Dickens and Patent Reform in the 1850s

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Introduction

One of the subplots in *Little Dorrit* by Charles Dickens concerns the activities of an inventor, Daniel Doyce, and his difficulties in interacting with the wonderfully entitled "Circumlocution Office." Although Dickens never explicitly mentions this interaction as concerning the obtaining of a patent on Doyce's invention, it is clear from his other writings that some of the offices being satirized are those that are involved in the granting of patents. Doyce himself is a clearly drawn portrait of a tinkerer and inventor who is not especially motivated by expectation of a return, a type that Dickens admired. Little Dorrit was serialized in 1855-1857, when patent reform was very much in the air in Britain and when there was even a movement for the abolition of patents after 1855, of which Dickens may have been a supporter (Philpotts 1992).

On the surface, *Little Dorrit* is a typical Victorian tale of fortunes made and lost, missing inheritances, and the triumph of virtue at the close. But within this story are several commentaries on the economic and political situation in England at the time, many of which are also relevant today. These include the dangers of investment fads propelled by word-of-mouth (or word-of-twitter in our day), the difficulties of a nascent firm in bringing its invention to market, and global technological competition along with Dickens' customary critiques of the inequities in society and society's treatment of the poor.

For the reader who has experienced the frustrations of bureaucracy (and who among us has not?), the portrait of the Circumlocution Office limned by Dickens is a wonderful bit of satire:

> "This glorious establishment had been early in the field, when the one sublime principle involving the difficult art of governing a country, was first distinctly revealed to statesman. It had been foremost to study that bright revelation, and to carry its shining influence through the whole of the official proceedings. Whatever was required to be done, the Circumlocution Office was beforehand with all the public departments in the art of perceiving --- HOW NOT TO DO IT." (*Little Dorrit*, Part 1, Chapter X, pp. 103-104).

It is probably that the specific office he has in mind here is the Treasury, which often had final approval of government undertakings. He gives the following example of the office (non-)performance:

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> "If another Gunpowder Plot had been discovered half an hour before the lighting of the match, nobody would have been justified in saving the parliament until there had been half a score of boards, half a bushel of minutes, several stacks of official memoranda, and a family-vault full of ungrammatical correspondence, on the part of the Circumlocution Office." (*Little Dorrit*, Part 1, Chapter X, p. 103).

In *Little Dorrit*, an inventor Daniel Doyce encounters this office when attempting to obtain recognition for an invention that he judges very useful for the country. As his friend Meagles says,

> "A dozen years ago, he perfects an invention (involving a curious secret process) of great importance to his country and his fellow-creatures. I won't say how much money it cost him, of how many years of his life he had been about it, but he brought it to perfection a dozen years ago." (*Little Dorrit*, Part 1, Chapter X, p. 119)

In this chapter I review the historical context in which this account was written, with an emphasis on its relevance to the patent debates of the time. After giving a brief history of patent legislation in Britain, I discuss the arguments pro and con for the existence of such a system. In some ways, these arguments are as relevant today as they were in the mid-19th century, in spite of the fact that considerable progress has been made in the administration of the patent system. In lieu of a conclusion, I offer a discussion of the ways in which Dickens' views on invention and patents are revealed in some of his writing contemporaneous with *Little Dorrit*.

The story

The subplot with which we are concerned in this essay is that involving the inventor Daniel Doyce and his investor Arthur Clennam (who is also the hero of the main story). This account, which is rather minor in the context of the whole novel, by no means exhausts the social observation and critique in the book. Dickens also has much to say about the unequal distribution of wealth in English society at the time, the perversity of imprisoning debtors, making it difficult for them to work their way out of debt, and the gullibility of individuals to financial investing fads. All this is embedded in a wonderful rags-to-riches-to-rags-to-moderate riches story, told with a great deal of humor.

Doyce and Clennam first encounter each other on a visit to the Circumlocution Office, where Doyce is attempting to obtain a patent for his invention (which is never named or even described beyond references to benches, tools, vices, straps, wheels, and a steam engine) and Clennam is seeking information about the debts owed by William Dorrit, the father of a young woman (Little Dorrit) in whom he has become interested. The Circumlocution Office is run by a family of Barnacles and Stiltstalkings, who regard nepotism rather than expertise and experience as the appropriate criteria for job appointments as the normal run of things. Clennam applies numerous times for

information, including visiting Mr. Tite Barnacle, the head of the office, at his home. The following is a typical description of his many visits:

> "For Mr. Tite Barnacle, Clennam made his fifth inquiry one day at the Circumlocution Office; having on previous occasions awaited that gentleman successively in a hall, a glass case, a waiting room, and a fire-proof passage where the department seemed to keep its wind." (*Little Dorrit*, Part 1, Chapter X, p. 107)

After many more tries of this kind, he finally receives this response from a Junior Barnacle:

> "Why, you'll—you'll ask until they tell you. Then you'll memorialise that Department (according to regular forms which you'll find out) for leave to memorialise this Department. If you get it (which you may after a time), that memorial must be entered in that Department, sent to be registered in this Department, sent back to be signed in that Department, sent back to be countersigned by this Department, and then it will begin to be regularly before that Department. You'll find out when the business passes through each of these stages, by asking at both Departments till they tell you." (*Little Dorrit*, Part 1, Chapter X, p. 116)

On this last occasion on exiting the Office, Clennam meets Daniel Doyce for the first time, in company with a mutual acquaintance, Mr. Meagles, who introduces them. Mr. Meagles is extremely put out by the treatment received by Doyce at the Office, where he has been attempting to present a new invention for the past dozen years. It is not entirely clear what he has been applying for, but it seems to be a patent (there is a mention of an associated curious secret process) as well as the sale or licensing of the invention to the government, as the benefits to the country in terms of savings and improvement are repeatedly mentioned. As I discuss later in this essay, Doyce's experience mirrors that of an inventor described earlier by Dickens in his 1950 article "A Poor Man's Tale of a Patent."

Clennam is clearly favorably impressed by Doyce, and this impression is reinforced when he meets Doyce on a walk from London to Twickenham to visit the Meagles some days later. Doyce appears to Clennam as "a man of great modesty and good sense," reluctant to talk about himself and his trade until Clennam shows true interest. In the discussion Doyce mentions his loss of a partner and his need for a new one who is a "man of business." Clennam, knowing that Meagles is advising Doyce on the choice of a new partner, mentions to Meagles that he is interested in the position, having returned recently from China with a modest inheritance. Meagles dully communicates his interest to Doyce and the deal is sealed quickly. Doyce's firm becomes Doyce and Clennam.

The new partnership proves successful, in that Doyce is now left to create, invent, and manufacture while Clennam manages the business end of things. Chapter 23 (pp. 266-267) give a vivid description of the workshop and Clennam's place in it. Doyce's straightforward record of his work and accounts are admired both by Clennam and by Dickens. The

workshop is equipped with a steam engine and many tools, suggesting that it is an early machine tool shop. Having satisfied himself that things are running smoothly, Clennam soon resolves to attempt another try at the Circumlocution Office, in spite of the experience of Doyce, described thusly:

> "as an ingenious man, he had necessarily to encounter every discouragement that the ruling powers for a length of time had been able by any means to put in the way of this class of culprits; but that was only reasonable self-defence in the powers, since How to do it must obviously be regarded as the natural and mortal enemy of How not to do it. In this was to be found the basis of the wise system, by tooth and nail upheld by the Circumlocution Office, of warning every ingenious British subject to be ingenious at his peril: of harassing him, obstructing him, inviting robbers (by making his remedy uncertain, difficult, and expensive) to plunder him, and at the best of confiscating his property after a short term of enjoyment, as though invention were on a par with felony." (*Little Dorrit*, Part 2, Chapter VIII, p. 517)

Of course, Clennam has no more success than Doyce. In the midst of these obstacles, a "barbaric power" (later on in the novel this country appears to be somewhere in the Middle East, although some identify it with Russia) is interested in Doyce's inventive power and ability to convert his inventions into practice. This country is described as knowing "How to do it." They invite Doyce to come and work for them for a time and he accepts, leaving Clennam in charge at home.

But then a new danger arises: the "plague" or "epidemic" (Dickens' words) associated with the banker and financier Mr. Merdle. Here Dickens describes a kind of financial bubble, although he does not specify exactly what it entails, only that it is associated with Merdle. One imagines a kind of Ponzi scheme, reminiscent of that due to Bernie Madoff in the present day. Clennam is persuaded by a friend, Mr. Pancks, that investing in Merdle is a sure thing and he invests all the assets of Doyce and Clennam in the Merdle bank, in spite of having previously agreed with Doyce not to speculate.

Of course it all comes crashing down, and Clennam is ruined, ending up in the Marshalsea debtor's prison himself, where he falls ill. While he is recovering, Doyce returns, thanks to the agency of Mr. Meagles, and is magnanimous, given his great successes abroad, where he has been given medals, awards, and financial return. Doyce attributes the loss to an error in Clennam's calculations, something which has often happened to him in the course of his inventions, and is very sorry that Clennam took it so hard. They are to forget the past and go forward with their newly successful business.

The context – Britain during the 1850s

There are three related strands to the background for Dickens portrayal of the Circumlocution Office: first, the many failures of the army and the government in the conduct of the Crimean War 1853-1856; second, the calls for patent reform that had begun in the 1830s and culminated in some reform legislation in 1852; and third, renewed calls for patent abolition following the enactment of that legislation.

During the Crimean War, there were numerous equipment and supply failures such as disease, food rotting in Balaclava (a port in Sevastopol on the Black Sea used by the British) before delivery to the soldiers, lack of waterproof ground sheets and clothing, and antiquated equipment. Most relevant to the story of invention, there were failures to adopt innovative new equipment for the war such as Brunel's screw propeller and floating siege gun, the American breech-loading rifle that allowed much more rapid firing, and a candle-powered stove that would be useful given the scarcity of firewood. The delays were often bureaucratic, and due to failure of the government to make decisions while calling for further testing. Worse yet, in some cases delay meant these inventions were taken up by other countries such as France or Russia, or in some cases re-invented by people in those countries (Philpotts 1992).

These failures, because they arguably caused avoidable deaths of soldiers, attracted the attention of the public and of satirists like Dickens. By 1855-56, the wisdom of the war was increasingly debated in the UK. The magazine *Punch* published a two-part article in March 1855 describing the presentation of the American breech-loading carbine to a public UK office. The inventor wants officials to make up their minds about it immediately so he can start a factory; if not, he threatens to market it to Louis Napoleon (the French Emperor) or the Czar (of Russia), a threat he carries out. A series of other inventors are also observed in the office, all with inventions that would have been useful in the Crimean War, one of whom has been attending the office for 20 years.

A second related area of concern was expressed by an article in *The North British Review* in 1855 that covered the Exhibition Universelle held in Paris May to November 1855. The author (who is anonymous and may have been the editor Fraser) evaluates the progress (or lack of it) in English and French exhibits relative to the Crystal Palace Exposition of 1851 just four years earlier. The author describes how France and the Continental States (the US) are catching up in some areas and remaining in front in others, attributing this to the greater interest on the part of their governments in promotion of the useful arts. This debate over the proper role of government in advancing technology in industry is familiar and the differences among these countries in such policies are apparent even today in some areas.[2] The article goes on to identify the British patent system as one of the areas in need

[2] For example, both France (1983) and the US (1981) were among the earliest countries to introduce an R&D tax credit to promote industrial investment in innovation, whereas the UK was a laggard, introducing one only in 2000-2002.

of vast improvement. I will have more to say about this critique of the patent system in the next section.

The UK patent system and its reforms

As background to the discussion of UK patent reform in the 1850s, I very briefly review the long history of the British patent system and its evolution focusing on the changes during the early and mid-19th century with which Dickens was concerned. For a more thorough review including many interesting examples, the reader is urged to consult MacLeod (1988 and 2007).

The origins of the British (original the English) patent system are in the reign of Elizabeth I, where licenses were issued to encourage continental inventors to move to England by granting them a monopoly, a policy originally introduced by William Cecil, Lord Burghley.[3] As time passed, these "monopoly" licenses also might be sold to wealthy individuals to raise money for the crown, leading in 1624 to the passage of the Statute of Monopolies to restrict such activity. Invention patents were in principle not outlawed by this bill, but survived with the following characteristics: 1) a fourteen year term; 2) granted to the first and true inventor; and 3) "it must be of such manufacture, which any other at the making of such letter patent did not use." (MacLeod 1988, quoting Sir Edward Coke, author of the bill). Unfortunately the complex administration of the system, involving direct approval by the Sovereign and the Privy Council, remained in place.

During the 17th and 18th centuries in the UK, the system evolved slowly but there was no change in essentials. By 1820-1830, it had become clear that it was unfit for purpose, being cumbersome and costly. In addition, it was subject to abuse by the government either in the form of requiring a share of the profits in return for a patent, or in some cases by preventing the issuance of a patent because the invention threatened its excise taxes on imports. As MacLeod 1988 puts it, during the late 16th and 17th centuries "there are a number of indications that the individual's claim to protection for his invention was subordinate to the interests of the state." The route to a patent followed a torturous path among Whitehall offices, as laid down by an act from 1535. It was a registration system with essentially no substantive examination. During the 18th century, accurate specification of the invention began to be required by the judicial system rather than the issuing office, meaning that litigation was required in many cases to understand exactly what constituted the invention under patent. Of course, litigation to uncover the exact nature of a patent raised costs also.

Following on a series of critiques written by "Vindicator" in the London Journal of Arts and Sciences, Parliament eventually passed a bill in 1835 that purported to improve the situation, but left many of the most serious problems intact (Janis 2002). According to

[3] The first part of the discussion here essentially concerns the English (including Wales) patent system, rather than the UK system. Until 1852, there were separate systems in Scotland and Ireland, which of course both raised costs and provided an incentive for imitators to set up shop in those countries.

Hindmarch (1851), these included failure to include foreign publications as prior art, no requirement for a printed specification or a clear claim of invention, bewildering and burdensome procedures, and most importantly, excessive cost to the potential patentee. Filing fees prior to 1852 were estimated to be 100 pounds for an English patent, 300 pounds if the patent was also taken out in Scotland and Ireland, at a time when a skilled worker earned an annual income of 50-100 pounds (MacLeod et al 2003).[4]

Dissatisfaction with the patent system grew during the period between 1835 Act and 1850, doubtless because the industrial revolution and its associated inventions had increased the interest of inventors and manufacturers in the operation of such a system. In 1848, Sir Henry Cole, who was on the council of the Society for the Encouragement of Arts, Manufactures, and Commerce (more commonly known as the Society of Arts) and was in favor of patent reform and also of public exhibition of inventions,[5] produced a report calling for patent reform (Bonython and Burton 2003). His primary critique was that patents were treated as a privilege granted by the sovereign rather than a just reward for invention. He also reviewed the many stages in obtaining a patent and estimated the cost as 250 pounds. He left the proofs of his article with Dickens in late 1848, inviting Dickens to join the newly created Patent Reform League. Dickens' response was to pen the satirical column "A Poor Man's Tale of a Patent" in his magazine *Household Words*.[6,7] This column introduces an inventor, Old John, a 56 year old smith in a shop (manufactory) at Birmingham, who has spent 20 years perfecting an invention and now desires to patent it.

Old John uses almost all of an inheritance of 100 pounds that he has been saving in pursuing the tortuous path to a patent. Dickens takes six long paragraphs to describe the many steps and expense required, for the sake of brevity, I quote here the description of the pre-1852 process by Hindmarch (a barrister in London with patent experience) in his treatise on patent reform. His account is essentially the same as that in Dickens' account:

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[4] In today's money, 100 pounds is approximately equal to 12,700 pounds, or $15,000. Clearly relative prices have changed, as this is substantially less than the annual salary of a skilled worker. Hindmarch (1851) reports that the full cost of patent in the UK including agent fees and the preparation of drawings, etc., was about 400 pounds.

[5] Cole was President of the Society in 1851-52 and was the main driving force behind the famous Crystal Palace Exhibition of 1851. Later he was instrumental in the founding of the Victoria and Albert Museum in Kensington.

[6] This satire can be found online at the Dickens Journal Online, www.djo.org.uk, and is also reprinted in Philips (1984). In his December 25, 1874 discussion of Bramwell (1874), Cole explicitly implies that a Poor Man's Tale relies on facts collected by the Society of Arts and that the attendant publicity gave the "deathblow" (his words) to the pre-1852 system.

[7] Household Words was a popular journal published weekly by Dickens between 1850 and1859. There were a large number of contributors, primarily Dickens himself, Henry Morley, and William H. Wills. Although authorship of each article was not attributed in the journal itself, Lohrli (1974) reconstructed the authors using records of payments in the Household Words office book.

> "a petition for the patent, verified by a solemn declaration, and left at the Home Office; a reference of the petition by the Secretary of State to the Attorney or Solicitor General; a report by one of those officers to the Crown in favour of the grant; a warrant under the sign manual to the Attorney or Solicitor General to prepare a bill for the patent; the preparation of the bill and two transcripts or copies of it in the Attorney General's Office, called the Patent Bill Office; the conversion of one of those copies of the bill into the Queen's Bill, upon its receiving the sign manual; the first bill being deposited in the Signet Office, a second copy is transformed into the Signet Bill by adding a few formal words to it, and sealing it with the seal of the Secretary of State; the Signet Bill being received in the Privy Seal Office, the remaining copy of the bill is in a similar manner converted into the Privy Seal Bill; the Privy Seal Bill is then delivered to the Lord Chancellor, and a patent made in a patent made in the form contained in the bill." [8] (Hindmarch 1951, pp. 5-6.)

In *Little Dorrit* the experience and description of Doyce clearly draw on Dickens' earlier essay for *Household Words*. Although *Little Dorrit* was written in 1855-57, it is set earlier in the 1830s, when the Marshalsea Debtor's Prison was still in operation (it closed in 1842) and the pre-1852 patent system was in place. Doyce himself is portrayed as an admirable inventive genius with little interest in the business or financial side of his enterprise. He dislikes financial speculation, as does a famous 19th century engineer-inventor in the UK, Isambard Kingdom Brunel, and is mainly concerned with making his inventions useful for society. Doyce, like Old John, is the type of character, sometimes known as a "hero-inventor," frequently invoked during this and later patent debates as a justification for the patent system itself and for access to that system at a low cost. As Philpotts (1992) reports, in 2001 one could even find a statement lauding the independent inventor on the USPTO website.

Ultimately Dickens' satire and Hindmarch's treatise along with several select committees and royal commissions during 1851-1852 contributed to the 1852 reform of the patent system. This reform went part of the way toward the development of a modern system that ensured exact specification of the invention and a less complex application procedure. The main features of the Patent Law Amendment Act of 1852 were the following: 1) Protection from the date of application, with an allowance for provisional application; 2) A single patent for the entire United Kingdom (including Ireland, Scotland, and Wales; 3) Moderate cost (25 pounds for an uncontested patent, with higher renewal fees at the third and seventh year)[9]; 4) Printing and publication of the specifications; and 5) A single office for patent application and specification. However, it did not introduce substantive pre-grant

[8] A "sign manual" is a personal signature, especially that of a sovereign.

[9] This was still not as cheap as in the US system, where the total cost of obtaining a patent was reported by one of Bramwell's (1874) discussants as 7 pounds ($35 at the time).

examination by the office or anyone else.[10] A related drawback was that although a Board of Commissioners was appointed, none of the members had any science or engineering experience to call upon.[11]

The patent abolition movement

Dissatisfaction with the patent system on the part of some inventors and manufacturers persisted after the 1852 reform Act. Some (notably the sugar manufacturer Robert Andrew Macfie but also including other manufacturers and some inventors) advocated abolition of the patent system, while others such as Hindmarch and Thomas Webster pushed for further reform. An interesting discussion took place at the York meeting of the National Association for the Promotion of Social Science in 1864 (Hastings 1865) between Webster and Macfie, among others.[12] Mr. Edgar opened the discussion by alluding to the passage of the 1852 Act thus:

> "The provisions of that Act, as we all know, were entirely in favour of inventors; it reduced the fees, and gave very considerable advantages to patentees. Since that time the number of patents has so very much increased in consequence, that the complaint now is of rather a different kind. Instead of the grievance now being that there are great obstacles thrown in the way of inventors, it is complained that there are too great facilities given to inventors. In consequence of these facilities patents have been multiplied to an enormous degree, and the question therefore is, whether any remedy can be applied, or whether the whole system ought not to be swept away." (Hastings 1865, p. 662)

This see-saw is certainly reminiscent of what happened in the United States after the passage of 1982 Act creating the Court of Appeals of the Federal Circuit, a specialized court to hear appeals of patent cases. This Court was perceived by many to be patent-friendly, and was followed by a considerable increase in patenting and litigation, again leading to calls for patent reform that would go in the opposite direction (Henry and Turner 2006; Ziedonis and Hall 2001). It is also to be expected,

[10] This was in contrast to the U. S. system, which introduced pre-grant examination in 1836. However, the French system after 1844 had essentially no pre-grant examination (Galvez-Behar 2019).

[11] The members are enumerated in the Act as the Lord Chancellor, the Master of the Rolls, the Attorney or Solicitor Generals of England, Scotland, and Ireland, and the Lord Advocate.

[12] The others included Sir Frederick Bramwell, a mechanical engineer and business consultant, later to be President of the Institution of Mechanical Engineers, the chair, and two commentators, Mr. Urlin and Mr. Fisher, whom I have been unable to identify, The entire discussion makes interesting reading, as it anticipates many of the patent controversies and arguments today such as inconsistency between the length of the patent term and the pace of innovation, the patenting of scientific discoveries, the importance of patents as an incentive to undertake follow-on investment to make the invention commercial, the costs of litigation, the alternative of secrecy, patents as a tax on subsequent innovation, and the unwieldy alternative of government prizes for invention. Bramwell also makes the point that many radical inventions come from outside the relevant industry (are therefore disruptive of existing sectors and resisted by the incumbents).

because patents come with both benefits and costs, and these are unequally distributed across inventors and other sections of society.

Machlup and Penrose (1950) reviews the patent controversies in Europe during the 19th century from the perspective of economists, focusing on the 1850-1875 period and on the situation in England and France. They report that at this time, the question of whether a patent system was necessary was bound up in the free trade controversies of the same era. For example, in 1851, a leader in the *Economist* stated that the granting of patents

> "excites fraud, stimulates men to run after schemes that may enable them to levy a tax on the public, begets disputes and quarrels betwixt inventors, provokes endless lawsuits [and] bestows rewards on the wrong persons." (*Economist,* July 26, 1851 edition, as quoted in the August 8, 2015 edition.)

The *Economist* was founded in 1843 by opponents of the English Corn Laws of 1815-1846. These laws provided tariffs and import restrictions designed to protect English farmers from cheap imports of wheat, oats, barley, and corn. So the opposition to patents was of a piece with a general preference for increased competition in all areas of trade. This argument was the main reason for Prussian and Swiss objections to a patent system as well as the reason that Holland eliminated their patent system in 1869 (Machlup and Penrose 1950; Janis 2002).

The arguments in favor of having a patent system are somewhat familiar and are much the same today as they were in the 19th century: 1) creators have a moral or natural right to receive ownership of their creations; 2) it provides an economic incentive to inventors to incur the cost of developing their invention and making it useful; 3) it encourages inventors to make their knowledge public so that others can build on it; and 4) it gives impecunious inventors protection of their idea when they approach others for finance to develop their invention. The last of these arguments is fairly compelling, if not always successful in practice.

The central problem for an inventor who would like to bring his idea to market has always been the problem of financing the necessary investment. In order to convince a potential investor of the quality and potential for commercial success of his invention, he must reveal his idea to the investor. This fact creates the risk that the investor will develop the idea on his own, leaving the inventor with no reward for his invention. Adam Smith clearly recognized this problem and he advocated patents as the fitting solution:

> "Thus the inventor of a new machine or any other invention has the exclusive priviledge of making and vending that invention for the space of 14 years by the law of this country, as a reward for his ingenuity, and it is probable that this is as equall an one as could be fallen upon. For if the legislature should appoint pecuniary rewards for the inventors of new machines, etc., they would hardly ever be so precisely proportiond to the merit of the invention as this is. For here, if the invention be good and such as is profitable to

> mankind, he will probably make a fortune by it; but if it be of no value he also will reap no benefit." (Smith 1763. *Lecture of Monday January 17*, page 103, paragraph 31.)

The need to obtain protection before approaching a financier for investment was one of the arguments of Bramwell (1874) in favor of patents and in the discussion of his paper, F. W. Campin gave an argument that sounds very much like that which could be attributed to a venture capitalist today:[13]

> "As a matter of practice he [F. W. Campin] had always found that when a capitalist was brought to aid an inventor, the very first thing he went into was the question of whether the patent was a valid legal property. That showed that he looked very much to having a legal guarantee that the money he was going to spend would be secured to him." (Campin in the discussion of Bramwell's 1874 paper, p. 75)

In 19th century United Kingdom, there were also several other arguments against having a patent system, some of which resonate today. The cumulative nature of science, invention, and innovation have always meant that a patent system is a two-edged sword. It provides an incentive for new and improved inventions, but to the extent that these build on previous inventions, it raises their cost via the potential for infringement or licensing of these previous inventions (Scotchmer 1991). One problem thus introduced was the difficulty of searching for prior art in order to ensure that your invention was indeed novel and was not likely to be subject to challenge via litigation. A notorious quote from Macfie during the discussion cited earlier echoes the complaints of some inventors today:[14]

> "In the manufacture with which I am connected—the sugar trade—there are somewhere like 300 or 400 patents. Now, how are we to know all these 400 patents? How are we to manage continually, in the natural process of making improvements in manufacture, to know which of these patents we are at any time conflicting with? So far as I know, we are not violating any patent; but really, if we are to be exceedingly earnest in the question, probably we would require to have a highly paid clerk in London continually analysing the various patents; and every year, by the multiplication of patents, this difficulty is becoming more formidable." (Macfie in Hastings 1865, p. 665)

A corollary of the prior art problem is the difficulties introduced by cumulative innovation. Bramwell said it clearly in the 1864 discussion:

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[13] On the importance of patents for VC financing, especially in bio- and life sciences, see Graham et al (2009), who report on the results of a survey of a 2008 patent survey of startups and their financiers.

[14] See Mulligan and Lee (2012) on the problem of scalability and for computations of patent search costs today. They offer an extreme example: "in a widget industry in which 30,000 firms had one patent apiece and could review one patent per hour, each firm would need to hire around fifteen full-time patent attorneys, resulting an industry-wide total discovery cost of almost a billion billable hours." (p. 295).

> "If anyone comes afterward with an improvement on an improvement, the two patentees are in this condition, that patentee No. 1 cannot use the invention of patentee No. 2 without his sanction; but patentee No. 2 is also unable to use the first invention without the sanction of patentee No. 1." (Bramwell in Hastings 1865, p. 672)

This is the same problem identified and modeled by Scotchmer (1991). Bramwell goes on to describe the usual solution – a cross-licensing agreement. Such a mechanism works well if the parties are able to identify each other easily, but can inhibit follow-on innovation as well as increasing transaction costs.

Another argument frequently heard during the debates over patent abolition was idea that many inventions were nearly simultaneous and driven by demand, and were therefore not worthy of being rewarded with a patented monopoly. The argument was basically that if one individual did not find it profitable to supply the invention, surely there were many others waiting in the wings to do so. Both the views that innovation is cumulative and that it is simultaneous were presented by the famous engineer Isambard Kingdom Brunel to a Select Committee of the House of Lords in 1851:

> "I believe that the most useful and novel inventions and improvements of the present day are mere progressive steps in a highly wrought and highly advanced system, suggested by, and dependent on, other previous steps, their whole value and the means of their application probably dependent on the success of some or many other inventions, some old, some new. I think also that really good improvements are not the result of inspiration; they are not, strictly speaking, inventions, but more or less the results of an observing mind, brought to bear upon circumstances as they arise, with an intimate knowledge of what has already been done, or what might now be done, by means of the present improved state of things, and that in most cases they result from a demand which circumstances happen to create. The consequence is that most good things are being thought of by many persons at the same time; and if there were publicity and freedom of communication, instead of concealment and mystery, ten times or a hundred times the number of useful ideas would be generated by each man, and with less mental effort and far less expenditure of time and money." (I. Brunel (1870), quoting the Memorandum of Evidence submitted by his father I. K. Brunel, p. 492.)

In this memorandum, Brunel goes on to given the familiar argument that in view of the likelihood of failure of an invention to yield any returns to the inventor, the existence of the patent system simply creates a costly distraction in terms of both time and money. He lists the following requirements for the success of a patented invention: 1) it should clearly be an improvement on any previous thing of its kind; 2) it must be truly new, a characteristic of which Brunel is very skeptical; 3) it should not depend for success on some other (likely

expensive) patented invention; 4) there should be demand that it can satisfy; and 5) the inventor needs collaborators that encourage its adoption and are able to contest the previous monopolies that it replaces. His view is that satisfying all these requirements is unlikely and renders most patents valueless, while distracting their inventors from invention.

In spite of these arguments, by the 1870s, the actual abolition debate had been more or less settled in favor of the patent system, although reforms to improve its operation were still being suggested, and it the question was still capable of creating controversy. On December 2, 1874, Bramwell presented a paper to the Royal Society of Arts on the question of whether a patent system should exist, and the discussion of his paper was continued at no less than three subsequent meetings of the Society because of the number of people who wished to speak. The general conclusion was in favor of patent system and the arguments in favor were much the same as those listed earlier.[15]

For the UK, the question was finally closed by the passage of the New Patents, Designs, and Trademarks Act in 1883, the same year that the Paris Convention for the Protection of Industrial Property was signed by the original 10 contracting countries. The UK became a signatory to this treaty in July 1884, the date it came into force, and there was no going back.

Discussion

Dickens was not a fan of bureaucracy and red tape, nor of lengthy legal processes, as he made clear in *Bleak House* (1852-1853). Much of his satirical critique in *Little Dorrit* is broadly directed at any government office that specializes in "How not to do it" rather than specifically towards the office(s) that grant patents. In fact, the word patent does not appear in *Little Dorrit*, although the discussion makes clear that Dickens has some kind of government reward for invention well in mind. However it is possible that he was focused on the failure to government offices to adopt and pay for inventions that would have been useful in the Crimean War, but used the pre-1852 patent application process to illustrate the process.

[15] Bramwell's paper makes good reading for those interested in patent policy – he anticipates many of the later arguments both pro and con for the system. He even uses the small country free-riding argument to explain why lack of a patent system in Holland and Switzerland does not slow the rate of invention much, whereas lack of a system in a large country like the UK, France, or the US would do so, anticipating some later economic models due to Scotchmer (2004) and Grossman and Lai (2004). Of course, there may be points on which one wants to argue with him. Moser (2005) showed that invention in countries without patents was not lower but it did take different directions, favoring technologies that could be kept secret. For another example, Bramwell downplays the role of simultaneous invention by emphasizing the failure of invention to satisfy long-needed demands but ignores completely the role of what today is called technological opportunity, that is the science and technological base that makes an invention feasible. That is, simultaneous invention can be frequent because both supply and demand for a particular need come together at a certain point in time; if only one of the two exist, the invention will not yet take place.

Nevertheless, his 1850 satire about the attempt of an inventor he called "Old John" to obtain a patent clearly shows that he was concerned about both the cost and the length of time faced by inventors in dealing with the system. His portrayal of Doyce in *Little Dorrit* shows his view that inventors are a benefit to society who deserve appropriate rewards and consideration, which they do not receive at the present time. Both "Old John" and Doyce exemplify the "hero inventor," creating and inventing without the immediate prospect of reward. As suggested earlier, the 1850 satire appears to have been written in response to a request by Henry Cole and the Patent Law Reform League and had the desired effect of reaching a far greater audience than that reached by any Royal Society of Arts pamphleteering and lobbying of Parliament. The 1852 Patent Reform Act was a direct consequence of this success. So why did Dickens spend so much time on the portrayal of an inventor and his struggles with government offices in a book written in 1855-57?

Philpotts (1992) offers one patent-related explanation, based on an article probably written by Morley (1853) in *Household Words* entitled Patent Wrongs and written just a year after the passage of the Act. This article described the history of Josiah Heath, the inventor of an important improvement in the manufacture of cast-steel, and his difficulties with obtaining licensing revenue from the Sheffield steel industry.[16] In brief, litigation over infringement of his patent lasted until after his death, and was never brought to a successful conclusion. The conclusion raises the question of whether or not Heath and society would have been better off if the patent had never been taken out.

Philpotts also suggests that by the time *Little Dorrit* was written, Dickens had aligned himself with those like Macfie and Brunel who argued for the abolition of the patent system. He uses the 1853 article on the failure of Heath to enforce his patent as evidence that Dickens had joined the patent abolitionists. Certainly Heath's experience was resonant of Brunel's critique. One can also find a passage in a discussion of the new art of photography that same year expressing approval of Fox Talbot's renunciation of his patents as well as the failure of two French daguerreotype practitioners in London to enforce the patents which they had licensed (Dickens 1853).

Besides the failures of the UK government to adopt badly needed new inventions during the Crimean War, another concern of Dickens after the 1852 patent reform was the distinction between patents and copyright. The central question for many was whether the act of creativity in invention was comparable to that in literary production. For example, Morley (1853) states the following:

> "Copyrights are wholly of another nature. Between the copyright of a book and the patent of an invention there exists not so much as the bond of a remote cousinship." (Morley 1853, *Household Words* 7, p. 233)

[16] See also Bishop (1959) on the potential weakness of Heath's patent and the subsequent work of Bessemer.

Those who favored longer copyright terms, like Dickens, were anxious that a distinction be made between the art of invention, which they viewed as largely a cumulative and simultaneous process involving input from any number of individuals and the art of literary creation, which was solely the product of one individual's mind. Thus they could simultaneously question the need for the patent system without advocating elimination of the copyright system or shortening the length of copyright. Copyright length had been increased to a maximum of 28 years in 1814 and then again to 42 years in 1842, and continued to be debated (Li et al. 2018; Seville 1999).

Dickens' concern with literary copyright arose from his experience with the lack of international protection for his works, which meant many were available for sale in the United States without his receiving compensation. He first experienced this with Pickwick papers, which was published in the US before Britain, and he made it clear with his interview comments when touring and lecturing in the US in 1842. But that is another story and beyond the scope of this essay!

Summing up, the story of Daniel Doyce in Little Dorrit is a window into the problems of patent system design as well as the costs of bureaucracy. It illustrates Dickens' view of inventors as practical men that contribute to society without much reward and observes that it is no surprise that such a man should seek funding and reward for his inventions in another country if his own does not deliver them. Although I have said less about it here, the story is also one of the dangers of financial bubbles and lack of diversification in investments.

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