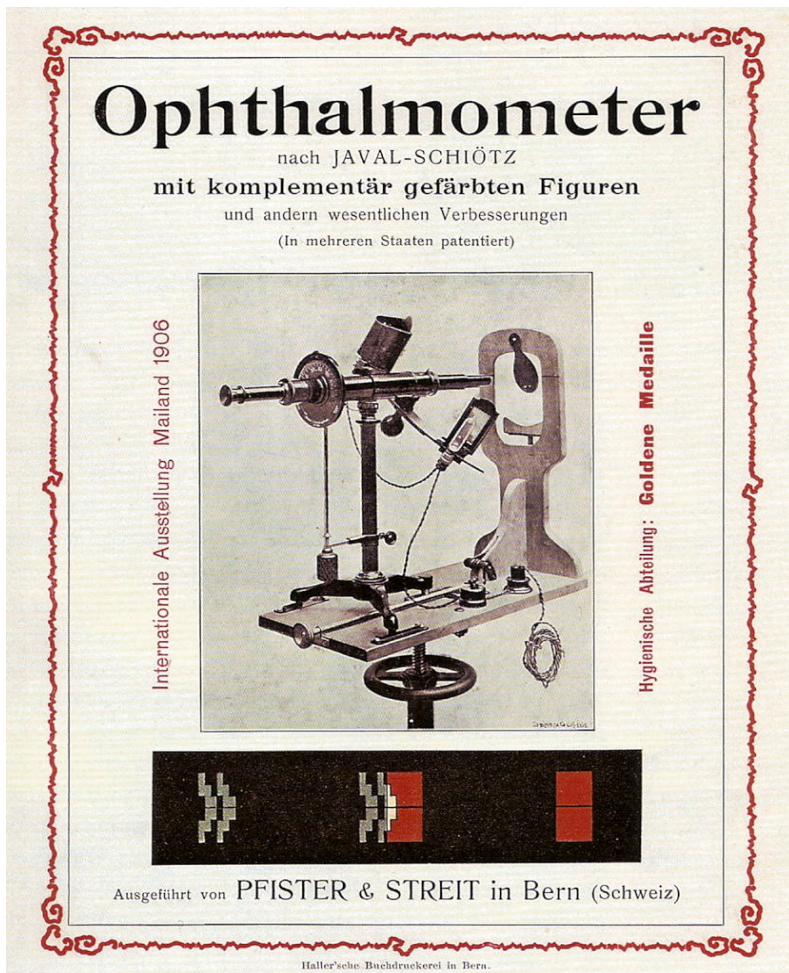
**200 - 300 Mio USD** turnover

## 6.1. The 20th Century (I)

x-y Coordinatograph (~1900): mechanical plotter, followed in 1923 by Polar Coordinatographs. Successfully made and sold from ~1860 until 1988.



1906 First successful Ophthalmometer



1925 Wilhelm HAAG, son-in-law of A. Streit, becomes the owner of "Haag-Streit"

1927 Hans PAPRITZ, new head of the workshops, invents the CORREX tension-gauge, still in production in 2012

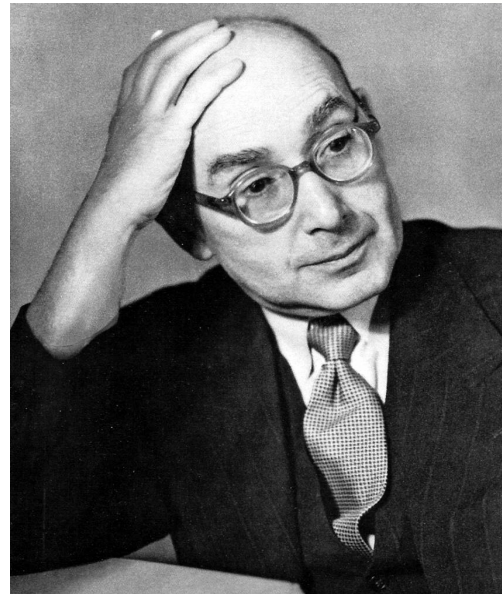
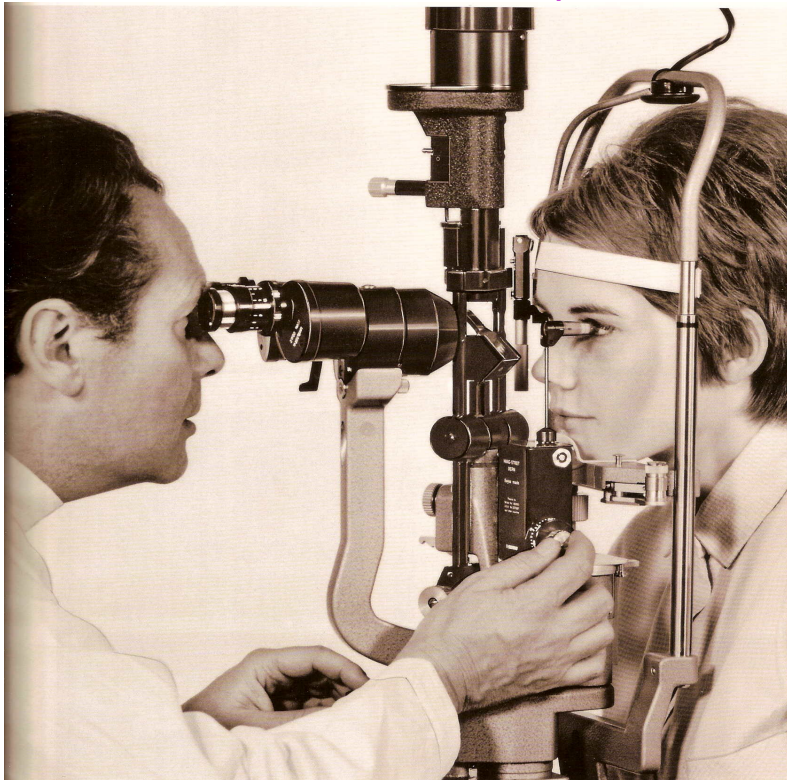


## 6.2. The 20th century (II)

Once more, the collaboration with a scientist, **Prof. Hans GOLDMANN** (1899-1991), ophthalmologist at Uni-Bern, starting in 1933, leads to success!

1958 100th anniversary — ~100 employees

Goldmann's Applanation Tonometer (model 1958, introduced in 1954) measures the intraocular pressure



2004 Slit Lamp

## Acknowledgements

I am very thankful to *Mr. Chris Haag* for providing me with first hand information about the beginnings of H-S-P-S, giving me access to private archival material and kindly allowing me to use the pictorial material of their lavishly illustrated 150th anniversary commemorative book.

But without *Dr. R. Saba*, who gave me a Polaristrobometer he had salvaged many years ago, I would never have been incited to study the collaboration between Heinrich Wild and the mechanical workshop he had convinced Hermann and Studer to setup at Bern.

Last but not least, I am grateful to the *EPFL*, through my laboratory, the *LPHE*, for its continued support.

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