2Notes for 129 : Patents

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1) Macro and Micro invention
   Last time we look at patents in an undifferentiated way and technologies in an undifferentiated way
   Most patents are useless, much of technological change is pretty trivial (at the individual invention level).
   This stuff is micro invention

   Some inventions are game changers (micro-chip, steam engine, internal combustion engine). Call them macro invention => set off an industry on a new path.

   Mokyr (Lever of Riches 1990) makes the argument that incentives really matter for micro but not for Macro
   Today two similar issues:
   General purpose technologies
   Technologies where standard adoption causes increasing returns

2) General purpose technologies
   Distinguish with inventions that show the way (spinning jenny)
   Two problems. (1) adaptation of the GPT to specific settings Crossover invention (2) innovation.

   Problem 1. It may be that the GPT has to change (example hybrid corn) and that takes time. Other example steam engine as low pressure (fine for mines and low RPM stationary devices) but for Rail and ships its high pressure that makes sense

   Problem 2: If the GPT is embodied in capital then it does not necessarily pay to throw the old technology away. (problem of sunk investment).

Lets do the capital accounting here. Take a direct drive plant. What is its value (roughly) before the GPT is adapted to its activity. What is its value after?

This kind of logic matters when you think of environmental abatement.

TABLE 3

SOURCES OF MECHANICAL DRIVE IN MANUFACTURING ESTABLISHMENTS, 1869–1939
(capacity in thousand horsepower)

	Direct Drive (Prime Movers)					*Indirect Drive (Primary and Secondary Electric Motors)*	*Total Direct and Indirect Drive*
Year	*Steam Engines (1)*	*Steam Turbines (2)*	*Internal Combustion Engines (3)*	*Water Wheels and Turbines (4)*	*Total Direct Drive (5)*	*(6)*	*(7)*
1869	1,216	—	—	1,130	2,346	—	2,346
1879	2,186	—	—	1,225	3,411	—	3,411
1889	4,581	—	9	1,242	5,832	16	5,848
1899	8,022	—	120	1,236	9,378	475	9,853
1909	12,026	90	592	1,273	13,981	4,582	18,563
1919	11,491	465	856	970	13,782	15,612	29,394
1929	6,857	1,112	722	623	9,314	33,844	43,158
1939	4,216	1,736	866	394	7,228	44,827	52,055

Sources: Columns 1–4 are estimates based on Richard B. DuBoff, "Electric Power in American Manufacturing 1889–1958" (Ph.D. dissertation, University of Pennsylvania, 1964), pp. 66–69 and Tables 14 and E-6. Columns 5 and 6 are from DuBoff, Tables E-6 and 13, respectively. Column 7 is the sum of Columns 5 and 6.

From Warren devine From Shafts to Wires JEH 1983.

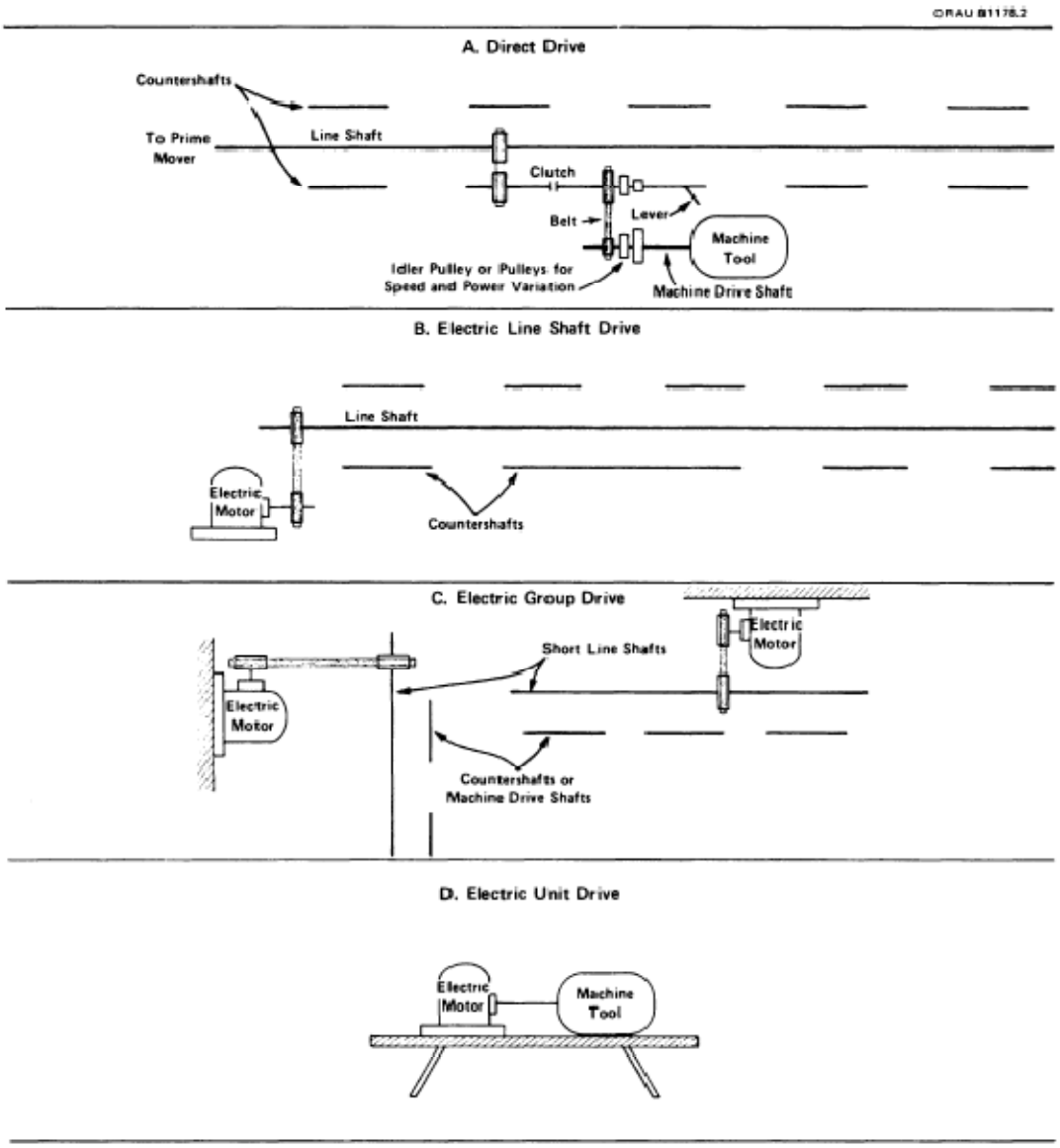

FIGURE 2
EVOLUTION OF POWER DISTRIBUTION IN MANUFACTURING

Why are GPTs supposed to be different from

3) Use of geography?
4) Use of careers
5) Use of education (is this specific to GPT or is it a trend that is economy wide)
6)

Beyond GPT why is inventive activity geographically concentrated?

Khan

Differences in Patent systems between U.S. and U.K. most others fall in between (much cheaper than US but first to file not first to invent, and most have shorter terms with renewals).

TABLE 3—COUNTRY CHARACTERISTICS

	Patent length		Population		GDP		Primary education	
Country	1851	1876	1851	1876	1851	1876	1851	1876
Austria	15	15	3,950	4,730	6,563	9,395	389	426
Bavaria	15	—	4,521	—	6,673	—	—	—
Belgium	15	20	4,449	5,303	8,042	14,849	549	582
Britain	14	14	25,601	30,662	60,479	107,661	555	680
Denmark	0	5	1,499	1,973	2,549	4,008	—	—
France	15	15	36,350	38,221	60,685	84,014	515	737
Germany	—	15	—	24,023	—	—	—	732
Netherlands	15	0	3,095	3,822	5,844	52,805	541	639
Prussia	12	—	16,331	—	24,105	—	730	—
Saxony	12	—	1,894	—	2,796	—	—	—
Norway & Sweden	15	—	4,875	—	5,993	—	615	—
Norway	—	3	—	1,803	—	2,650	—	658
Sweden	—	3	—	4,363	—	8,006	—	568
Switzerland	0	0	2,379	2,750	1,986	5,787	—	759
Württemberg	10	—	1,745	—	2,575	—	—	—

Notes: Patent length measures the maximal duration of patent grants (Lerner, 2000; Coryton, 1855). Data on population and GDP (in million 1990 dollars) are drawn from Maddison (1995, 2001). Population data for Bavaria, Prussia, Saxony, and Württemberg from the *Annuaire statistique* (1916). Primary education is measured as the number of children in primary education per 1,000 persons between the age of 5 and 14 (Lindert, 2004).

From Petra Moser Do patent laws influence Innovation AER 2003

Clio and the Economics of QWERTY (Paul A. David) Presented by Brandon Hensley

I. Overview
   a. Who can use QWERTY? DSK? Other?
   b. DSK 20-40% faster
   c. Costs to retrain employees on DSK recouped in 10 days (1940s study)
   d. Raises the big question: **Why do we still use QWERTY**?

II. The Development of QWERTY
   a. Patented in 1867 by Christopher Latham Sholes
   b. Couldn't see what you were typing- "non-visible printing point"
   c. Typebars ("arms" that contain the letters) would jam
   d. Particularly bad because you couldn't *see* it had jammed
   e. Solution: put keys in inconvenient places to avoid jams; QWERTY is born!

III. Early Manufacturing and Marketing
   a. Manufactured by Remington (famous arms maker) starting in 1873
   b. Brand name "TYPE WRITER" could be typed with top row only
   c. Economic depression and expensive production meant not many sold in 1870s

IV. Innovations
   a. Print wheel device can eliminate typebars
   b. Alternative design allows visible printing point
   c. "Ideal" keyboard developed now that these problems could be addressed
   d. Typewriters sold with "Ideal" or "Universal (QWERTY)" layouts

V. Economics of QWERTY
   a. Technological Inter-relatedness
      i. Touch typing first used in late 1880s and first applied to QWERTY
      ii. User costs *decrease* as layout becomes more popular
   b. System Scale Economies
      i. Tendency to converge to a single system
      ii. One person chooses to learn touch typing on QWERTY => businesses more likely to adopt QWERTY => next person more likely to learn QWERTY
      iii. Hard to predict which layout will be converged upon
         1. Little factors magnified in importance
         2. E.g. affiliation with Remington
   c. Quasi-Irreversibility
      i. Type-writer makers were not bounded by fixed costs to any layout
         1. Hence, it was cheap for them to switch layouts
      ii. Large number of people who can touch type on QWERTY => manufacturers want to produce QWERTYs
      iii. Not nearly so easy for typists to switch layouts
   d. Thus, we standardized, albeit on *the wrong layout*