

Electrical techno-science and IP **in transition, 1880-1920**

Graeme Gooday &
Stathis Arapostathis

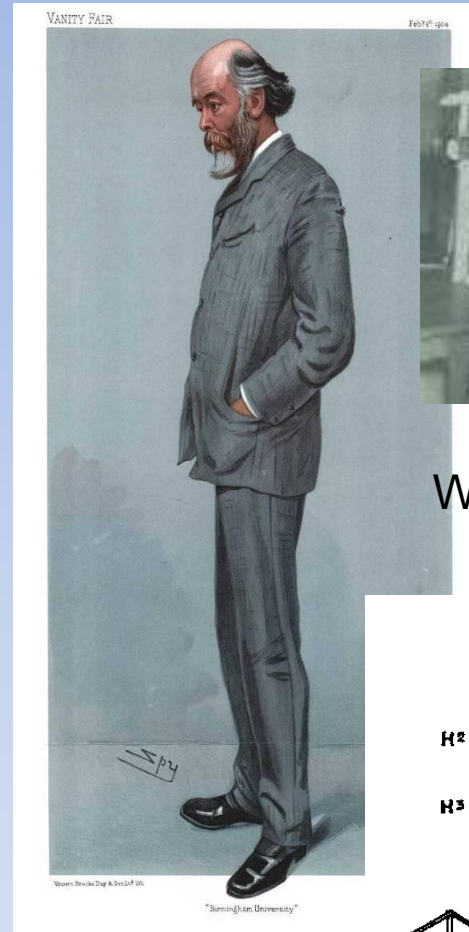
Key themes

- Common culture of electrical techno-science diverging to specialized professions of physics and electrical engineering
- 1880s: shared practices of patenting, practically oriented, and common publication venues e.g. The Electrician
- 1920s: physicists de-industrialize to “pure” state science
 - electrical engineering represented by practitioners as an autonomous “science” not as subordinate “applied science”
- Huxley, Lodge et al attempt from 1880s seek to control practical “applied science” through academic “pure science”
- First World War raised value of state-funded “applied science” – backlash raised profile/funding of post-war “pure science”.

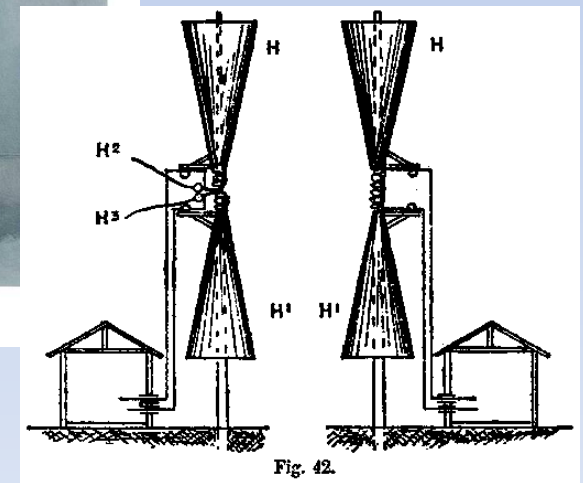
Overall plan

1. Electrical technology & the pure/applied dichotomy
2. Fluid epistemic, social & institutional boundaries in electrical techno-science and its IP relations
3. Rhetorical construction of a "pure" science of physics
4. WW1 and changing State role of electrical physicist & engineer

Oliver Lodge – at the interface of physics & electrical technology



Whirling machine 1893



Syntonic wireless 1897

1. Electrical technology & the pure/applied electricity dichotomy

- Grove quotation 1882 - handout
- “applied science” as the useful implementation of electricity
- Meaning as autonomous form of practical science
- Misunderstood by some historians like Pocock.
- Huxley’s attack on the autonomy of “Applied science” in 1880
- Huxley quotation 1880 - handout
- Attempt to subordinate applied science to “pure” science
- But Huxley 1887 recognizes science & applications co-evolve
- IP Significance: applied science patentable, pure science not?
- Up to a point, but homology not perfect

2. Fluid epistemic, social & institutional boundaries in electrical techno-science and its IP relations

- Shifting meaning of electrician: 18thC: electrical experimenter
- 19thC: electrical specialist, mid 20thC: a technician who fixes
- The Electrician journal epitomized this culture – reporting JJ Thomson & corpuscle in 1897 & Einstein's relativity in 1905
- Also proud of authority in reporting patent litigation (quote)
- Parallel development of categories of physicist and electrical engineer – gradual specialization as electrical domain grows
- Nevertheless lots of patenting undertaken by both sorts of practitioners. Contrast Tyndall/Maxwell
- Irony of Lodge UK and Rowland in USA taking out considerable numbers of patents whilst also promoting “pure science”

Patenting in early electro-technology

- **USA** Thomas Edison c.1093 (& 1239 non-US) & Henry Rowland 26+
- **United Kingdom**
- George Hookham: 1 86
- Sebastian Ziani de Ferranti: 98 electrical patents , 179 patents in total
- William Thomson (Lord Kelvin) :70+
- Silvanus P. Thompson: 62
- Guglielmo Marconi: 55
- Ambrose Fleming: 37
- Oliver Lodge: 31
- William Ayrton: 25
- William Preece: 12
- Arthur Heaviside: 6
- Oliver Heaviside: 1
- John Tyndall & James Clerk Maxwell: 0

3) The rhetorical construction of a "pure" science of physics

- Williamson & Lodge: pure science detached from commerce
- Ron Kline on Rowland's apparent inconsistency on IP/purity
- Lodge focus on John Tyndall as beacon of "pure science" – despite Royal Institution being set up for "applied science"
- Huxleyan agenda for pure science as source of applications
- Lodge's Fabian agenda esp as Birmingham Univ Principal 1900
Link to Chamberlain municipalism in campus reorganization
- Tries to get local IEE to recognize dominance of pure science
- Issues for Lodge – dropping patenting for busy scientist, and conflict of patent with culture of open journal publishing
- Dissent among contemporaries: comments on late Kelvin

4) WW1 and the changing State role of the electrical physicist and engineer for the State

- First World War sets agenda focussing on “applied science”
- 1915: German use of gas warfare prompts UK reassessment
- Government launches DSIR & Board of Invention for war plan
- Electrical engineers & physicists involved 1916 & react to DSIR practical focus: “Science in its applications to industry”
- J.A. Fleming promotes post-war collaboration on “problems of industrial research” & on “purely scientific researches”
- Science and the Nation, 1917: Cambridge fear applied science
- Narrative: pure science drives application. Bragg on wireless
- Lord Moulton’s alternative views on pure/applied distinction
- Post-war State funds pure, applied & engineering science

Conclusions/Epilogue

- Postwar physicists rewrite history of physics as industry-free
- Recast history of electrical invention: dynamos, wireless etc just as the application of hegemonic “pure” science of physics
- E.g. Lodge autobiography Past Years (1931) omits all reference to patenting
- Electrical engineering claims “scientific” status not reliant on physics or simply applying the results of physicists
- Fleming *et al.* set the agenda of electrical engineering with its own laboratory culture, metrologies, training systems.
- Patenting still major feature of electrical engineering practice, but some academic forms funded by UGC & local consulting
- Further research needed on contested and shifting identities of physics and electrical engineering in interwar period